

cec/o

bi/o

-pepsia

an/o

or/o

bar/o

duoden/o

append/o

-phagia

col/o

-prandial

proct/o

Sixth Edition

# Medical Terminology

A Living Language



Bonnie F. Fremgen

Suzanne S. Frucht



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# Medical Terminology

A Living Language

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**Media Director:** Amy Peltier  
**Lead Media Project Manager:** Lorena Cerisano  
**Full-Service Project Management:** Patty Donovan, Laserwords  
**Composition:** Laserwords Pvt. Ltd  
**Printer/Binder:** Courier/Kendallville  
**Cover Printer:** Courier/Kendallville  
**Text Font:** Meriden Com 11/13

## Dedication

To my husband for his love and encouragement.

Bonnie Fremgen

To Rick, Kristin, and Chris for their love, support, and friendship. And especially to the newest member of our family, Adrienne.

Suzanne Frucht

To Danielle Doller, whose incredible editing skills (and friendship) have made each edition of this text better.

We would like to extend a special thank you to Garnet Tomich who went above and beyond to help make this edition shine.

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### Library of Congress Cataloging-in-Publication Data

Fremgen, Bonnie F., author.

Medical terminology : a living language / Bonnie F. Fremgen, Suzanne S. Frucht. — Sixth edition.

p. ; cm.

Includes bibliographical references and index.

ISBN 978-0-13-407025-4 — ISBN 0-13-407025-9

I. Frucht, Suzanne S., author. II. Title.

[DNLM: 1. Medicine—Terminology—English. W 15]

R123

610.1'4—dc23

2015001788

10 9 8 7 6 5 4 3 2 1

**PEARSON**

ISBN-10: 0-13-407025-9  
ISBN-13: 978-0-13-407025-4

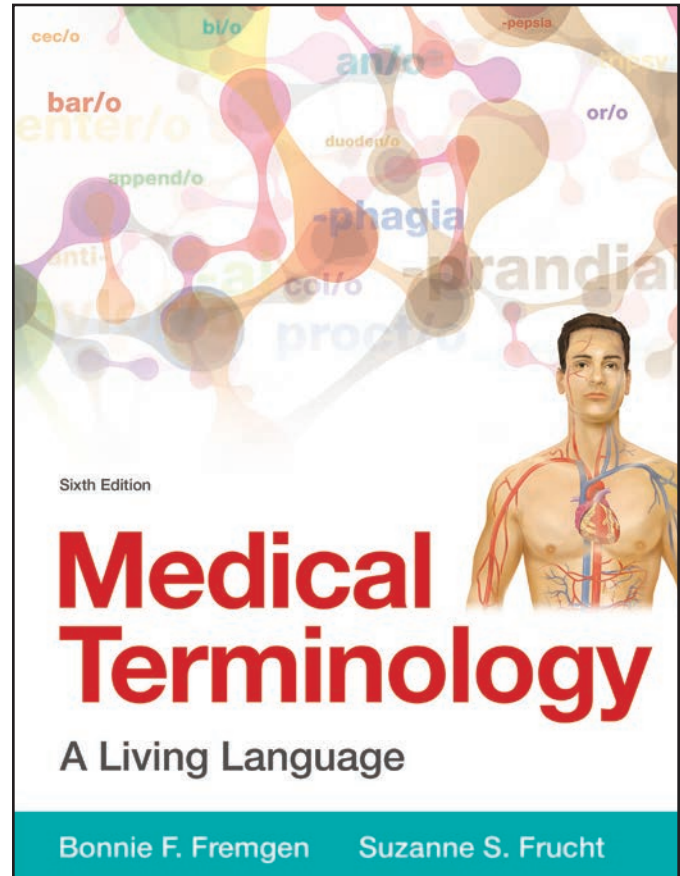
# Welcome!

Welcome to the fascinating study of medical language—a vital part of your preparation for a career as a health professional. We are glad that you have joined us. Throughout your career, in a variety of settings, you will use medical terminology to communicate with coworkers and patients. Employing a carefully constructed learning system, ***Medical Terminology: A Living Language*** has helped thousands of readers gain a successful grasp of medical language within a real-world context.

In developing this book we had seven goals in mind:

1. To provide a clear introduction to the basic rules of using word parts to form medical terms.
2. To use phonetic pronunciations that will help you easily pronounce terms by spelling out the word part according to the way it sounds.
3. To help you understand medical terminology within the context of the human body systems. Realizing that this book is designed for a terminology course and not an anatomy and physiology course, we have aimed to stick to only the basics.
4. To help you develop a full range of Latin and Greek word parts used to build medical terms so that you will be able to interpret unfamiliar terms you encounter in the future.
5. To help you visualize medical language with an abundance of real-life photographs and accurate illustrations.
6. To provide you with a wealth of practice applications at the end of each chapter to help you review and master the content as you go along.
7. To create rich multimedia practice opportunities for you by way of MyMedicalTerminologyLab.


Please turn the page to get a visual glimpse of what makes this book an ideal guide to your exploration of medical terminology.



# A Guide to What Makes This Book Special

## Streamlined Content

Fourteen chapters and only the most essential anatomy and physiology coverage make this book a perfect mid-sized fit for a one-term course.




### Brief Contents

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## Chapter-Opening Page Spreads

“At a Glance” and “Illustrated” pages begin each chapter, providing a quick, visual snapshot of what’s covered.



### Integumentary System at a Glance

**Function**  
The skin provides a protective two-way barrier between our internal environment and the outside world. It also plays an important role in temperature regulation, houses sensory receptors to detect the environment around us, and secretes important fluids.

**Organs**  
Here are the primary structures that comprise the integumentary system.  
**skin hair nails sebaceous glands sweat glands**

**Word Parts**  
Here are the most common word parts (with their meanings) used to build integumentary system terms. For a more comprehensive list, refer to the Terminology section of this chapter.

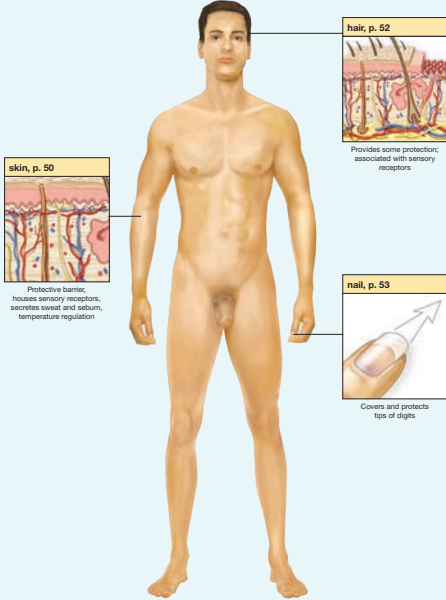
**Combining Forms**

<b>albin/o</b>	white	<b>myc/o</b>	fungus
<b>cauter/o</b>	to burn	<b>necr/o</b>	death
<b>cry/o</b>	cold	<b>onych/o</b>	nail
<b>cutane/o</b>	skin	<b>pedicul/o</b>	lice
<b>derm/o</b>	skin	<b>phot/o</b>	light
<b>dermat/o</b>	skin	<b>py/o</b>	pus
<b>diaphor/o</b>	profuse sweating	<b>rhytid/o</b>	wrinkle
<b>electr/o</b>	electricity	<b>sarc/o</b>	flesh
<b>erythr/o</b>	red	<b>scler/o</b>	hard
<b>hidr/o</b>	sweat	<b>seb/o</b>	oil
<b>ichthy/o</b>	scaly, dry	<b>system/o</b>	system
<b>kerat/o</b>	hard, horny	<b>trich/o</b>	hair
<b>leuk/o</b>	white	<b>ungu/o</b>	nail
<b>lip/o</b>	fat	<b>vesic/o</b>	sac, bladder
<b>melan/o</b>	black	<b>xer/o</b>	dry

**Suffixes**  
**-derma** skin condition

**Prefixes**  
**allo-** other, different from usual  
**xeno-** foreign

### Integumentary System Illustrated



**skin, p. 50**  
Protective barrier, houses sensory receptors, secretes sweat and sebum, temperature regulation

**hair, p. 52**  
Provides some protection; associated with sensory receptors

**nail, p. 53**  
Covers and protects tips of digits



## Key Terms and Pronunciations

Every subsection starts with a list of key terms and pronunciations for those words that will be covered in that section. This sets the stage for comprehension and mastery.

**Color-Coded Word Parts**—Red combining forms, blue suffixes, and green prefixes allow for quick recognition throughout the book.

## NEW! Informative and Interesting Sidebars

The popular Med Term Tip feature offers tidbits of noteworthy information about medical terms that engage learners. New features for the sixth edition are Word Watch and What's In A Name?, which further assist students as they learn medical terminology by helping them not to confuse similar-sounding words and by reinforcing word parts.

mixes with hydrochloric acid and other gastric juices to form a liquid mixture called **chyme**, which then passes through the remaining portion of the digestive system.

Entry into and exit from the stomach is controlled by muscular valves called **sphincters**. These valves open and close to ensure that food can only move forward down the gut tube. The **cardiac sphincter**, named for its proximity to the heart, is located between the esophagus and the stomach; also called the **lower esophageal sphincter (LES)**, it keeps food from flowing backward into the esophagus.

The antrum tapers out into the **pyloric sphincter**, which regulates the passage of food into the small intestine. Only a small amount of the chyme is allowed to pass through the small intestine with each opening of the sphincter for two important reasons. First, the small intestine is much narrower than the stomach and cannot hold as much as the stomach can. Second, the chyme is highly acidic and must be thoroughly neutralized as it leaves the stomach.

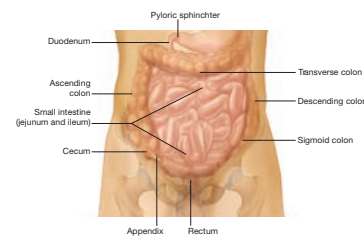
### Small Intestine

**duodenum** (doo-oh-DEE-num / doo-OD-eh-num)  
**ileocecal valve** (ill-ee-oh-SEE-kal)

**jejunum** (jil-JOO-num)  
**ileum** (ILL-ee-um)

The small intestine, or small bowel, is the major site of digestion and absorption of nutrients from food. It is located between the pyloric sphincter and the colon (see Figure 8.6). Because the small intestine is concerned with absorption of food products, an abnormality in this organ can cause malnutrition. The small intestine, with an average length of 20 feet, is the longest portion of the alimentary canal and has three sections: the **duodenum**, the **jejunum**, and the **ileum**.

- The duodenum extends from the pyloric sphincter to the jejunum, and is about 10–12 inches long. Digestion is completed in the duodenum after the liquid chyme from the stomach is mixed with digestive juices from the pancreas and gallbladder.
- The jejunum, or middle portion, extends from the duodenum to the ileum and is about eight feet long.



Digestive System 269

**What's In A Name?**  
Look for these word parts:  
**cardio** = heart  
**hydro** = water  
**-ic** = pertaining to  
**-ile** = pertaining to

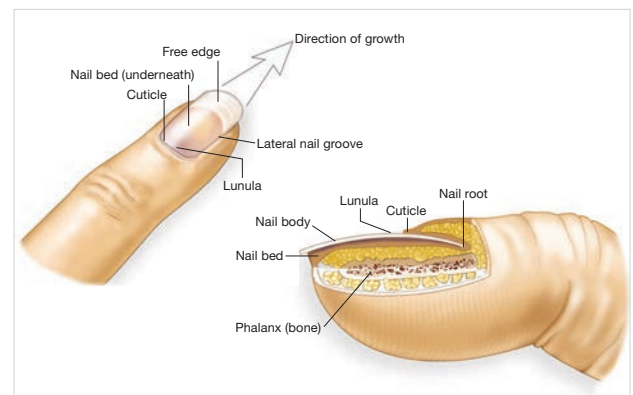
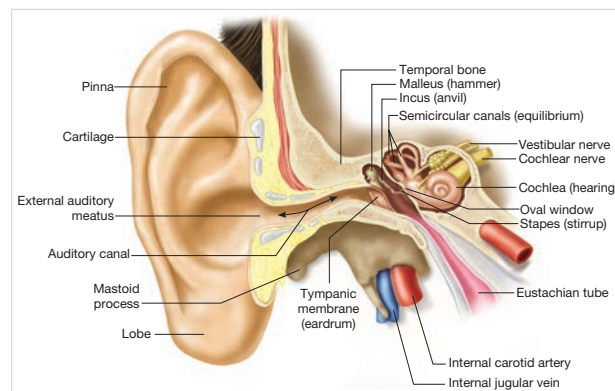
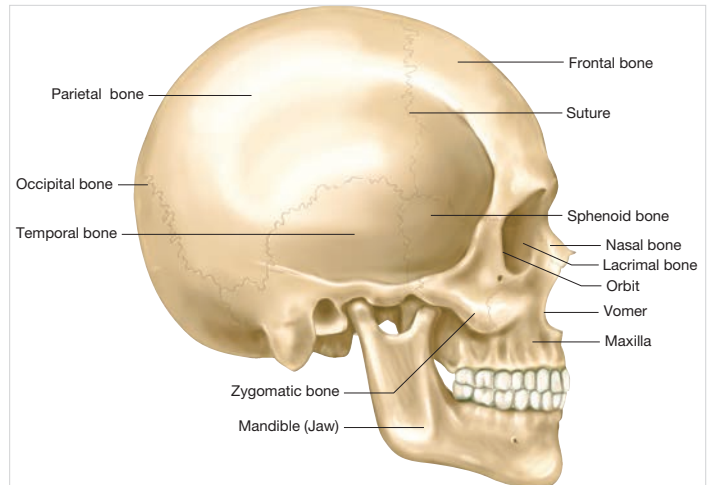
**Med Term Tip**  
It is easier to remember the function of the pyloric sphincter when you note that **pyloro** means "gatekeeper." This gatekeeper controls the forward movement of food. Sphincters are rings of muscle that can be opened and closed to control entry and exit from hollow organs like the stomach, colon, and bladder.

**Word Watch**  
Be careful not to confuse the word root **ileo** meaning "ileum," a portion of the small intestine, and **ilio** meaning "ilium," a pelvic bone.

**Figure 8.6** The small intestine. Anterior view of the abdominal cavity illustrating how the three sections of small intestine—duodenum, jejunum, ileum—begin at the pyloric sphincter and end at the colon, but are not arranged in a orderly fashion.

## Medically Accurate Illustrations

Concepts come to life with vibrant, clear, consistent, and scientifically precise images.



Word Tables

Study lists are categorized and presented in a clear, logical, color-coded format that eases the learning process. The Signs and Symptoms subsection within the Pathology table contains disease-related terms grouped by organ. This allows terms to be categorized into smaller groups, therefore making learning easier. Also the three-column format in the Word Building sections allows for the term (with pronunciation and/or abbreviation), word parts (if appropriate), and definitions to be displayed. The Pharmacology table also includes word parts in a fourth column.

Terminology  
Word Parts Used to Build Male Reproductive System Terms

The following lists contain the combining forms, suffixes, and prefixes used to build terms in the remaining sections of this chapter.

Combining Forms		
andr/o	male	
balan/o	glans penis	
carcin/o	cancer	
crypt/o	hidden	
epididym/o	epididymis	
genit/o	genital	
hydri/o	water	
immun/o	protection	
olig/o	scanty	
orch/o	testes	
orchid/o	testes	
orchid/o	testes	
pen/o	penis	
prostat/o	prostate gland	
rect/o	rectum	
spermato/o	sperm	
testicul/o	testicle	
ur/o	urine	
urethr/o	urethra	
vas/o	dilated vein	
vas/o	vas deferens	
vesicul/o	seminal vesicle	

Suffixes		
-al	pertaining to	
-ar	pertaining to	
-cele	protrusion	
-cide	to kill	
-ectomy	surgical removal	
-gen	that which produces	
-iasis	abnormal condition	
-ic	pertaining to	
-ile	pertaining to	
-itis	inflammation	
-logy	study of	
-lysis	destruction	
-oid	resembling	
-oma	tumor	
-osis	abnormal condition	
-otomy	create a new opening	
-otomy	cutting into	
-pexy	surgical fixation	
-plasia	formation of cells	
-plasty	surgical repair	
-rhea	discharge	
-spermia	sperm condition	

Prefixes		
a-	without	
an-	without	
anti-	against	
dys-	abnormal	
epi-	above	
hyper-	excessive	
hypo-	below	
trans-	across	

Abbreviations			
AE	above elbow	NSAID	nonsteroidal anti-inflammatory drug
AK	above knee	OA	osteoarthritis
BDT	bone density testing	ORIF	open reduction-internal fixation
BE	below elbow	Orth, ortho	orthopedics
BK	below knee	P	phosphorus
C1, C2, etc.	first cervical vertebra, second cervical vertebra, etc.	RA	rheumatoid arthritis
C4	fourth cervical vertebra	RLE	right lower extremity
CL	clavicle	RUE	right upper extremity
EL	elbow	SLE	systemic lupus erythematosus
EM	elbow, middle	T1, T2, etc.	first thoracic vertebra, second thoracic vertebra, etc.
EN	end, end of	THA	total hip arthroplasty
EP	epi, above	THR	total hip replacement
ER	end, end of	TKA	total knee arthroplasty
ES	end, end of	TKR	total knee replacement
ET	end, end of	UE	upper extremity

Adjective Forms of Anatomical Terms		
Term	Word Parts	Definition
conjunctival (kon-JUNKT-ih-vul)	conjunctiv/o = conjunctiva -al = pertaining to	Pertaining to the conjunctiva.
corneal (KOR-nee-al)	corn/o = cornea -al = pertaining to	Pertaining to the cornea.
extraocular (EGS-truh-OK-yoo-lar)	extra- = outside of ocul/o = eye -ar = pertaining to	Pertaining to being outside the eyeball; for example, the extraocular eye muscles.
irital (ir-id-al)	irid/o = iris -al = pertaining to	Pertaining to the iris.
lacrimal (LAK-rim-al)	lacrim/o = tears -al = pertaining to	Pertaining to tears.
macular (MAK-oo-lar)	macul/o = macula lutea -ar = pertaining to	Pertaining to the macula.
ocular (OK-oo-lar)	ocul/o = eye -ar = pertaining to	Pertaining to the eye.
intraocular (in-truh-OK-oo-lar)	intra- = within ocul/o = eye -ar = pertaining to	Pertaining to within the eye.
ophthalmic (of-THAL-mik)	ophthalm/o = eye -ic = pertaining to	Pertaining to the eye.
optic (OP-ik)	opt/o = eye, vision -ic = pertaining to	Pertaining to the eye or vision.
optical (OP-tih-kul)	opt/o = eye, vision -al = pertaining to	Pertaining to the eye or vision.
pupillary (PYOO-pih-lair-ee)	pupill/o = pupil -ary = pertaining to	Pertaining to the pupil.
retinal (RET-in-al)	retin/o = retina -al = pertaining to	Pertaining to the retina.
scleral (SKL-er-al)	scler/o = sclera -al = pertaining to	Pertaining to the sclera.

Pharmacology			
Classification	Word Parts	Action	Examples
anesthetic ophthalmic solution (of-THAL-mik)	an- = without esthes/o = sensation, feeling -ic = pertaining to ophthalm/o = eye -ic = pertaining to	Eye drops for pain relief associated with eye infections, corneal abrasions, or surgery.	proparacaine, Ak-Taine, Ocu-Caline; tetracaine, Opticaine, Portocaine
antibiotic ophthalmic solution (of-THAL-mik)	anti- = against bi/o = life -ic = pertaining to ophthalm/o = eye -ic = pertaining to	Eye drops for the treatment of bacterial eye infections.	erythromycin, Del-Mycin, Icthrin Ophthalmic
antiglaucoma medications (an-eye-glau-KOH-mah)	anti- = against glau/o = gray -oma = mass	Reduce intraocular pressure by lowering the amount of aqueous humor in the eyeball. May achieve this by either reducing the production of aqueous humor or increasing its outflow.	timolol, Betimol, Timoptic; acetazolamide, Ak-Zol, Dazamide; prostaglandin analogs, Lumigan, Xalatan
artificial tears		Medications, many of them over the counter, to treat dry eyes.	buffered isotonic solutions, Alavis Tears, Refresh Plus, Moisture Eyes
miotic drops (my-OT-ik)	mi/o = lessening -ic = pertaining to	Any substance that causes the pupil to constrict. These medications may also be used to treat glaucoma.	physostigmine, Esnerine Sulfate, Carbachol, Carbastat, etc.

Diagnostic Procedures		
Term	Word Parts	Definition
Medical Procedures		
auscultation (oss-kul-TAY-shun)		Process of listening to the sounds of the body by using a stethoscope.
sphygmomanometer (sfig-moh-mah-NOM-eh-ter)	sphygm/o = pulse manometer = instrument to measure pressure	Instrument for measuring blood pressure (BP). Also referred to as a blood pressure cuff.
stethoscope (STETH-oh-scope)	steth/o = chest -scope = instrument for viewing	Instrument for listening to body sounds (auscultation), such as the chest, heart, and intestines.

Therapeutic Procedures		
Term	Word Part	Definition
Medical Treatments		
arthrocentesis (ar-throh-sen-TEE-sis)	arthr/o = joint -centesis = puncture to withdraw fluid	Involves the insertion of a needle into the joint cavity in order to remove or aspirate fluid. May be done to remove excess fluid from a joint or to obtain fluid for examination.
orthotic (or-THOT-ik)	orth/o = straight -ic = pertaining to	Orthopedic appliance, such as a brace or splint, used to prevent or correct deformities.
prosthesis (pross-THÉE-sis)	prosth/o = addition	Artificial device used as a substitute for a body part that is either congenitally missing or absent as a result of accident or disease. An example would be an artificial leg.
Surgical Procedures		
amputation (am-pew-TAY-shun)		Partial or complete removal of a limb for a variety of reasons, including tumors, gangrene, intractable pain, crushing injury, or uncontrollable infection.
arthroclasia (ar-throh-KLAY-see-ah)	arthr/o = joint -clasia = surgically break	To forcibly break loose a fused joint while the patient is under anesthesia. Fusion is usually caused by the buildup of scar tissue or adhesions.
arthrodesis (ar-throh-DEE-sis)	arthr/o = joint -desis = to fuse	Procedure to stabilize a joint by fusing the bones together.
arthroscopic surgery (ar-throh-SKOP-ik)	arthr/o = joint -scopy = process of visually examining -ic = pertaining to	Performing a surgical procedure while using an arthroscope to view the internal structure, such as a joint.
arthrotomy (ar-THROT-oh-mee)	arthr/o = joint -otomy = cutting into	Surgical procedure that cuts into a joint capsule.
bone graft		Place of bone taken from the patient used to take the place of a removed bone or a bony defect at another site.

Pathology (continued)		
Term	Word Parts	Definition
adrenopathy (ad-ren-OP-ah-thee)	adren/o = adrenal gland -pathy = disease	General term for adrenal gland disease.
adema (eh-DEE-mah)	Wound Watch adema = swelling of the thyroid gland. Watch how the term adema is used in this condition. It may also appear as the suffix -adema.	Condition in which the body tissues contain excessive amounts of fluid.
endocrinopathy (en-doh-kri-nah-OP-ah-thee)	endo- = within crin/o = to secrete -pathy = disease	General term for diseases of the endocrine system.
exophthalmos (eks-of-THAL-mohs)	ex- = outward ophthalm/o = eye	Condition in which the eyeballs protrude, such as in Graves' disease. This is generally caused by an overproduction of thyroid hormone.
glycosuria (glye-kohs-YOO-ree-ah)	glycos/o = sugar -uria = urine condition	Having a high level of sugar excreted in the urine.
gynecomastia (gigh-neh-koh-MAST-ee-ah)	gyneco- = female mast/o = breast -ia = condition	Development of breast tissue in males. May be a symptom of adrenal feminization.
hirsutism (HER-soot-izm)	-ism = state of	Condition of having an excessive amount of hair. Term generally used to describe females who have the adult male pattern of hair growth. Can be the result of a hormonal imbalance.
hypercalcemia (high-per-kah-SEE-mee-ah)	hyper- = excessive calci/o = calcium -emia = blood condition	Condition of having a high level of calcium in the blood, associated with hypersecretion of parathyroid hormone.
hypercholesterolemia (high-per-koh-SEE-mee-ah)	hyper- = excessive chole- = cholesterol -emia = blood condition	Condition of having a high level of cholesterol in the blood, associated with diabetes mellitus.
hypocalcemia (high-poh-kah-SEE-mee-ah)	hypo- = below calci/o = calcium -emia = blood condition	The condition of having a low level of calcium in the blood, associated with hyposecretion of parathyroid hormone. Hypocalcemia may result in tetany.
hypokalemia (high-poh-kah-SEE-mee-ah)	hypo- = below kali/o = potassium -emia = blood condition	Condition of having a low level of sugar in the blood.

Figure 11-11		
A photograph of a woman with exophthalmos. This condition is associated with hypersecretion of the thyroid gland. (Credit: Medical Source/Photo Inc.)		

Figure 8-17 Using a sphygmomanometer to measure blood pressure.		
A photograph showing a person's arm being measured with a sphygmomanometer. The cuff is wrapped around the upper arm, and the person is sitting down.		

## NEW! Practice As You Go

A mix of exercises peppered throughout the chapters to help you take a quick assessment of your understanding of the material discussed.

### Practice As You Go

#### C. Terminology Matching

Match each term to its definition.

- |                                     |   |
|-------------------------------------|---|
| 1. _____ Wilms' tumor               | a. kidney stones  |
| 2. _____ azotemia                   | b. feeling the need to urinate immediately                            |
| 3. _____ urinary retention          | c. childhood malignant kidney tumor                                   |
| 4. _____ nephroptosis               | d. swelling of the kidney due to urine collecting in the renal pelvis |
| 5. _____ nocturia                   | e. involuntary release of urine                                       |
| 6. _____ incontinence               | f. frequent urination at night  |
| 7. _____ hydronephrosis             | g. excess nitrogenous waste in bloodstream                            |
| 8. _____ urgency                    | h. inability to fully empty bladder                                   |
| 9. _____ nephrolithiasis            | i. a floating kidney  |
| 10. _____ polycystic kidney disease | j. multiple cysts in the kidneys                                      |

### Practice As You Go

#### A. Complete the Statement

- The study of the heart is called \_\_\_\_\_.
- The three layers of the heart are \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
- The impulse for the heartbeat (the pacemaker) originates in the \_\_\_\_\_.
- Arteries carry blood \_\_\_\_\_ the heart.
- The four heart valves are \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
- The \_\_\_\_\_ are the receiving chambers of the heart and the \_\_\_\_\_ are the pumping chambers.
- The \_\_\_\_\_ circulation carries blood to and from the lungs.
- The pointed tip of the heart is called the \_\_\_\_\_.
- The \_\_\_\_\_ divides the heart into left and right halves.
- \_\_\_\_\_ is the contraction phase of the heartbeat and \_\_\_\_\_ is the relaxation phase.

### Practice As You Go

#### B. Give the adjective form for each anatomical structure

- Blood \_\_\_\_\_ or \_\_\_\_\_
- White cell \_\_\_\_\_
- Clotting cell \_\_\_\_\_
- Fibers \_\_\_\_\_
- Red cell \_\_\_\_\_

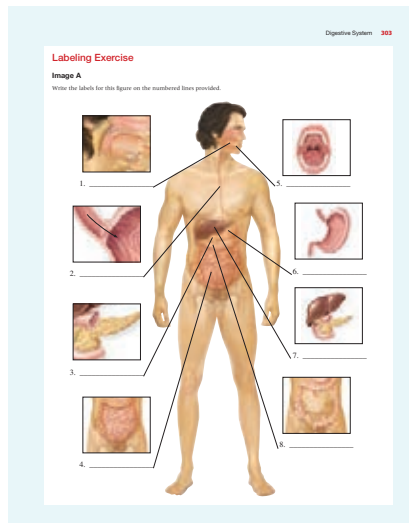
### Practice As You Go

#### E. What Does it Stand For?

- KUB \_\_\_\_\_
- cath \_\_\_\_\_
- cysto \_\_\_\_\_
- GU \_\_\_\_\_
- ESWL \_\_\_\_\_
- UTI \_\_\_\_\_
- UC \_\_\_\_\_
- RP \_\_\_\_\_
- ARF \_\_\_\_\_
- BUN \_\_\_\_\_
- CRF \_\_\_\_\_
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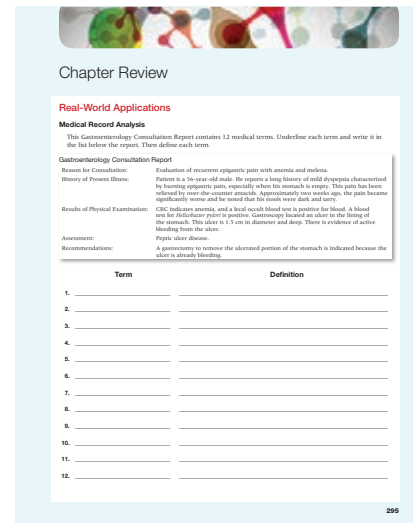
## Chapter Review

**Practice Exercises—**A wide array of workbook exercises at the end of each chapter serve as a fun and challenging study review.



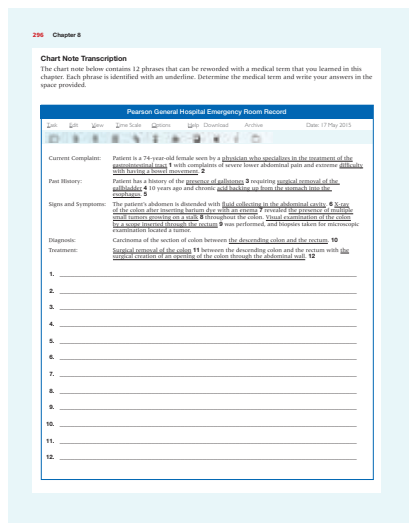
Additionally Labeling Exercises provide a visual challenge to reinforce students' grasp of anatomy and physiology concepts.

**Real-World Applications—**Three critical thinking activities allow students to apply their medical knowledge to true-to-life scenarios:



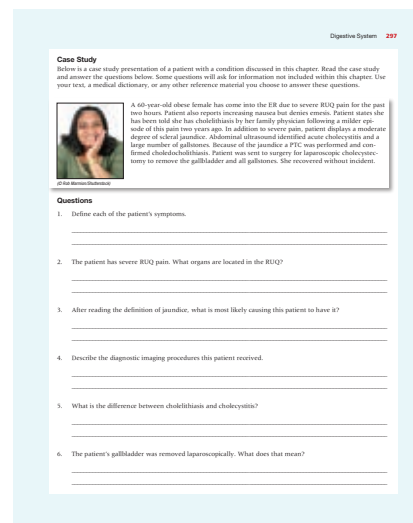
### 1) Medical Record Analysis

Exercises that challenge students to read examples of real medical records and then to apply their medical terminology knowledge in answering related questions.



### 2) Chart Note Transcription

Slice-of-real-life exercise that asks students to replace lay terms in a medical chart with the proper medical term.



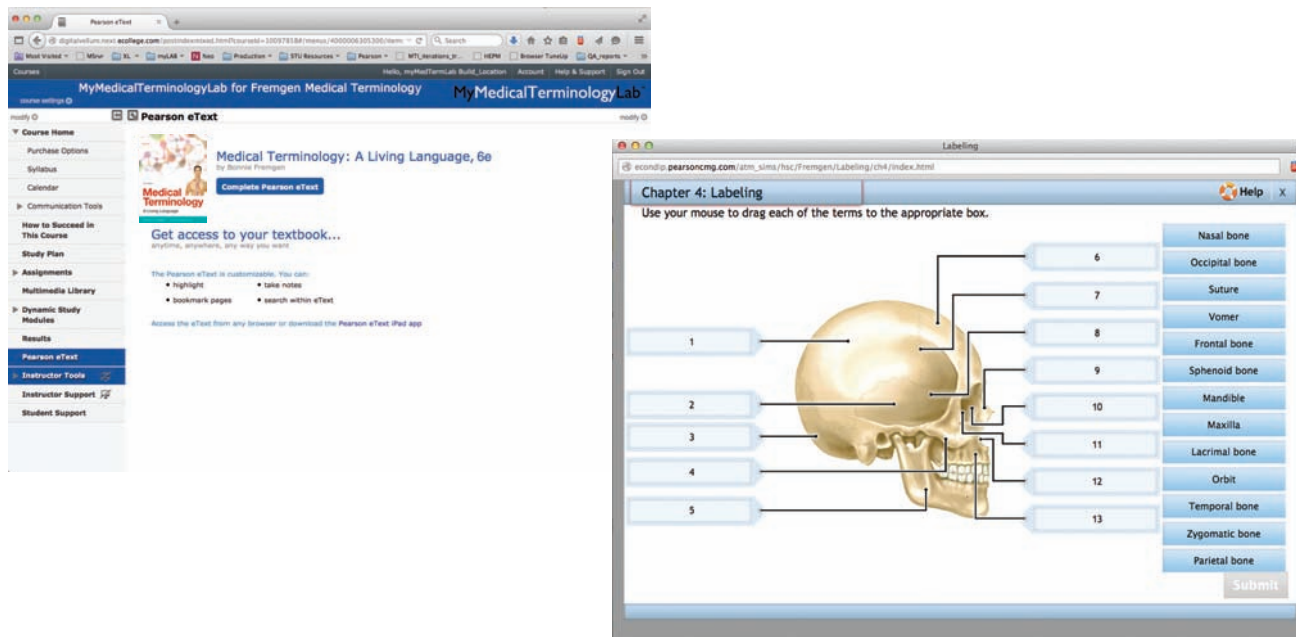
### 3) Case Study

Scenarios that use critical thinking questions to help students develop a firmer understanding of the terminology in context.



# The Total Teaching and Learning Package

We are committed to providing students and instructors with exactly the tools they need to be successful in the classroom and beyond. To this end, *Medical Terminology: A Living Language* is supported by the most complete and dynamic set of resources available today.



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The ultimate personalized learning tool is available at [www.mymedicalterminologylab.com](http://www.mymedicalterminologylab.com).

This online course correlates with the textbook and is available for purchase separately or for a discount when packaged with the book. MyMedicalTerminologyLab is an immersive study experience that presents students with, quizzes, videos, learning activities and other self-study challenges. The system allows learners to track their own progress through the course and use a personalized study plan to achieve success.

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Perhaps the most gratifying part of an educator's work is the "aha" learning moment when the light bulb goes off and a student truly understands a concept—when a connection is made.

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## Preface

Since the first edition of *Medical Terminology: A Living Language* was published it has been noted for its “clean” and logical format that promotes learning. In this revised edition, we have built upon this strength by enhancing many features to make this text an ideal choice for semester- or quarter-length courses.

### Features of this Edition

This new sixth edition contains features that facilitate student mastery, while maintaining the best aspects of previous editions. Each chapter is arranged in a similar format and the content is organized with an emphasis on maintaining consistency and accuracy. All terms have been evaluated to ensure they remain in current use and reflect the newest technologies and procedures.

We have revised *Medical Terminology: A Living Language* so that it provides for an even more valuable teaching and learning experience. Here are the enhancements we have made:

- The Terminology section includes a comprehensive list of all combining forms, suffixes, and prefixes used to build terms in the remaining sections of the chapter.
- The popular Med Term Tip margin note has been expanded to include two additional features called **What’s In A Name?** and **Word Watch**. Word Watch points out words that may confuse students due to similar sound or similar spelling and What’s In A Name? reinforces the breakdown of word parts used in the section being discussed.
- **Practice As You Go** is a “speed bump” feature scattered throughout the chapters that allows the reader to get a quick check on their grasp of the content presented by using a combination of short-answer exercises. Answers are provided at the back of the book.

## Organization of the Book

### Introductory Chapter

Chapter 1 contains information necessary for an understanding of how medical terms are formed. This includes learning about word roots, combining forms, prefixes, and suffixes, and general rules for building medical terms. Readers will also learn about terminology for medical records and the different healthcare settings. Chapter 2 presents terminology relating to the body organization, including organs and body systems. Here readers will first encounter word-building tables, a feature found in each remaining chapter that lists medical terms and their respective word parts.

### Anatomy and Physiology Chapters

Chapters 3–13 are organized by body system. Each chapter begins with the System At A Glance feature, which lists combining forms, prefixes, and/or suffixes with their meanings and is followed by a System Illustrated overview of the organs in the system. The anatomy and physiology section is divided into the various components of the system, and each subsection begins with a list of key medical terms accompanied by a pronunciation guide. Key terms are boldfaced the first time they appear in the narrative. The Terminology section of each chapter begins with a list of all word parts used within the chapter. For ease of learning, the medical terms are divided into five separate sections: adjective forms of anatomical terms, pathology, diagnostic procedures, therapeutic procedures, and pharmacology. The word parts used to build terms are highlighted within each table. An abbreviations section then follows to complete the chapter.

## Special Topics Chapter

Chapter 14 contains timely information and appropriate medical terms relevant to the following medical specialties: pharmacology, mental health, diagnostic imaging, rehabilitation services, surgery, and oncology. Knowledge of these topics is necessary for the well-rounded healthcare worker.

## Appendices

The appendices contain helpful reference lists of word parts and definitions. This information is intended for quick access. There are three appendices: Word Parts Arranged Alphabetically and Defined, Word Parts Arranged Alphabetically by Definition, and Abbreviations. Finally, all of the key terms appear again in the combination glossary/index at the end of the text.



## About the Authors



### Bonnie F. Fremgen

Bonnie F. Fremgen is a former Associate Dean of the Allied Health Program at Robert Morris College. She has taught medical law and ethics courses as well as clinical and administrative topics. In addition, Dr. Fremgen has served as an advisor for students' career planning. She has broad interests and experiences in the healthcare field, including hospitals, nursing homes, and physicians' offices.

Dr. Fremgen holds a nursing degree as well as a master's in healthcare administration. She received her PhD from the College of Education at the University of Illinois. Dr. Fremgen has performed postdoctoral studies in Medical Law at Loyola University Law School in Chicago. She has authored five textbooks with Pearson.



### Suzanne S. Frucht

Suzanne S. Frucht is an Associate Professor Emeritus of Anatomy and Physiology at Northwest Missouri State University (NWMSU). She holds baccalaureate degrees in biological sciences and physical therapy from Indiana University, an MS in biological sciences at NWMSU, and a PhD in molecular biology and biochemistry from the University of Missouri–Kansas City.

For 14 years Dr. Frucht worked full time as a physical therapist in various healthcare settings, including acute care hospitals, extended care facilities, and home health. Based on her educational and clinical experience she was invited to teach medical terminology part time in 1988 and became a full-time faculty member three years later as she discovered her love for the challenge of teaching. Dr. Frucht has taught a variety of courses including medical terminology, human anatomy, human physiology, and animal anatomy and physiology. She received the Governor's Award for Excellence in Teaching in 2003. After retiring from teaching in 2008, she continues to be active in student learning through teaching medical terminology as an online course and writing medical terminology texts and anatomy and physiology laboratory manuals.

## About the Illustrators



Marcelo Oliver is president and founder of Body Scientific International LLC. He holds an MFA degree in Medical and Biological Illustration from the University of Michigan. For the past 15 years, his passion has been to condense complex anatomical information into visual education tools for students, patients, and medical professionals. For seven years Oliver worked as a medical illustrator and creative director developing anatomical charts used for student and patient education. In the years that followed, he created educational and marketing tools for medical device companies prior to founding Body Scientific International, LLC.

Body Scientific's lead artists in this publication were medical illustrators Liana Bauman and Katie Burgess. Both hold a Master of Science degree in Biomedical Visualization from the University of Illinois at Chicago. Their contribution in the publication was key in the creation and editing of artwork throughout.





# Our Development Team

We would like to express deep gratitude to the over 100 colleagues from schools across the country that have provided us with many hours of their time over the years to help us tailor this book to suit the dynamic needs of instructors and students. These individuals have reviewed manuscript chapters and illustrations for content, accuracy, level, and utility. We sincerely thank them and feel that *Medical Terminology: A Living Language* has benefited immeasurably from their efforts, insights, encouragement, and selfless willingness to share their expertise as educators.

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## A Commitment to Accuracy

As a student embarking on a career in healthcare you probably already know how critically important it is to be precise in your work. Patients and coworkers will be counting on you to avoid errors on a daily basis. Likewise, we owe it to you—the reader—to ensure accuracy in this book. We have gone to great lengths to verify that the information provided in *Medical Terminology: A Living Language* is complete and correct. To this end, here are the steps we have taken:

1. **Editorial Review**—We have assembled a large team of developmental consultants (listed on the preceding pages) to critique every word and every image in this book. Multiple content experts have read each chapter for accuracy.
2. **Medical Illustrations**—A team of medically trained illustrators was hired to prepare each piece of art that graces the pages of this book. These illustrators have a higher level of scientific education than the artists for most textbooks, and they worked directly with the authors and members of our development team to make sure that their work was clear, correct, and consistent with what is described in the text.
3. **Accurate Ancillaries**—Realizing that the teaching and learning ancillaries are often as vital to instruction as the book itself, we took extra steps to ensure accuracy and consistency within these components. We assigned some members of our development team to specifically focus on critiquing every bit of content that comprises the instructional ancillary resources to confirm accuracy.

While our intent and actions have been directed at creating an error-free text, we have established a process for correcting any mistakes that may have slipped past our editors. Pearson takes this issue seriously and therefore welcomes any and all feedback that you can provide along the lines of helping us enhance the accuracy of this text. If you identify any errors that need to be corrected in a subsequent printing, please notify us. Thank you for helping Pearson to reach its goal of providing the most accurate medical terminology textbooks available.

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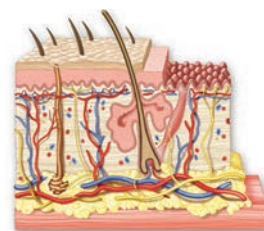
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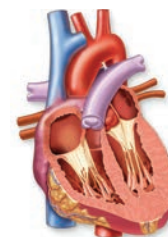
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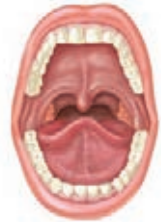


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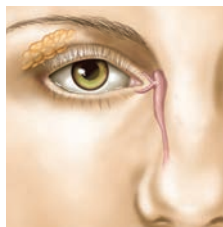
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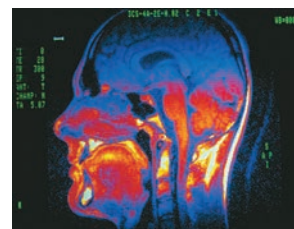
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Sixth Edition

# Medical Terminology

A Living Language

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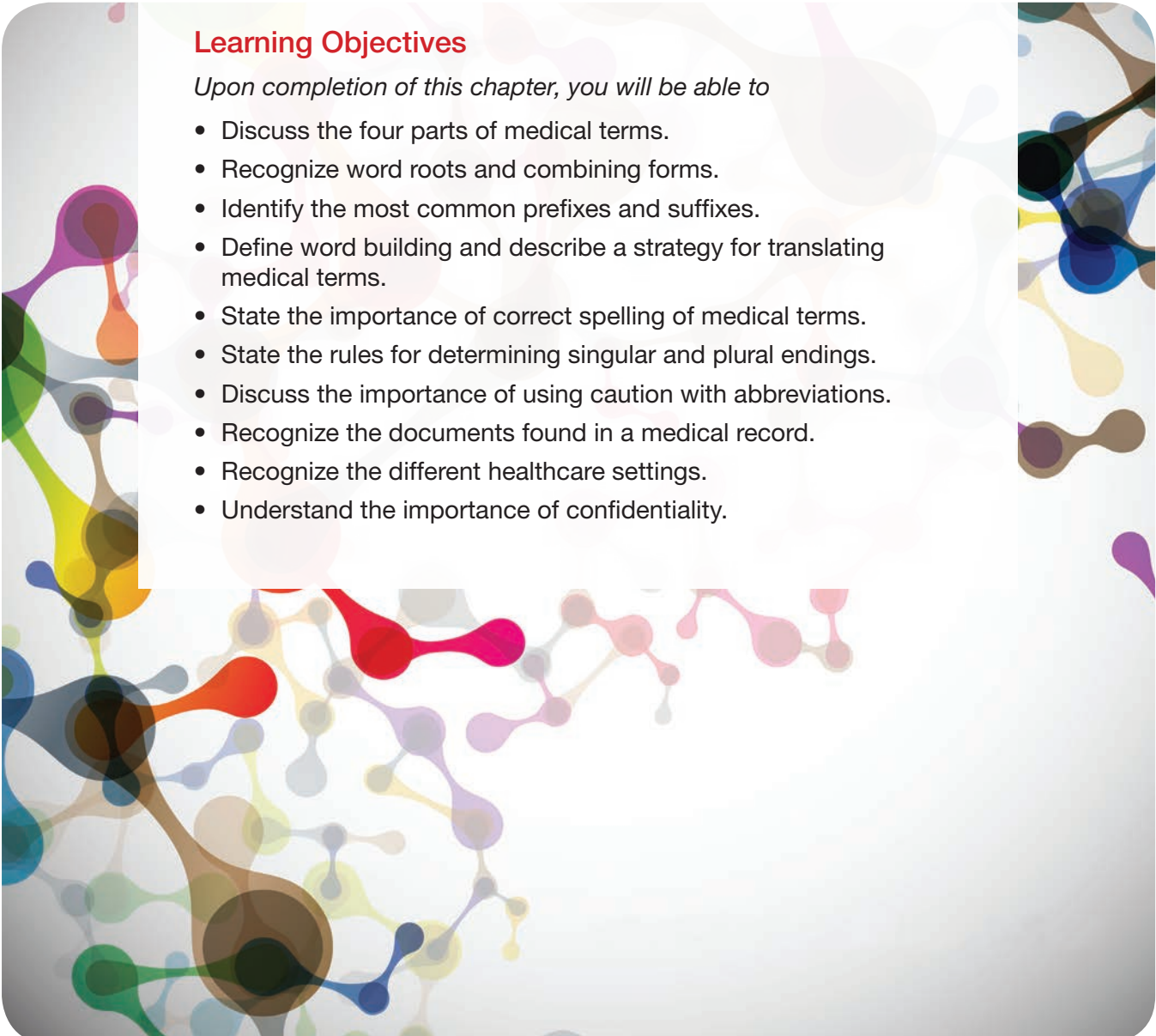


# 1

## Introduction to Medical Terminology

### Learning Objectives

*Upon completion of this chapter, you will be able to*

- Discuss the four parts of medical terms.
  - Recognize word roots and combining forms.
  - Identify the most common prefixes and suffixes.
  - Define word building and describe a strategy for translating medical terms.
  - State the importance of correct spelling of medical terms.
  - State the rules for determining singular and plural endings.
  - Discuss the importance of using caution with abbreviations.
  - Recognize the documents found in a medical record.
  - Recognize the different healthcare settings.
  - Understand the importance of confidentiality.
- 

# Medical Terminology at a Glance

Learning medical terminology can initially seem like studying a strange new language. However, once you understand some of the basic rules about how medical terms are formed using word building, it will become much like piecing together a puzzle. The general guidelines for forming words; an understanding of word roots, combining forms, prefixes, and suffixes; pronunciation; and spelling are discussed in this chapter. Chapter 2 introduces you to terms that are used to describe the body as a whole. Chapters 3–13 each focus on a specific body system and present new combining forms, prefixes, and suffixes, as well as exercises to help you gain experience building new medical terms. Finally, Chapter 14 includes the terminology for several important areas of patient care. Additionally, sprinkled throughout all chapters are “Med Term Tips” to assist in clarifying some of the material, “Word Watch” boxes to point out terms that may be particularly confusing, and “What’s In A Name?” boxes to highlight the word parts found in the text. New medical terms to be discussed in each section are listed separately at the beginning of the section, and each chapter contains numerous pathological, diagnostic, treatment, and surgical terms. You should use these lists as an additional study tool for previewing and reviewing terms.

Understanding medical terms requires you being able to put words together or build words from their parts. It is impossible to memorize thousands of medical terms; however, once you understand the basics, you can distinguish the meaning of medical terms by analyzing their prefixes, suffixes, and word roots. Remember that there will always be some exceptions to every rule, and medical terminology is no different. We attempt to point out these exceptions where they exist. Most medical terms, however, do follow the general rule that there is a **word root** (indicated by a red color) or fundamental meaning for the word, a **prefix** (indicated by a green color) and a **suffix** (indicated by a blue color) that modify the meaning of the word root, and sometimes a **combining vowel** to connect other word parts. You will be amazed at the seemingly difficult words you will be able to build and understand when you follow the simple steps in word building (see Figure 1.1 ■).



■ **Figure 1.1** Nurse completing a patient report. Healthcare workers use medical terminology in order to accurately and efficiently communicate patient information to each other. (Monkey Business Images/Shutterstock)

# Building Medical Terms From Word Parts

Four different word parts or elements can be used to construct medical terms:

1. The **word root** is the foundation of the word.  
**cardi** ogram = record of the heart
2. A **prefix** is at the beginning of the word.  
**peri** cardium = around the heart
3. A **suffix** is at the end of the word.  
card **itis** = inflammation of the heart
4. The **combining vowel** is a vowel (usually o) that links the word root to another word root or a suffix.  
cardi **o** my **o** pathy = disease of the heart muscle

## Med Term Tip

Medical terms are built from word parts:

Word Part	Example (Meaning)
Word root	<i>cardi</i> (heart)
Prefix	<i>peri-</i> (around)
Suffix	<i>-itis</i> (inflammation)

When these components are put together, the word *pericarditis* is formed, meaning inflammation around the heart.

The following sections on word roots, combining vowels and forms, prefixes, and suffixes will consider each of these word parts in more detail and present examples of some of those most commonly used.

## Practice As You Go

### A. Complete the Statement

1. The four components of a medical term are \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
2. The combination of a word root and the combining vowel is called a(n) \_\_\_\_\_.
3. The vowel that connects two word roots or a suffix with a word root is usually a(n) \_\_\_\_\_.
4. A word part used at the end of a word root to change the meaning of the word is called a(n) \_\_\_\_\_.
5. A(n) \_\_\_\_\_ is used at the beginning of a word to indicate number, location, or time.

## Word Roots

The word root is the foundation of a medical term and provides the general meaning of the word. The word root often indicates the body system or part of the body being discussed, such as *cardi* for heart. At other times the word root may be an action. For example, the word root *cis* means to cut (as in incision).

A term may have more than one word root. For example, **osteoarthritis** (oss-tee-oh-ar-THRY-tis) combines the word root *oste* meaning bone and *arthr* meaning the joint. When the suffix *-itis*, meaning inflammation, is added, we have the entire word, meaning an inflammation involving bone at a joint.

## Combining Vowel/Form

To make it possible to pronounce long medical terms with ease and to combine several word parts, a combining vowel is used. This is most often the vowel *o*. Combining vowels are utilized in two places: between a word root and a suffix or between two word roots.

**Med Term Tip**

Remember to break down every word into its components (prefix, word root/combining form, and suffix) when learning medical terminology. Do not try to memorize every medical term. Instead, figure out how the word is formed from its components. In a short time you will be able to do this automatically when seeing a new term.

To decide whether or not to use a combining vowel between a word root and a suffix, first look at the suffix. If it begins with a vowel, do not use the combining vowel. If, however, the suffix begins with a consonant, then use a combining vowel. For example: To combine *arthr* with *-scope* will require a combining vowel: **arthroscope** (AR-throh-scope). But to combine *arthr* with *-itis* does not require a combining vowel: **arthritis** (ar-THRY-tis).

The combining vowel is typically kept between two word roots, even if the second word root begins with a vowel. For example, in forming the term **gastroenteritis** (gas-troh-en-ter-EYE-tis), the combining vowel is kept between the two word roots *gastr* and *enter* (gastreteritis is incorrect). As you can tell from pronouncing these two terms, the combining vowel makes the pronunciation easier.

When writing a word root by itself, its **combining form** is typically used. This consists of the word root and its combining vowel written in a word root/vowel form, for example, *cardi/o*. Since it is often simpler to pronounce word roots when they appear in their combining form, we use this format throughout this book.

## Common Combining Forms

Some commonly used word roots in their combining form, their meaning, and examples of their use follow. Review the examples to observe when a combining vowel was kept and when it was dropped according to the rules presented above.

COMBINING FORM	MEANING	EXAMPLE (DEFINITION)
<b>bi/o</b>	life	biology (study of life)
<b>carcin/o</b>	cancer	carcinoma (cancerous tumor)
<b>cardi/o</b>	heart	cardiac (pertaining to the heart)
<b>chem/o</b>	chemical	chemotherapy (treatment with chemicals)
<b>cis/o</b>	to cut	incision (process of cutting into)
<b>dermat/o</b>	skin	dermatology (study of the skin)
<b>enter/o</b>	small intestine	enteric (pertaining to the small intestine)
<b>gastr/o</b>	stomach	gastric (pertaining to the stomach)
<b>gynec/o</b>	female	gynecology (study of females)
<b>hemat/o</b>	blood	hematic (pertaining to the blood)
<b>immun/o</b>	immunity	immunology (study of immunity)
<b>laryng/o</b>	larynx	laryngeal (pertaining to the voice box)
<b>nephro/o</b>	kidney	nephromegaly (enlarged kidney)
<b>neur/o</b>	nerve	neural (pertaining to a nerve)
<b>ophthalm/o</b>	eye	ophthalmic (pertaining to the eye)
<b>ot/o</b>	ear	otic (pertaining to the ear)
<b>path/o</b>	disease	pathology (study of disease)
<b>pulmon/o</b>	lung	pulmonary (pertaining to the lungs)
<b>rhin/o</b>	nose	rhinoplasty (surgical repair of the nose)

## Practice As You Go

### B. Name That Term

Use the suffix **-ology** to write a term for each medical specialty.

1. heart \_\_\_\_\_
2. stomach \_\_\_\_\_
3. skin \_\_\_\_\_
4. eye \_\_\_\_\_
5. immunity \_\_\_\_\_
6. kidney \_\_\_\_\_
7. blood \_\_\_\_\_
8. female \_\_\_\_\_
9. nerve \_\_\_\_\_
10. disease \_\_\_\_\_

## Prefixes

A new medical term is formed when a prefix is added to the front of the term. Prefixes frequently give information about the location of an organ, the number of parts, or the time (frequency). For example, the prefix **bi-** stands for two of something, such as **bilateral** (bye-LAH-ter-al), meaning to have two sides. However, not every term will have a prefix.

### Common Prefixes

Some of the more common prefixes, their meanings, and examples of their use are shown below. When written by themselves, prefixes are followed by a hyphen.

PREFIX	MEANING	EXAMPLE (DEFINITION)
<b>a-</b>	without	aphasia (without speech)
<b>an-</b>	without	anoxia (without oxygen)
<b>anti-</b>	against	antibiotic (against life)
<b>auto-</b>	self	autograft (a graft from one's own body)
<b>brady-</b>	slow	bradycardia (slow heartbeat)
<b>de-</b>	without	depigmentation (without pigment)
<b>dys-</b>	painful; difficult; abnormal	dysuria (painful urination); dyspnea (difficulty breathing); dystrophy (abnormal development)

**Word Watch** |||||

Be very careful with prefixes; many have similar spellings but very different meanings. For example:

*inter-* means “between”; *intra-* means “inside”

*per-* means “through”; *peri-* means “around”

*re-* means “again”; *retro-* means “behind”

PREFIX	MEANING	EXAMPLE (DEFINITION)
<b>endo-</b>	within; inner	endoscope (instrument to view within); endocardium (inner lining of heart)
<b>epi-</b>	above	epigastric (above the stomach)
<b>eu-</b>	normal	eupnea (normal breathing)
<b>ex-</b>	outward	exostosis (condition of outward, or projecting, bone)
<b>extra-</b>	outside of	extracorporeal (outside of the body)
<b>hetero-</b>	different	heterograft (graft [like a skin graft] from another species)
<b>homo-</b>	same	homograft (graft [like a skin graft] from the same species)
<b>hyper-</b>	excessive	hypertrophy (excessive development)
<b>hypo-</b>	below; insufficient	hypodermic (below the skin); hypoglycemia (insufficient blood sugar)
<b>in-</b>	not; inward	infertility (not fertile); inhalation (to breathe in)
<b>inter-</b>	between	intervertebral (between the vertebrae)
<b>intra-</b>	within	intravenous (within a vein)
<b>macro-</b>	large	macrotia (having large ears)
<b>micro-</b>	small	microtia (having small ears)
<b>neo-</b>	new	neonatology (study of the newborn)
<b>para-</b>	beside; abnormal; two like parts of a pair	paranasal (beside the nose); paresthesia (abnormal sensation); paraplegia (paralysis of two like parts of a pair [the legs])
<b>per-</b>	through	percutaneous (through the skin)
<b>peri-</b>	around	pericardial (around the heart)
<b>post-</b>	after	postpartum (after birth)
<b>pre-</b>	before	preoperative (before a surgical operation)
<b>pro-</b>	before	prolactin (before milk)
<b>pseudo-</b>	false	pseudocyesis (false pregnancy)
<b>re-</b>	again	reinfection (to infect again)
<b>retro-</b>	backward; behind	retrograde (to move backward); retroperitoneal (behind the peritoneum)
<b>sub-</b>	under	subcutaneous (under the skin)
<b>tachy-</b>	fast	tachycardia (fast heartbeat)
<b>trans-</b>	across	transurethral (across the urethra)
<b>ultra-</b>	beyond	ultrasound (beyond sound [high- frequency sound waves])
<b>un-</b>	not	unconscious (not conscious)



## Number Prefixes

Some common prefixes pertaining to the number of items or measurement, their meanings, and examples of their use are shown below.

PREFIX	MEANING	EXAMPLE (DEFINITION)
bi-	two	bilateral (two sides)
hemi-	half	hemiplegia (paralysis of one side/half of the body)
mono-	one	monoplegia (paralysis of one extremity)
multi-	many	multigravida (woman pregnant more than once)
nulli-	none	nulligravida (woman with no pregnancies)
pan-	all	pansinusitis (inflammation of all the sinuses)
poly-	many	polymyositis (inflammation of many muscles)
quadri-	four	quadriplegia (paralysis of all four limbs)
semi-	partial	semiconscious (partially conscious)
tetra-	four	tetraplegia (paralysis of all four limbs)
tri-	three	triceps (muscle with three heads)

## Practice As You Go

### C. Prefix Practice

Circle the prefixes in the following terms and then define them in the spaces provided.

1. tachycardia \_\_\_\_\_
2. pseudocyst \_\_\_\_\_
3. hypoglycemia \_\_\_\_\_
4. intercostal \_\_\_\_\_
5. eupnea \_\_\_\_\_
6. postoperative \_\_\_\_\_
7. monoplegia \_\_\_\_\_
8. subcutaneous \_\_\_\_\_

## Suffixes

A suffix is attached to the end of a word to add meaning, such as a condition, disease, or procedure. For example, the suffix *-itis*, meaning inflammation, when added to *cardi-* forms the new word **carditis** (car-DYE-tis), meaning inflammation of the heart. Every medical term *must* have a suffix. Most often

**Med Term Tip**

Remember, if a suffix begins with a vowel, the combining vowel is dropped; for example, *mastitis* rather than *mastoitis*.

the suffix is added to a word root, as in *carditis* above; however, terms can also be built from a suffix added directly to a prefix, without a word root. For example, the term **dystrophy** (DIS-troh-fee), meaning abnormal development, is built from the prefix *dys-* (meaning abnormal) and the suffix *-trophy* (meaning development).

## Common Suffixes

Some common suffixes, their meanings, and examples of their use are shown below. When written by themselves, suffixes are preceded by a hyphen.

SUFFIX	MEANING	EXAMPLE (DEFINITION)
-algia	pain	gastralgia (stomach pain)
-cele	protrusion	cystocele (protrusion of the bladder)
-cyte	cell	erythrocyte (red cell)
-dynia	pain	cardiodynia (heart pain)
-ectasis	dilation	bronchiectasis (dilated bronchi)
-gen	that which produces	pathogen (that which produces disease)
-genic	producing	carcinogenic (cancer producing)
-ia	state, condition	bradycardia (condition of slow heart)
-iasis	abnormal condition	lithiasis (abnormal condition of stones)
-ism	state of	hypothyroidism (state of low thyroid)
-itis	inflammation	dermatitis (inflammation of skin)
-logist	one who studies	cardiologist (one who studies the heart)
-logy	study of	cardiology (study of the heart)
-lytic	destruction	thrombolytic (clot destruction)
-malacia	abnormal softening	chondromalacia (abnormal cartilage softening)
-megaly	enlarged	cardiomegaly (enlarged heart)
-oma	tumor, mass	carcinoma (cancerous tumor)
-opsy	view of	biopsy (view of life)
-osis	abnormal condition	cyanosis (abnormal condition of being blue)
-pathy	disease	myopathy (muscle disease)
-plasm	formation	neoplasm (new formation)
-plegia	paralysis	laryngoplegia (paralysis of larynx)
-ptosis	drooping	blepharoptosis (drooping eyelid)
-rrhage	excessive, abnormal flow	hemorrhage (excessive bleeding)
-rrhagia	abnormal flow condition	cystorrhagia (abnormal flow from the bladder)
-rrhea	discharge	rhinorrhea (discharge from the nose)
-rrhexis	rupture	hysterorrhexis (ruptured uterus)



SUFFIX	MEANING	EXAMPLE (DEFINITION)
-sclerosis	hardening	arteriosclerosis (hardening of an artery)
-stenosis	narrowing	angiostenosis (narrowing of a vessel)
-therapy	treatment	chemotherapy (treatment with chemicals)
-trophy	development	hypertrophy (excessive development)

## Adjective Suffixes

The following suffixes are used to convert a word root into an adjective. These suffixes usually are translated as *pertaining to*.

SUFFIX	MEANING	EXAMPLE (DEFINITION)
-ac	pertaining to	cardiac (pertaining to the heart)
-al	pertaining to	duodenal (pertaining to the duodenum)
-an	pertaining to	ovarian (pertaining to the ovary)
-ar	pertaining to	ventricular (pertaining to a ventricle)
-ary	pertaining to	pulmonary (pertaining to the lungs)
-atic	pertaining to	lymphatic (pertaining to lymph)
-eal	pertaining to	esophageal (pertaining to the esophagus)
-iac	pertaining to	chondriac (pertaining to cartilage)
-ic	pertaining to	gastric (pertaining to the stomach)
-ile	pertaining to	penile (pertaining to the penis)
-ine	pertaining to	uterine (pertaining to the uterus)
-ior	pertaining to	superior (pertaining to above)
-nic	pertaining to	embryonic (pertaining to an embryo)
-ory	pertaining to	auditory (pertaining to hearing)
-ose	pertaining to	adipose (pertaining to fat)
-ous	pertaining to	intravenous (pertaining to within a vein)
-tic	pertaining to	acoustic (pertaining to hearing)

## Surgical Suffixes

The following suffixes indicate surgical procedures.

SUFFIX	MEANING	EXAMPLE (DEFINITION)
-centesis	puncture to withdraw fluid	arthrocentesis (puncture to withdraw fluid from a joint)
-ectomy	surgical removal	gastrectomy (surgically remove the stomach)
-ostomy	surgically create an opening	colostomy (surgically create an opening for the colon [through the abdominal wall])

### Med Term Tip

Surgical suffixes have very specific meanings:

-otomy means "to cut into"

-ostomy means "to surgically create an opening"

-ectomy means "to cut out" or "remove"

SUFFIX	MEANING	EXAMPLE (DEFINITION)
-otomy	cutting into	thoracotomy (cutting into the chest)
-pexy	surgical fixation	nephropexy (surgical fixation of a kidney)
-plasty	surgical repair	dermatoplasty (surgical repair of the skin)
-rrhaphy	to suture	myorrhaphy (suture together muscle)
-tome	instrument to cut	dermatome (instrument to cut skin)

## Procedural Suffixes

The following suffixes indicate procedural processes or instruments.

SUFFIX	MEANING	EXAMPLE (DEFINITION)
-gram	record or picture	electrocardiogram (record of heart's electricity)
-graphy	process of recording	electrocardiography (process of recording the heart's electrical activity)
-meter	instrument for measuring	audiometer (instrument to measure hearing)
-metry	process of measuring	audiometry (process of measuring hearing)
-scope	instrument for viewing	gastroscope (instrument to view stomach)
-scopic	pertaining to visually examining	endoscopic (pertaining to visually examining within)
-scopy	process of visually examining	gastroscopy (process of visually examining the stomach)

## Practice As You Go

### D. Combining Form and Suffix Practice

Join a combining form and a suffix to form words with the following meanings.

- study of lungs \_\_\_\_\_
- nose discharge \_\_\_\_\_
- abnormal softening of a kidney \_\_\_\_\_
- enlarged heart \_\_\_\_\_
- cutting into the stomach \_\_\_\_\_
- inflammation of the skin \_\_\_\_\_
- surgical removal of the voice box \_\_\_\_\_
- surgical repair of a joint \_\_\_\_\_

## Word Building

Word building consists of putting together two or more word elements to form a variety of terms. Prefixes and suffixes may be added to a combining form to create a new descriptive term. For example, adding the prefix *hypo-* (meaning below) and the suffix *-ic* (meaning pertaining to) to the combining form *derm/o* (meaning skin) forms **hypodermic** (high-poh-DER-mik), which means pertaining to below the skin.

## Interpreting Medical Terms

The following strategy is a reliable method for puzzling out the meaning of an unfamiliar medical term.

STEP	EXAMPLE
1. Divide the term into its word parts.	gastr/o/enter/o/ology
2. Define each word part.	<b>gastr</b> = stomach <b>o</b> = combining vowel, no meaning <b>enter</b> = small intestine <b>o</b> = combining vowel, no meaning <b>-logy</b> = study of
3. Combine the meaning of the word parts.	stomach, small intestine, study of

### Med Term Tip

To gain a quick understanding of a term, it may be helpful to you to read from the end of the word (or the suffix) back to the beginning (the prefix), and then pick up the word root. For example, *pericarditis* reads inflammation (*-itis*) around (*peri-*) the heart (*cardi/o*).

## Pronunciation

You may hear different pronunciations for the same terms depending on where a person was born or educated. As long as it is clear which term people are discussing, differing pronunciations are acceptable. Some people are difficult to understand over the telephone or on a transcription tape. If you have any doubt about a term being discussed, ask for the term to be spelled. For example, it is often difficult to hear the difference between the terms **abduction** and **adduction**. However, since the terms refer to opposite directions of movement, it is very important to double-check if there is any question about which term is being used.

Each new term in this book is introduced in boldface type, with the phonetic or “sounds like” pronunciation in parentheses immediately following. The part of the word that should receive the greatest emphasis during pronunciation appears in capital letters, for example, **pericarditis** (per-ih-car-DYE-tis). Each term presented in this book is also pronounced on the accompanying My Medical Terminology Lab website ([www.mymedicalterminologylab.com](http://www.mymedicalterminologylab.com)). Listen to each word, then pronounce it silently to yourself or out loud.

## Spelling

Although you may hear differing pronunciations of the same term, there is only one correct spelling. If you have any doubt about the spelling of a term or of its meaning, always look it up in a medical dictionary. If only one letter of the word is changed, it can make a critical difference for the patient. For example, imagine the problem that could arise if you note for insurance purposes that a portion of a patient’s **ileum**, or small intestine, was removed when in reality he had surgery for removal of a piece of his **ilium**, or hip bone.

### Med Term Tip

If you have any doubt about the meaning or spelling of a word, look it up in your medical dictionary. Even experienced medical personnel still need to look up a few words.

Some words have the same beginning sounds but are spelled differently. Examples include:

**Sounds like *si***

psy	<b>psychiatry</b> (sigh-KIGH-ah-tree)
cy	<b>cytology</b> (sigh-TALL-oh-gee)

**Sounds like *dis***

dys	<b>dyspepsia</b> (dis-PEP-see-ah)
dis	<b>dislocation</b> (dis-low-KAY-shun)

## Singular and Plural Endings

Many medical terms originate from Greek and Latin words. The rules for forming the singular and plural forms of some words follow the rules of these languages rather than English. For example, the heart has a left atrium and a right atrium for a total of two *atria*, not two *atriums*. Other words, such as *virus* and *viruses*, are changed from singular to plural by following English rules. Each medical term needs to be considered individually when changing from the singular to the plural form. The following examples illustrate how to form plurals.

WORDS ENDING IN	SINGULAR	PLURAL
-a	vertebra	vertebrae
-ax	thorax	thoraces
-ex or -ix	appendix	appendices
-is	metastasis	metastases
-ma	sarcoma	sarcomata
-nx	phalanx	phalanges
-on	ganglion	ganglia
-us	nucleus	nuclei
-um	ovum	ova
-y	biopsy	biopsies

## Practice As You Go

### E. Make It Plural

Change the following singular terms to plural terms.

1. metastasis \_\_\_\_\_
2. ovum \_\_\_\_\_
3. diverticulum \_\_\_\_\_
4. atrium \_\_\_\_\_
5. diagnosis \_\_\_\_\_
6. vertebra \_\_\_\_\_

## Abbreviations

Abbreviations are commonly used in the medical profession as a way of saving time. However, some abbreviations can be confusing, such as *SM* for simple mastectomy and *sm* for small. Using incorrect abbreviations can result in problems for a patient, as well as with insurance records and processing. If you have any concern that you will confuse someone by using an abbreviation, spell out the word instead. It is never acceptable to use made-up abbreviations. All types of healthcare facilities will have a list of approved abbreviations, and it is extremely important that you become familiar with this list and follow it closely. Throughout this book abbreviations are included, when possible, immediately following terms. Additionally, a list of common abbreviations for each body system is provided in each chapter. Finally, Appendix III offers a complete alphabetical listing of all the abbreviations used in this text.

## The Medical Record

The **medical record** or chart documents the details of a patient's hospital stay. Each healthcare professional that has contact with the patient in any capacity completes the appropriate report of that contact and adds it to the medical chart. This results in a permanent physical record of the patient's day-to-day condition, when and what services he or she received, and the response to treatment. Each institution adopts a specific format for each document and its location within the chart. This is necessary because each healthcare professional must be able to locate quickly and efficiently the information he or she needs in order to provide proper care for the patient. The medical record is also a legal document. Therefore, it is essential that all chart components be completely filled out and signed. Each page must contain the proper patient identification information: the patient's name, age, gender, physician, admission date, and identification number.

While the patient is still in the hospital, a unit clerk is usually responsible for placing documents in the proper place. After discharge, the medical records department ensures that all documents are present, complete, signed, and in the correct order. If a person is readmitted, especially for the same diagnosis, parts of this previous chart can be pulled and added to the current chart for reference (see Figure 1.2 ■). Physicians' offices and other outpatient care providers such as clinics and therapists also maintain a medical record detailing each patient's visit to their facility.

The digital revolution has also impacted healthcare with the increasing use of the **Electronic Medical Record (EMR)**. A software program allows you to enter patient information into a computer or tablet, which then organizes and stores the information. You enter information either at a centralized workstation or by using mobile devices at the point of care. Once digitally stored, the information may be analyzed and monitored to detect and prevent potential errors. Since the records are digitally stored, they can be accessed and shared between healthcare providers easily, which reduces unnecessary repetition of tests and inadvertent medication errors. The following list includes the most common elements of a paper chart with a brief description.

**History and Physical**—Written or dictated by admitting physician; details patient's history, results of physician's examination, initial diagnoses, and physician's plan of treatment

■ **Figure 1.2** Health information professionals maintain accurate, orderly, and permanent patient records. Medical records are securely stored and available for future reference. (B. Franklin/Shutterstock)



**Physician's Orders**—Complete list of care, medications, tests, and treatments physician orders for patient

**Nurse's Notes**—Record of patient's care throughout the day; includes vital signs, treatment specifics, patient's response to treatment, and patient's condition

**Physician's Progress Notes**—Physician's daily record of patient's condition, results of physician's examinations, summary of test results, updated assessment and diagnoses, and further plans for patient's care

**Consultation Reports**—Reports given by specialists whom physician has asked to evaluate patient

**Ancillary Reports**—Reports from various treatments and therapies patient has received, such as rehabilitation, social services, or respiratory therapy

**Diagnostic Reports**—Results of diagnostic tests performed on patient, principally from clinical lab (e.g., blood tests) and medical imaging (e.g., X-rays and ultrasound)

**Informed Consent**—Document voluntarily signed by patient or a responsible party that clearly describes purpose, methods, procedures, benefits, and risks of a diagnostic or treatment procedure

**Operative Report**—Report from surgeon detailing an operation; includes pre- and postoperative diagnosis, specific details of surgical procedure itself, and how patient tolerated procedure

**Anesthesiologist's Report**—Relates details regarding substances (such as medications and fluids) given to patient, patient's response to anesthesia, and vital signs during surgery

**Pathologist's Report**—Report given by pathologist who studies tissue removed from patient (e.g., bone marrow, blood, or tissue biopsy)

**Discharge Summary**—Comprehensive outline of patient's entire hospital stay; includes condition at time of admission, admitting diagnosis, test results, treatments and patient's response, final diagnosis, and follow-up plans



# Healthcare Settings

The use of medical terminology is widespread. It provides healthcare professionals with a precise and efficient method of communicating very specific patient information to one another, regardless of whether they are in the same type of facility (see Figure 1.3 ■). What follows are descriptions of the different types of settings where medical terminology is used.

**Acute Care or General Hospitals**—Provide services to diagnose (laboratory, diagnostic imaging) and treat (surgery, medications, therapy) diseases for a short period of time; in addition, they usually provide emergency and obstetrical care

**Specialty Care Hospitals**—Provide care for very specific types of diseases; for example, a psychiatric hospital

**Nursing Homes or Long-Term Care Facilities**—Provide long-term care for patients needing extra time to recover from illness or injury before returning home, or for persons who can no longer care for themselves

**Ambulatory Care Centers, Surgical Centers, or Outpatient Clinics**—Provide services not requiring overnight hospitalization; services range from simple surgeries to diagnostic testing or therapy

**Physicians' Offices**—Provide diagnostic and treatment services in a private office setting

**Health Maintenance Organization (HMO)**—Provides wide range of services by a group of primary-care physicians, specialists, and other healthcare professionals in a prepaid system

**Home Health Care**—Provides nursing, therapy, personal care, or housekeeping services in patient's own home

**Rehabilitation Centers**—Provide intensive physical and occupational therapy; includes inpatient and outpatient treatment

**Hospices**—Provide supportive treatment to terminally ill patients and their families



■ **Figure 1.3** A nurse and medical assistant review a patient's chart and plan his or her daily care. (*Life in View/ Science Source*)

## Confidentiality

Anyone working with medical terminology and involved in the medical profession must have a firm understanding of confidentiality. Any information or record relating to a patient must be considered privileged. This means that you have a moral and legal responsibility to keep all information about the patient confidential. If you are asked to supply documentation relating to a patient, the proper authorization form must be signed by the patient. Give only the specific information that the patient has authorized. The Health Insurance Portability and Accountability Act of 1996 (HIPAA) set federal standards providing patients with more protection of their medical records and health information, better access to their own records, and greater control over how their health information is used and to whom it is disclosed.





# Chapter Review

## Practice Exercises

### A. Terminology Matching

Match each definition to its term.

- |   |                               |
|---|-------------------------------|
| 1. _____ Provides services for a short period of time                       | a. rehabilitation center      |
| 2. _____ Complete outline of a patient's entire hospital stay               | b. nurse's notes              |
| 3. _____ Describes purpose, methods, benefits, and risks of procedure       | c. ancillary report           |
| 4. _____ Contains updated assessment, diagnoses, and further plans for care | d. hospice                    |
| 5. _____ Provides supportive care to terminally ill patients and families   | e. discharge summary          |
| 6. _____ Written by the admitting physician                                 | f. physician's progress notes |
| 7. _____ Reports results from study of tissue removed from the patient      | g. ambulatory care center     |
| 8. _____ Written by the surgeon   | h. diagnostic report          |
| 9. _____ Provides services not requiring overnight hospital stay            | i. long-term care facility    |
| 10. _____ Report given by a specialist                                      | j. informed consent           |
| 11. _____ Record of a patient's care throughout the day                     | k. history and physical       |
| 12. _____ Clinical lab and medical imaging reports                          | l. acute care hospital        |
| 13. _____ Provides intensive physical and occupational therapy              | m. pathologist's report       |
| 14. _____ Report of treatment/therapy the patient received                  | n. consultation report        |
| 15. _____ Provides care for patients who need more time to recover          | o. operative report           |

### B. Define the Suffix

1. **-plasty** \_\_\_\_\_
2. **-stenosis** \_\_\_\_\_
3. **-itis** \_\_\_\_\_
4. **-al** \_\_\_\_\_
5. **-algia** \_\_\_\_\_
6. **-otomy** \_\_\_\_\_
7. **-megaly** \_\_\_\_\_

8. **-ectomy** \_\_\_\_\_
9. **-rrhage** \_\_\_\_\_
10. **-centesis** \_\_\_\_\_
11. **-gram** \_\_\_\_\_
12. **-ac** \_\_\_\_\_
13. **-malacia** \_\_\_\_\_
14. **-ism** \_\_\_\_\_
15. **-rrhaphy** \_\_\_\_\_
16. **-ostomy** \_\_\_\_\_
17. **-pexy** \_\_\_\_\_
18. **-rrhea** \_\_\_\_\_
19. **-scopy** \_\_\_\_\_
20. **-oma** \_\_\_\_\_

### C. Name That Prefix

1. inner \_\_\_\_\_
2. large \_\_\_\_\_
3. before \_\_\_\_\_
4. around \_\_\_\_\_
5. new \_\_\_\_\_
6. without \_\_\_\_\_
7. half \_\_\_\_\_
8. painful, difficult \_\_\_\_\_
9. excessive \_\_\_\_\_
10. above \_\_\_\_\_
11. many \_\_\_\_\_
12. slow \_\_\_\_\_
13. self \_\_\_\_\_
14. across \_\_\_\_\_
15. two \_\_\_\_\_

## D. Building Medical Terms

Build a medical term by combining the word parts requested in each question.

For example, use the combining form for *spleen* with the suffix meaning *enlargement* to form a word meaning *enlargement of the spleen* (answer: *splenomegaly*).

1. combining form for *heart* \_\_\_\_\_  
 suffix meaning *abnormal softening* \_\_\_\_\_  
 } term meaning *softening of the heart*
  
2. word root form for *stomach* \_\_\_\_\_  
 suffix meaning *to surgically create an opening* \_\_\_\_\_  
 } term meaning *creating an opening into the stomach*
  
3. combining form for *nose* \_\_\_\_\_  
 suffix meaning *surgical repair* \_\_\_\_\_  
 } term meaning *surgical repair of the nose*
  
4. prefix meaning *excessive* \_\_\_\_\_  
 suffix meaning *development* \_\_\_\_\_  
 } term meaning *excessive development*
  
5. combining form meaning *disease* \_\_\_\_\_  
 suffix meaning *the study of* \_\_\_\_\_  
 } term meaning *the study of disease*
  
6. word root meaning *nerve* \_\_\_\_\_  
 suffix for *tumor/mass* \_\_\_\_\_  
 } term meaning *nerve tumor*
  
7. combining form meaning *stomach* \_\_\_\_\_  
 combining form meaning *small intestine* \_\_\_\_\_  
 suffix meaning *study of* \_\_\_\_\_  
 } term meaning *study of stomach and small intestine*
  
8. word root meaning *ear* \_\_\_\_\_  
 suffix meaning *inflammation* \_\_\_\_\_  
 } term meaning *ear inflammation*
  
9. prefix meaning *chemical* \_\_\_\_\_  
 suffix meaning *treatment* \_\_\_\_\_  
 } term meaning *chemical treatment*
  
10. combining form meaning *cancer* \_\_\_\_\_  
 suffix meaning *that which produces* \_\_\_\_\_  
 } term meaning *that which produces cancer*

**E. Define the Combining Form**

1. **bi/o** \_\_\_\_\_
2. **carcin/o** \_\_\_\_\_
3. **cardi/o** \_\_\_\_\_
4. **chem/o** \_\_\_\_\_
5. **cis/o** \_\_\_\_\_
6. **dermat/o** \_\_\_\_\_
7. **enter/o** \_\_\_\_\_
8. **gastr/o** \_\_\_\_\_
9. **gynec/o** \_\_\_\_\_
10. **hemat/o** \_\_\_\_\_
11. **immun/o** \_\_\_\_\_
12. **laryng/o** \_\_\_\_\_
13. **path/o** \_\_\_\_\_
14. **nephr/o** \_\_\_\_\_
15. **neur/o** \_\_\_\_\_
16. **ophthalm/o** \_\_\_\_\_
17. **ot/o** \_\_\_\_\_
18. **pulmon/o** \_\_\_\_\_
19. **rhin/o** \_\_\_\_\_

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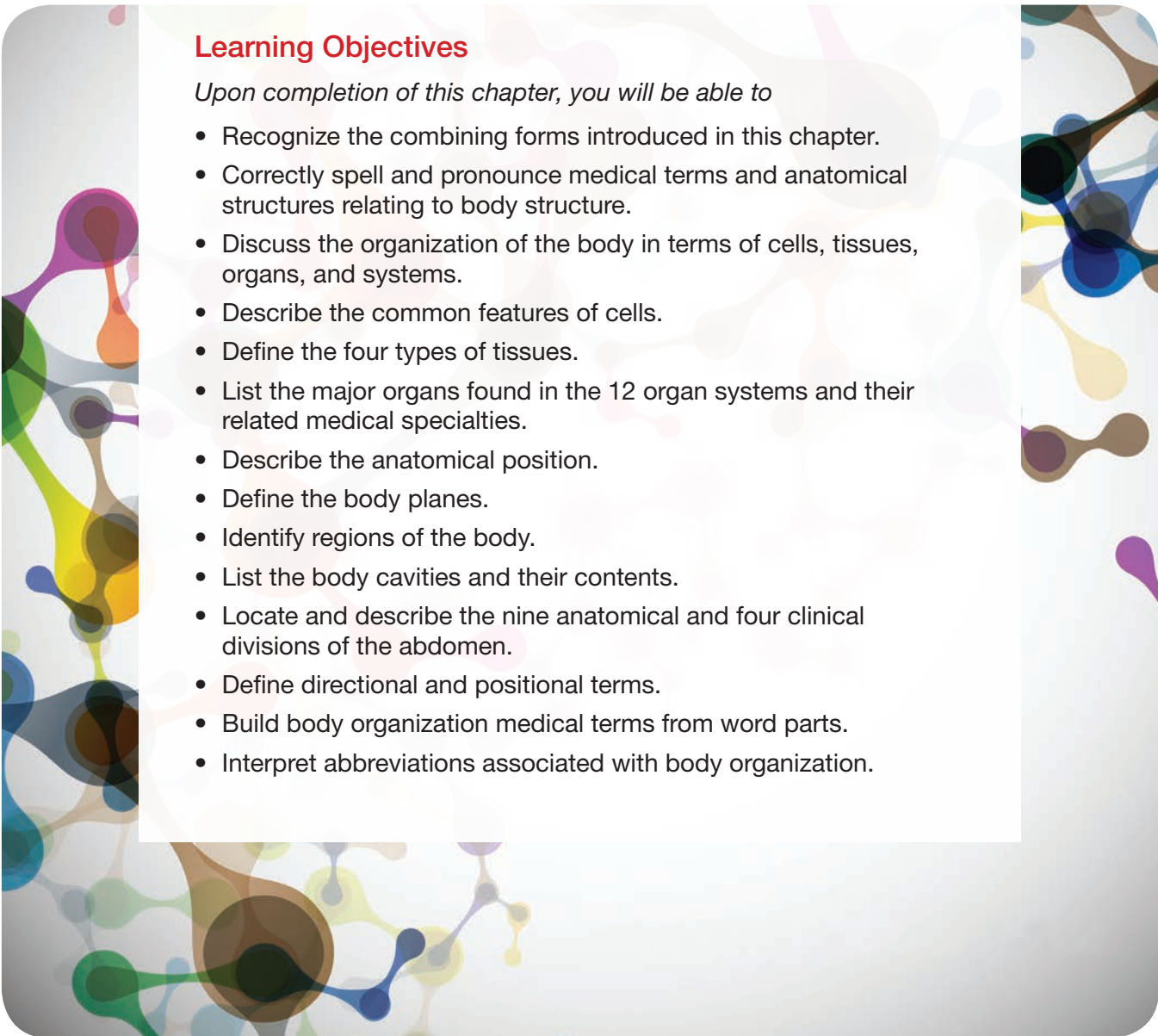


# 2

## Body Organization

### Learning Objectives

*Upon completion of this chapter, you will be able to*

- Recognize the combining forms introduced in this chapter.
  - Correctly spell and pronounce medical terms and anatomical structures relating to body structure.
  - Discuss the organization of the body in terms of cells, tissues, organs, and systems.
  - Describe the common features of cells.
  - Define the four types of tissues.
  - List the major organs found in the 12 organ systems and their related medical specialties.
  - Describe the anatomical position.
  - Define the body planes.
  - Identify regions of the body.
  - List the body cavities and their contents.
  - Locate and describe the nine anatomical and four clinical divisions of the abdomen.
  - Define directional and positional terms.
  - Build body organization medical terms from word parts.
  - Interpret abbreviations associated with body organization.
- 



# Body Organization at a Glance

## Arrangement

The body is organized into levels; each is built from the one below it. In other words, the body as a whole is composed of systems, a system is composed of organs, an organ is composed of tissues, and tissues are composed of cells.

## Levels

**cells   tissues   organs   systems   body**

## Word Parts

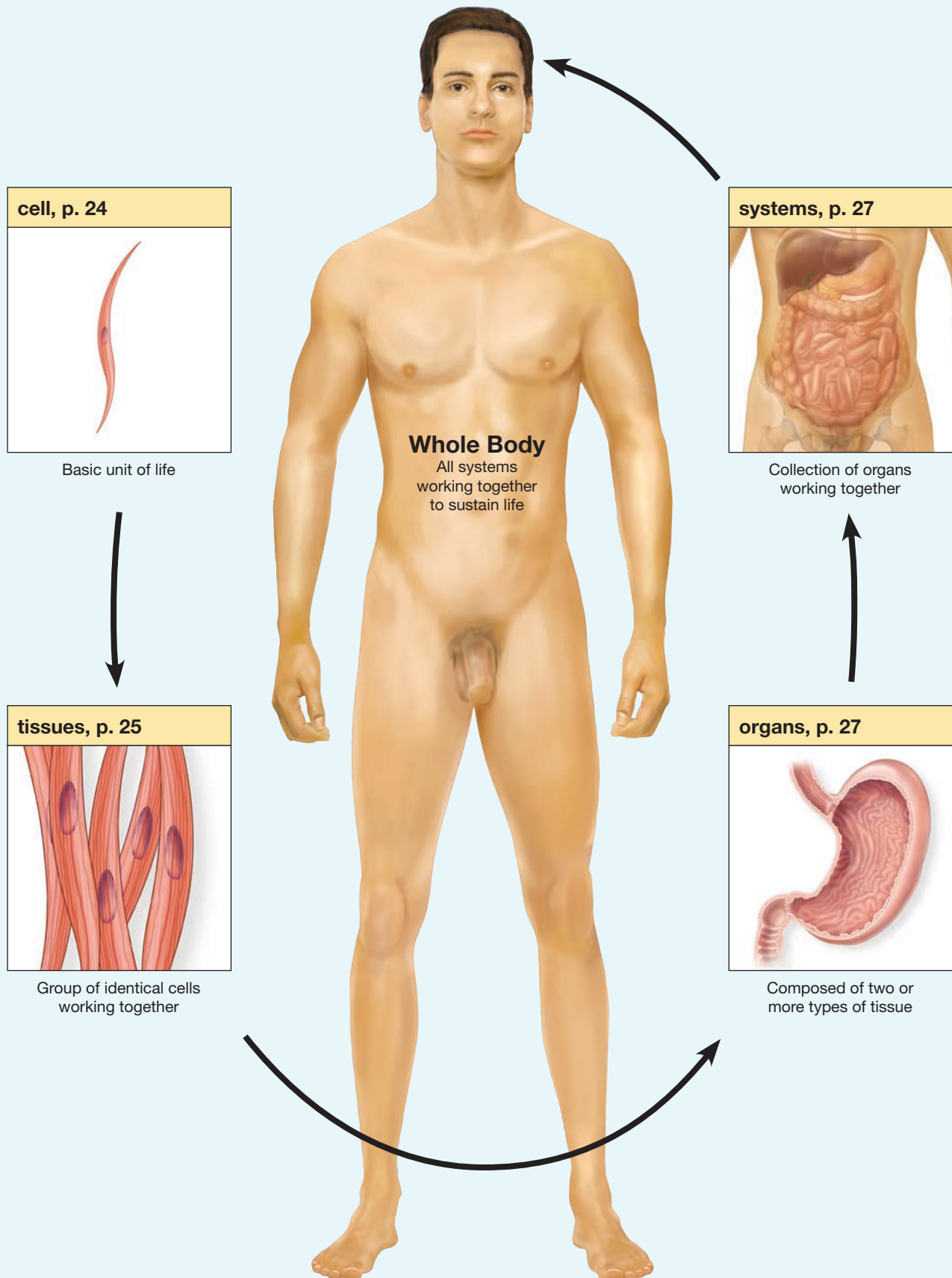
Presented here are some of the more common combining forms used to build body organizational terms.

### Combining Forms

<b>abdomin/o</b>	abdomen	<b>lymph/o</b>	lymph
<b>adip/o</b>	fat	<b>medi/o</b>	middle
<b>anter/o</b>	front	<b>muscul/o</b>	muscle
<b>brachi/o</b>	arm	<b>nephr/o</b>	kidney
<b>cardi/o</b>	heart	<b>neur/o</b>	nerve
<b>caud/o</b>	tail	<b>ophthalm/o</b>	eye
<b>cephal/o</b>	head	<b>orth/o</b>	straight, upright
<b>cervic/o</b>	neck	<b>ot/o</b>	ear
<b>chondr/o</b>	cartilage	<b>pariet/o</b>	cavity wall
<b>crani/o</b>	skull	<b>ped/o</b>	foot
<b>crin/o</b>	to secrete	<b>pelv/o</b>	pelvis
<b>crur/o</b>	leg	<b>peritone/o</b>	peritoneum
<b>cyt/o</b>	cell	<b>pleur/o</b>	pleura
<b>dermat/o</b>	skin	<b>poster/o</b>	back
<b>dist/o</b>	away from	<b>proct/o</b>	rectum and anus
<b>dors/o</b>	back	<b>proxim/o</b>	near to
<b>enter/o</b>	small intestine	<b>pub/o</b>	genital region
<b>epitheli/o</b>	epithelium	<b>pulmon/o</b>	lung
<b>gastr/o</b>	stomach	<b>rhin/o</b>	nose
<b>glute/o</b>	buttock	<b>spin/o</b>	spine
<b>gynec/o</b>	woman	<b>super/o</b>	above
<b>hemat/o</b>	blood	<b>thorac/o</b>	chest
<b>hist/o</b>	tissue	<b>ur/o</b>	urine
<b>immun/o</b>	protection	<b>urin/o</b>	urine
<b>infer/o</b>	below	<b>vascul/o</b>	blood vessel
<b>inguin/o</b>	groin	<b>ventr/o</b>	belly
<b>laryng/o</b>	larynx	<b>vertebr/o</b>	vertebra
<b>later/o</b>	side	<b>viscer/o</b>	internal organ
<b>lumb/o</b>	loin (low back)		



# Body Organization Illustrated



## Levels of Body Organization

body  
cells

organs  
systems

tissues

Before taking a look at the whole human body, we need to examine its component parts. The human **body** is composed of **cells**, **tissues**, **organs**, and **systems**. These components are arranged in a hierarchical manner. That is, parts from a lower level come together to form the next higher level. In that way, cells come together to form tissues, tissues come together to form organs, organs come together to form systems, and all the systems come together to form the whole body.

### Cells

cell membrane

cytology (sigh-TALL-oh-jee)

cytoplasm (SIGH-toh-plazm)

nucleus

#### What's In A Name?

Look for these word parts:

cyt/o = cell

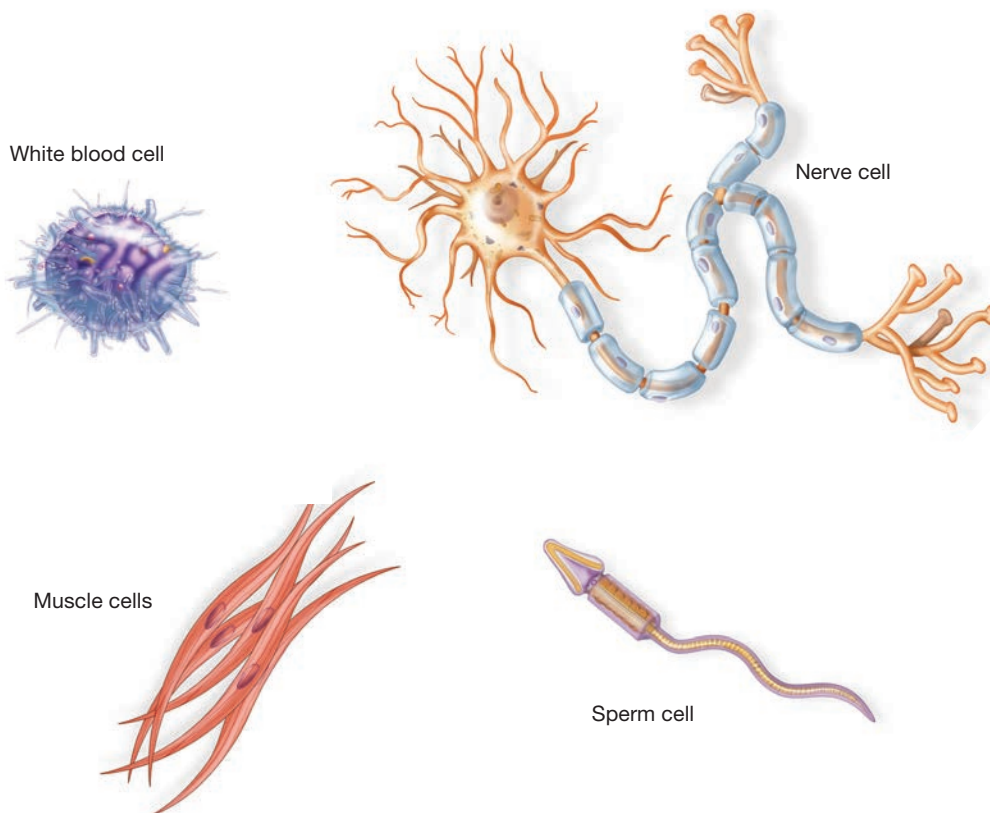
-logy = study of

-plasm = formation

#### Med Term Tip

Cells were first seen by Robert Hooke over 300 years ago. To him, the rectangular shapes looked like prison cells, so he named them cells. It was a common practice for early anatomists to name an organ solely on its appearance.

The cell is the fundamental unit of all living things. That is to say, it is the smallest structure of a body that has all the properties of being alive: responding to stimuli, engaging in metabolic activities, and reproducing itself. All the tissues and organs in the body are composed of cells. Individual cells perform functions for the body such as reproduction, hormone secretion, energy production, and excretion. Special cells are also able to carry out very specific functions, such as contraction by muscle cells and electrical impulse transmission by nerve cells. The study of cells and their functions is called **cytology**. No matter the difference in their shape and function, at some point during their life cycle all cells have a **nucleus**, **cytoplasm**, and a **cell membrane** (see Figure 2.1 ■). The cell membrane is the outermost boundary of a cell. It encloses the cytoplasm, the watery internal environment of the cell, and the nucleus, which contains the cell's DNA.



■ **Figure 2.1** Examples of four different types of cells from the body. Although each cell has a cell membrane, nucleus, and cytoplasm, each has a unique shape depending on its location and function.

## Tissues

connective tissue

epithelial tissue (ep-ih-THEE-lee-al)

histology (hiss-TALL-oh-jee)

muscular tissue

nervous tissue

**Histology** is the study of tissue. A tissue is formed when like cells are grouped together and function together to perform a specific activity. The body has four types of tissue: **muscular tissue**, **epithelial tissue**, **connective tissue**, and **nervous tissue** (see Figure 2.2 ■).

## Muscular Tissue

cardiac muscle

smooth muscle

muscle fibers

skeletal muscle

Muscular tissue produces movement in the body through contraction, or shortening in length, and is composed of individual muscle cells called **muscle fibers**. Muscle tissue forms one of three basic types of muscles: **skeletal muscle**, **smooth muscle**, or **cardiac muscle**. Skeletal muscle is attached to bone. Smooth muscle is found in internal organs such as the intestine, uterus, and blood vessels. Cardiac muscle is found only in the heart.

## Epithelial Tissue

epithelium (ep-ih-THEE-lee-um)

Epithelial tissue, or **epithelium**, is found throughout the body and is composed of close-packed cells that form the covering for and lining of body structures. For example, both the top layer of skin and the lining of the stomach are epithelial tissue (see Figure 2.2). In addition to forming a protective barrier, epithelial tissue may be specialized to absorb substances (such as nutrients from the intestine), secrete substances (such as sweat glands), or excrete wastes (such as the kidney tubules).

## Connective Tissue

adipose (ADD-ih-pohs)

bone

cartilage (CAR-tih-lij)

tendons

Connective tissue is the supporting and protecting tissue in body structures. Because connective tissue performs many different functions depending on its location, it appears in many different forms so that each is able to perform the task required at that location. For example, **bone** provides structural support for the whole body. **Cartilage** is the shock absorber in joints. **Tendons** tightly connect skeletal muscles to bones. **Adipose** provides protective padding around body structures (see Figure 2.2).

## Nervous Tissue

brain

nerves

neurons

spinal cord

Nervous tissue is composed of cells called **neurons** (see Figure 2.2). This tissue forms the **brain**, **spinal cord**, and a network of **nerves** throughout the entire body, allowing for the conduction of electrical impulses to send information between the brain and the rest of the body.

### What's In A Name?

Look for these word parts:

epitheli/o = epithelium

hist/o = tissue

muscul/o = muscle

-al = pertaining to

-ar = pertaining to

-logy = study of

-ous = pertaining to

### What's In A Name?

Look for these word parts:

cardi/o = heart

-ac = pertaining to

-al = pertaining to

### Med Term Tip

The term *epithelium* comes from the prefix *epi-* meaning “on top of” and the combining form *the-ili/o* meaning “nipple” (referring to any projection from the surface).

### What's In A Name?

Look for these word parts:

adip/o = fat

-ose = pertaining to

### What's In A Name?

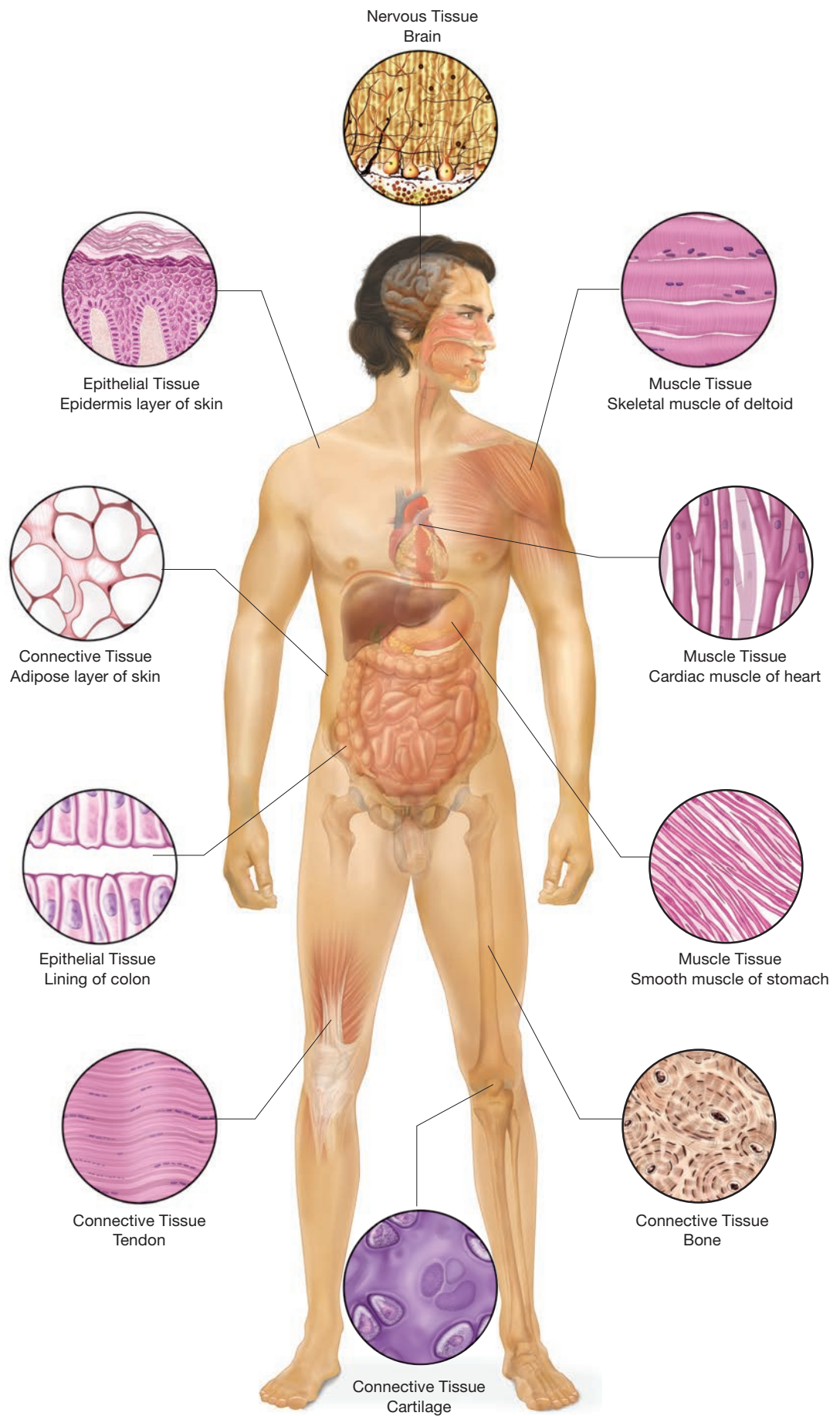
Look for these word parts:

neur/o = nerve

spin/o = spine

-al = pertaining to

■ **Figure 2.2** The appearance of different types of tissues—muscle, epithelial, nervous, connective—and their location within the body.



## Practice as You Go

### A. Complete the Statement

- The levels of organization of the body in order from smallest to largest are: \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.
- No matter its shape, all cells have a \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
- \_\_\_\_\_ tissue lines internal organs and serves as a covering for the skin.
- \_\_\_\_\_ muscle is located in the heart, \_\_\_\_\_ muscle is attached to bones, and \_\_\_\_\_ muscle is found in internal organs.
- Cartilage and tendons are examples of \_\_\_\_\_ tissue.
- Nervous tissue is composed of \_\_\_\_\_.

## Organs and Systems

Organs are composed of several different types of tissue that work as a unit to perform special functions. For example, the stomach contains smooth muscle tissue, nervous tissue, and epithelial tissue that allow it to contract to mix food with digestive juices.

A system is composed of several organs working in a coordinated manner to perform a complex function or functions. To continue with our example, the stomach plus the other digestive system organs—the oral cavity, esophagus, liver, pancreas, small intestine, and colon—work together to ingest, digest, and absorb our food.

Table 2.1 ■ presents the organ systems that are discussed in this book along with the major organs found in each system, the system functions, and the medical specialties that treat conditions of that system.




**Table 2.1** Organ Systems of the Human Body

System and Medical Specialty	Word Parts	Structures	Functions
<b>Integumentary System</b> (in-teg-you-MEN-tah-ree)  dermatology (der-mah-TALL-oh-jee)	-ary = pertaining to dermat/o = skin -logy = study of	<ul style="list-style-type: none"> <li>• Skin</li> <li>• Hair</li> <li>• Nails</li> <li>• Sweat glands</li> <li>• Sebaceous glands</li> </ul>	Forms protective two-way barrier and aids in temperature regulation.








Table 2.1 Organ Systems of the Human Body (continued)




System and Medical Specialty	Word Parts	Structures		Functions
<b>Musculoskeletal System (MS)</b> (mus-qu-low-SKEL-et-all)  orthopedics (or-thoh-PEE-diks)  orthopedic surgery (or-thoh-PEE-dik)	<b>muscul/o</b> = muscle <b>-al</b> = pertaining to <b>orth/o</b> = straight <b>ped/o</b> = foot <b>-ic</b> = pertaining to	<ul style="list-style-type: none"><li>• Bones</li><li>• Joints</li><li>• Muscles</li></ul>		Skeleton supports and protects the body, forms blood cells, and stores minerals. Muscles produce movement.
<b>Cardiovascular System (CV)</b> (car-dee-oh-VAS-kew-lar)  cardiology (car-dee-ALL-oh-jee)	<b>cardi/o</b> = heart <b>vascul/o</b> = blood vessel <b>-ar</b> = pertaining to <b>-logy</b> = study of	<ul style="list-style-type: none"><li>• Heart</li><li>• Arteries</li><li>• Veins</li></ul>		Pumps blood throughout the entire body to transport nutrients, oxygen, and wastes.
<b>Blood (Hematic System)</b> (he-MAT-tik)  hematology (hee-mah-TALL-oh-jee)	<b>hemat/o</b> = blood <b>-ic</b> = pertaining to <b>-logy</b> = study of	<ul style="list-style-type: none"><li>• Plasma</li><li>• Erythrocytes</li><li>• Leukocytes</li><li>• Platelets</li></ul>		Transports oxygen, protects against pathogens, and controls bleeding.





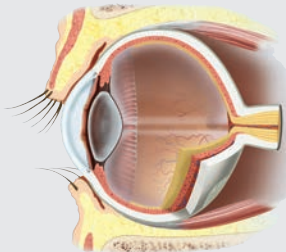

**Table 2.1** Organ Systems of the Human Body (continued)

System and Medical Specialty	Word Parts	Structures		Functions
<b>Lymphatic System</b> (lim-FAT-ik)  immunology (im-yoo-NALL-oh-jee)	<b>lymph/o</b> = lymph <b>-atic</b> = pertaining to <b>immun/o</b> = protection <b>-logy</b> = study of	<ul style="list-style-type: none"> <li>• Lymph nodes</li> <li>• Lymphatic vessels</li> <li>• Spleen</li> <li>• Thymus gland</li> <li>• Tonsils</li> </ul>		Protects the body from disease and invasion from pathogens.
<b>Respiratory System</b>  otorhinolaryngology (ENT) (oh-toh-rye-noh-lair-ing-GALL-oh-jee)  pulmonology (pull-mon-ALL-oh-jee)  thoracic surgery (tho-RASS-ik)	<b>-ory</b> = pertaining to <b>ot/o</b> = ear <b>rhin/o</b> = nose <b>laryng/o</b> = larynx <b>pulmon/o</b> = lung <b>thorac/o</b> = chest <b>-ic</b> = pertaining to <b>-logy</b> = study of	<ul style="list-style-type: none"> <li>• Nasal cavity</li> <li>• Pharynx</li> <li>• Larynx</li> <li>• Trachea</li> <li>• Bronchial tubes</li> <li>• Lungs</li> </ul>		Obtains oxygen and removes carbon dioxide from the body.
<b>Digestive or Gastrointestinal System (GI)</b>  gastroenterology (gas-troh-en-ter-ALL-oh-jee)  proctology (prok-TOL-oh-jee)	<b>gastr/o</b> = stomach <b>enter/o</b> = small intestine <b>proct/o</b> = rectum and anus <b>-al</b> = pertaining to <b>-logy</b> = study of	<ul style="list-style-type: none"> <li>• Oral cavity</li> <li>• Pharynx</li> <li>• Esophagus</li> <li>• Stomach</li> <li>• Small intestine</li> <li>• Colon</li> <li>• Liver</li> <li>• Gallbladder</li> <li>• Pancreas</li> <li>• Salivary glands</li> </ul>		Ingests, digests, and absorbs nutrients for the body.

**Table 2.1** Organ Systems of the Human Body (continued)

System and Medical Specialty	Word Parts	Structures		Functions
<b>Urinary System</b> (YOO-rih-nair-ee)  <b>nephrology</b> (neh-FROL-oh-jee)  <b>urology</b> (yoo-RALL-oh-jee)	<b>urin/o</b> = urine <b>-ary</b> = pertaining to <b>nephro/o</b> = kidney <b>ur/o</b> = urine <b>-logy</b> = study of	<ul style="list-style-type: none"> <li>• Kidneys</li> <li>• Ureters</li> <li>• Urinary bladder</li> <li>• Urethra</li> </ul>		Filters waste products out of the blood and removes them from the body.
<b>Female Reproductive System</b>  <b>gynecology (GYN)</b> (gigh-neh-KOL-oh-jee)  <b>obstetrics (OB)</b> (ob-STET-riks)	<b>gynec/o</b> = female <b>-logy</b> = study of	<ul style="list-style-type: none"> <li>• Ovary</li> <li>• Fallopian tubes</li> <li>• Uterus</li> <li>• Vagina</li> <li>• Vulva</li> <li>• Breasts</li> </ul>		Produces eggs for reproduction and provides place for growing baby.
<b>Male Reproductive System</b>  <b>urology</b> (yoo-RALL-oh-jee)	<b>ur/o</b> = urine <b>-logy</b> = study of	<ul style="list-style-type: none"> <li>• Testes</li> <li>• Epididymis</li> <li>• Vas deferens</li> <li>• Penis</li> <li>• Seminal vesicles</li> <li>• Prostate gland</li> <li>• Bulbourethral gland</li> </ul>		Produces sperm for reproduction.

**Table 2.1 Organ Systems of the Human Body (continued)**

System and Medical Specialty	Word Parts	Structures	Functions
<b>Endocrine System</b> (EN-doh-krin)  <b>endocrinology</b> (en-doh-krin-ALL-oh-jee)	<b>endo-</b> = within <b>crin/o</b> = to secrete <b>-ine</b> = pertaining to <b>-logy</b> = study of	<ul style="list-style-type: none"> <li>• Pituitary gland</li> <li>• Pineal gland</li> <li>• Thyroid gland</li> <li>• Parathyroid glands</li> <li>• Thymus gland</li> <li>• Adrenal glands</li> <li>• Pancreas</li> <li>• Ovaries</li> <li>• Testes</li> </ul>	 <p>Regulates metabolic activities of the body.</p>
<b>Nervous System</b>  <b>neurology</b> (noo-RALL-oh-jee)  <b>neurosurgery</b> (noo-roh-SIR-jer-ee)	<b>-ous</b> = pertaining to <b>neur/o</b> = nerve <b>-logy</b> = study of	<ul style="list-style-type: none"> <li>• Brain</li> <li>• Spinal cord</li> <li>• Nerves</li> </ul>	 <p>Receives sensory information and coordinates the body's response.</p>
<b>Special Senses</b>  <b>ophthalmology</b> (off-thal-MALL-oh-jee)	<b>ophthalm/o</b> = eye <b>-logy</b> = study of	<ul style="list-style-type: none"> <li>• Eye</li> </ul>	 <p>Vision</p>
<b>otorhinolaryngology (ENT)</b> (oh-toh-rye-noh-lair-ing-GALL-oh-jee)	<b>ot/o</b> = ear <b>rhin/o</b> = nose <b>laryng/o</b> = larynx <b>-logy</b> = study of	<ul style="list-style-type: none"> <li>• Ear</li> </ul>	 <p>Hearing and balance</p>

## Practice as You Go

### B. Organ System and Function Challenge

For each organ listed below, identify the name of the system it belongs to and then match it to its function.

Organ	System	Function
1. _____ skin	_____	a. supports the body
2. _____ heart	_____	b. provides place for growing baby
3. _____ stomach	_____	c. filters waste products from blood
4. _____ uterus	_____	d. provides two-way barrier
5. _____ bones	_____	e. produces movement
6. _____ lungs	_____	f. produces sperm
7. _____ kidney	_____	g. ingests, digests, and absorbs nutrients
8. _____ testes	_____	h. coordinates body's response
9. _____ brain	_____	i. pumps blood through blood vessels
10. _____ muscles	_____	j. obtains oxygen

## Body

### anatomical position

As seen from the previous sections, the body is the sum of all the systems, organs, tissues, and cells found within it. It is important to learn the anatomical terminology that applies to the body as a whole in order to correctly identify specific locations and directions when dealing with patients. The **anatomical position** is used when describing the positions and relationships of structures in the human body. A body in the anatomical position is standing erect with the arms at the sides of the body, the palms of the hands facing forward, and the eyes looking straight ahead. In addition, the legs are parallel with the feet, and the toes are pointing forward (see Figure 2.3 ■). For descriptive purposes the assumption is always that the person is in the anatomical position even if the body or parts of the body are in any other position.

#### What's In A Name?

Look for this word part:

-al = pertaining to

## Body Planes

coronal plane (kor-RONE-al)

coronal section

cross-section

frontal plane

frontal section

horizontal plane

longitudinal section

median plane

sagittal plane (SAJ-ih-tal)

sagittal section

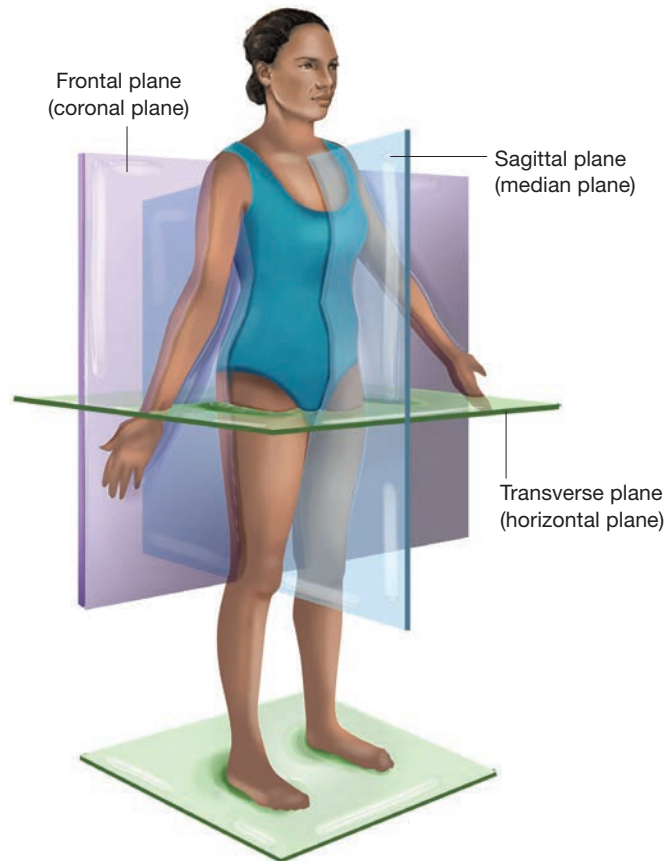
transverse plane

transverse section

The terminology for body planes is used to assist medical personnel in describing the body and its parts. To understand body planes, imagine cuts slicing through the body at various angles. This imaginary slicing allows us to use more specific language when describing parts of the body. These body planes, illustrated in Figure 2.4 ■, include the following:



■ **Figure 2.3** The anatomical position: standing erect, gazing straight ahead, arms down at sides, palms facing forward, fingers extended, legs together, and toes pointing forward. (Patrick Watson, Pearson Education)



■ **Figure 2.4** The planes of the body. The sagittal plane is vertical from front to back, the frontal plane is vertical from left to right, and the transverse plane is horizontal.

1. **Sagittal plane:** This vertical plane runs lengthwise from front to back and divides the body or any of its parts into right and left portions. The right and left sides do not have to be equal. If the sagittal plane passes through the middle of the body, thus dividing it into equal right and left halves, it is called a **midsagittal** or **median plane**. A cut along the sagittal plane yields a **sagittal section** view of the inside of the body.
2. **Frontal plane:** The frontal, or **coronal plane**, divides the body into front and back portions; a vertical lengthwise plane is running from side to side. A cut along the frontal plane yields a **frontal** or **coronal section** view of the inside of the body.
3. **Transverse plane:** The transverse, or **horizontal plane**, is a crosswise plane that runs parallel to the ground. This imaginary cut would divide the body or its parts into upper and lower portions. A cut along the transverse plane yields a **transverse section** view of the inside of the body.

The terms **cross-section** and **longitudinal section** are frequently used to describe internal views of structures. A lengthwise slice along the long axis of a structure produces a longitudinal section. A slice perpendicular to the long axis of the structure produces a cross-section view.

#### What's In A Name?

Look for these word parts:

**medi/o** = middle

**trans-** = across

**-al** = pertaining to

**-an** = pertaining to

Practice As You Go

C. Body Plane Matching

Match each body plane to its definition.

1. \_\_\_\_\_ frontal plane

2. \_\_\_\_\_ sagittal plane

3. \_\_\_\_\_ transverse plane
- a. divides the body into right and left

b. divides the body into upper and lower

c. divides the body into anterior and posterior

**Med Term Tip**  
As you learn medical terminology, it is important that you remember not to use common phrases and terms any longer. Many people commonly use the term *stomach* (an organ) when they actually mean *abdomen* (a body region).

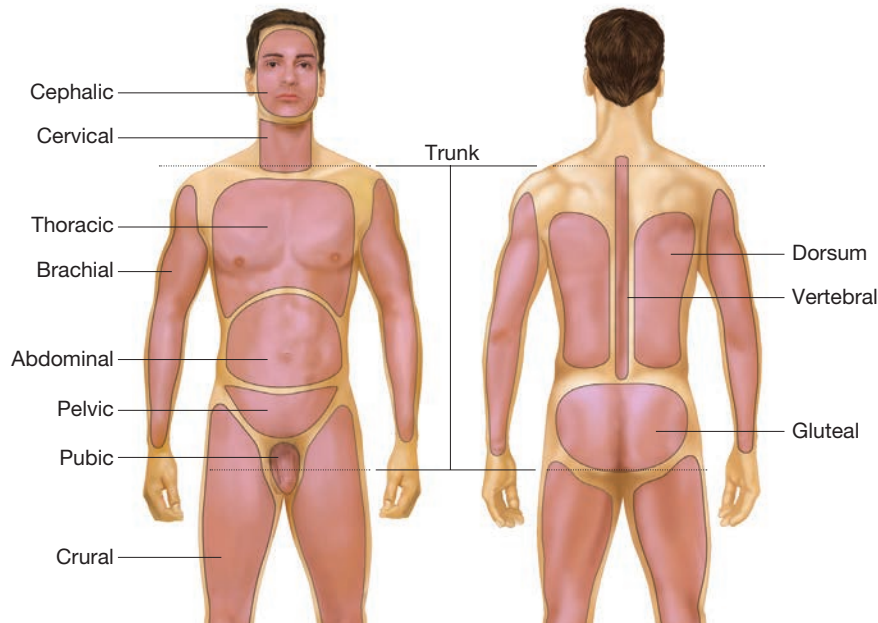
Body Regions

The body is divided into large regions that can easily be identified externally. It is vital to be familiar with both the anatomical name of each region as well as its common name. See Table 2.2 ■ for a description of each region and Figure 2.5 ■ to locate each region on the body.

Table 2.2 Terms Describing Body Regions

Region	Word Parts	Description
abdominal region (ab-DOM-ih-nal)	<b>abdomin/o</b> = abdomen <b>-al</b> = pertaining to	Abdomen; on anterior side of trunk
brachial region (BRAY-kee-all)	<b>brachi/o</b> = arm <b>-al</b> = pertaining to	Upper extremities (UE) or arms
cephalic region (seh-FAL-ik)	<b>cephal/o</b> = head <b>-ic</b> = pertaining to	Head
cervical region (SER-vih-kal)	<b>cervic/o</b> = neck <b>-al</b> = pertaining to	Neck; connects head to trunk
crural region (KREW-ral)	<b>crur/o</b> = leg <b>-al</b> = pertaining to	Lower extremities (LE) or legs
dorsum (DOOR-sum)	<b>dors/o</b> = back of body	Back; on posterior side of trunk
gluteal region (GLOO-tee-all)	<b>glute/o</b> = buttock <b>-al</b> = pertaining to	Buttocks; on posterior side of trunk
pelvic region (PELL-vik)	<b>pelv/o</b> = pelvis <b>-ic</b> = pertaining to	Pelvis; on anterior side of trunk
pubic region (PEW-bik)	<b>pub/o</b> = genital <b>-ic</b> = pertaining to	Region containing external genitals; on anterior side of trunk
thoracic region (tho-RASS-ik)	<b>thorac/o</b> = chest <b>-ic</b> = pertaining to	Chest; on anterior side of trunk; also called thorax
trunk		Contains all body regions other than head, neck, and extremities; also called torso
vertebral region (VER-tee-bral)	<b>vertebr/o</b> = vertebra <b>-al</b> = pertaining to	Overlies spinal column or vertebrae; on posterior side of trunk





■ **Figure 2.5** Anterior and posterior views of the body illustrating the location of various body regions.

## Practice As You Go

### D. Body Region Practice

For each term below, write the corresponding body region.

1. head \_\_\_\_\_
2. genitals \_\_\_\_\_
3. leg \_\_\_\_\_
4. buttocks \_\_\_\_\_
5. neck \_\_\_\_\_
6. arm \_\_\_\_\_
7. back \_\_\_\_\_
8. chest \_\_\_\_\_

## Body Cavities

**abdominal cavity**

**abdominopelvic cavity**

(ab-dom-ih-noh-PELL-vik)

**cranial cavity** (KRAY-nee-al)

**diaphragm** (DYE-ah-fram)

**mediastinum** (mee-dee-ass-TYE-num)

**parietal layer** (pah-RYE-eh-tal)

**parietal peritoneum**

**parietal pleura**

**pelvic cavity**

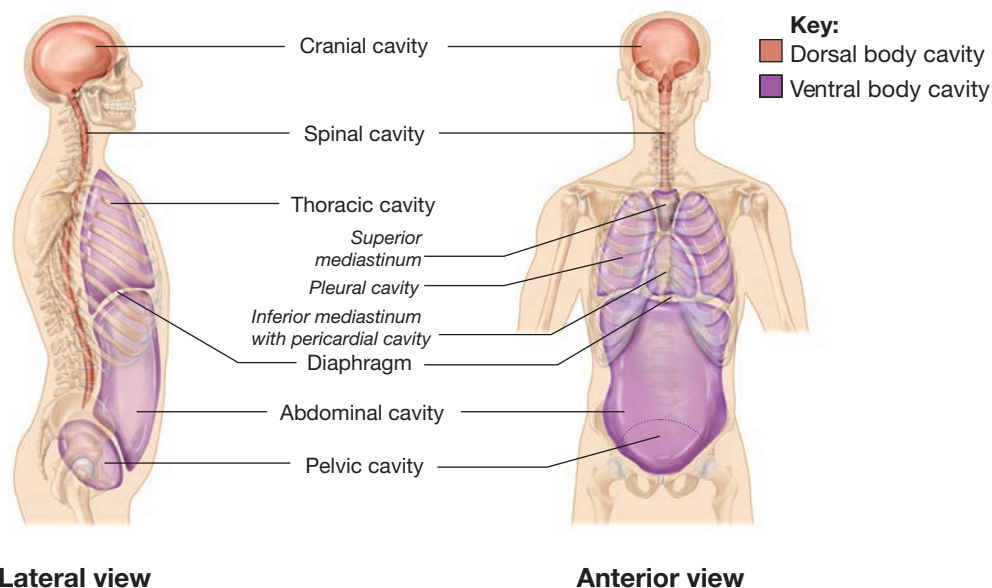
**pericardial cavity** (pair-ih-CAR-dee-al)

**peritoneum** (pair-ih-toh-NEE-um)

pleura (PLOO-rah)  
 pleural cavity (PLOO-ral)  
 spinal cavity  
 thoracic cavity

viscera (VISS-er-ah)  
 visceral layer (VISS-er-al)  
 visceral peritoneum  
 visceral pleura

The body is not a solid structure; it has many open spaces or cavities. The cavities are part of the normal body structure and are illustrated in Figure 2.6 ■. We can divide the body into four major cavities—two dorsal cavities and two ventral cavities.



■ **Figure 2.6** The dorsal (red) and ventral (purple) body cavities.

### What's In A Name?

Look for these word parts:

abdomin/o = abdomen  
 crani/o = skull  
 pelv/o = pelvis  
 pariet/o = cavity wall  
 pleur/o = pleura  
 spin/o = spine  
 thorac/o = chest  
 viscer/o = internal organ  
 peri- = around  
 -al = pertaining to  
 -ic = pertaining to

### Med Term Tip

The kidneys are the only major abdominopelvic organ located outside the sac formed by the peritoneum. Because they are found behind this sac, their position is referred to as *retroperitoneal* (retro- = behind; peritone/o = peritoneum; -al = pertaining to).

The dorsal cavities include the **cranial cavity**, containing the brain, and the **spinal cavity**, containing the spinal cord.

The ventral cavities include the **thoracic cavity** and the **abdominopelvic cavity**. The thoracic cavity contains the two lungs and a central region between them called the **mediastinum**. The heart, aorta, esophagus, trachea, and thymus gland are some of the structures located in the mediastinum. There is an actual physical wall between the thoracic cavity and the abdominopelvic cavity called the **diaphragm**. The diaphragm is a muscle used for breathing. The abdominopelvic cavity is generally subdivided into a superior **abdominal cavity** and an inferior **pelvic cavity**. The organs of the digestive, excretory, and reproductive systems are located in these cavities. The organs within the ventral cavities are referred to as a group as the internal organs or **viscera**. Table 2.3 ■ describes the body cavities and their major organs.

All of the ventral cavities are lined by, and the viscera are encased in, a two-layer membrane called the **pleura** in the thoracic cavity and the **peritoneum** in the abdominopelvic cavity. The outer layer that lines the cavities is called the **parietal layer** (i.e., **parietal pleura** and **parietal peritoneum**), and the inner layer that encases the viscera is called the **visceral layer** (i.e., **visceral pleura** and **visceral peritoneum**).

Within the thoracic cavity, the pleura is subdivided, forming the **pleural cavity**, containing the lungs, and the **pericardial cavity**, containing the heart. The larger abdominopelvic cavity is usually subdivided into regions in order to precisely refer to different areas. Two different methods of subdividing this cavity are used: the anatomical divisions and the clinical divisions. Choose a method partly

**Table 2.3** Body Cavities and Their Major Organs

Cavity	Major Organs
<i>Dorsal cavities</i>	
Cranial cavity	Brain
Spinal cavity	Spinal cord
<i>Ventral cavities</i>	
Thoracic cavity	Pleural cavity: lungs
	Pericardial cavity: heart
	Mediastinum: heart, esophagus, trachea, thymus gland, aorta
<i>Abdominopelvic cavities</i>	
Abdominal cavity	Stomach, spleen, liver, gallbladder, pancreas, and portions of the small intestine and colon
Pelvic cavity	Urinary bladder, ureters, urethra, and portions of the small intestine and colon
	Female: uterus, ovaries, fallopian tubes, vagina
	Male: prostate gland, seminal vesicles, portion of vas deferens

on personal preference and partly on which system best describes the patient's condition. See Table 2.4 ■ for a description of these methods for dividing the abdominopelvic cavity.

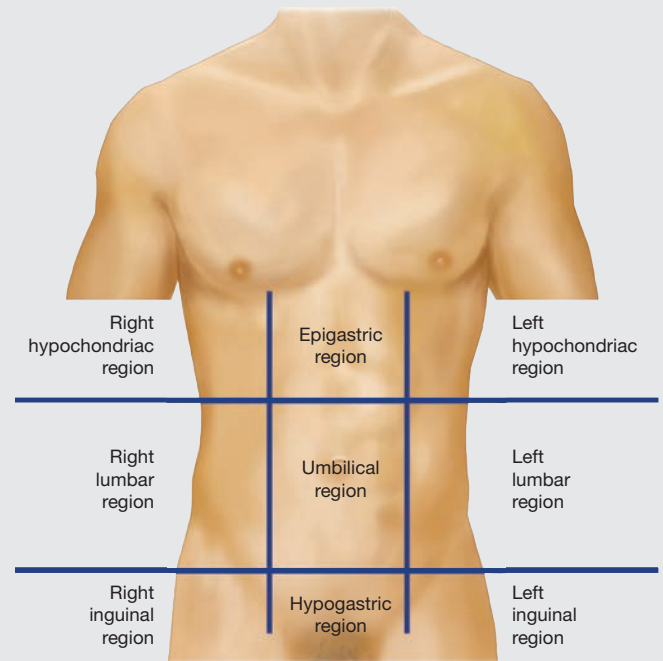
**Table 2.4** Methods of Subdividing the Abdominopelvic Cavity**Anatomical Divisions of the Abdomen**

- Right hypochondriac (high-poh-KON-dree-ak): Right lateral region of upper row beneath the lower ribs
- Epigastric (ep-ih-GAS-trik): Middle area of upper row above the stomach
- Left hypochondriac: Left lateral region of the upper row beneath the lower ribs
- Right lumbar: Right lateral region of the middle row at the waist
- Umbilical (um-BILL-ih-kal): Central area over the navel
- Left lumbar: Left lateral region of the middle row at the waist
- Right inguinal (ING-gwih-nal): Right lateral region of the lower row at the groin
- Hypogastric (high-poh-GAS-trik): Middle region of the lower row beneath the navel
- Left inguinal: Left lateral region of the lower row at the groin

**What's In A Name?**

Look for these word parts:

- chondr/o = cartilage
- gastr/o = stomach
- inguin/o = groin
- lumb/o = loin (low back)
- epi- = above
- hypo- = below
- al = pertaining to
- ar = pertaining to
- iac = pertaining to
- ic = pertaining to

**Med Term Tip**

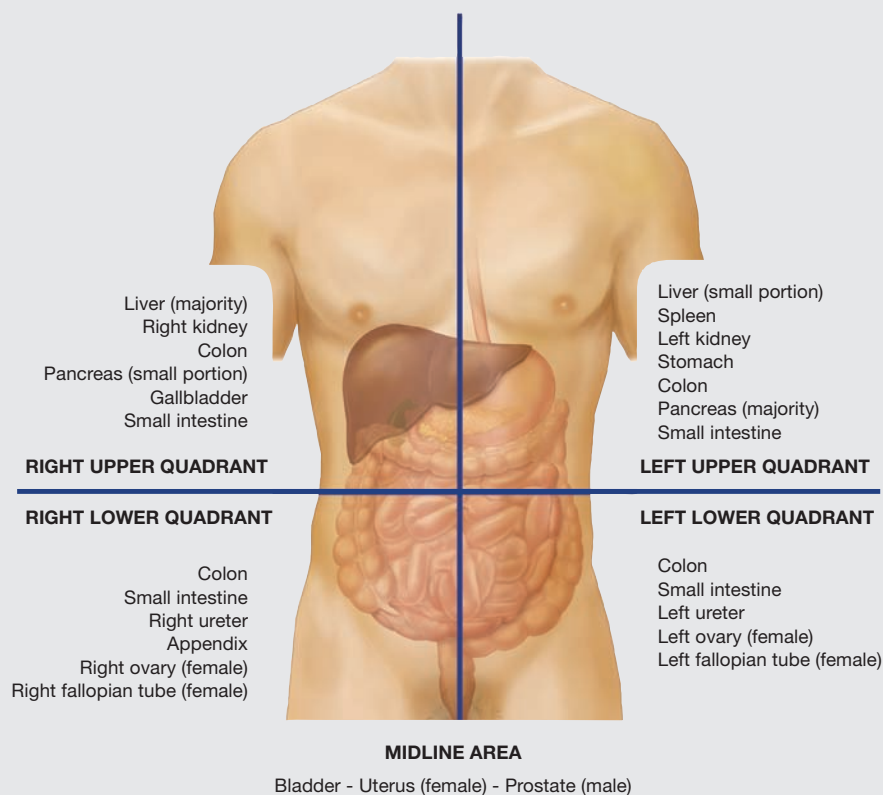
To visualize the nine anatomical divisions, imagine a tic-tac-toe diagram over this region.

**Med Term Tip**

The term *hypochondriac*, literally meaning “below the cartilage” (of the ribs), has come to refer to a person who believes he or she is sick when there is no obvious cause for illness. These patients commonly complain of aches and pains in the hypochondriac region.

**Table 2.4** Methods of Subdividing the Abdominopelvic Cavity (continued)**Clinical Divisions of the Abdomen**

- Right upper quadrant (RUQ): Contains majority of liver, gallbladder, small portion of pancreas, right kidney, small intestines, and colon
- Right lower quadrant (RLQ): Contains small intestine and colon, right ovary and fallopian tube, appendix, and right ureter
- Left upper quadrant (LUQ): Contains small portion of liver, spleen, stomach, majority of pancreas, left kidney, small intestines, and colon
- Left lower quadrant (LLQ): Contains small intestine and colon, left ovary and fallopian tube, and left ureter
- Midline organs: uterus, bladder, prostate gland



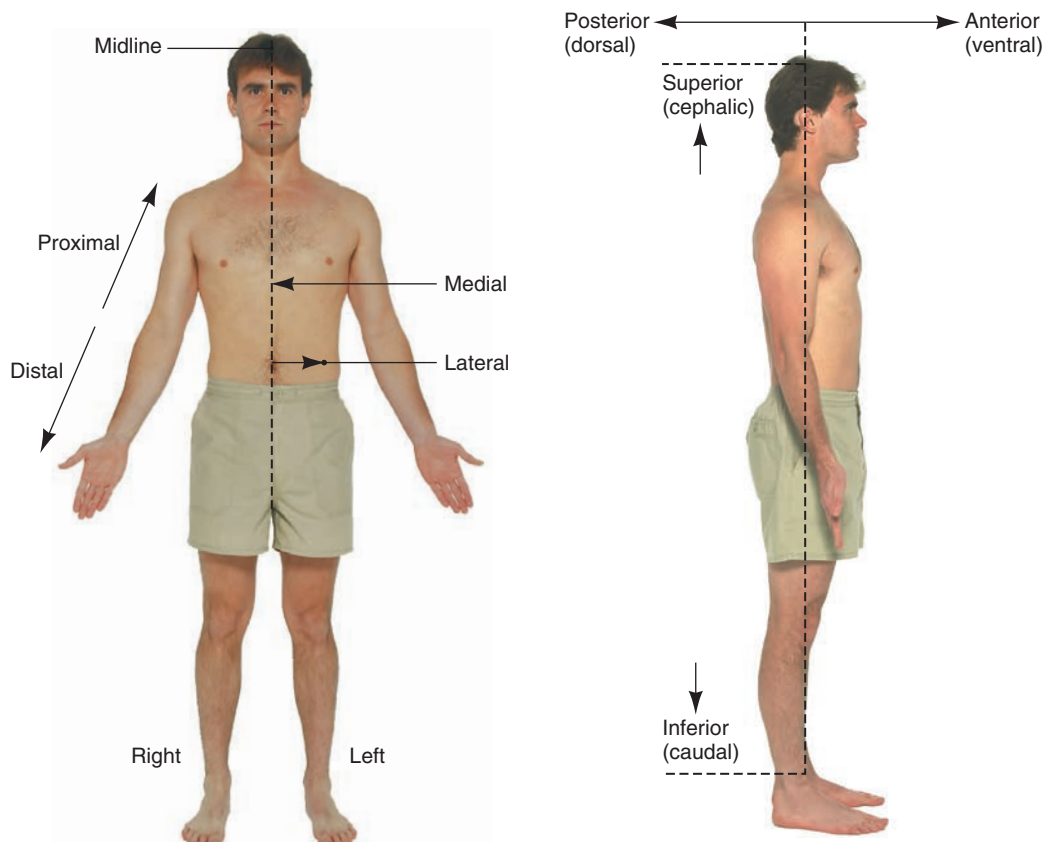
## Practice As You Go

### E. Complete the Statement

1. In the \_\_\_\_\_ position the body is standing erect with arms at sides and palms facing forward.
2. The \_\_\_\_\_ quadrant of the abdomen contains the appendix.
3. The dorsal cavities are the \_\_\_\_\_ cavity and the \_\_\_\_\_ cavity.
4. There are \_\_\_\_\_ anatomical divisions in the abdominal cavity.
5. The \_\_\_\_\_ region of the abdominal cavity is located in the right lower lateral region near the groin.
6. Within the thoracic cavity the lungs are found in the \_\_\_\_\_ cavity and the heart is found in the \_\_\_\_\_ cavity.

## Directional and Positional Terms

Directional and positional terms describe one process's, organ's, or system's relationship to another. Table 2.5 ■ presents commonly used terms for describing the position of the body or its parts. They are listed in pairs that have opposite meanings; for example, superior versus inferior, anterior versus posterior, medial versus lateral, proximal versus distal, superficial versus deep, and supine versus prone. Directional terms are illustrated in Figure 2.7 ■.



■ **Figure 2.7** Anterior and lateral views of the body illustrating directional terms.  
(Michal Heron, Pearson Education)

**Table 2.5** Terms for Describing Body Position

Term	Word parts	Description
superior (soo-PEE-ree-or) or cephalic (seh-FAL-ik)	<b>super/o</b> = above <b>-ior</b> = pertaining to <b>cephal/o</b> = head <b>-ic</b> = pertaining to	More toward the head, or above another structure. Example: The adrenal glands are superior to the kidneys.
inferior (in-FEE-ree-or) or caudal (KAUD-al)	<b>infer/o</b> = below <b>-ior</b> = pertaining to <b>caud/o</b> = tail <b>-al</b> = pertaining to	More toward the feet or tail, or below another structure. Example: The intestine is inferior to the heart.
anterior (an-TEE-ree-or) or ventral (VEN-tral)	<b>anter/o</b> = front <b>-ior</b> = pertaining to <b>ventr/o</b> = belly <b>-al</b> = pertaining to	More toward the front or belly side of the body. Example: The navel is located on the anterior surface of the body.
posterior (poss-TEE-ree-or) or dorsal (DOR-sal)	<b>poster/o</b> = back <b>-ior</b> = pertaining to <b>dors/o</b> = back <b>-al</b> = pertaining to	More toward the back or spinal cord side of the body. Example: The posterior wall of the right kidney was excised.
medial (MEE-dee-al)	<b>medi/o</b> = middle <b>-al</b> = pertaining to	Refers to the middle or near the middle of the body or the structure. Example: The heart is medially located in the chest cavity.
lateral (LAT-er-al)	<b>later/o</b> = side <b>-al</b> = pertaining to	Refers to the side. Example: The ovaries are located lateral to the uterus.
proximal (PROK-sim-al)	<b>proxim/o</b> = near to <b>-al</b> = pertaining to	Located nearer to the point of attachment to the body. Example: In the anatomical position, the elbow is proximal to the hand.
distal (DISS-tal)	<b>dist/o</b> = away from <b>-al</b> = pertaining to	Located farther away from the point of attachment to the body. Example: The hand is distal to the elbow.
apex (AY-peks)		Tip or summit of an organ. Example: We hear the heartbeat by listening over the apex of the heart.

**Table 2.5** Terms for Describing Body Position (continued)

Term	Word parts	Description
base		Bottom or lower part of an organ. Example: On the X-ray, a fracture was noted at the base of the skull.
superficial		More toward the surface of the body. Example: The cut was superficial.
deep		Further away from the surface of the body. Example: An incision into an abdominal organ is a deep incision.
supine (soo-PINE)		The body is lying horizontally and facing upward. Example: The patient is in the supine position for abdominal surgery.

■ **Figure 2.8A** The supine position. (Richard Logan, Pearson Education)

prone (PROHN)		The body is lying horizontally and facing downward. Example: The patient is placed in the prone position for spinal surgery.
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■ **Figure 2.8B** The prone position. (Richard Logan, Pearson Education)

## Abbreviations

<b>AP</b>	anteroposterior	<b>LUQ</b>	left upper quadrant
<b>CV</b>	cardiovascular	<b>MS</b>	musculoskeletal
<b>ENT</b>	ear, nose, and throat	<b>OB</b>	obstetrics
<b>GI</b>	gastrointestinal	<b>PA</b>	posteroanterior
<b>GYN</b>	gynecology	<b>RLQ</b>	right lower quadrant
<b>lat</b>	lateral	<b>RUQ</b>	right upper quadrant
<b>LE</b>	lower extremity	<b>UE</b>	upper extremity
<b>LLQ</b>	left lower quadrant		





# Chapter Review

## Practice Exercises

### A. Prefix Practice

Circle the prefixes in the following terms and define in the space provided.

1. epigastric \_\_\_\_\_
2. pericardium \_\_\_\_\_
3. hypochondriac \_\_\_\_\_
4. retroperitoneal \_\_\_\_\_

### B. Terminology Matching

Match each term to its definition.

- |                      |  |
|----------------------|--|
| 1. _____ distal      | a. away from the surface                                     |
| 2. _____ prone       | b. toward the surface  |
| 3. _____ lateral     | c. located closer to point of attachment to the body         |
| 4. _____ inferior    | d. caudal  |
| 5. _____ deep        | e. tip or summit of an organ                                 |
| 6. _____ apex        | f. lying face down   |
| 7. _____ base        | g. cephalic  |
| 8. _____ posterior   | h. ventral   |
| 9. _____ superficial | i. dorsal  |
| 10. _____ supine     | j. lying face up   |
| 11. _____ anterior   | k. to the side   |
| 12. _____ medial     | l. middle  |
| 13. _____ proximal   | m. bottom or lower part of an organ                          |
| 14. _____ superior   | n. located further away from point of attachment to the body |

**C. What's the Abbreviation?**

1. musculoskeletal \_\_\_\_\_
2. lateral \_\_\_\_\_
3. right upper quadrant \_\_\_\_\_
4. cardiovascular \_\_\_\_\_
5. gastrointestinal \_\_\_\_\_
6. anteroposterior \_\_\_\_\_
7. obstetrics \_\_\_\_\_
8. left lower quadrant \_\_\_\_\_

**D. Build a Medical Term**

Build terms for each expression using the correct combining forms and suffixes.

1. pertaining to spinal cord side \_\_\_\_\_
2. pertaining to the chest \_\_\_\_\_
3. pertaining to above \_\_\_\_\_
4. pertaining to the tail \_\_\_\_\_
5. pertaining to internal organs \_\_\_\_\_
6. pertaining to the side \_\_\_\_\_
7. pertaining to away from \_\_\_\_\_
8. pertaining to nerves \_\_\_\_\_
9. study of the lungs \_\_\_\_\_
10. pertaining to the muscles \_\_\_\_\_
11. pertaining to the belly side \_\_\_\_\_
12. pertaining to the front \_\_\_\_\_
13. pertaining to the head \_\_\_\_\_
14. pertaining to the middle \_\_\_\_\_

**E. Define the Combining Form**

1. **viscer/o** \_\_\_\_\_
2. **poster/o** \_\_\_\_\_
3. **abdomin/o** \_\_\_\_\_
4. **thorac/o** \_\_\_\_\_
5. **medi/o** \_\_\_\_\_

6. **ventr/o** \_\_\_\_\_
7. **anter/o** \_\_\_\_\_
8. **hist/o** \_\_\_\_\_
9. **epitheli/o** \_\_\_\_\_
10. **crani/o** \_\_\_\_\_
11. **cyt/o** \_\_\_\_\_
12. **proxim/o** \_\_\_\_\_
13. **cephal/o** \_\_\_\_\_

## F. Terminology Matching

Match each organ to its body cavity.

- |                               |                         |
|-------------------------------|-------------------------|
| 1. _____ gallbladder          | a. right upper quadrant |
| 2. _____ appendix             | b. left upper quadrant  |
| 3. _____ urinary bladder      | c. right lower quadrant |
| 4. _____ small intestines     | d. left lower quadrant  |
| 5. _____ right kidney         | e. all quadrants        |
| 6. _____ left ovary           | f. midline structure    |
| 7. _____ stomach              |                         |
| 8. _____ colon                |                         |
| 9. _____ right ureter         |                         |
| 10. _____ pancreas (majority) |                         |

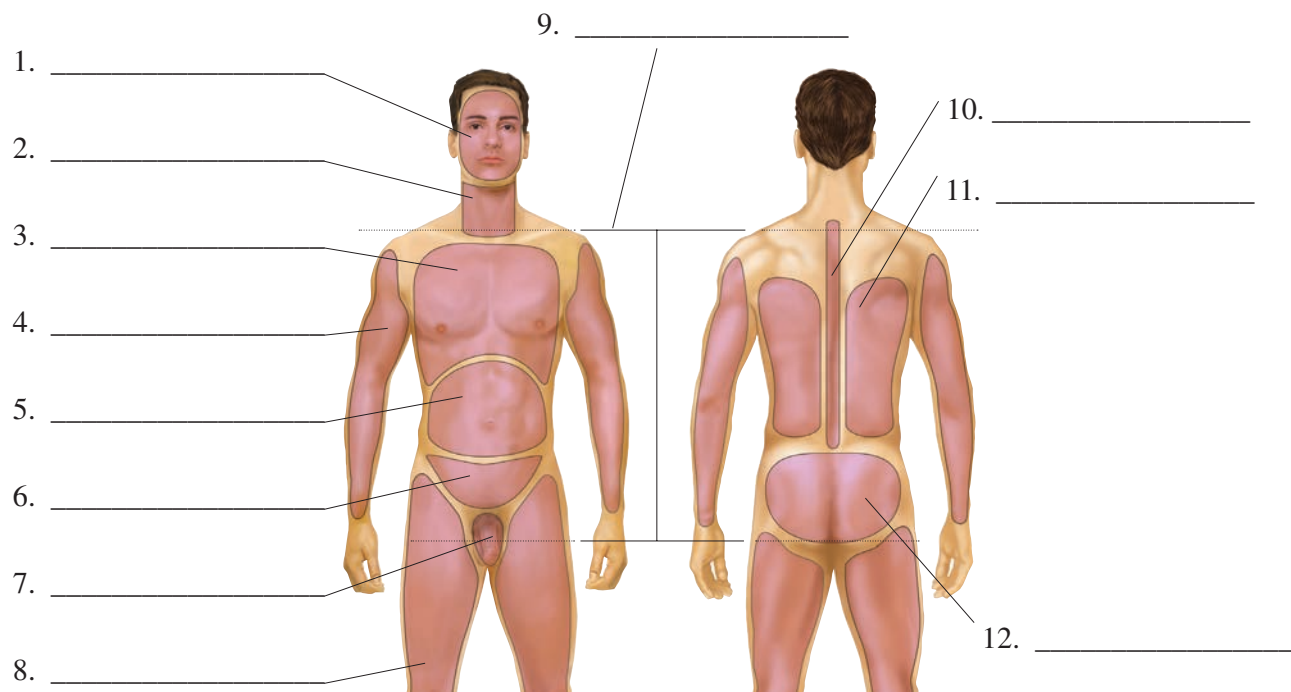
**G. Fill in the Blank**

cardiology	otorhinolaryngology	urology	gynecology
ophthalmology	gastroenterology	dermatology	orthopedics

1. John is a musician who plays an electric bass guitar and is experiencing difficulty in hearing soft voices. He would consult a physician in \_\_\_\_\_.
2. Ruth is a stock trader with the Chicago Board of Trade. She has had a pounding and racing heartbeat. She would consult a physician specializing in \_\_\_\_\_.
3. Mary Ann is experiencing excessive bleeding from the uterus. She would consult a \_\_\_\_\_ doctor.
4. José has fractured his wrist in a fall. A physician in \_\_\_\_\_ would see him for an examination.
5. A physician who performs eye exams specializes in the field of \_\_\_\_\_.
6. When her daughter had repeated bladder infections, Mrs. Cortez sought the opinion of a specialist in \_\_\_\_\_.
7. Martha could not get rid of a persistent skin rash with over-the-counter creams. She decided to make an appointment with a specialist in \_\_\_\_\_.
8. After reviewing his X-ray, the specialist in \_\_\_\_\_ informed Mr. Sparks that he had a stomach ulcer.

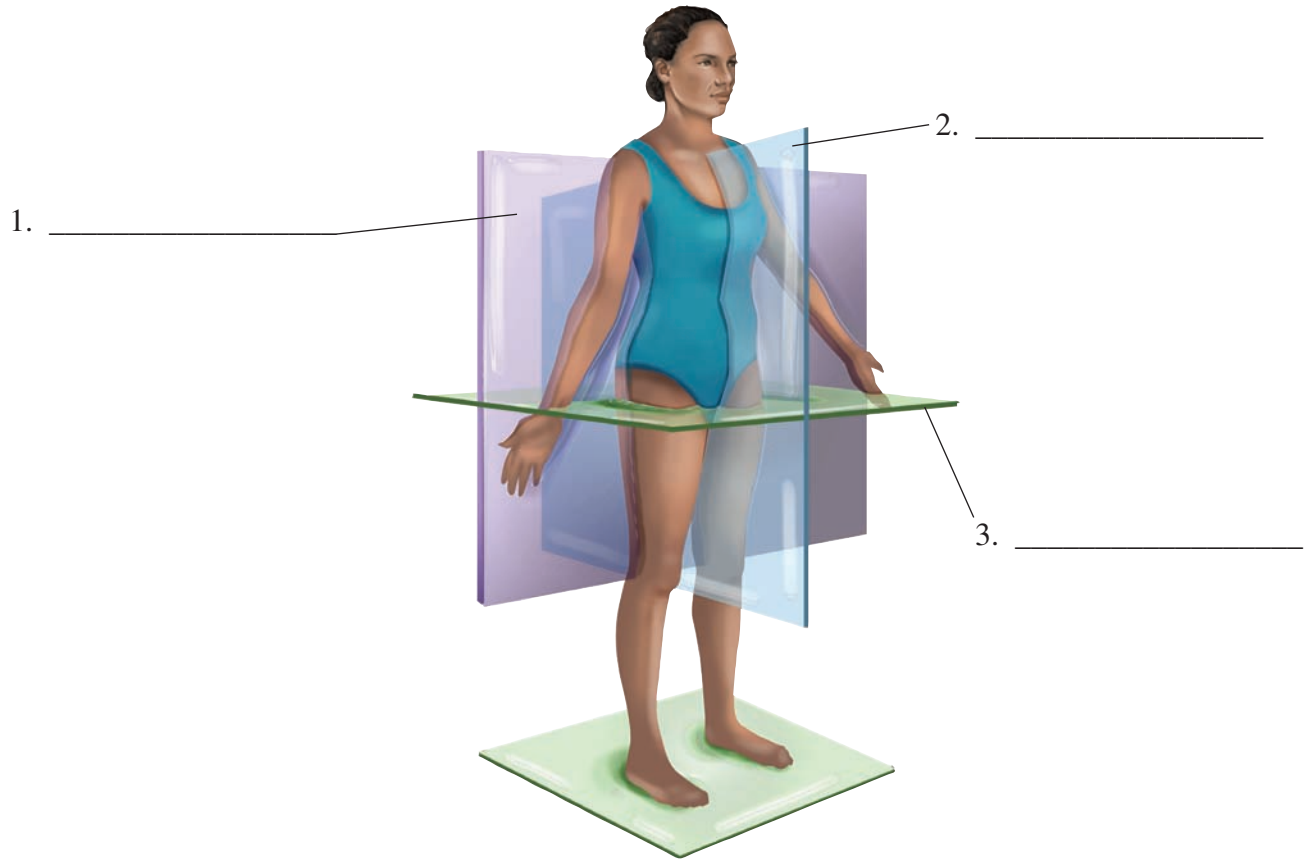
**Labeling Exercise****Image A**

Write the labels for this figure on the numbered lines provided.



**Image B**

Write the labels for this figure on the numbered lines provided.



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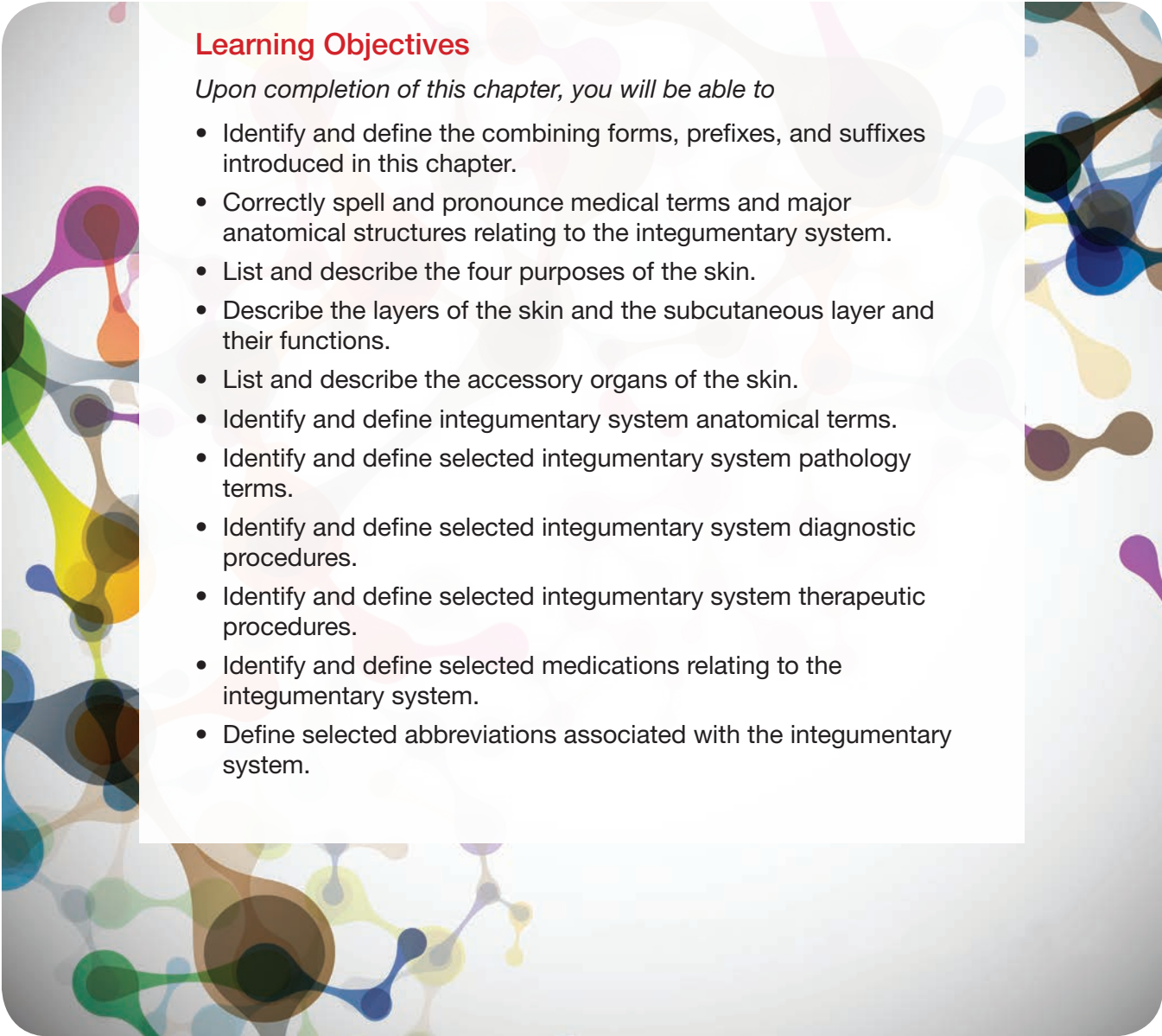


# 3

## Integumentary System

### Learning Objectives

*Upon completion of this chapter, you will be able to*

- Identify and define the combining forms, prefixes, and suffixes introduced in this chapter.
  - Correctly spell and pronounce medical terms and major anatomical structures relating to the integumentary system.
  - List and describe the four purposes of the skin.
  - Describe the layers of the skin and the subcutaneous layer and their functions.
  - List and describe the accessory organs of the skin.
  - Identify and define integumentary system anatomical terms.
  - Identify and define selected integumentary system pathology terms.
  - Identify and define selected integumentary system diagnostic procedures.
  - Identify and define selected integumentary system therapeutic procedures.
  - Identify and define selected medications relating to the integumentary system.
  - Define selected abbreviations associated with the integumentary system.
- 



# Integumentary System at a Glance

## Function

The skin provides a protective two-way barrier between our internal environment and the outside world. It also plays an important role in temperature regulation, houses sensory receptors to detect the environment around us, and secretes important fluids.

## Organs

Here are the primary structures that comprise the integumentary system.

**skin**      **hair**      **nails**      **sebaceous glands**      **sweat glands**

## Word Parts

Here are the most common word parts (with their meanings) used to build integumentary system terms. For a more comprehensive list, refer to the Terminology section of this chapter.

### Combining Forms

<b>albin/o</b>	white	<b>myc/o</b>	fungus
<b>cauter/o</b>	to burn	<b>necr/o</b>	death
<b>cry/o</b>	cold	<b>onych/o</b>	nail
<b>cutane/o</b>	skin	<b>pedicul/o</b>	lice
<b>derm/o</b>	skin	<b>phot/o</b>	light
<b>dermat/o</b>	skin	<b>py/o</b>	pus
<b>diaphor/o</b>	profuse sweating	<b>rhytid/o</b>	wrinkle
<b>electr/o</b>	electricity	<b>sarc/o</b>	flesh
<b>erythr/o</b>	red	<b>scler/o</b>	hard
<b>hidr/o</b>	sweat	<b>seb/o</b>	oil
<b>ichthy/o</b>	scaly, dry	<b>system/o</b>	system
<b>kerat/o</b>	hard, horny	<b>trich/o</b>	hair
<b>leuk/o</b>	white	<b>ungu/o</b>	nail
<b>lip/o</b>	fat	<b>vesic/o</b>	sac, bladder
<b>melan/o</b>	black	<b>xer/o</b>	dry

### Suffixes

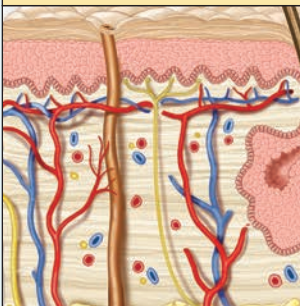
<b>-derma</b>	skin condition
---------------	----------------

### Prefixes

<b>allo-</b>	other, different from usual
<b>xeno-</b>	foreign

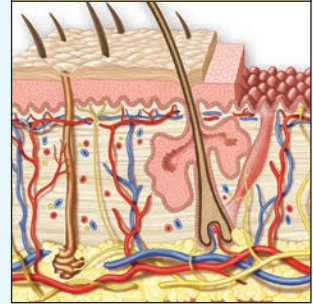
# Integumentary System Illustrated

**skin, p. 50**



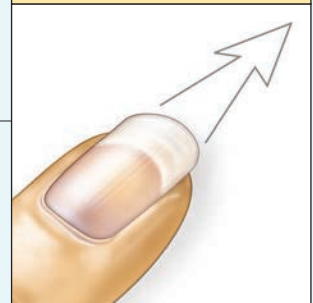
Protective barrier,  
houses sensory receptors,  
secretes sweat and sebum,  
temperature regulation

**hair, p. 52**



Provides some protection;  
associated with sensory  
receptors

**nail, p. 53**



Covers and protects  
tips of digits

# Anatomy and Physiology of the Integumentary System

**cutaneous membrane** (kew-TAY-nee-us)

**hair**

**integument** (in-TEG-you-mint)

**integumentary system**

(in-teg-you-MEN-tah-ree)

**nails**

**pathogens** (PATH-oh-jenz)

**sebaceous glands** (see-BAY-shus)

**sensory receptors**

**skin**

**sweat glands**

The **skin** and its accessory organs—**sweat glands**, **sebaceous glands**, **hair**, and **nails**—are known as the **integumentary system**, with **integument** and **cutaneous membrane** being alternate terms for skin. In fact, the skin is the largest organ of the body and can weigh more than 20 pounds in an adult. The skin serves many purposes for the body: protecting, housing nerve receptors, secreting fluids, and regulating temperature.

The primary function of the skin is protection. It forms a two-way barrier capable of keeping **pathogens** (disease-causing organisms) and harmful chemicals from entering the body. It also stops critical body fluids from escaping the body and prevents injury to the internal organs lying underneath the skin.

**Sensory receptors** that detect temperature, pain, touch, and pressure are located in the skin. The messages for these sensations are conveyed to the spinal cord and brain from the nerve endings in the middle layer of the skin.

Fluids are produced in two types of skin glands: sweat and sebaceous. Sweat glands assist the body in maintaining its internal temperature by creating a cooling effect as sweat evaporates. The sebaceous glands, or oil glands, produce an oily substance that lubricates the skin surface.

The structure of skin aids in the regulation of body temperature through a variety of means. As noted previously, the evaporation of sweat cools the body. The body also lowers its internal temperature by dilating superficial blood vessels in the skin. This brings more blood to the surface of the skin, which allows the release of heat. If the body needs to conserve heat, it constricts superficial blood vessels, keeping warm blood away from the surface of the body. Finally, the continuous layer of fat that makes up the subcutaneous layer of the skin acts as insulation.

## What's In A Name?

Look for these word parts:

**path/o** = disease

**-gen** = that which produces

**-ary** = pertaining to

**-ory** = pertaining to

**-ous** = pertaining to

## Med Term Tip

Flushing of the skin, a normal response to an increase in environmental temperature or to a fever, is caused by an increased blood flow to the skin of the face and neck. However, in some people, it is also a response to embarrassment, called blushing, and is not easily controlled.

## What's In A Name?

Look for these word parts:

**derm/o** = skin

**epi-** = above

**hypo-** = below

## Med Term Tip

An understanding of the different layers of the skin is important for healthcare workers because much of the terminology relating to types of injections and medical conditions, such as burns, is described using these designations.

## The Skin

**dermis** (DER-mis)

**epidermis** (ep-ih-DER-mis)

**hypodermis** (high-poh-DER-mis)

**subcutaneous layer** (sub-kyoo-TAY-nee-us)

The skin is composed of two layers, the superficial **epidermis** and the deeper **dermis**. Underlying the dermis is another layer called the **hypodermis**, or **subcutaneous layer** (see Figure 3.1 ■). The hypodermis is not truly one of the layers of the skin, but because it assists in the functions of the skin, it is studied along with the skin.

## Epidermis

**basal layer** (BAY-sal)

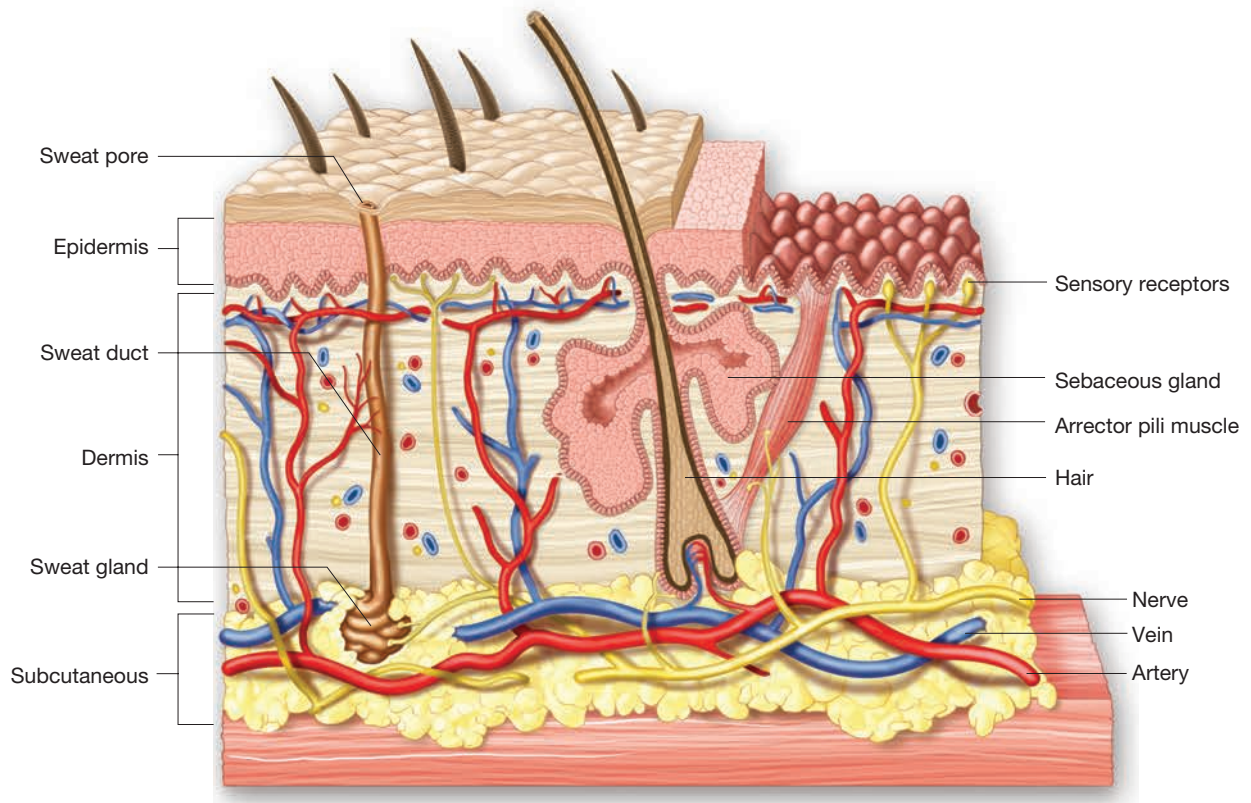
**keratin** (KAIR-ah-tin)

**melanin** (MEL-ah-nin)

**melanocytes** (mel-AN-oh-sights)

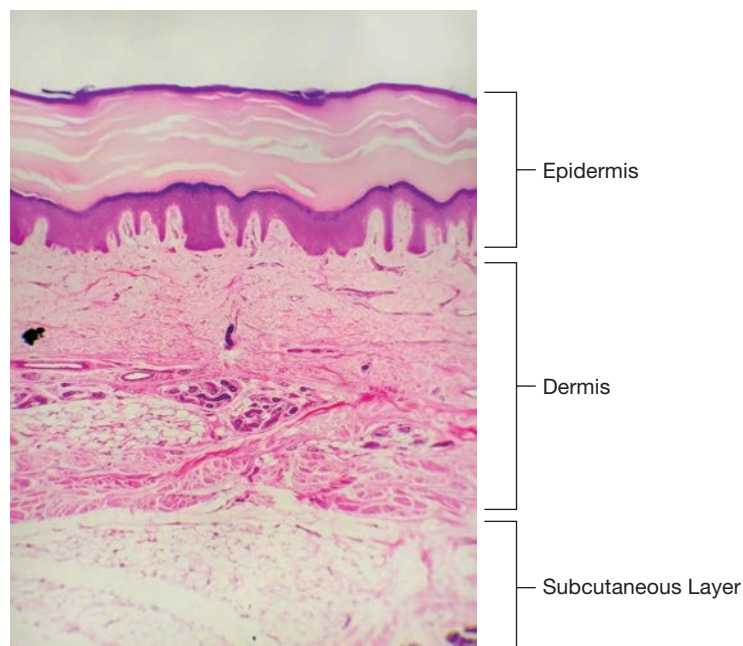
**stratified squamous epithelium** (STRAT-ih-fyde / SKWAY-mus / ep-ih-THEE-lee-um)





■ **Figure 3.1** Skin structure, including the layers of the skin, the subcutaneous layer, and the accessory organs: sweat gland, sebaceous gland, and hair.

The epidermis is composed of **stratified squamous epithelium** (see Figure 3.2 ■). This type of epithelial tissue consists of flat scale-like cells arranged in overlapping layers or strata. The epidermis does not have a blood supply or any connective tissue, so it is dependent for nourishment on the deeper layers of skin.



■ **Figure 3.2** Photomicrograph showing the three layers of the skin. (Jubal Harshaw/Shutterstock)

**What's In A Name?**

Look for these word parts:

**bas/o** = base

**melan/o** = black

**-al** = pertaining to

**-cyte** = cell

**-ous** = pertaining to

**Med Term Tip**

We lose 30,000–50,000 old, dead skin cells per minute and replace them with new, younger cells. In fact, because of this process, the epidermis is completely replaced every 25 days.

**Med Term Tip**

A suntan can be thought of as a protective response to the rays of the sun. However, when the melanin in the skin is not able to absorb all the rays of the sun, the skin burns and DNA may be permanently and dangerously damaged.

**Med Term Tip**

Ridges formed in the dermis of our fingertips are what give each of us unique fingerprints. These do not change during a person's lifetime and so are a reliable means of identification. In fact, fingerprints are still visible on Egyptian mummies.

**What's In A Name?**

Look for these word parts:

**lip/o** = fat

**-cyte** = cell

**Med Term Tip**

Our hair turns gray as part of the normal aging process when we no longer produce melanin.

The deepest layer within the epidermis is called the **basal layer**. Cells in this layer continually grow and multiply. New cells that are forming push the old cells toward the outer layer of the epidermis. During this process the cells shrink, die, and become filled with a hard protein called **keratin**. These dead, overlapping, keratinized cells allow the skin to act as an effective barrier to infection and also make it waterproof.

The basal layer also contains special cells called **melanocytes**, which produce the black pigment **melanin**. Not only is this pigment responsible for the color of the skin, but it also protects against damage from the ultraviolet (UV) rays of the sun. This damage may be in the form of leather-like skin and wrinkles, which are not hazardous, or it may be one of several forms of skin cancer. Dark-skinned people have more melanin and are generally less likely to get wrinkles or skin cancer.

**Dermis**

**collagen fibers** (KOL-ah-jen)

**corium** (KOH-ree-um)

The dermis, also referred to as the **corium**, is the middle layer of skin, located between the epidermis and the subcutaneous layer (see Figure 3.2). Its name means “true skin.” Unlike the thinner epidermis, the dermis is living tissue with a very good blood supply. The dermis itself is composed of connective tissue and **collagen fibers**. Collagen fibers are made from a strong, fibrous protein present in connective tissue, forming a flexible “glue” that gives connective tissue its strength. The dermis houses hair follicles, sweat glands, sebaceous glands, blood vessels, lymph vessels, sensory receptors, nerve fibers, and muscle fibers.

**Subcutaneous Layer**

**lipocytes** (LIP-oh-sights)

The subcutaneous layer (or hypodermis) is a continuous layer of fat that separates the dermis from deeper tissues (see Figure 3.2). It is composed of fat cells called **lipocytes**. Its functions include protecting deeper tissues of the body from trauma, acting as insulation from heat and cold, and serving as a source of energy in a starvation situation.

**Accessory Organs**

The accessory organs of the skin are the anatomical structures located within the dermis, including the hair, nails, sebaceous glands, and sweat glands.

**Hair**

**arrector pili** (ah-REK-tor / pee-lie)

**hair root**

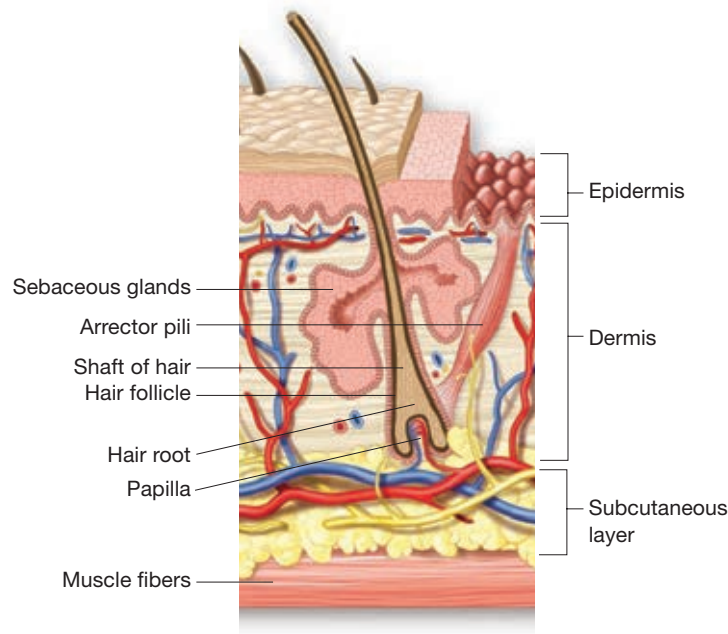
**hair follicle** (FALL-ikl)

**hair shaft**

The fibers that make up hair are composed of the protein keratin, the same hard protein material that fills the cells of the epidermis. The process of hair formation is much like the process of growth in the epidermal layer of the skin. The deeper cells in the **hair root** force older keratinized cells to move upward, forming the **hair shaft**. The hair shaft grows toward the skin surface within the **hair follicle**. Melanin gives hair its color. Sebaceous glands release oil directly into the hair follicle. Each hair has a small slip of smooth muscle attached to it called the **arrector pili** muscle (see Figure 3.3 ■). When this muscle contracts the hair shaft stands up, resulting in “goose bumps.”



**■ Figure 3.3** Structure of a hair and its associated sebaceous gland.



## Nails

**cuticle** (KEW-tikl)

free edge

**lunula** (LOO-nyoo-lah)

**nail bed**

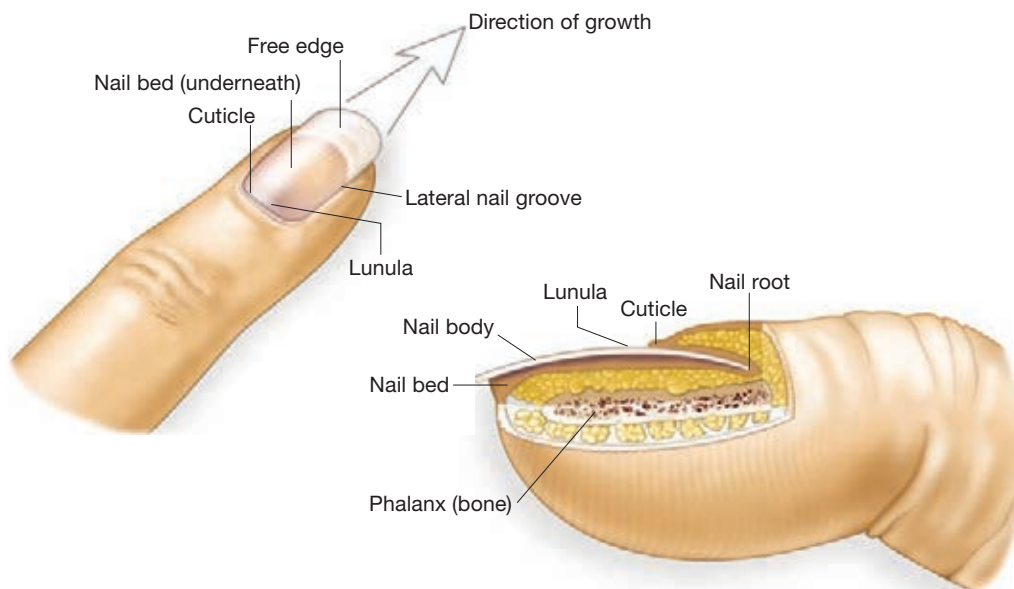
**nail body**

nail root

Nails are a flat plate of keratin called the **nail body** that covers the ends of fingers and toes. The nail body is connected to the tissue underneath by the **nail bed**. Nails grow longer from the **nail root**, which is found at the base of the nail and is covered and protected by the soft tissue **cuticle**. The **free edge** is the exposed edge that is trimmed when nails become too long. The light-colored half-moon area at the base of the nail is the **lunula** (see Figure 3.4 ■).

### Med Term Tip

Because of its rich blood supply and light color, the nail bed is an excellent place to check patients for low oxygen levels in their blood. Deoxygenated blood is a very dark purple-red and gives skin a bluish tinge called *cyanosis*.



■ **Figure 3.4** External and internal structures of nails.

## Sebaceous Glands

### sebum

Sebaceous glands, found in the dermis, secrete the oil **sebum**, which lubricates the hair and skin, thereby helping to prevent drying and cracking. These glands secrete sebum directly into hair follicles, rather than a duct (see Figure 3.1). Secretion from the sebaceous glands increases during adolescence, playing a role in the development of acne. Sebum secretion begins to diminish as age increases. A loss of sebum in old age, along with sun exposure, can account for wrinkles and dry skin.

## Sweat Glands

**apocrine glands** (APP-oh-krin)

**sweat duct**

**perspiration**

**sweat pore**

**sudoriferous glands** (sue-doh-RIF-er-us)

About 2 million sweat glands, also called **sudoriferous glands**, are found throughout the body. These highly coiled glands are located in the dermis. Sweat travels to the surface of the skin in a **sweat duct**. The surface opening of a sweat duct is called a **sweat pore** (see Figure 3.1).

Sweat glands function to cool the body as sweat evaporates. Sweat or **perspiration** contains a small amount of waste product but is normally colorless and odorless. However, there are sweat glands called **apocrine glands** in the pubic and underarm areas that secrete a thicker sweat, which can produce an odor when it comes into contact with bacteria on the skin. This is what we recognize as body odor.

### What's In A Name?

Look for these word parts:

**crin/o** = to secrete

**-ous** = pertaining to

### Word Watch

Be careful when using **hydr/o** meaning "water" and **hidr/o** meaning "sweat."

## Practice As You Go

### A. Complete the Statement

1. The two layers of skin are the superficial \_\_\_\_\_ and deeper \_\_\_\_\_.
2. The \_\_\_\_\_ separates the dermis from underlying tissue.
3. The \_\_\_\_\_ layer is the only living layer of the epidermis.
4. The hypodermis is composed primarily of \_\_\_\_\_.
5. Sensory receptors are located in the \_\_\_\_\_ layer of skin.
6. Nails and hair are composed of a hard protein called \_\_\_\_\_.
7. \_\_\_\_\_ is the pigment that gives skin its color.
8. Another name for the dermis is \_\_\_\_\_.
9. The nail body is connected to underlying tissue by the \_\_\_\_\_.
10. \_\_\_\_\_ glands release their product directly into hair follicles while \_\_\_\_\_ glands release their product into a duct.

# Terminology

## Word Parts Used to Build Integumentary System Terms

The following lists contain the combining forms, suffixes, and prefixes used to build terms in the remaining sections of this chapter.

### Combining Forms

<b>albin/o</b>	white
<b>angi/o</b> (see Chapter 5)	vessel
<b>bas/o</b>	base
<b>bi/o</b>	life
<b>carcin/o</b>	cancer
<b>cauter/o</b>	to burn
<b>chem/o</b>	chemical
<b>cis/o</b>	to cut
<b>cortic/o</b> (see Chapter 4)	outer layer
<b>cry/o</b>	cold
<b>cutane/o</b>	skin
<b>cyt/o</b>	cell
<b>derm/o</b>	skin
<b>dermat/o</b>	skin

<b>diaphor/o</b>	profuse sweating
<b>electr/o</b>	electricity
<b>erythr/o</b>	red
<b>esthesi/o</b> (see Chapter 12)	feeling
<b>hem/o</b> (see Chapter 6)	blood
<b>hidr/o</b>	sweat
<b>ichthy/o</b>	scaly, dry
<b>kerat/o</b>	hard, horny
<b>leuk/o</b>	white
<b>lip/o</b>	fat
<b>melan/o</b>	black
<b>myc/o</b>	fungus
<b>necr/o</b>	death

<b>onych/o</b>	nail
<b>pedicul/o</b>	lice
<b>phot/o</b>	light
<b>py/o</b>	pus
<b>rhytid/o</b>	wrinkle
<b>sarc/o</b>	flesh
<b>scler/o</b>	hard
<b>seb/o</b>	oil
<b>septic/o</b> (see Chapter 6)	infection
<b>system/o</b>	system
<b>trich/o</b>	hair
<b>ungu/o</b>	nail
<b>vesic/o</b>	sac
<b>xer/o</b>	dry

### Suffixes

<b>-al</b>	pertaining to
<b>-derma</b>	skin condition
<b>-ectomy</b>	surgical removal
<b>-emia</b> (see Chapter 6)	blood condition
<b>-ia</b>	state, condition
<b>-iasis</b>	abnormal condition
<b>-ic</b>	pertaining to

<b>-ism</b>	state of
<b>-itis</b>	inflammation
<b>-logy</b>	study of
<b>-malacia</b>	abnormal softening
<b>-oma</b>	mass, tumor
<b>-opsy</b>	view of
<b>-osis</b>	abnormal condition

<b>-ous</b>	pertaining to
<b>-phagia</b> (see Chapter 8)	eat, swallow
<b>-plasty</b>	surgical repair
<b>-rrhea</b>	discharge
<b>-tic</b>	pertaining to
<b>-tome</b>	instrument to cut
<b>-ule</b>	small

### Prefixes

<b>allo-</b>	other
<b>an-</b>	without
<b>anti-</b>	against
<b>auto-</b>	self

<b>de-</b>	without
<b>epi-</b>	above
<b>hyper-</b>	excessive
<b>hypo-</b>	below

<b>intra-</b>	within
<b>para-</b>	beside
<b>sub-</b>	under
<b>xeno-</b>	foreign

## Adjective Forms of Anatomical Terms

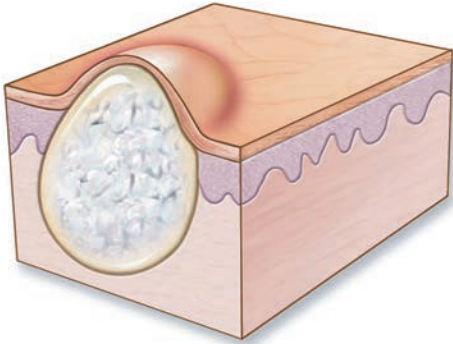

Term	Word Parts	Definition
<b>cutaneous</b> (kyoo-TAY-nee-us)	<b>cutane/o</b> = skin <b>-ous</b> = pertaining to	Pertaining to the skin.
<b>dermal</b> (DER-mal)	<b>derm/o</b> = skin <b>-al</b> = pertaining to	Pertaining to the skin.
<b>epidermal</b> (ep-ih-DER-mal)	<b>epi-</b> = above <b>derm/o</b> = skin <b>-al</b> = pertaining to	Pertaining to upon the skin.
<b>hypodermic</b> (high-poh-DER-mik)	<b>hypo-</b> = below <b>derm/o</b> = skin <b>-ic</b> = pertaining to	Pertaining to under the skin.
<b>intra-dermal</b> (ID) (in-trah-DER-mal)	<b>intra-</b> = within <b>derm/o</b> = skin <b>-al</b> = pertaining to	Pertaining to within the skin.
<b>subcutaneous</b> (Subc, Subq) (sub-kyoo-TAY-nee-us)	<b>sub-</b> = under <b>cutane/o</b> = skin <b>-ous</b> = pertaining to	Pertaining to under the skin.
<b>ungual</b> (UNG-gwal)	<b>ungu/o</b> = nail <b>-al</b> = pertaining to	Pertaining to the nails.

## Practice As You Go

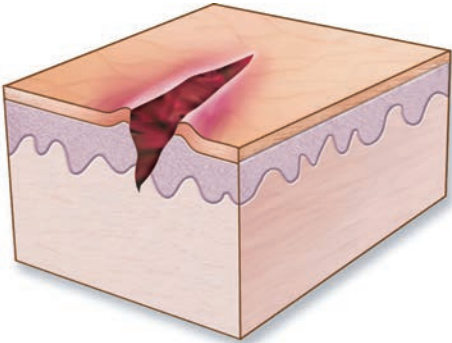
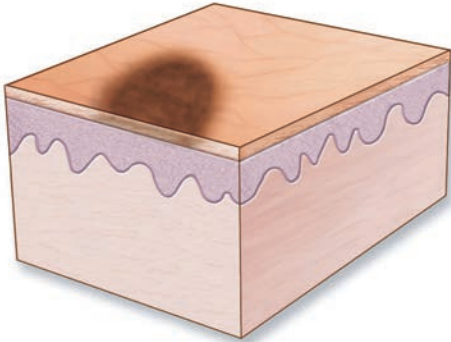
### B. Give the adjective form for each anatomical structure.

1. A nail \_\_\_\_\_
2. The skin \_\_\_\_\_ or \_\_\_\_\_
3. Above the skin \_\_\_\_\_
4. Below the skin \_\_\_\_\_ or \_\_\_\_\_
5. Within the skin \_\_\_\_\_

## Pathology

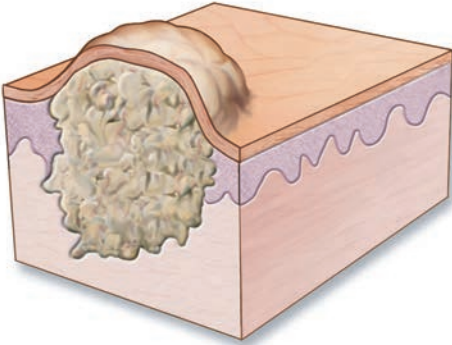
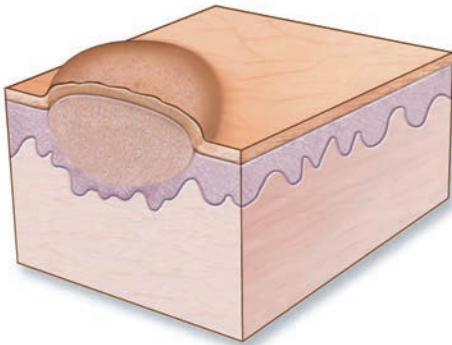

Term	Word Parts	Definition
<b>Medical Specialties</b>		
<b>dermatology</b> (Derm, dermat) (der-mah-TALL-oh-jee)	<b>dermat/o</b> = skin <b>-logy</b> = study of	Branch of medicine involving diagnosis and treatment of conditions and diseases of the integumentary system. Physician is a <i>dermatologist</i> .
<b>plastic surgery</b>		Surgical specialty involved in repair, reconstruction, or improvement of body structures such as the skin that are damaged, missing, or misshapen. Physician is a <i>plastic surgeon</i> .
<b>Signs and Symptoms</b>		
<b>abrasion</b> (ah-BRAY-zhun)		A scraping-away of the skin surface by friction.
<b>anhidrosis</b> (an-hi-DROH-sis)	<b>an-</b> = without <b>hidr/o</b> = sweat <b>-osis</b> = abnormal condition	Abnormal condition of no sweat.
<b>comedo</b> (KOM-ee-doh)		Collection of hardened sebum in hair follicle. Also called a <i>blackhead</i> .
<b>contusion</b>		Injury caused by a blow to the body; causes swelling, pain, and bruising. The skin is not broken.
<b>cyst</b> (SIST)		Fluid-filled sac under the skin.
		
■ <b>Figure 3.5</b> Cyst.		
<b>depigmentation</b> (dee-pig-men-TAY-shun)	<b>de-</b> = without	Loss of normal skin color or pigment.
<b>diaphoresis</b> (dye-ah-for-REE-sis)	<b>diaphor/o</b> = profuse sweating	Profuse sweating.
<b>ecchymosis</b> (ek-ih-MOH-sis)	<b>-osis</b> = abnormal condition	Skin discoloration caused by blood collecting under the skin following blunt trauma to the skin. A bruise.
		
■ <b>Figure 3.6</b> Male lying supine with large ecchymosis on lateral rib cage and shoulder. (Michal Heron, Pearson Education)		

## Pathology (continued)


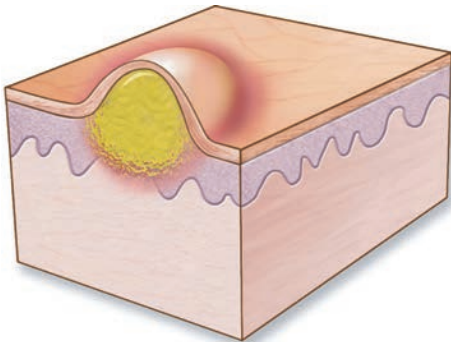
Term	Word Parts	Definition
<b>erythema</b> (er-ih-THEE-mah)	<b>erythr/o</b> = red <b>hem/o</b> = blood	Redness or flushing of the skin.
<b>erythroderma</b> (eh-rith-roh-DER-mah)	<b>erythr/o</b> = red <b>-derma</b> = skin condition	The condition of having reddened or flushed skin.
<b>eschar</b> (ES-kar)		A thick layer of dead tissue and tissue fluid that develops over a deep burn area.
<b>fissure</b> (FISH-er)		Crack-like lesion or groove on the skin.
		
■ <b>Figure 3.7</b> Fissure.		
<b>hirsutism</b> (HER-soot-izm)	<b>-ism</b> = state of	Excessive hair growth over the body.
<b>hyperemia</b> (high-per-EE-mee-ah)	<b>hyper-</b> = excessive <b>-emia</b> = blood condition	Redness of the skin due to increased blood flow.
<b>hyperhidrosis</b> (high-per-hi-DROH-sis)	<b>hyper-</b> = excessive <b>hidr/o</b> = sweat <b>-osis</b> = abnormal condition	Abnormal condition of excessive sweat.
<b>hyperpigmentation</b> (high-per-pig-men-TAY-shun)	<b>hyper-</b> = excessive	Abnormal amount of pigmentation in the skin.
<b>ichthyoderma</b> (ick-thee-oh-DER-mah)	<b>ichthy/o</b> = scaly, dry <b>-derma</b> = skin condition	The condition of having scaly and dry skin.
<b>lesion</b> (LEE-shun)		A general term for a wound, injury, or abnormality.
<b>leukoderma</b> (loo-koh-DER-mah)	<b>leuk/o</b> = white <b>-derma</b> = skin condition	Having skin that appears white because the normal skin pigment is absent. May be all of the skin or just in some areas.
<b>lipoma</b> (lip-OH-mah)	<b>lip/o</b> = fat <b>-oma</b> = mass	Fatty mass.
<b>macule</b> (MACK-yool)	<b>-ule</b> = small	Flat, discolored area that is flush with the skin surface. An example would be a freckle or a birthmark.
		
■ <b>Figure 3.8</b> Macule.		



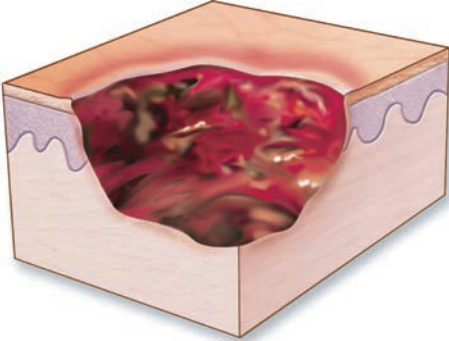
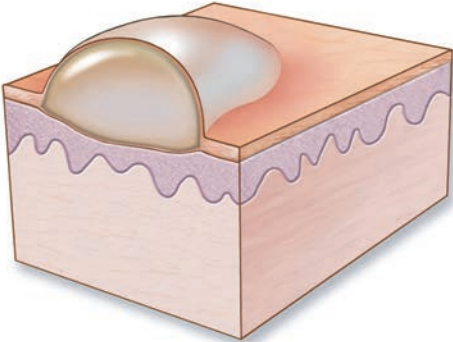
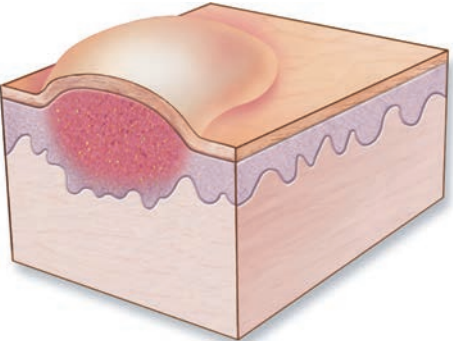
## Pathology (continued)

Term	Word Parts	Definition
<b>necrosis</b> (neh-KROH-sis)	<b>necr/o</b> = death <b>-osis</b> = abnormal condition	Abnormal condition of death.
<b>nevus</b> (NEV-us)		Pigmented skin blemish, birthmark, or mole. Usually benign but may become cancerous.
<b>nodule</b> (NOD-yool)	<b>-ule</b> = small	Firm, solid mass of cells in the skin larger than 0.5 cm in diameter.
		
■ <b>Figure 3.9</b> Nodule.		
<b>onychomalacia</b> (on-ih-koh-mah-LAY-she-ah)	<b>onych/o</b> = nail <b>-malacia</b> = abnormal softening	Softening of the nails.
<b>pallor</b> (PAL-or)		Abnormal paleness of the skin.
<b>papule</b> (PAP-yool)	<b>-ule</b> = small	Small, solid, circular raised spot on the surface of the skin less than 0.5 cm in diameter.
		
■ <b>Figure 3.10</b> Papule.		
<b>petechiae</b> (peh-TEE-kee-eye)		Pinpoint purple or red spots from minute hemorrhages under the skin.
		
■ <b>Figure 3.11</b> Petechiae, pinpoint skin hemorrhages. (Dr. P. Marazzi/Science Source)		


## Pathology (continued)

Term	Word Parts	Definition
<b>photosensitivity</b> (foh-toh-sen-sih-TIH-vih-tee)	<b>phot/o</b> = light	Condition in which the skin reacts abnormally when exposed to light, such as the ultraviolet (UV) rays of the sun.
<b>pruritus</b> (proo-RIGH-tus)		Severe itching.
<b>purpura</b> (PER-pew-rah)	<i>Purpura</i> is the Latin term for purple	Hemorrhages into the skin due to fragile blood vessels that appear dark brown/purplish. Commonly seen in older adults.
<p>■ <b>Figure 3.12</b> Purpura, hemorrhaging into the skin due to fragile blood vessels. (Scimat/Science Source)</p> 		
<b>purulent</b> (PYUR-yoo-lent)		Containing pus or an infection that is producing pus. Pus consists of dead bacteria, white blood cells, and tissue debris.
<b>pustule</b> (PUS-tyool)	<b>-ule</b> = small	Raised spot on the skin containing pus.
<p>■ <b>Figure 3.13</b> Pustule.</p> 		
<b>pyoderma</b> (pye-oh-DER-mah)	<b>py/o</b> = pus <b>-derma</b> = skin condition	The presence of pus on or in the layers of skin. A sign of a bacterial infection.
<b>scleroderma</b> (sklair-ah-DER-mah)	<b>scler/o</b> = hard <b>-derma</b> = skin condition	A condition in which the skin has lost its elasticity and become hardened.
<b>seborrhea</b> (seb-or-EE-ah)	<b>seb/o</b> = oil <b>-rrhea</b> = discharge	Oily discharge.
<b>suppurative</b> (SUP-pure-a-tiv)		Containing or producing pus.


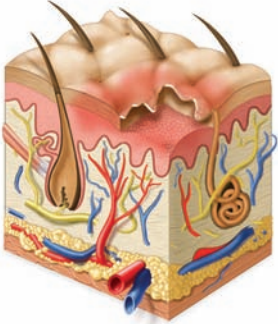





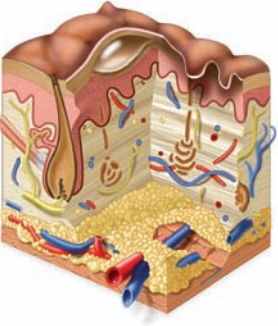

## Pathology (continued)

Term	Word Parts	Definition
<b>ulcer</b> (ULL-ser)		Open sore or lesion in skin or mucous membrane.
		
<b>Figure 3.14</b> Ulcer.		
<b>urticaria</b> (er-tih-KAY-ree-ah)	-ia = state, condition	Also called <i>hives</i> ; a skin eruption of pale reddish wheals with severe itching. Usually associated with food allergy, stress, or drug reactions.
<b>vesicle</b> (VESS-ikl)	vesic/o = sac	A blister; small, fluid-filled raised spot on the skin.
		
<b>Figure 3.15</b> Vesicle.		
<b>wheel</b> (WEEL)		Small, round, swollen area on the skin; typically seen in allergic skin reactions such as <i>hives</i> and usually accompanied by urticaria.
		
<b>Figure 3.16</b> Wheal.		
<b>xeroderma</b> (zee-roh-DER-mah)	xer/o = dry -derma = skin condition	Condition in which the skin is abnormally dry.
<b>Skin</b>		
<b>abscess</b> (AB-sess)		A collection of pus in the skin.
<b>acne</b> (ACK-nee)		Inflammatory disease of the sebaceous glands and hair follicles resulting in papules and pustules.

## Pathology (continued)

Term	Word Parts	Definition
<b>acne rosacea</b> (ACK-nee roh-ZAY-she-ah)		Chronic form of acne seen in adults involving redness, tiny pimples, and broken blood vessels, primarily on the nose and cheeks.
<b>acne vulgaris</b> (ACK-nee vul-GAY-ris)		Common form of acne seen in teenagers. Characterized by comedos, papules, and pustules.
<b>albinism</b> (al-BIH-nizm)	<b>albin/o</b> = white <b>-ism</b> = state of	A genetic condition in which the body is unable to make melanin. Characterized by white hair and skin and red pupils due to the lack of pigment. The person with albinism is called an <i>albino</i> .
<b>basal cell carcinoma (BCC)</b> (BAY-sal / sell / kar-sin-NOH-ma)	<b>bas/o</b> = base <b>-al</b> = pertaining to <b>carcin/o</b> = cancer <b>-oma</b> = tumor	Cancerous tumor of the basal cell layer of the epidermis. A frequent type of skin cancer that rarely metastasizes or spreads. These cancers can arise on sun-exposed skin.
<p>■ <b>Figure 3.17</b> Basal cell carcinoma. A frequent type of skin cancer that rarely metastasizes. (Centers for Disease Control)</p> 		
<b>burn</b>		Damage to the skin that can result from exposure to open fire, electricity, ultraviolet (UV) light from the sun, or caustic chemicals. Seriousness depends on the amount of body surface involved and the depth of the burn as determined by the amount of damage to each layer. Skin and burns are categorized as first degree, second degree, or third degree. See Figure 3.18 ■ for a description of the damage associated with each degree of burn. Extent of a burn is estimated using the Rule of Nines (see Figure 3.19 ■).

Pathology (continued)

Term	Word Parts	Definition
 Superficial First Degree	 Skin reddened	 <i>(bojan fatur/Getty Images)</i>
 Partial thickness Second Degree	 Blisters	 <i>(©English/Custom Medical Stock Photo)</i>
 Full thickness Third Degree	 Charring	 <i>(Dr. M.A. Ansary/Science Source)</i>


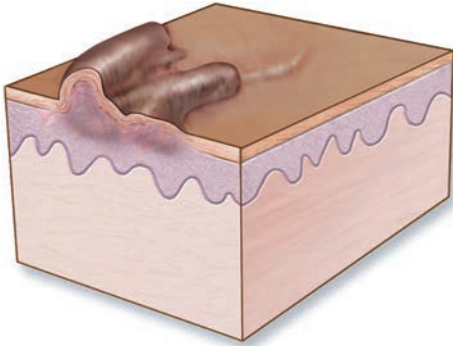

■ **Figure 3.18** Comparison of the level of skin damage as a result of the three different degrees of burns.



## Pathology (continued)




Term	Word Parts	Definition
<p>Figure 3.19 illustrates the Rule of Nines, a method for determining the percentage of body surface burned. The diagrams show the front and back views of a human body, with different colored sections representing percentages of the total body surface. The percentages are: Head (9), Neck (9), Chest (9), Abdomen (9), Pelvis (1), and Legs (9 each). The arms are divided into four sections, each representing 4.5% of the body surface.</p>		
<b>cellulitis</b> (sell-you-LYE-tis)	<b>-itis</b> = inflammation	A diffuse, acute infection and inflammation of the connective tissue found in the skin.
<b>cicatrix</b> (SICK-ah-trix)		A scar.
<b>decubitus ulcer</b> (decub) (dee-KYOO-bih-tus)	Comes from the Latin word <i>decumbo</i> , meaning “lying down”	Open sore caused by pressure over bony prominences cutting off the blood flow to the overlying skin. These can appear in bedridden patients who lie in one position too long and can be difficult to heal. Also called <i>bedsore</i> or <i>pressure sore</i> .
<b>dermatitis</b> (der-mah-TYE-tis)	<b>dermat/o</b> = skin <b>-itis</b> = inflammation	Inflammation of the skin.
<b>dermatosis</b> (der-mah-TOH-sis)	<b>dermat/o</b> = skin <b>-osis</b> = abnormal condition	A general term indicating the presence of an abnormal skin condition.
<b>dry gangrene</b> (GANG-green)		Late stages of gangrene characterized by the affected area becoming dried, blackened, and shriveled; referred to as <i>mummified</i> .
<b>eczema</b> (EK-zeh-mah)		Superficial dermatitis of unknown cause accompanied by redness, vesicles, itching, and crusting.
<b>gangrene</b> (GANG-green)		Tissue necrosis usually due to deficient blood supply.
<b>ichthyosis</b> (ick-thee-OH-sis)	<b>ichthy/o</b> = scaly, dry <b>-osis</b> = abnormal condition	Condition in which the skin becomes dry, scaly, and keratinized.

## Pathology (continued)


Term	Word Parts	Definition
<b>impetigo</b> (im-peh-TYE-goh)		A highly infectious bacterial infection of the skin with pustules that rupture and become crusted over.
<p>■ <b>Figure 3.20</b> Impetigo, a highly contagious bacterial infection.  <i>(Biophoto Associates)</i></p>		
<b>Kaposi's sarcoma</b> (KAP-oh-seez / sar-KOH-mah)	<b>sarc/o</b> = flesh <b>-oma</b> = tumor	Form of skin cancer frequently seen in acquired immunodeficiency syndrome (AIDS) patients. Consists of brownish-purple papules that spread from the skin and metastasize to internal organs.
<b>keloid</b> (KEE-loyd)		Formation of a raised and thickened hypertrophic scar after an injury or surgery.
		
<p>■ <b>Figure 3.21</b> Keloid.</p>		
<b>keratosis</b> (kair-ah-TOH-sis)	<b>kerat/o</b> = hard, horny <b>-osis</b> = abnormal condition	Term for any skin condition involving an overgrowth and thickening of the epidermis layer.
<b>laceration</b>		A torn or jagged wound; incorrectly used to describe a cut.
<b>malignant melanoma (MM)</b> (mah-LIG-nant / mel-a-NOH-ma)	<b>melan/o</b> = black <b>-oma</b> = tumor	Dangerous form of skin cancer caused by an uncontrolled growth of melanocytes. May quickly metastasize or spread to internal organs.
<p>■ <b>Figure 3.22</b> Malignant melanoma. This photograph demonstrates the highly characteristic color of this tumor.  <i>(National Cancer Institute)</i></p>		



## Pathology (continued)

Term	Word Parts	Definition
<b>pediculosis</b> (peh-dik-you-LOH-sis)	<b>pedicul/o</b> = lice <b>-osis</b> = abnormal condition	Infestation with lice. The eggs laid by the lice are called nits and cling tightly to hair.
<b>psoriasis</b> (soh-RYE-ah-sis)	<b>-iasis</b> = abnormal condition	Chronic inflammatory condition consisting of papules forming “silvery scale” patches with circular borders.
<p>■ <b>Figure 3.23</b> Psoriasis. This photograph demonstrates the characteristic white skin patches of this condition. (<i>phasinphoto/Shutterstock</i>)</p> 		
<b>rubella</b> (roo-BELL-ah)		Contagious viral skin infection. Commonly called <i>German measles</i> .
<b>scabies</b> (SKAY-bees)		Contagious skin disease caused by an egg-laying mite that burrows through the skin and causes redness and intense itching; often seen in children.
<b>sebaceous cyst</b> (see-BAY-shus / SIST)	<b>seb/o</b> = oil	Sac under the skin filled with sebum or oil from a sebaceous gland. This can grow to a large size and may need to be excised.
<b>squamous cell carcinoma (SCC)</b> (SKWAY-mus/sell/kar-sih-NOH-mah)	<b>carcin/o</b> = cancer <b>-oma</b> = tumor	Cancer of the epidermis layer of skin that may invade deeper tissue and metastasize. Often begins as a sore that does not heal.
<p>■ <b>Figure 3.24</b> Squamous cell carcinoma. (<i>National Cancer Institute</i>)</p> 		
<b>strawberry hemangioma</b> (hee-man-jee-OH-ma)	<b>hem/o</b> = blood <b>angi/o</b> = vessel <b>-oma</b> = mass	Congenital collection of dilated blood vessels causing a red birthmark that fades a few months after birth.
<p>■ <b>Figure 3.25</b> Strawberry hemangioma, a birthmark caused by a collection of blood vessels in the skin. (<i>SPL/Science Source</i>)</p> 		

## Pathology (continued)

Term	Word Parts	Definition
<b>systemic lupus erythematosus</b> (SLE) (sis-TEM-ik / LOO-pus / air-ih-them-ah-TOH-sis)	<b>system/o</b> = system <b>-ic</b> = pertaining to <b>erythr/o</b> = red	Chronic disease of the connective tissue that injures the skin, joints, kidneys, nervous system, and mucous membranes. This is an autoimmune condition meaning that the body's own immune system attacks normal tissue of the body. May produce a characteristic red, scaly butterfly rash across the cheeks and nose.
<b>tinea</b> (TIN-ee-ah)		Fungal skin disease resulting in itching, scaling lesions.
<b>tinea capitis</b> (TIN-ee-ah / CAP-it-is)	<i>Capitis</i> is the Latin term for the head	Fungal infection of the scalp. Commonly called <i>ringworm</i> .
<b>tinea pedis</b> (TIN-ee-ah / PED-is)	<i>Pedis</i> is the Latin term for the foot	Fungal infection of the foot. Commonly called <i>athlete's foot</i> .
<b>varicella</b> (vair-ih-SELL-ah)		Contagious viral skin infection. Commonly called <i>chickenpox</i> .
<p>■ <b>Figure 3.26</b> Varicella or chickenpox, a viral skin infection. In this photograph, the rash is beginning to form scabs. (Beneda Miroslav/Shutterstock)</p> 		
<b>verruca</b> (ver-ROO-kah)		Commonly called <i>warts</i> ; a benign growth caused by a virus. Has a rough surface that is removed by chemicals and/or laser therapy.
<b>vitiligo</b> (vit-ill-EYE-go)		Disappearance of pigment from the skin in patches, causing a milk-white appearance. Also called <i>leukoderma</i> .
<b>wet gangrene</b> (GANG-green)		An area of gangrene that becomes secondarily infected by pus-producing bacteria.
<b>Hair</b>		
<b>alopecia</b> (al-oh-PEE-she-ah)		Absence or loss of hair, especially of the head. Commonly called <i>baldness</i> .
<b>carbuncle</b> (CAR-bung-kl)		Furuncle involving several hair follicles.
<b>furuncle</b> (FOO-rung-kl)		Bacterial infection of a hair follicle. Characterized by redness, pain, and swelling. Also called a <i>boil</i> .
<b>trichomycosis</b> (trik-oh-my-KOH-sis)	<b>trich/o</b> = hair <b>myc/o</b> = fungus <b>-osis</b> = abnormal condition	Abnormal condition of hair fungus.

## Pathology (continued)

Term	Word Parts	Definition
<b>Nails</b>		
<b>onych</b> (oh-NICK-ee-ah)	<b>onych/o</b> = nail <b>-ia</b> = state, condition	Infected nail bed.
<b>onychomycosis</b> (on-ih-koh-my-KOH-sis)	<b>onych/o</b> = nail <b>myc/o</b> = fungus <b>-osis</b> = abnormal condition	Abnormal condition of nail fungus.
<b>onychophagia</b> (on-ih-koh-FAY-jee-ah)	<b>onych/o</b> = nail <b>-phagia</b> = eat, swallow	Nail eating (nail biting).
<b>paronychia</b> (pair-oh-NICK-ee-ah)	<b>para-</b> = beside <b>onych/o</b> = nail <b>-ia</b> = state, condition	Infection of the skin fold around a nail.



■ **Figure 3.27** Paronychia.  
(Scott Camazine/Getty Images)

## Practice As You Go


### C. Match each pathology term with its definition.

- |                        |                                       |
|------------------------|---------------------------------------|
| 1. _____ eczema        | a. decubitus ulcer                    |
| 2. _____ nevus         | b. lack of skin pigment               |
| 3. _____ lipoma        | c. acne commonly seen in adults       |
| 4. _____ urticaria     | d. hardened skin                      |
| 5. _____ bedsore       | e. redness, vesicles, itching, crusts |
| 6. _____ acne rosacea  | f. birthmark                          |
| 7. _____ acne vulgaris | g. excessive hair growth              |
| 8. _____ hirsutism     | h. caused by deficient blood supply   |
| 9. _____ alopecia      | i. fatty tumor                        |
| 10. _____ gangrene     | j. hives                              |
| 11. _____ scleroderma  | k. baldness                           |
| 12. _____ albinism     | l. acne of adolescence                |

## Diagnostic Procedures

Term	Word Parts	Definition
<b>Clinical Laboratory Tests</b>		
<b>culture and sensitivity (C&amp;S)</b>		Laboratory test that grows a colony of bacteria removed from an infected area in order to identify the specific infecting bacteria and then determine its sensitivity to a variety of antibiotics.
<b>Biopsy Procedures</b>		
<b>biopsy</b> (BX, bx) (BYE-op-see)	<b>bi/o</b> = life <b>-opsy</b> = view of	Piece of tissue removed by syringe and needle, knife, punch, or brush to examine under a microscope. Used to aid in diagnosis.
<b>Word Watch</b>       Be careful when using <b>bi-</b> meaning “two” and <b>bi/o</b> meaning “life.”		
<b>exfoliative cytology</b> (ex-FOH-lee-ah-tiv/ sigh-TALL-oh-jee)	<b>cyt/o</b> = cell <b>-logy</b> = study of	Scraping cells from tissue and then examining them under a microscope.
<b>frozen section (FS)</b>		Thin piece of tissue cut from a frozen specimen for rapid examination under a microscope.
<b>fungal scrapings</b>	<b>-al</b> = pertaining to	Scrapings, taken with a curette or scraper, of tissue from lesions are placed on a growth medium and examined under a microscope to identify fungal growth.

## Therapeutic Procedures

Term	Word Parts	Definition
<b>Skin Grafting</b>		
<b>allograft</b> (AL-oh-graft)	<b>allo-</b> = other	Skin graft from one person to another; donor is usually a cadaver. Also called <i>homograft</i> (homo = same).
<b>autograft</b> (AW-toh-graft)	<b>auto-</b> = self	Skin graft from a person's own body.
<p>■ <b>Figure 3.28</b> A freshly applied autograft. Note that the donor skin has been perforated so that it can be stretched to cover a larger burned area. (Bob Ingelhart/Getty Images)</p> 		
<b>dermatome</b> (DER-mah-tohm)	<b>derm/o</b> = skin <b>-tome</b> = instrument to cut	Instrument for cutting the skin or thin transplants of skin.
<b>dermatoplasty</b> (DER-mah-toh-plas-tee)	<b>dermat/o</b> = skin <b>-plasty</b> = surgical repair	Skin grafting; transplantation of skin.
<b>skin graft (SG)</b>		Transfer of skin from a normal area to cover another site. Used to treat burn victims and after some surgical procedures. Also called <i>dermatoplasty</i> .

## Therapeutic Procedures (continued)

<b>xenograft</b> (ZEN-oh-graft)	<b>xeno-</b> = foreign	Skin graft from an animal of another species (usually a pig) to a human. Also called <i>heterograft</i> ( <b>hetero-</b> = other).
<b>Surgical Procedures</b>		
<b>cauterization</b> (kaw-ter-ih-ZAY-shun)	<b>cauter/o</b> = to burn	Destruction of tissue by using caustic chemicals, electric currents, or by heating or freezing.
<b>cryosurgery</b> (cry-oh-SER-jer-ee)	<b>cry/o</b> = cold	Use of extreme cold to freeze and destroy tissue.
<b>curettage</b> (koo-REH-tahzh)		Removal of superficial skin lesions with a curette (surgical instrument shaped like a spoon) or scraper.
<b>debridement</b> (de-BREED-mint)		Removal of foreign material and dead or damaged tissue from a wound.
<b>electrocautery</b> (ee-leck-troh-KAW-teh-ree)	<b>electr/o</b> = electricity	To destroy tissue with an electric current.
<b>incision and drainage</b> (I&D)	<b>cis/o</b> = to cut	Making an incision to create an opening for the drainage of material such as pus.
<b>onychectomy</b> (on-ee-KECK-toh-mee)	<b>onych/o</b> = nail <b>-ectomy</b> = surgical removal	Removal of a nail.
<b>Plastic Surgery Procedures</b>		
<b>chemabrasion</b> (kee-moh-BRAY-zhun)	<b>chem/o</b> = chemical	Abrasion using chemicals. Also called a <i>chemical peel</i> .
<b>dermabrasion</b> (DERM-ah-bray-shun)	<b>derm/o</b> = skin	Abrasion or rubbing using wire brushes or sandpaper. Performed to remove acne scars, tattoos, and scar tissue.
<b>laser therapy</b>		Removal of skin lesions and birthmarks using a laser beam that emits intense heat and power at a close range. The laser converts frequencies of light into one small, powerful beam.
<b>liposuction</b> (LIP-oh-suck-shun)	<b>lip/o</b> = fat	Removal of fat beneath the skin by means of suction.
<b>rhytidectomy</b> (rit-ih-DECK-toh-mee)	<b>rhytid/o</b> = wrinkle <b>-ectomy</b> = surgical removal	Surgical removal of excess skin to eliminate wrinkles. Commonly referred to as a <i>face lift</i> .

## Practice As You Go

### D. Match each procedure term with its definition.

- |                        |  |
|------------------------|--|
| 1. _____ debridement   | a. surgical removal of wrinkled skin           |
| 2. _____ cauterization | b. instrument to cut thin slices of skin       |
| 3. _____ chemabrasion  | c. removing a piece of tissue for examination  |
| 4. _____ dermatoplasty | d. use of extreme cold to destroy tissue       |
| 5. _____ biopsy        | e. skin grafting                               |
| 6. _____ rhytidectomy  | f. removal of lesions with scraper             |
| 7. _____ curettage     | g. removal of skin with brushes                |
| 8. _____ dermabrasion  | h. removal of damaged skin                     |
| 9. _____ dermatome     | i. destruction of tissue with electric current |
| 10. _____ cryosurgery  | j. chemical peel                               |

## Pharmacology

Classification	Word Parts	Action	Examples
<b>anesthetic</b> (an-es-THET-tic)	<b>an-</b> = without <b>esthesi/o</b> = feeling <b>-tic</b> = pertaining to	Deadens pain when applied to the skin.	lidocaine, Xylocaine; procaine, Novocain
<b>antibiotic</b> (an-tye-bye-AW-tic)	<b>anti-</b> = against <b>bi/o</b> = life <b>-tic</b> = pertaining to	Kills bacteria causing skin infections.	bacitracin/neomycin/polymixinB, Neosporin ointment
<b>antifungal</b> (an-tye-FUNG-all)	<b>anti-</b> = against <b>-al</b> = pertaining to	Kills fungi infecting the skin.	miconazole, Monistat; clotrimazole, Lotrimin
<b>antiparasitic</b> (an-tye-pair-ah-SIT-tic)	<b>anti-</b> = against <b>-ic</b> = pertaining to	Kills mites or lice.	lindane, Kwell; permethrin, Nix
<b>antipruritic</b> (an-tye-proo-RIGH-tik)	<b>anti-</b> = against <b>-ic</b> = pertaining to	Reduces severe itching.	diphenhydramine, Benadryl; camphor/pramoxine/zinc, Caladryl
<b>antiseptic</b> (an-tye-SEP-tic)	<b>anti-</b> = against <b>septic/o</b> = infection <b>-tic</b> = pertaining to	Kills bacteria in skin cuts and wounds or at a surgical site.	isopropyl alcohol; hydrogen peroxide
<b>corticosteroid cream</b>	<b>cortic/o</b> = outer layer	A cream containing a hormone produced by the adrenal cortex that has very strong anti-inflammatory properties.	hydrocortisone, Cortaid; triamcinolone, Kenalog

## Abbreviations

<b>BCC</b>	basal cell carcinoma	<b>MM</b>	malignant melanoma
<b>BX, bx</b>	biopsy	<b>SCC</b>	squamous cell carcinoma
<b>C&amp;S</b>	culture and sensitivity	<b>SG</b>	skin graft
<b>decub</b>	decubitus ulcer	<b>SLE</b>	systemic lupus erythematosus
<b>Derm, dermat</b>	dermatology	<b>STSG</b>	split-thickness skin graft
<b>FS</b>	frozen section	<b>Subc, Subq</b>	subcutaneous
<b>I&amp;D</b>	incision and drainage	<b>UV</b>	ultraviolet
<b>ID</b>	intra		

### Word Watch

Be careful when using the abbreviation *ID* meaning “intra” and *I&D* meaning “incision and drainage.”

## Practice As You Go

### E. Give the abbreviation for each term.

1. frozen section \_\_\_\_\_
2. incision and drainage \_\_\_\_\_
3. intra \_\_\_\_\_
4. subcutaneous \_\_\_\_\_
5. ultraviolet \_\_\_\_\_
6. biopsy \_\_\_\_\_
7. culture and sensitivity \_\_\_\_\_
8. basal cell carcinoma \_\_\_\_\_
9. decubitus ulcer \_\_\_\_\_
10. dermatology \_\_\_\_\_





# Chapter Review

## Real-World Applications

### Medical Record Analysis

This Dermatology Consultation Report contains 11 medical terms. Underline each term and write it in the list below the report. Then define each term.


#### Dermatology Consultation Report

Reason for Consultation:	Possible recurrence of basal cell carcinoma, left cheek.
History of Present Illness:	Patient is a 74-year-old male first seen by his regular physician five years ago for persistent facial lesions. Biopsies revealed basal cell carcinoma in two lesions, one on the nasal tip and the other on the left cheek. These were successfully excised. The patient noted that the left cheek lesion returned approximately one year ago. Patient reports pruritus and states the lesion is growing larger.
Results of Physical Exam:	Examination revealed a 10 × 14 mm lesion on left cheek 20 mm anterior to the ear. The lesion displays marked erythema and poorly defined borders. The area immediately around the lesion shows depigmentation with vesicles.
Assessment:	Recurrence of basal cell carcinoma.
Recommendations:	Due to the lesion's size, shape, and reoccurrence, deep excision of the carcinoma through the epidermis and dermis layers followed by dermatoplasty is recommended.

Term	Definition
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____
7. _____	_____
8. _____	_____
9. _____	_____
10. _____	_____
11. _____	_____

## Chart Note Transcription

The chart note below contains 10 phrases that can be reworded with a medical term that you learned in this chapter. Each phrase is identified with an underline. Determine the medical term and write your answers in the spaces provided.

Pearson General Hospital Consultation Report	
Task	Edit View Time Scale Options Help Download Archive Date: 17 May 2015
	
Current Complaint:	A 64-year-old female with an <u>open sore</u> <b>1</b> on her right leg is seen by the <u>specialist in treating diseases of the skin</u> . <b>2</b>
Past History:	Patient states she first noticed an area of pain, <u>severe itching</u> , <b>3</b> and <u>redness of the skin</u> <b>4</b> just below her right knee about 6 weeks ago. <u>One week later raised spots containing pus</u> <b>5</b> appeared. Patient states the raised spots containing pus ruptured and the open sore appeared.
Signs and Symptoms:	Patient has a deep open sore 5 × 3 cm: It is 4 cm distal to the knee on the lateral aspect of the right leg. It appears to extend into the <u>middle skin layer</u> , <b>6</b> and the edges show signs of <u>tissue death</u> . <b>7</b> The open sore has a small amount of drainage but there is no odor. A <u>sample of the drainage that was grown in the lab to identify the microorganism and determine the best antibiotic</u> <b>8</b> of the drainage revealed <i>Staphylococcus</i> bacteria in the open sore.
Diagnosis:	<u>Inflammation of connective tissue in the skin</u> . <b>9</b>
Treatment:	<u>Removal of damaged tissue</u> <b>10</b> of the open sore followed by application of an antibiotic cream. Patient was instructed to return to the skin disease specialist's office in two weeks, or sooner if the open sore does not heal or if it begins draining pus.
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____
6.	_____
7.	_____
8.	_____
9.	_____
10.	_____

## Case Study

Below is a case study presentation of a patient with a condition discussed in this chapter. Read the case study and answer the questions below. Some questions will ask for information not included within this chapter. Use your text, a medical dictionary, or any other reference material you choose to answer these questions.



(Monkey Business Images/Shutterstock)

A 40-year-old female is seen in the dermatologist's office, upon the recommendation of her internist, for a workup for suspected SLE. Her presenting symptoms include erythema rash across her cheeks and nose, photosensitivity resulting in raised rash in sun-exposed areas, patches of alopecia, and pain and stiffness in her joints. The dermatologist examines the patient and orders exfoliative cytology and fungal scrapings to rule out other sources of the rash. Her internist had already placed the patient on oral anti-inflammatory medication for joint pain. The dermatologist orders corticosteroid cream for the rash. The patient is advised to use a sunscreen and make a follow-up appointment for results of the biopsy.

## Questions

1. What pathological condition does the internist think this patient might have? Look this condition up in a reference source, and include a short description of it. SLE is an autoimmune disease. Use a reference source to look up the name of another autoimmune disease.

---



---

2. List and define each of the patient's presenting symptoms in your own words.

---



---

3. What diagnostic tests did the dermatologist perform? Describe it in your own words. Why were they important in helping the dermatologist make a diagnosis?

---



---

4. Each physician initiated a treatment. Describe them in your own words.

---



---

5. What do you think the term "workup" means?

---



---

## Practice Exercises

### A. Define the Word Parts

	Definition	Example from Chapter
1. <b>cry/o</b>	_____	_____
2. <b>cutane/o</b>	_____	_____
3. <b>diaphor/o</b>	_____	_____
4. <b>py/o</b>	_____	_____
5. <b>cauter/o</b>	_____	_____
6. <b>ungu/o</b>	_____	_____
7. <b>lip/o</b>	_____	_____
8. <b>hidr/o</b>	_____	_____
9. <b>rhytid/o</b>	_____	_____
10. <b>seb/o</b>	_____	_____
11. <b>trich/o</b>	_____	_____
12. <b>necr/o</b>	_____	_____
13. <b>-derma</b>	_____	_____
14. <b>allo-</b>	_____	_____
15. <b>xeno-</b>	_____	_____

### B. Describe the Type of Burn

1. first degree \_\_\_\_\_
2. second degree \_\_\_\_\_
3. third degree \_\_\_\_\_

### C. Define the Term

1. macule \_\_\_\_\_
2. papule \_\_\_\_\_
3. cyst \_\_\_\_\_
4. fissure \_\_\_\_\_

5. pustule \_\_\_\_\_
6. wheal \_\_\_\_\_
7. vesicle \_\_\_\_\_
8. ulcer \_\_\_\_\_
9. nodule \_\_\_\_\_
10. laceration \_\_\_\_\_

### D. Word Building Practice

The combining form **dermat/o** refers to the skin. Use it to write a term that means:

1. inflammation of the skin \_\_\_\_\_
2. any abnormal skin condition \_\_\_\_\_
3. an instrument for cutting the skin \_\_\_\_\_
4. specialist in skin \_\_\_\_\_
5. surgical repair of the skin \_\_\_\_\_
6. study of the skin \_\_\_\_\_

The combining form **melan/o** means black. Use it to write a term that means:

7. black tumor \_\_\_\_\_
8. black cell \_\_\_\_\_

The suffix **-derma** means skin. Use it to write a term that means:

9. scaly skin \_\_\_\_\_
10. white skin \_\_\_\_\_
11. red skin \_\_\_\_\_

The combining form **onych/o** refers to the nail. Use it to write a term that means:

12. abnormal softening of the nails \_\_\_\_\_
13. infection around the nail \_\_\_\_\_
14. nail eating (biting) \_\_\_\_\_
15. removal of the nail \_\_\_\_\_

### E. What Does it Stand For?

1. C&S \_\_\_\_\_
2. BCC \_\_\_\_\_
3. dermat \_\_\_\_\_

4. SG \_\_\_\_\_
5. decub \_\_\_\_\_
6. MM \_\_\_\_\_

### F. Fill in the Blank

impetigo	tinea	keloid	exfoliative cytology	xeroderma
petechiae	frozen section	paronychia	scabies	Kaposi's sarcoma

- The winter climates can cause dry skin. The medical term for this is \_\_\_\_\_.
- Kim has experienced small pinpoint purplish spots caused by bleeding under the skin. This is called \_\_\_\_\_.
- Janet has a fungal skin disease. This is called \_\_\_\_\_.
- A contagious skin disease caused by a mite is \_\_\_\_\_.
- An infection around the entire nail is called \_\_\_\_\_.
- A form of skin cancer affecting AIDS patients is called \_\_\_\_\_.
- Latricia has a bacterial skin infection that results in pustules crusting and rupturing. It is called \_\_\_\_\_.
- James's burn scar became a hypertrophic \_\_\_\_\_.
- For a(n) \_\_\_\_\_ test, cells scraped off the skin are examined under a microscope.
- During surgery a \_\_\_\_\_ was ordered for a rapid exam of tissue cut from a tumor.

### G. Pharmacology Challenge

Fill in the classification for each drug description, then match the brand name.

Drug Description	Classification	Brand Name
1. _____ kills fungi	_____	a. Kwell
2. _____ reduces severe itching	_____	b. Cortaid
3. _____ kills mites and lice	_____	c. Benadryl
4. _____ powerful anti-inflammatory	_____	d. Neosporin
5. _____ deadens pain	_____	e. Monistat
6. _____ kills bacteria	_____	f. Xylocaine



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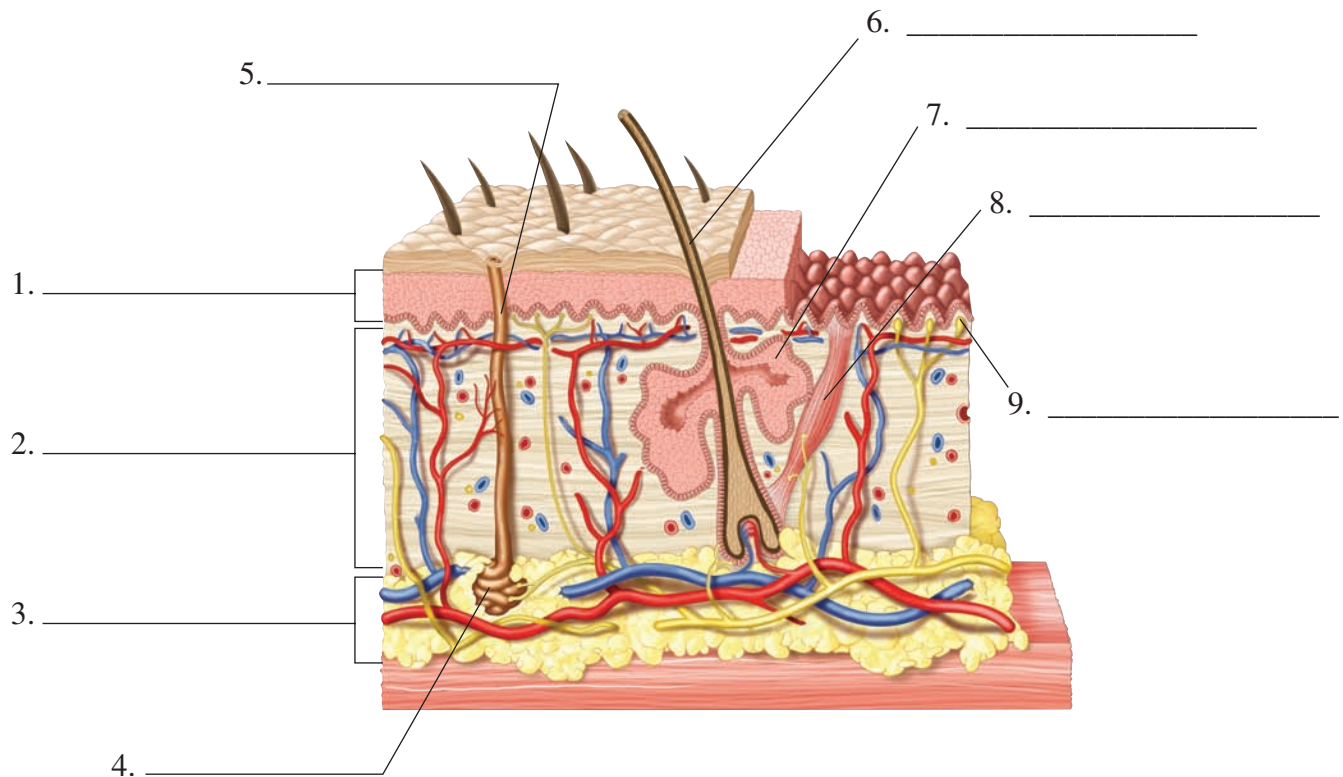
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## Labeling Exercise

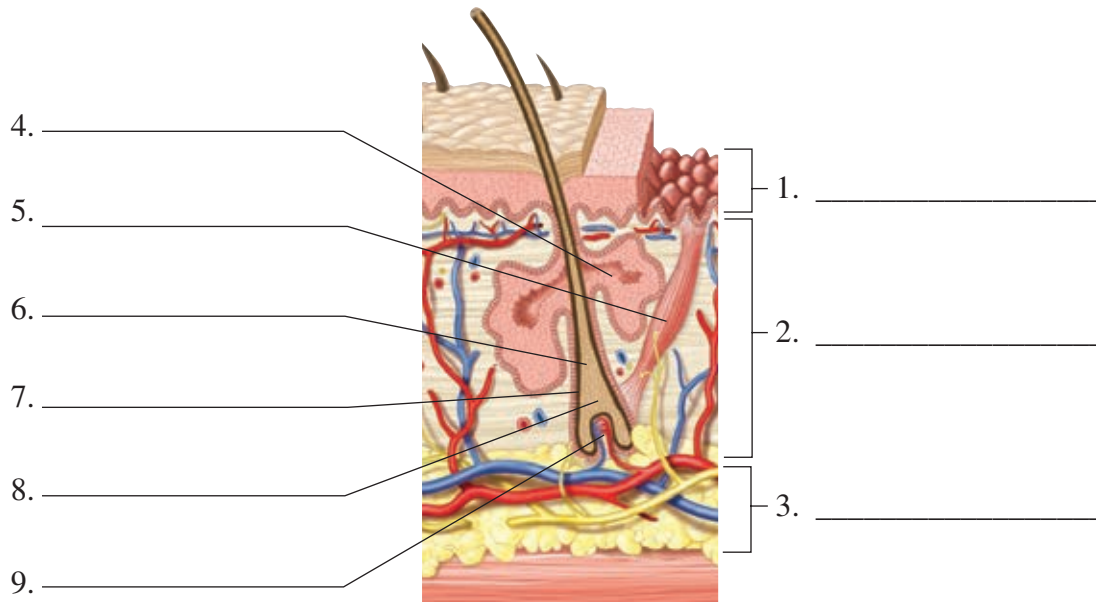
### Image A

Write the labels for this figure on the numbered lines provided.



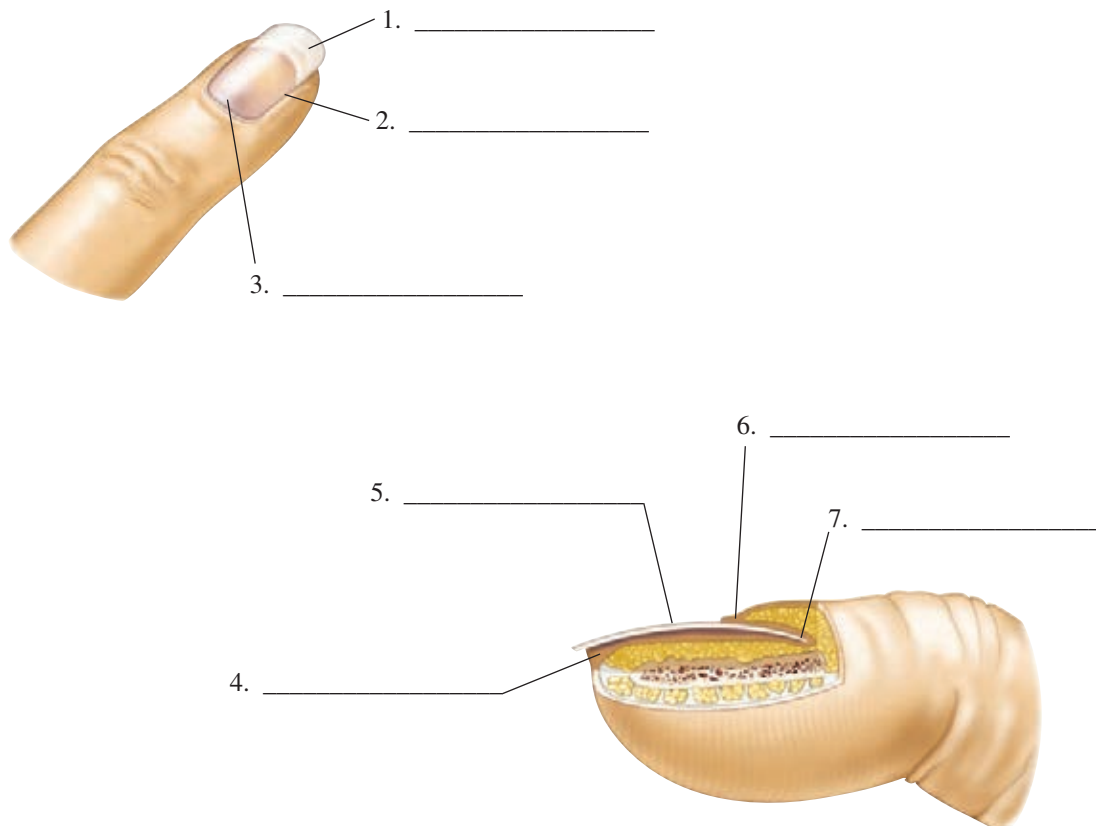
## Image B

Write the labels for this figure on the numbered lines provided.



## Image C

Write the labels for this figure on the numbered lines provided.



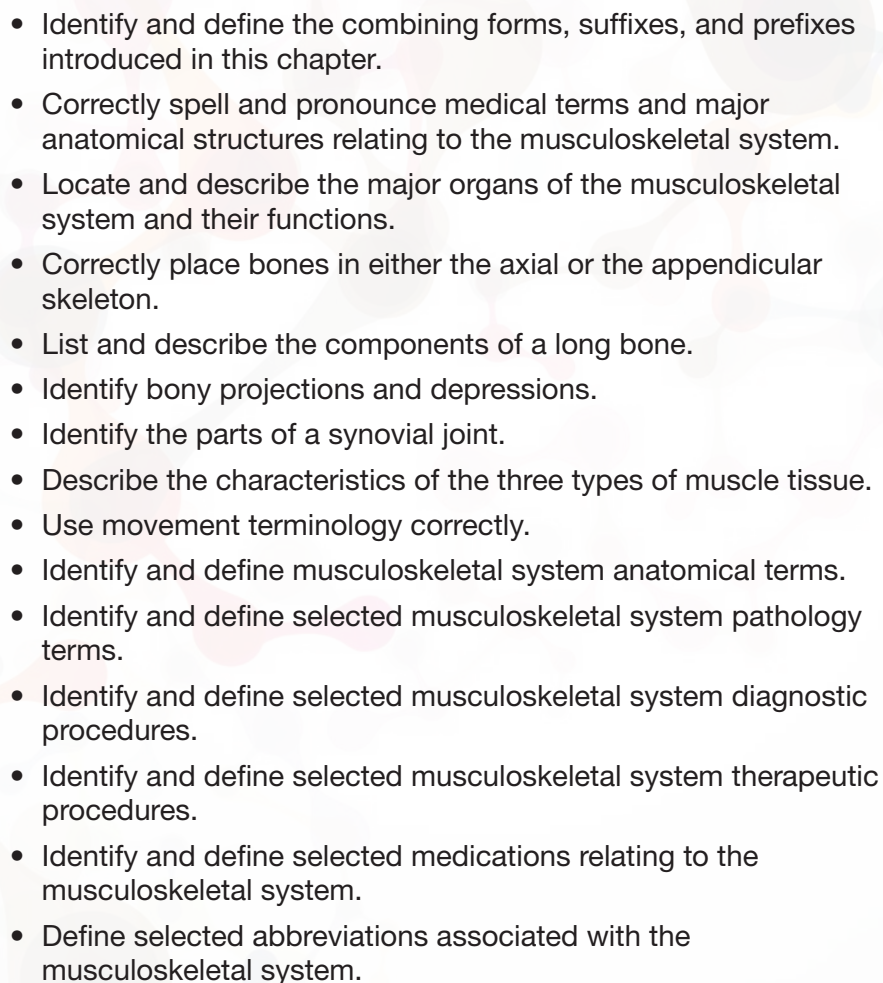


# 4

## Musculoskeletal System

### Learning Objectives

*Upon completion of this chapter, you will be able to*

- Identify and define the combining forms, suffixes, and prefixes introduced in this chapter.
  - Correctly spell and pronounce medical terms and major anatomical structures relating to the musculoskeletal system.
  - Locate and describe the major organs of the musculoskeletal system and their functions.
  - Correctly place bones in either the axial or the appendicular skeleton.
  - List and describe the components of a long bone.
  - Identify bony projections and depressions.
  - Identify the parts of a synovial joint.
  - Describe the characteristics of the three types of muscle tissue.
  - Use movement terminology correctly.
  - Identify and define musculoskeletal system anatomical terms.
  - Identify and define selected musculoskeletal system pathology terms.
  - Identify and define selected musculoskeletal system diagnostic procedures.
  - Identify and define selected musculoskeletal system therapeutic procedures.
  - Identify and define selected medications relating to the musculoskeletal system.
  - Define selected abbreviations associated with the musculoskeletal system.
- 



# Section I: Skeletal System at a Glance

## Function

The skeletal system consists of 206 bones that make up the internal framework of the body, called the skeleton. The skeleton supports the body, protects internal organs, serves as a point of attachment for skeletal muscles for body movement, produces blood cells, and stores minerals.

## Organs

Here are the primary structures that comprise the skeletal system:

**bones**

**joints**

## Word Parts

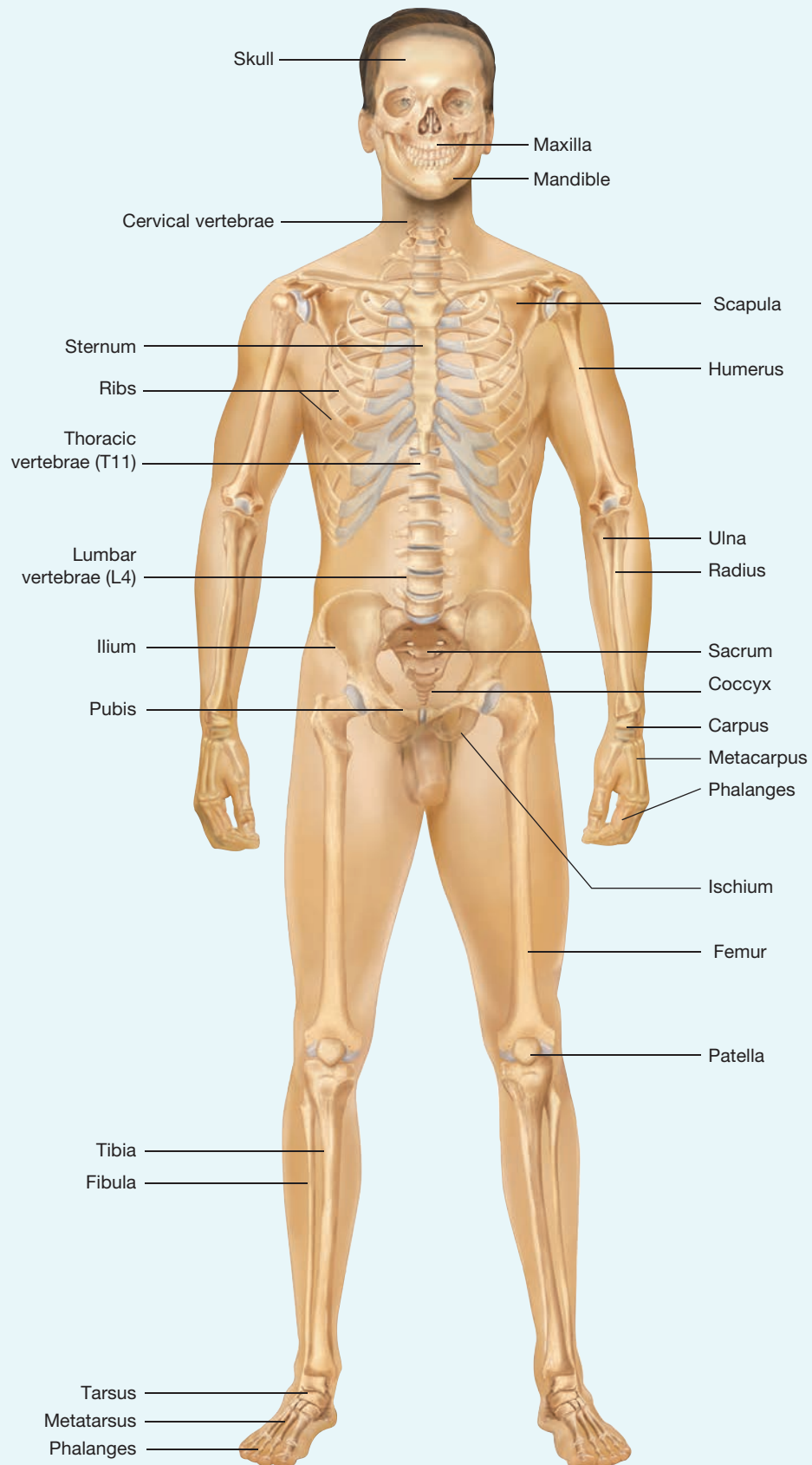
Here are the most common word parts (with their meanings) used to build skeletal system terms. For a more comprehensive list, refer to the Terminology section of this chapter.

## Combining Forms

<b>ankyl/o</b>	stiff joint	<b>metatars/o</b>	metatarsus
<b>arthr/o</b>	joint	<b>myel/o</b>	bone marrow, spinal cord
<b>articul/o</b>	joint	<b>orth/o</b>	straight
<b>burs/o</b>	sac	<b>oste/o</b>	bone
<b>carp/o</b>	carpus	<b>patell/o</b>	patella
<b>cervic/o</b>	neck	<b>pector/o</b>	chest
<b>chondr/o</b>	cartilage	<b>ped/o</b>	child; foot
<b>clavicul/o</b>	clavicle	<b>pelv/o</b>	pelvis
<b>coccyg/o</b>	coccyx	<b>phalang/o</b>	phalanges
<b>cortic/o</b>	outer layer	<b>pod/o</b>	foot
<b>cost/o</b>	rib	<b>prosthet/o</b>	addition
<b>crani/o</b>	skull	<b>pub/o</b>	pubis
<b>femor/o</b>	femur	<b>radi/o</b>	radius; ray (X-ray)
<b>fibul/o</b>	fibula	<b>sacr/o</b>	sacrum
<b>humer/o</b>	humerus	<b>scapul/o</b>	scapula
<b>ili/o</b>	ilium	<b>scoli/o</b>	crooked
<b>ischi/o</b>	ischium	<b>spin/o</b>	spine
<b>kyph/o</b>	hump	<b>spondyl/o</b>	vertebrae
<b>lamin/o</b>	lamina (part of vertebra)	<b>stern/o</b>	sternum
<b>lord/o</b>	bent backward	<b>synovi/o</b>	synovial membrane
<b>lumb/o</b>	loin (low back between ribs and pelvis)	<b>synov/o</b>	synovial membrane
<b>mandibul/o</b>	mandible	<b>tars/o</b>	tarsus
<b>maxill/o</b>	maxilla	<b>thorac/o</b>	chest
<b>medull/o</b>	inner region	<b>tibi/o</b>	tibia
<b>metacarp/o</b>	metacarpus	<b>uln/o</b>	ulna
		<b>vertebr/o</b>	vertebra

(continued on page 84)

# Skeletal System Illustrated



## Suffixes

<b>-blast</b>	immature	<b>-listhesis</b>	slipping
<b>-clasia</b>	to surgically break	<b>-logic</b>	pertaining to study of
<b>-desis</b>	to fuse	<b>-porosis</b>	porous

## Prefixes

<b>dis-</b>	apart
<b>non-</b>	not

### Med Term Tip

The term *skeleton*, from the Greek word *skeltos* meaning “dried up,” was originally used in reference to a dried-up mummified body, but over time came to be used for bones.

# Anatomy and Physiology of the Skeletal System

bone marrow  
bones  
joints

ligaments (LIG-ah-ments)  
skeleton

Each bone in the human body is a unique organ that carries its own blood supply, nerves, and lymphatic vessels. When these **bones** are connected to each other it forms the framework of the body called a **skeleton**. The skeleton protects vital organs and stores minerals. **Bone marrow** is the site of blood cell production. A **joint** is the place where two bones meet and are held together by **ligaments**. This gives flexibility to the skeleton. The skeleton, joints, and muscles work together to produce movement.

## Bones

**cartilage** (CAR-tih-lij)  
**osseous tissue** (OSS-ee-us)  
**ossification** (oss-sih-fih-KAY-shun)

**osteoblasts** (OSS-tee-oh-blasts)  
**osteocytes** (OSS-tee-oh-sights)

### What's In A Name?

Look for these word parts:

**oste/o** = bone  
**-blast** = immature  
**-cyte** = cell  
**-ous** = pertaining to

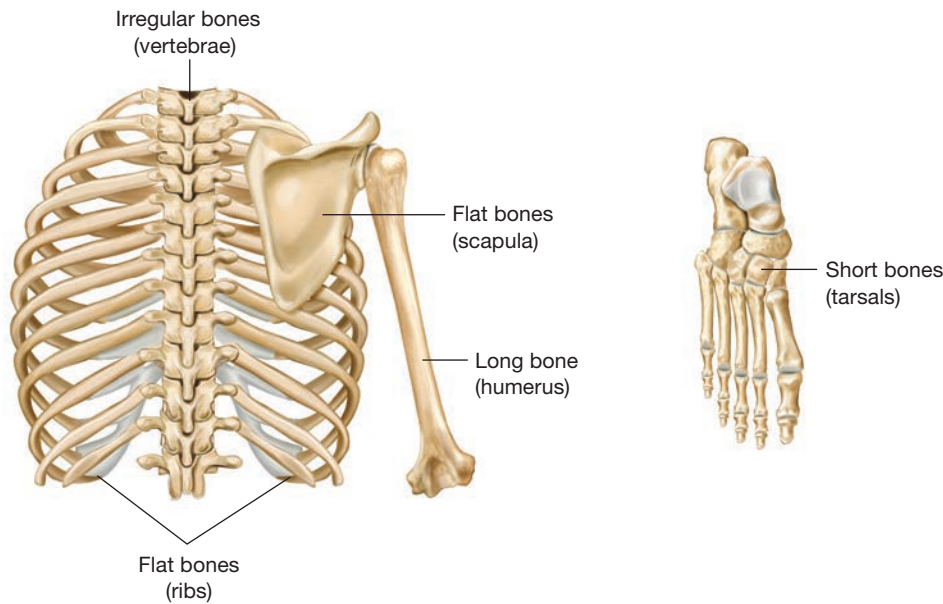
Bones, also called **osseous tissue**, are one of the hardest materials in the body. Bones are formed from a gradual process beginning before birth called **ossification**. The first model of the skeleton, made of **cartilage**, is formed in the fetus. **Osteoblasts**, immature bone cells, gradually replace the cartilage with bone. In a fully adult bone, the osteoblasts have matured into **osteocytes** that work to maintain the bone. The formation of strong bones is greatly dependent on an adequate supply of minerals such as calcium (Ca) and phosphorus (P).

## Bone Structure

**articular cartilage** (ar-TIK-yoo-lar)  
**cancellous bone** (CAN-sell-us)  
**compact bone**  
**cortical bone** (KOR-ti-kal)  
**diaphysis** (dye-AFF-ih-sis)  
**epiphysis** (eh-PIFF-ih-sis)  
**flat bones**  
**irregular bones**

**long bones**  
**medullary cavity** (MED-you-lair-ee)  
**periosteum** (pair-ee-AH-stee-um)  
**red bone marrow**  
**short bones**  
**spongy bone**  
**yellow bone marrow**





■ **Figure 4.1** Classification of bones by shape.

Several different types of bones are found throughout the body and fall into four categories based on their shape: **long bones**, **short bones**, **flat bones**, and **irregular bones** (see Figure 4.1 ■). Long bones are longer than they are wide; examples are the femur and humerus. Short bones are roughly as long as they are wide; examples are the carpals and tarsals. Irregular bones received their name because the shapes of the bones are very irregular; for example, the vertebrae are irregular bones. Flat bones are usually plate-shaped bones such as the sternum, scapulae, and pelvis.

The majority of bones in the human body are long bones. These bones have similar structure with a central shaft or **diaphysis** that widens at each end, which is called an **epiphysis**. Each epiphysis is covered by a layer of cartilage called **articular cartilage** to prevent bone from rubbing directly on bone. The remaining surface of each bone is covered with a thin connective tissue membrane called the **periosteum**, which contains numerous blood vessels, nerves, and lymphatic vessels. The dense and hard exterior surface bone is called **cortical** or **compact bone**. **Cancellous** or **spongy bone** is found inside the bone. As its name indicates, spongy bone has spaces in it, giving it a spongelike appearance. These spaces contain **red bone marrow**, which manufactures most of the blood cells and is found in some parts of all bones.

The center of the diaphysis contains an open canal called the **medullary cavity**. Early in life this cavity also contains red bone marrow, but as we age the red bone marrow of the medullary cavity gradually converts to **yellow bone marrow**, which consists primarily of fat cells. Figure 4.2 ■ contains an illustration of the structure of long bones.

## Bone Projections and Depressions

**condyle** (KON-dile)

**epicondyle** (ep-ih-KON-dile)

**fissure** (FISH-er)

**foramen** (for-AY-men)

**fossa** (FOSS-ah)

**head**

**neck**

**process**

**sinus** (SIGH-nus)

**trochanter** (tro-KAN-ter)

**tubercle** (TOO-ber-kl)

**tuberosity** (too-ber-OSS-ih-tee)

Bones have many projections and depressions; some are rounded and smooth in order to articulate with another bone in a joint. Others are rough to provide muscles with attachment points. The general term for any bony

### What's In A Name?

Look for these word parts:

**articul/o** = joint

**cortic/o** = outer layer

**medull/o** = inner region

**oste/o** = bone

**peri-** = around

**-al** = pertaining to

**-ar** = pertaining to

**-ary** = pertaining to

### Med Term Tip

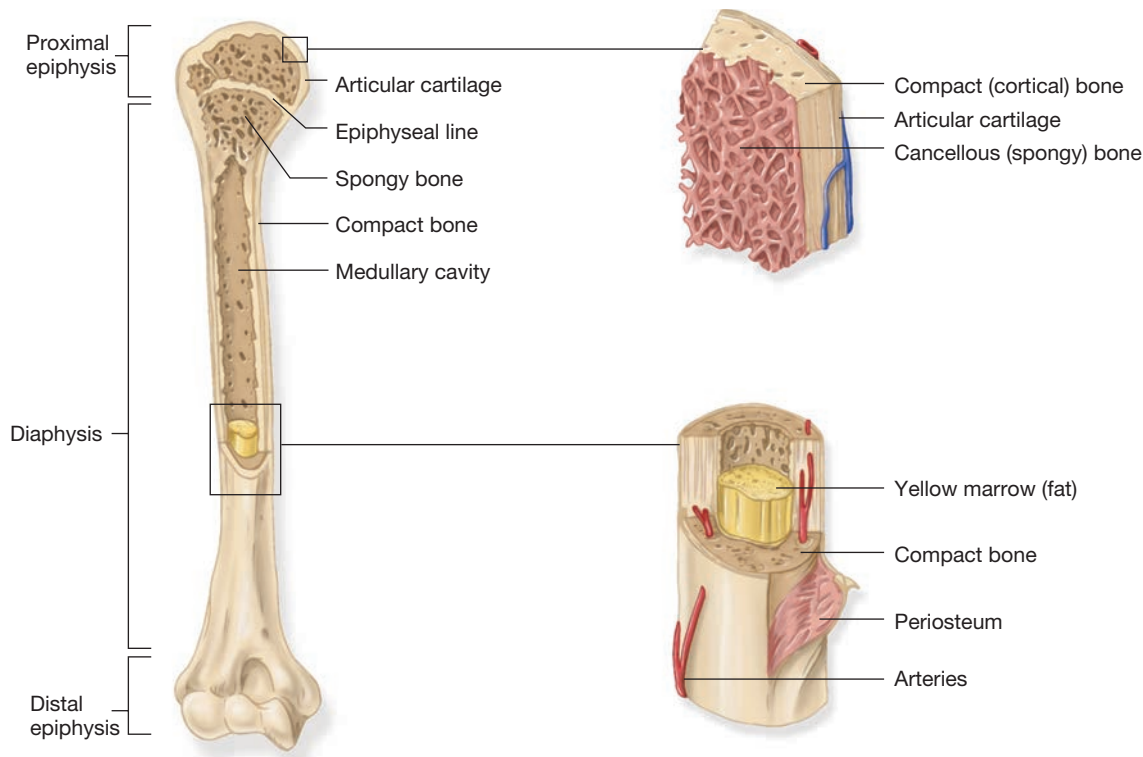
Do not confuse a long bone with a large bone. A long bone is not necessarily a large bone. The bones of your fingers are short in length, but since they are longer than they are wide, they are classified as long bones.

### Med Term Tip

The term *diaphysis* comes from the Greek term meaning "to grow between."

### Med Term Tip

The elbow, commonly referred to as the *funny bone*, is actually a projection of the ulna called the olecranon process.



■ **Figure 4.2** Components of a long bone. The entire long bone is on the left side accompanied by a blow-up of the proximal epiphysis and a section of the diaphysis.

projection is a **process**. Then there are specific terms to describe the different shapes and locations of various processes. These terms are commonly used on operative reports and in physicians' records for clear identification of areas on the individual bones. Some of the common bony processes include the following:

1. The **head** is a large, smooth, ball-shaped end on a long bone. It may be separated from the body or shaft of the bone by a narrow area called the **neck**.
2. A **condyle** refers to a smooth, rounded portion at the end of a bone.
3. The **epicondyle** is a projection located above or on a condyle.
4. The **trochanter** refers to a large rough process for the attachment of a muscle.
5. A **tubercle** is a small, rough process that provides the attachment for tendons and muscles.
6. The **tuberosity** is a large, rough process that provides the attachment of tendons and muscles.

See Figure 4.3 ■ for an illustration of the processes found on the femur.

Additionally, bones have hollow regions or depressions, the most common of which are the:

7. **Sinus**: a hollow cavity within a bone.
8. **Foramen**: a smooth, round opening for nerves and blood vessels.
9. **Fossa**: consists of a shallow cavity or depression on the surface of a bone.
10. **Fissure**: a slit-type opening.

## Skeleton

### What's In A Name?

Look for these word parts:

-al = pertaining to

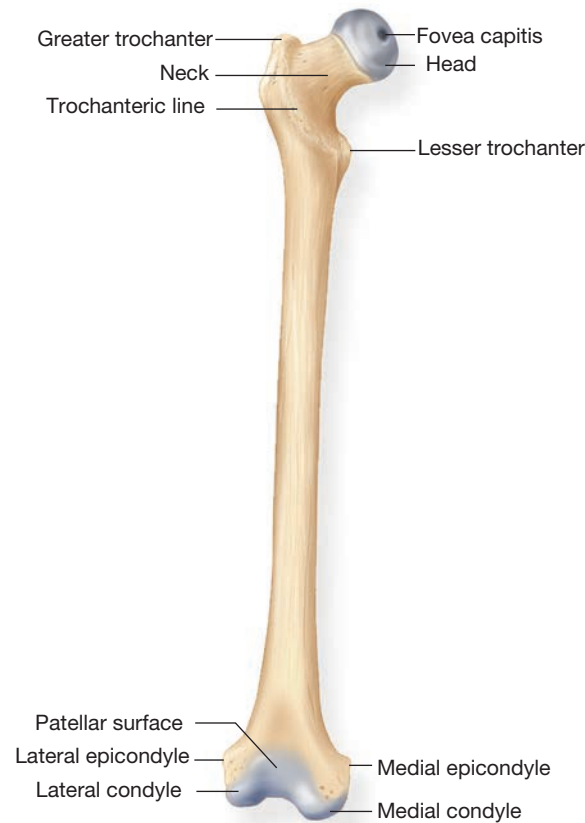
-ar = pertaining to

**appendicular skeleton** (app-en-DIK-yoo-lar)

**axial skeleton** (AK-see-al)

The human skeleton has two divisions: the **axial skeleton** and the **appendicular skeleton**. Figures 4.4 and 4.8 illustrate these two skeletons.

■ **Figure 4.3** Bony processes found on the femur.



## Axial Skeleton

**cervical vertebrae**

**coccyx** (COCK-six)

**cranium** (KRAY-nee-um)

**ethmoid bone** (ETH-moyd)

**facial bones**

**frontal bone**

**hyoid bone** (HIGH-oyd)

**intervertebral disk** (in-ter-VER-teh-bral)

**lacrimal bone** (LACK-rim-al)

**lumbar vertebrae**

**mandible** (MAN-dih-bl)

**maxilla** (mack-SIH-lah)

**nasal bone**

**occipital bone** (ock-SIP-eh-tal)

**palatine bone** (PAL-ah-tine)

**parietal bone** (pah-RYE-eh-tal)

**rib cage**

**sacrum** (SAY-crum)

**sphenoid bone** (SFEE-noyd)

**sternum** (STER-num)

**temporal bone** (TEM-por-al)

**thoracic vertebrae**

**vertebral column** (VER-teh-bral)

**vomer bone** (VOH-mer)

**zygomatic bone** (zey-ge-MAT-ik)

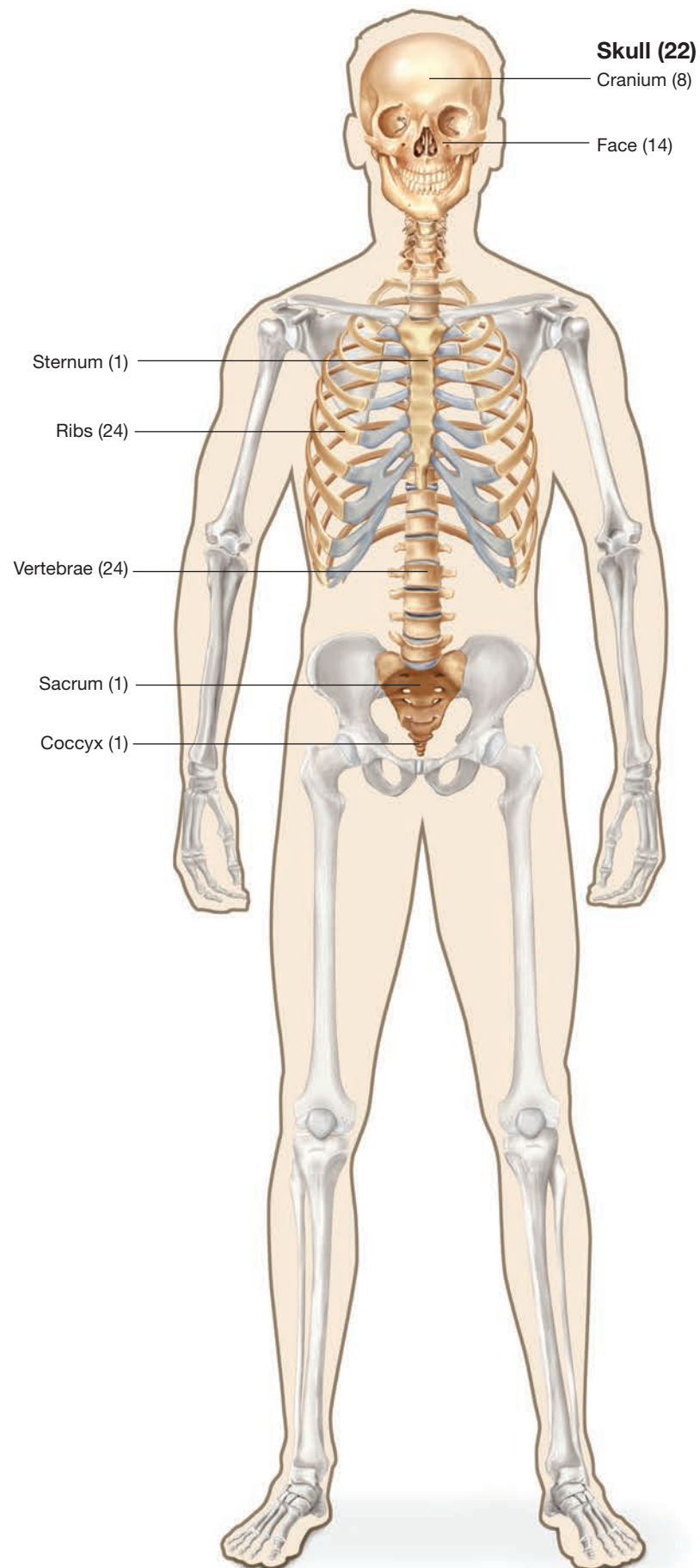
## Med Term Tip

Newborn infants have about 300 bones at birth that will fuse into 206 bones as an adult.

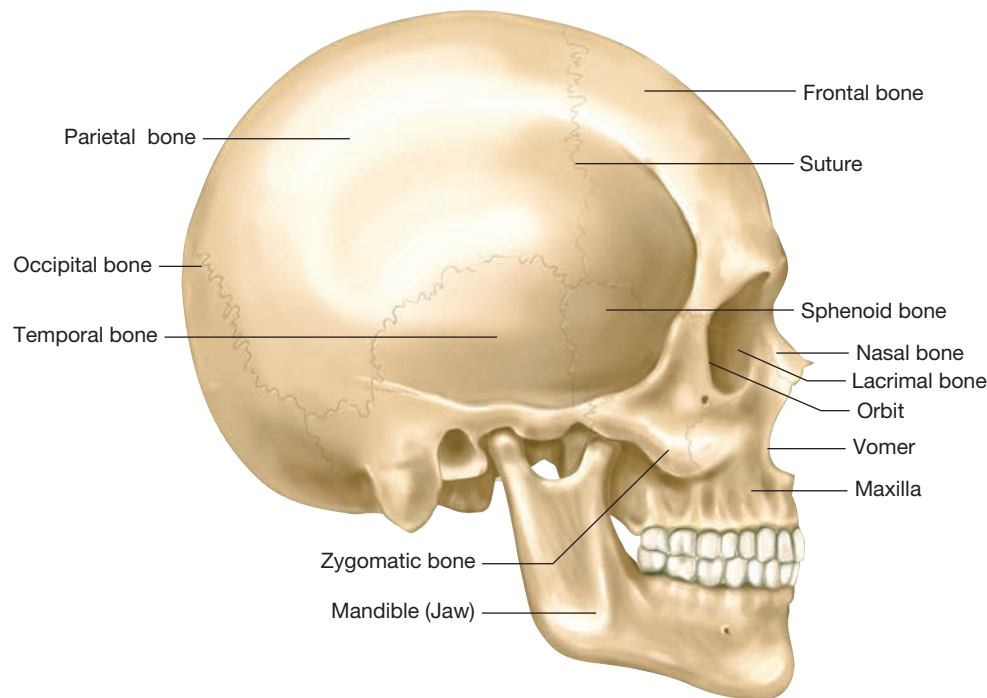
The axial skeleton includes the bones of the head, neck, spine, chest, and trunk of the body (see Figure 4.4 ■). These bones form the central axis for the whole body and protect many of the internal organs such as the brain, lungs, and heart.

The head or skull is divided into two parts consisting of the **cranium** and **facial bones**. These bones surround and protect the brain, eyes, ears, nasal cavity, and oral cavity from injury. The muscles for chewing and moving the head are attached to the cranial bones. The cranium encases the brain and consists of the **frontal**, **parietal**, **temporal**, **ethmoid**, **sphenoid**, and **occipital bones**. The facial bones surround the mouth, nose, and eyes, and include the **mandible**, **maxilla**,

■ **Figure 4.4** Bones of the axial skeleton.



■ **Figure 4.5** Bones of the skull.



**zygomatic, vomer, palatine, nasal, and lacrimal bones.** The cranial and facial bones are illustrated in Figure 4.5 ■ and described in Table 4.1 ■.

The **hyoid bone** is a single U-shaped bone suspended in the neck between the mandible and larynx. It is a point of attachment for swallowing and speech muscles.

The trunk of the body consists of the **vertebral column, sternum, and rib cage**. The vertebral or spinal column is divided into five sections: **cervical vertebrae, thoracic vertebrae, lumbar vertebrae, sacrum, and coccyx** (see Figure 4.6 ■ and Table 4.2 ■). Located between each pair of vertebrae, from the cervical through the lumbar regions, is an **intervertebral disk**. Each disk is composed of fibrocartilage to provide a cushion between the vertebrae. The rib cage has 12 pairs of ribs attached at the back to the vertebral column. Ten of the pairs are also attached to the sternum in the front (see Figure 4.7 ■). The lowest two pairs are called *floating ribs* and

#### Med Term Tip

The term *coccyx* comes from the Greek word for the cuckoo because the shape of these small bones extending off the sacrum resembles this bird's bill.

**Table 4.1** Bones of the Skull

Name	Number	Description
<b>Cranial Bones</b>		
Frontal bone	1	Forehead
Parietal bone	2	Upper sides of cranium and roof of skull
Occipital bone	1	Back and base of skull
Temporal bone	2	Sides and base of cranium
Sphenoid bone	1	Bat-shaped bone that forms part of the base of the skull, floor, and sides of eye orbit
Ethmoid bone	1	Forms part of eye orbit, nose, and floor of cranium
<b>Facial Bones</b>		
Lacrimal bone	2	Inner corner of each eye
Nasal bone	2	Form part of nasal septum and support bridge of nose
Maxilla	1	Upper jaw
Mandible	1	Lower jawbone; only movable bone of the skull
Zygomatic bone	2	Cheekbones
Vomer bone	1	Base of nasal septum
Palatine bone	1	Hard palate (PAH lat) roof of oral cavity and floor of nasal cavity

#### What's In A Name?

Look for these word parts:

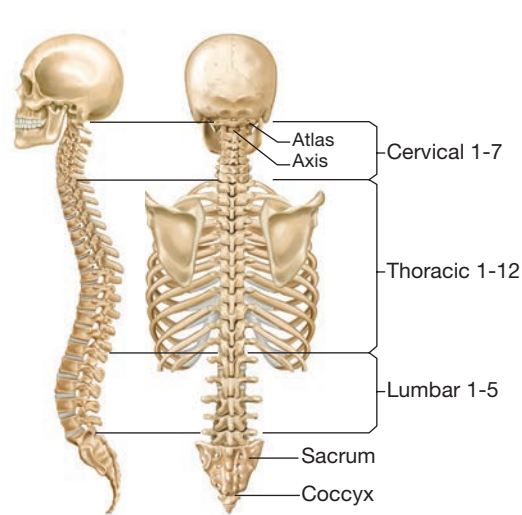
-al = pertaining to

-ar = pertaining to

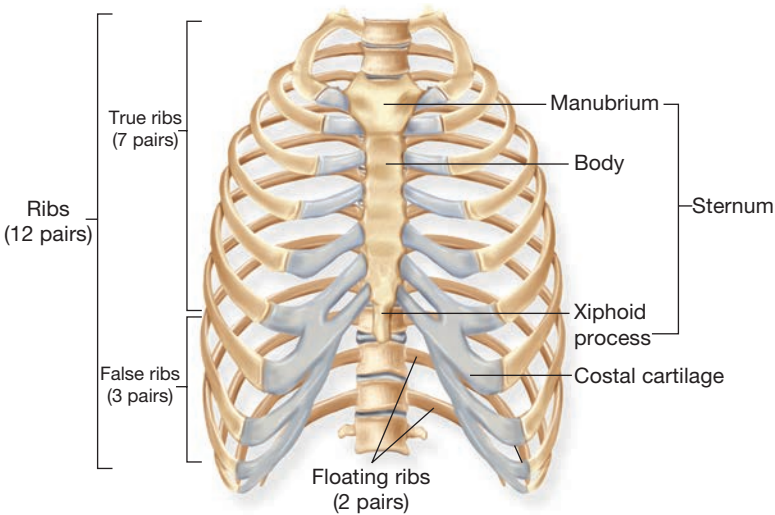
-oid = resembling

-tic = pertaining to





■ **Figure 4.6** Divisions of the vertebral column.



■ **Figure 4.7** The structure of the rib cage.

Table 4.2 Bones of the Vertebral/Spinal Column		
Name	Number	Description
Cervical vertebra	7	Vertebrae in the neck region
Thoracic vertebra	12	Vertebrae in the chest region with ribs attached
Lumbar vertebra	5	Vertebrae in the small of the back, about waist level
Sacrum	1	Five vertebrae that become fused into one triangular-shaped flat bone at the base of the vertebral column
Coccyx	1	Three to five very small vertebrae attached to the sacrum, often become fused

are attached only to the vertebral column. The rib cage serves to provide support for organs, such as the heart and lungs.

Appendicular Skeleton

- carpus (CAR-pus)
- clavicle (CLAV-ih-kl)
- femur (FEE-mer)
- fibula (FIB-yoo-lah)
- humerus (HYOO-mer-us)
- ilium (ILL-ee-um)
- innominate bone (ih-NOM-ih-nayt)
- ischium (ISS-kee-um)
- lower extremities
- metacarpus (met-ah-CAR-pus)
- metatarsus (met-ah-TAHR-sus)
- os coxae (OSS / KOK-sigh)

- patella (pah-TELL-ah)
- pectoral girdle (PEK-toh-ral)
- pelvic girdle (PEL-vik)
- phalanges (fah-LAN-jeez)
- pubis (PYOO-bis)
- radius (RAY-dee-us)
- scapula (SKAP-yoo-lah)
- tarsus (TAHR-sus)
- tibia (TIB-ee-ah)
- ulna (UHL-nah)
- upper extremities

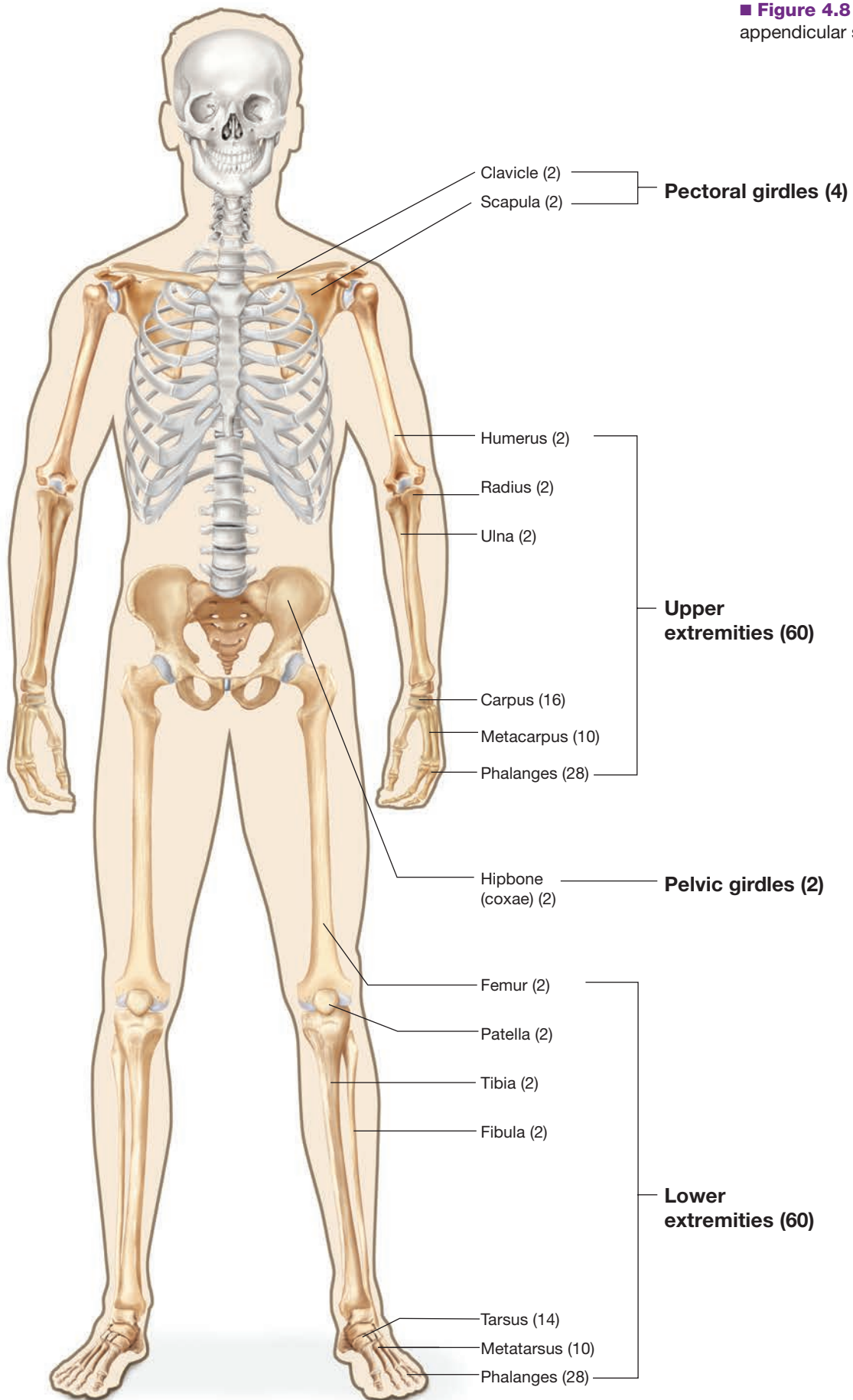
**What's In A Name?**  
Look for these word parts:  
pector/o = chest  
pelv/o = pelvis  
-al = pertaining to  
-ic = pertaining to

**Med Term Tip**  
The term *girdle*, meaning something that encircles or confines, refers to the entire bony structure of the shoulder and the pelvis. If just one bone from these areas is being discussed, like the ilium of the pelvis, it would be named as such. If, however, the entire pelvis is being discussed, it would be called the pelvic girdle.

The appendicular skeleton consists of the **pectoral girdle**, **upper extremities**, **pelvic girdle**, and **lower extremities** (see Figure 4.8 ■). These are the bones for our appendages or limbs and along with the muscles attached to them, they are responsible for body movement.



■ **Figure 4.8** Bones of the appendicular skeleton.



The pectoral girdle consists of the **clavicle** and **scapula** bones. It functions to attach the upper extremity, or arm, to the axial skeleton by articulating with the sternum anteriorly and the vertebral column posteriorly. The bones of the upper extremity include the **humerus**, **ulna**, **radius**, **carpus**, **metacarpus**, and **phalanges**. These bones are illustrated in Figure 4.9 ■ and described in Table 4.3 ■.

■ **Figure 4.9** Anatomical and common names for the pectoral girdle and upper extremity.

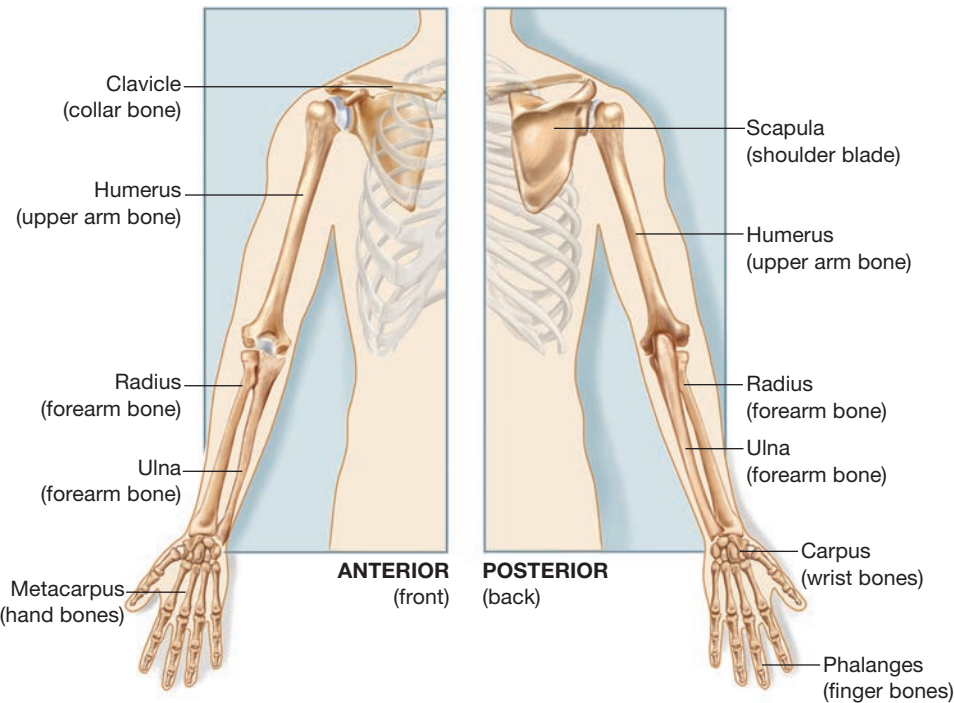
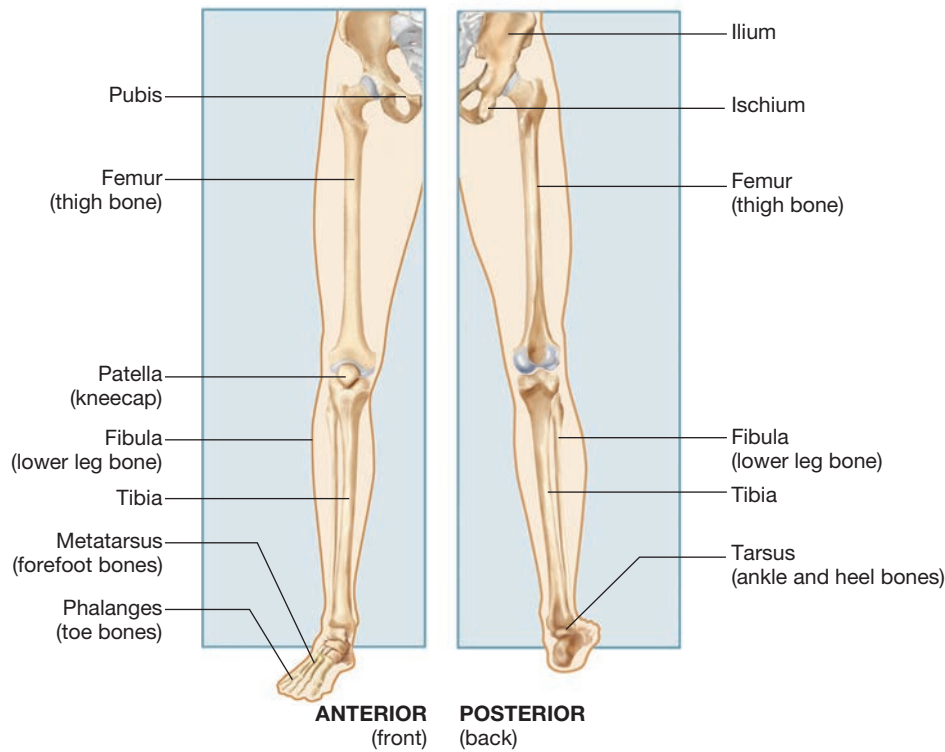


Table 4.3 Bones of the Pectoral Girdle and Upper Extremity		
Name	Number	Description
Pectoral Girdle		
Clavicle	2	Collar bone
Scapula	2	Shoulder blade
Upper Extremity		
Humerus	2	Upper arm bone
Radius	2	Forearm bone on thumb side of lower arm
Ulna	2	Forearm bone on little finger side of lower arm
Carpus	16	Bones of wrist
Metacarpus	10	Bones in palm of hand
Phalanges	28	Finger bones; three in each finger and two in each thumb

The pelvic girdle is called the **os coxae** or the **innominate bone** or hipbone. It contains the **ilium**, **ischium**, and **pubis**. It articulates with the sacrum posteriorly to attach the lower extremity, or leg, to the axial skeleton. The lower extremity bones include the **femur**, **patella**, **tibia**, **fibula**, **tarsus**, **metatarsus**, and phalanges. These bones are illustrated in Figure 4.10 ■ and described in Table 4.4 ■.



■ **Figure 4.10** Anatomical and common names for the pelvic girdle and lower extremity.

**Table 4.4** Bones of the Pelvic Girdle and Lower Extremity

Name	Number	Description
<b>Pelvic Girdle/Os Coxae</b>		
Ilium	2	Part of the hipbone
Ischium	2	Part of the hipbone
Pubis	2	Part of the hipbone
<b>Lower Extremity</b>		
Femur	2	Upper leg bone; thigh bone
Patella	2	Kneecap
Tibia	2	Shin bone; thicker lower leg bone
Fibula	2	Thinner, long bone in lateral side of lower leg
Tarsus	14	Ankle and heel bones
Metatarsus	10	Forefoot bones
Phalanges	28	Toe bones; three in each toe and two in each great toe

## Joints

**articulation** (ar-tik-yoo-LAY-shun)

**bursa** (BER-sah)

**cartilaginous joints** (car-tih-LAJ-ih-nus)

**fibrous joints** (FYE-bruss)

**joint capsule**

**synovial fluid**

**synovial joint** (sin-OH-vee-al)

**synovial membrane**

Joints are formed when two or more bones meet. This is also referred to as an **articulation**. There are three types of joints based on the amount of movement allowed between the bones: **synovial joints**, **cartilaginous joints**, and **fibrous joints** (see Figure 4.11 ■).

Most joints are freely moving synovial joints (see Figure 4.12 ■), which are enclosed by an elastic **joint capsule**. The joint capsule is lined with **synovial membrane**, which secretes **synovial fluid** to lubricate the joint. As noted earlier, the ends of bones in a synovial joint are covered by a layer of articular cartilage. Cartilage is very tough, but still flexible. It withstands high levels of stress to act as a shock absorber for the joint and prevents bone from rubbing against bone. Cartilage is found in several other areas of the body, such as the nasal septum, external ear, eustachian tube, larynx, trachea, bronchi, and intervertebral disks. One example of a synovial joint is the ball-and-socket joint found at the shoulder and hip. The ball rotating in the socket allows for a wide range of motion. Bands of strong connective tissue called ligaments bind bones together at the joint.

Some synovial joints contain a **bursa**, which is a saclike structure composed of connective tissue and lined with synovial membrane. Most commonly found between bones and ligaments or tendons, bursas function to reduce friction. Some common bursa locations are the elbow, knee, and shoulder joints.

Not all joints are freely moving. Fibrous joints allow almost no movement since the ends of the bones are joined by thick fibrous tissue, which may even fuse into solid bone. The sutures of the skull are an example of a fibrous joint. Cartilaginous joints allow for slight movement but hold bones firmly in place by a solid piece of cartilage. An example of this type of joint is the pubic symphysis, the point at which the left and right pubic bones meet in the front of the lower abdomen.

### What's In A Name?

Look for these word parts:

**articul/o** = joint

**fibr/o** = fibers

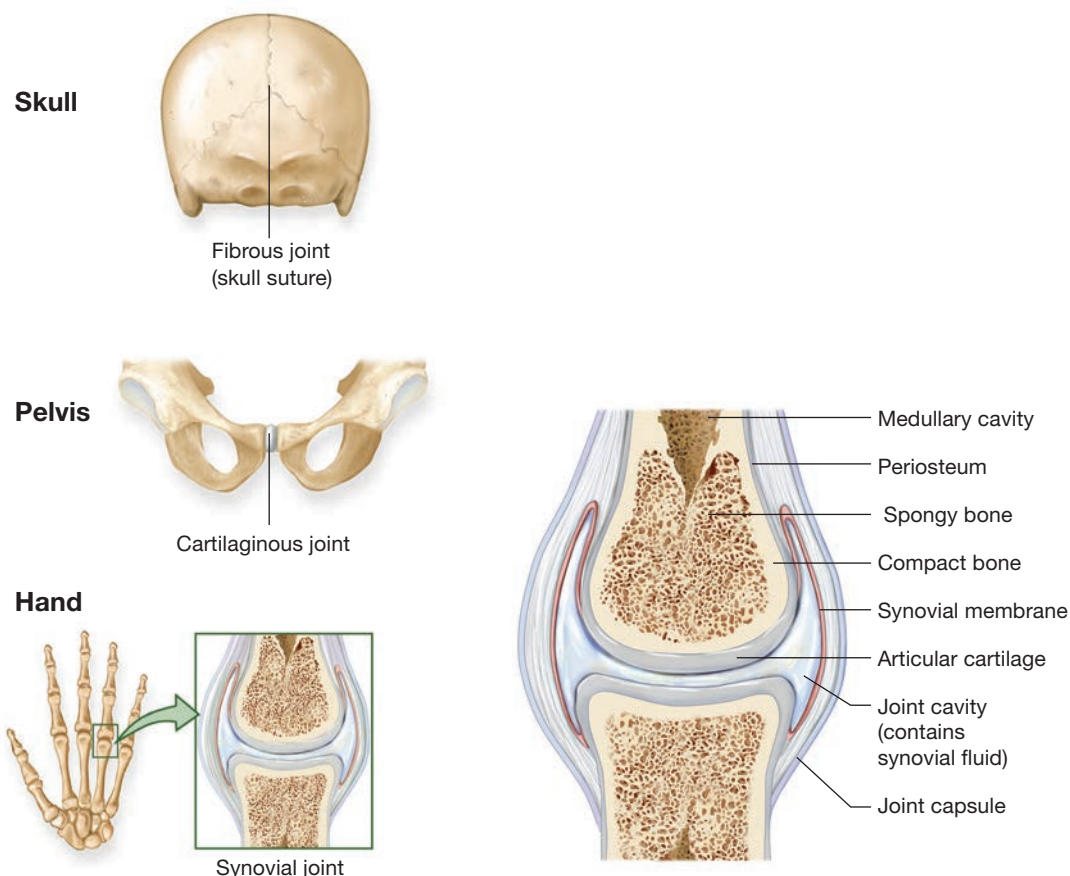
**synovi/o** = synovial membrane

**-al** = pertaining to

**-ous** = pertaining to

### Med Term Tip

*Bursitis* is an inflammation of the bursa located between bony prominences such as at the shoulder. Housemaid's knee, a term thought to have originated from the damage to the knees that occurred when maids knelt to scrub floors, is a form of bursitis and carries the medical name *prepatellar bursitis*.



■ **Figure 4.11** Examples of three types of joints found in the body.

■ **Figure 4.12** Structure of a generalized synovial joint.

## Practice As You Go

### A. Complete the Statement

1. The two divisions of the human skeleton are the \_\_\_\_\_ and \_\_\_\_\_.
2. The five functions of the skeletal system are to \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
3. \_\_\_\_\_ bones are roughly as long as they are wide.
4. The membrane covering bones is called the \_\_\_\_\_.
5. Another name for spongy bone is \_\_\_\_\_ bone.
6. \_\_\_\_\_ joints are the most common joints in the body.
7. A \_\_\_\_\_ is a smooth, round opening in bones.
8. The \_\_\_\_\_ is the shaft of a long bone.

## Terminology

### Word Parts Used to Build Skeletal System Terms

The following lists contain the combining forms, suffixes, and prefixes used to build terms in the remaining sections of this chapter.

#### Combining Forms

<b>ankyl/o</b>	stiff joint
<b>arthr/o</b>	joint
<b>burs/o</b>	bursa
<b>carp/o</b>	carpus
<b>cervic/o</b>	neck
<b>chondr/o</b>	cartilage
<b>clavicul/o</b>	clavicle
<b>coccyg/o</b>	coccyx
<b>cortic/o</b>	outer layer
<b>cost/o</b>	rib
<b>crani/o</b>	skull
<b>cutane/o</b>	skin
<b>erythr/o</b>	red

<b>femor/o</b>	femur
<b>fibul/o</b>	fibula
<b>humer/o</b>	humerus
<b>ili/o</b>	ilium
<b>ischi/o</b>	ischium
<b>kyph/o</b>	hump
<b>lamin/o</b>	lamina
<b>lord/o</b>	bent backward
<b>lumb/o</b>	loin
<b>mandibul/o</b>	mandible
<b>maxill/o</b>	maxilla
<b>medull/o</b>	inner region
<b>metacarp/o</b>	metacarpus

<b>metatars/o</b>	metatarsus
<b>myel/o</b>	bone marrow, spinal cord
<b>orth/o</b>	straight
<b>oste/o</b>	bone
<b>patell/o</b>	patella
<b>path/o</b>	disease
<b>ped/o</b>	child; foot
<b>phalang/o</b>	phalanges
<b>pod/o</b>	foot
<b>prosthet/o</b>	addition
<b>pub/o</b>	pubis
<b>radi/o</b>	radius, ray (X-ray)

## Combining Forms (continued)

<b>sacr/o</b>	sacrum
<b>sarc/o</b>	flesh
<b>scapul/o</b>	scapula
<b>scoli/o</b>	crooked
<b>spin/o</b>	spine

<b>spondyl/o</b>	vertebra
<b>stern/o</b>	sternum
<b>synov/o</b>	synovial membrane
<b>system/o</b>	system

<b>tars/o</b>	tarsus
<b>thorac/o</b>	chest
<b>tibi/o</b>	tibia
<b>uln/o</b>	ulna
<b>vertebr/o</b>	vertebra

## Suffixes

<b>-ac</b>	pertaining to
<b>-al</b>	pertaining to
<b>-algia</b>	pain
<b>-ar</b>	pertaining to
<b>-ary</b>	pertaining to
<b>-centesis</b>	puncture to withdraw fluid
<b>-clasia</b>	surgically break
<b>-desis</b>	to fuse
<b>-eal</b>	pertaining to
<b>-ectomy</b>	surgical removal
<b>-genic</b>	producing
<b>-gram</b>	record
<b>-graphy</b>	process of recording

<b>-iatry</b>	medical treatment
<b>-ic</b>	pertaining to
<b>-itis</b>	inflammation
<b>-listhesis</b>	slipping
<b>-logy</b>	study of
<b>-malacia</b>	abnormal softening
<b>-metry</b>	process of measuring
<b>-oma</b>	tumor
<b>-ory</b>	pertaining to
<b>-osis</b>	abnormal condition
<b>-otomy</b>	cutting into
<b>-ous</b>	pertaining to

<b>-pathy</b>	disease
<b>-plasty</b>	surgical repair
<b>-porosis</b>	porous
<b>-scope</b>	instrument for viewing
<b>-scopic</b>	pertaining to visually examining
<b>-scopy</b>	process of visually examining
<b>-stenosis</b>	narrowing
<b>-tic</b>	pertaining to
<b>-tome</b>	instrument to cut

## Prefixes

<b>anti-</b>	against
<b>bi-</b>	two
<b>dis-</b>	apart

<b>ex-</b>	outward
<b>inter-</b>	between
<b>intra-</b>	within

<b>non-</b>	not
<b>per-</b>	through
<b>sub-</b>	under

## Adjective Forms of Anatomical Terms

Term	Word Parts	Definition
<b>carpal</b> (CAR-pal)	<b>carp/o</b> = carpus <b>-al</b> = pertaining to	Pertaining to the carpus.
<b>cervical</b> (CER-vih-kal)	<b>cervic/o</b> = neck <b>-al</b> = pertaining to	Pertaining to the neck.
<b>clavicular</b> (cla-VIK-yoo-lar)	<b>clavicul/o</b> = clavicle <b>-ar</b> = pertaining to	Pertaining to the clavicle.
<b>coccygeal</b> (cock-SIH-gee-al)	<b>coccyg/o</b> = coccyx <b>-eal</b> = pertaining to	Pertaining to the coccyx.
<b>costal</b> (KOS-tal)	<b>cost/o</b> = rib <b>-al</b> = pertaining to	Pertaining to the rib.



## Adjective Forms of Anatomical Terms (continued)

Term	Word Parts	Definition
<b>cranial</b> (KRAY-nee-all)	<b>crani/o</b> = skull <b>-al</b> = pertaining to	Pertaining to the skull.
<b>femoral</b> (FEM-or-all)	<b>femor/o</b> = femur <b>-al</b> = pertaining to	Pertaining to the femur.
<b>fibular</b> (FIB-yoo-lar)	<b>fibul/o</b> = fibula <b>-ar</b> = pertaining to	Pertaining to the fibula.
<b>humeral</b> (HYOO-mer-all)	<b>humer/o</b> = humerus <b>-al</b> = pertaining to	Pertaining to the humerus.
<b>iliac</b> (ILL-ee-ack)	<b>ili/o</b> = ilium <b>-ac</b> = pertaining to	Pertaining to the ilium.
<b>intervertebral</b> (in-ter-VER-teh-bral)	<b>inter-</b> = between <b>vertebr/o</b> = vertebra <b>-al</b> = pertaining to	Pertaining to between vertebrae.
<b>intracranial</b> (in-trah-KRAY-nee-al)	<b>intra-</b> = within <b>crani/o</b> = skull <b>-al</b> = pertaining to	Pertaining to within the skull.
<b>ischial</b> (ISS-kee-al)	<b>ischi/o</b> = ischium <b>-al</b> = pertaining to	Pertaining to the ischium.
<b>lumbar</b> (LUM-bar)	<b>lumb/o</b> = low back <b>-ar</b> = pertaining to	Pertaining to the low back.
<b>mandibular</b> (man-DIB-yoo-lar)	<b>mandibul/o</b> = mandible <b>-ar</b> = pertaining to	Pertaining to the mandible.
<b>maxillary</b> (mack-sih-LAIR-ree)	<b>maxill/o</b> = maxilla <b>-ary</b> = pertaining to	Pertaining to the maxilla.
<b>metacarpal</b> (met-ah-CAR-pal)	<b>metacarp/o</b> = metacarpus <b>-al</b> = pertaining to	Pertaining to the metacarpus.
<b>metatarsal</b> (met-ah-TAHR-sal)	<b>metatars/o</b> = metatarsus <b>-al</b> = pertaining to	Pertaining to the metatarsus.
<b>patellar</b> (pa-TELL-ar)	<b>patell/o</b> = patella <b>-ar</b> = pertaining to	Pertaining to the patella.
<b>phalangeal</b> (fay-lan-JEE-all)	<b>phalang/o</b> = phalanges <b>-eal</b> = pertaining to	Pertaining to the phalanges.
<b>pubic</b> (PYOO-bik)	<b>pub/o</b> = pubis <b>-ic</b> = pertaining to	Pertaining to the pubis.
<b>radial</b> (RAY-dee-all)	<b>radi/o</b> = radius <b>-al</b> = pertaining to	Pertaining to the radius.
<b>sacral</b> (SAY-kral)	<b>sacr/o</b> = sacrum <b>-al</b> = pertaining to	Pertaining to the sacrum.
<b>scapular</b> (SKAP-yoo-lar)	<b>scapul/o</b> = scapula <b>-ar</b> = pertaining to	Pertaining to the scapula.
<b>sternal</b> (STER-nal)	<b>stern/o</b> = sternum <b>-al</b> = pertaining to	Pertaining to the sternum.
<b>tarsal</b> (TAHR-sal)	<b>tars/o</b> = tarsus <b>-al</b> = pertaining to	Pertaining to the tarsus.

## Adjective Forms of Anatomical Terms (continued)

Term	Word Parts	Definition
<b>thoracic</b> (tho-RASS-ik)	<b>thorac/o</b> = thorax <b>-ic</b> = pertaining to	Pertaining to the thorax.
<b>tibial</b> (TIB-ee-all)	<b>tibi/o</b> = tibia <b>-al</b> = pertaining to	Pertaining to the tibia.
<b>ulnar</b> (UHL-nar)	<b>uln/o</b> = ulna <b>-ar</b> = pertaining to	Pertaining to the ulna.
<b>vertebral</b> (VER-teh-bral)	<b>vertebr/o</b> = vertebra <b>-al</b> = pertaining to	Pertaining to a vertebra.

## Practice As You Go

### B. Adjective Form Practice

Give the adjective form for the following bones.

- femur \_\_\_\_\_
- sternum \_\_\_\_\_
- clavicle \_\_\_\_\_
- coccyx \_\_\_\_\_
- maxilla \_\_\_\_\_
- tibia \_\_\_\_\_
- patella \_\_\_\_\_
- phalanges \_\_\_\_\_
- humerus \_\_\_\_\_
- pubis \_\_\_\_\_

## Pathology

Term	Word Parts	Definition
<b>Medical Specialties</b>		
<b>chiropractic</b> (ki-roh-PRAK-tik)	<b>-tic</b> = pertaining to	Healthcare profession concerned with diagnosis and treatment of malalignment conditions of the spine and musculoskeletal system with the intention of affecting the nervous system and improving health. Healthcare professional is a <i>chiropractor</i> .

## Pathology (continued)

Term	Word Parts	Definition
<b>orthopedics</b> (Orth, ortho) (or-thoh-PEE-diks)	<b>orth/o</b> = straight <b>ped/o</b> = child, foot <b>-ic</b> = pertaining to	Branch of medicine specializing in the diagnosis and treatment of conditions of the musculoskeletal system; also called <i>orthopedic surgery</i> . Physician is an <i>orthopedist</i> or <i>orthopedic surgeon</i> . Name derived from straightening ( <i>orth/o</i> ) deformities in children ( <i>ped/o</i> ).
<b>orthotics</b> (or-THOT-iks)	<b>orth/o</b> = straight <b>-tic</b> = pertaining to	Healthcare profession specializing in making orthopedic appliances such as braces and splints. Person skilled in making and adjusting these appliances is an <i>orthotist</i> .
<b>podiatry</b> (po-DYE-ah-tree)	<b>pod/o</b> = foot <b>-iatry</b> = medical treatment	Healthcare profession specializing in diagnosis and treatment of disorders of the feet and lower legs. Healthcare professional is a <i>podiatrist</i> .
<b>prosthetics</b> (pross-THET-iks)	<b>prosthet/o</b> = addition <b>-ic</b> = pertaining to	Healthcare profession specializing in making artificial body parts. Person skilled in making and adjusting prostheses is a <i>prosthetist</i> .
<b>Signs and Symptoms</b>		
<b>arthralgia</b> (ar-THRAL-jee-ah)	<b>arthr/o</b> = joint <b>-algia</b> = pain	Joint pain.
<b>bursitis</b> (ber-SIGH-tis)	<b>burs/o</b> = bursa <b>-itis</b> = inflammation	Inflammation of a bursa.
<b>callus</b> (KAL-us)		The mass of bone tissue that forms at a fracture site during its healing.
<b>chondromalacia</b> (kon-droh-mah-LAY-she-ah)	<b>chondr/o</b> = cartilage <b>-malacia</b> = abnormal softening	Softening of the cartilage.
<b>crepitation</b> (krep-ih-TAY-shun)		The noise produced by bones or cartilage rubbing together in conditions such as arthritis. Also called <i>crepitus</i> .
<b>ostealgia</b> (oss-tee-AL-jee-ah)	<b>oste/o</b> = bone <b>-algia</b> = pain	Bone pain.
<b>osteomyelitis</b> (oss-tee-oh-mi-ell-EYE-tis)	<b>oste/o</b> = bone <b>myel/o</b> = bone marrow <b>-itis</b> = inflammation	Inflammation of bone and bone marrow.
<b>synovitis</b> (sih-no-VIGH-tis)	<b>synov/o</b> = synovial membrane <b>-itis</b> = inflammation	Inflammation of synovial membrane.

The image contains two anatomical diagrams of a human leg, labeled A and B, showing the tibia and fibula. Diagram A shows a complete fracture of the tibia, with a red line indicating the break. Diagram B shows a complete fracture of the fibula, with a red line indicating the break.

■ **Figure 4.13** A) Closed (or simple) fracture and B) open (or compound) fracture.

### Colles' fracture (COL-eez)

A common type of wrist fracture.



■ **Figure 4.14** Colles' fracture. (Akawath/Shutterstock)


**comminuted fracture**  
(kom-ih-NYOOT-ed)

Fracture in which the bone is shattered, splintered, or crushed into many small pieces or fragments.


**compound fracture**

Fracture in which the bone has broken through the skin. Also called an *open fracture* (see Figure 4.13B ■).

## Pathology (continued)


Term	Word Parts	Definition
<b>compression fracture</b>		Fracture involving loss of height of a vertebral body. It may be the result of trauma, but in older people, especially women, it may be caused by conditions like osteoporosis.
<b>fracture</b> (FX, Fx)		A broken bone.
<b>greenstick fracture</b>		Fracture in which there is an incomplete break; one side of bone is broken and the other side is bent. This type of fracture is commonly found in children due to their softer and more pliable bone structure.
<b>impacted fracture</b>		Fracture in which bone fragments are pushed into each other.
<b>oblique fracture</b> (oh-BLEEK)		Fracture at an angle to the bone.
<p>■ <b>Figure 4.15</b> X-ray showing oblique fracture of the humerus. (Du Cane Medical Imaging Ltd./Science Source)</p> 		
<b>pathologic fracture</b> (path-ah-LOJ-ik)	<b>path/o</b> = disease <b>-logic</b> = pertaining to study of	Fracture caused by diseased or weakened bone.
<b>spiral fracture</b>	<b>-al</b> = pertaining to	Fracture in which the fracture line spirals around the shaft of the bone. Can be caused by a twisting injury and is often slower to heal than other types of fractures.
<b>stress fracture</b>		A slight fracture caused by repetitive low-impact forces, like running, rather than a single forceful impact.

## Pathology (continued)

Term	Word Parts	Definition
transverse fracture		Complete fracture that is straight across the bone at right angles to the long axis of the bone.
<p>■ <b>Figure 4.16</b> X-ray showing transverse fracture of radius. (James Stevenson/Science Source)</p>		
Bones		
<b>chondroma</b> (kon-DROH-mah)	<b>chondr/o</b> = cartilage <b>-oma</b> = tumor	A tumor, usually benign, that forms in cartilage.
<b>Ewing's sarcoma</b> (YOO-wings / sar-KOH-mah)	<b>sarc/o</b> = flesh <b>-oma</b> = tumor	Malignant growth found in the shaft of long bones that spreads through the periosteum. Removal is the treatment of choice because this tumor will metastasize or spread to other organs.
<b>exostosis</b> (eck-sos-TOH-sis)	<b>ex-</b> = outward <b>oste/o</b> = bone <b>-osis</b> = abnormal condition	A bony, outward projection from the surface of a bone; also called a <i>bone spur</i> .
<b>myeloma</b> (my-ah-LOH-mah)	<b>myel/o</b> = bone marrow <b>-oma</b> = tumor	A tumor that forms in bone marrow tissue.
<b>osteochondroma</b> (oss-tee-oh-kon-DROH-mah)	<b>oste/o</b> = bone <b>chondr/o</b> = cartilage <b>-oma</b> = tumor	A tumor, usually benign, that consists of both bone and cartilage tissue.
<b>osteogenic sarcoma</b> (oss-tee-oh-JEN-ik / sark-OH-mah)	<b>oste/o</b> = bone <b>-genic</b> = producing <b>sarc/o</b> = flesh <b>-oma</b> = tumor	The most common type of bone cancer. Usually begins in osteocytes found at the ends of long bones.
<b>osteomalacia</b> (oss-tee-oh-mah-LAY-she-ah)	<b>oste/o</b> = bone <b>-malacia</b> = abnormal softening	Softening of the bones caused by a deficiency of calcium. It is thought to be caused by insufficient sunlight and vitamin D in children.
<b>osteopathy</b> (oss-tee-OPP-ah-thee)	<b>oste/o</b> = bone <b>-pathy</b> = disease	A general term for bone disease.



## Pathology (continued)

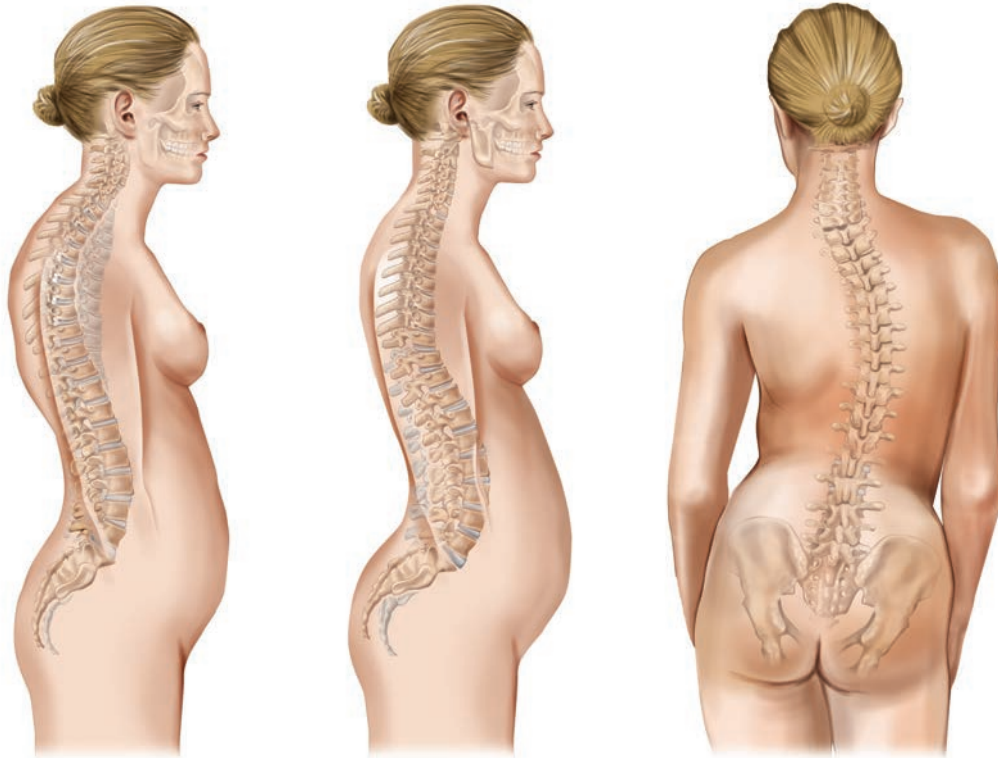
Term	Word Parts	Definition
<b>osteoporosis</b> (oss-tee-oh-por-ROH-sis)	<b>oste/o</b> = bone <b>-porosis</b> = porous	Decrease in bone mass producing a thinning and weakening of the bone with resulting fractures. The bone becomes more porous, especially in the spine and pelvis.
<b>Paget's disease</b> (PAH-jets)		A fairly common metabolic disease of the bone from unknown causes. It usually attacks middle-aged and older adults and is characterized by bone destruction and deformity. Named for Sir James Paget, a British surgeon.
<b>rickets</b> (RIK-ets)		Deficiency in calcium and vitamin D found in early childhood that results in bone deformities, especially bowed legs.
<b>Spinal Column</b>		
<b>ankylosing spondylitis</b> (ang-kih-LOH-sing / spon-dih-LYE-tis)	<b>ankyl/o</b> = stiff joint <b>spondyl/o</b> = vertebra <b>-itis</b> = inflammation	Inflammatory spinal condition resembling rheumatoid arthritis and results in gradual stiffening and fusion of the vertebrae. More common in men than in women.
<b>herniated nucleus pulposus (HNP)</b> (HER-nee-ated / NOO-klee-us / pull-POH-sus)		Herniation or protrusion of an intervertebral disk; also called <i>herniated disk</i> or <i>ruptured disk</i> . May require surgery.
<p>■ <b>Figure 4.17</b> Magnetic resonance imaging (MRI) image demonstrating a back herniated disc. (Michelle Milano/Shutterstock)</p>		
<b>kyphosis</b> (ki-FOH-sis)	<b>kyph/o</b> = hump <b>-osis</b> = abnormal condition	Abnormal increase in the outward curvature of the thoracic spine. Also known as <i>hunchback</i> or <i>humpback</i> . See Figure 4.18 ■ for an illustration of abnormal spine curvatures.

## Pathology (continued)

### Term

### Word Parts

### Definition



■ **Figure 4.18**

Abnormal spinal curvatures: kyphosis, lordosis, and scoliosis.

**Kyphosis**  
(excessive posterior thoracic curvature - hunchback)

**Lordosis**  
(excessive anterior lumbar curvature - swayback)

**Scoliosis**  
(lateral curvature)

**lordosis**  
(lor-DOH-sis)

**lord/o** = bent backward  
**-osis** = abnormal condition

Abnormal increase in the forward curvature of the lumbar spine. Also known as *swayback*. See again Figure 4.18 for an illustration of abnormal spine curvatures.

**scoliosis**  
(skoh-lee-OH-sis)

**scoli/o** = crooked  
**-osis** = abnormal condition

Abnormal lateral curvature of the spine. See again Figure 4.18 for an illustration of abnormal spine curvatures.

**spina bifida**  
(SPY-nah / BIF-ih-dah)

**spin/o** = spine  
**bi-** = two

Congenital anomaly occurring when a vertebra fails to fully form around the spinal cord.

**spinal stenosis**  
(ste-NOH-sis)

**spin/o** = spine  
**-al** = pertaining to

**Word Watch** ||||| Watch how the term *stenosis* is used in this condition. It most often appears as the suffix **-stenosis**. However, in this case, it is used as a freestanding word.

**spondylolisthesis**  
(spon-dih-loh-liss-THEE-sis)

**spondyl/o** = vertebra  
**-listhesis** = slipping

The forward sliding of a lumbar vertebra over the vertebra below it.

**spondylosis**  
(spon-dih-LOH-sis)

**spondyl/o** = vertebra  
**-osis** = abnormal condition

Specifically refers to ankylosing of the spine, but commonly used in reference to any degenerative condition of the vertebral column.

## Pathology (continued)

Term	Word Parts	Definition
<b>whiplash</b>		Cervical muscle and ligament sprain or strain as a result of a sudden movement forward and backward of the head and neck. Can occur as a result of a rear-end auto collision.
<b>Joints</b>		
<b>bunion</b> (BUN-yun)		Inflammation of the bursa of the first metatarsophalangeal joint (base of the big toe).
<b>dislocation</b>	<b>dis-</b> = apart	Occurs when the bones in a joint are displaced from their normal alignment and the ends of the bones are no longer in contact.
<b>osteoarthritis</b> (OA) (oss-tee-oh-ar-THRY-tis)	<b>oste/o</b> = bone <b>arthr/o</b> = joint <b>-itis</b> = inflammation	Arthritis resulting in degeneration of the bones and joints, especially those bearing weight. Results in bone rubbing against bone. Also called degenerative joint disease (DJD).
<b>rheumatoid arthritis</b> (RA) (ROO-mah-toyd / ar-THRY-tis)	<b>arthr/o</b> = joint <b>-itis</b> = inflammation	Chronic form of arthritis with inflammation of the joints, swelling, stiffness, pain, and changes in the cartilage that can result in crippling deformities; considered to be an autoimmune disease.



■ **Figure 4.19** Patient with typical rheumatoid arthritis contractures. (Michal Heron, Pearson Education)

## Pathology (continued)

Term	Word Parts	Definition
<b>sprain</b>		Damage to the ligaments surrounding a joint due to overstretching, but no dislocation of the joint or fracture of the bone.
<b>subluxation</b> (sub-LUCKS-a-shun)	<b>sub-</b> = under	An incomplete dislocation, the joint alignment is disrupted, but the ends of the bones remain in contact.
<b>systemic lupus erythematosus</b> (SLE) (sis-TEM-ik / LOOP-us / air-ih-them-ah-TOH-sis)	<b>system/o</b> = system <b>-ic</b> = pertaining to <b>erythr/o</b> = red	Chronic inflammatory autoimmune disease of connective tissue affecting many systems that may include joint pain and arthritis. May be mistaken for rheumatoid arthritis.
<b>talipes</b> (TAL-ih-peeZ)		Congenital deformity causing misalignment of the ankle joint and foot. Also referred to as a <i>clubfoot</i> .

## Practice As You Go

### C. Fracture Type Matching

Match each fracture type to its definition.

- |                     |  |
|---------------------|--|
| 1. _____ comminuted | a. fracture line is at an angle          |
| 2. _____ greenstick | b. fracture line curves around the bone  |
| 3. _____ compound   | c. bone is splintered or crushed         |
| 4. _____ simple     | d. bone is pressed into itself           |
| 5. _____ impacted   | e. fracture line is straight across bone |
| 6. _____ transverse | f. skin has been broken                  |
| 7. _____ oblique    | g. no open wound                         |
| 8. _____ spiral     | h. bone only partially broken            |

## Diagnostic Procedures

Term	Word Part	Definition
<b>Diagnostic Imaging</b>		
<b>arthrogram</b> (AR-throh-gram)	<b>arthr/o</b> = joint <b>-gram</b> = record	X-ray record of a joint, usually taken after the joint has been injected by a contrast medium.
<b>arthrography</b> (ar-THROG-rah-fee)	<b>arthr/o</b> = joint <b>-graphy</b> = process of recording	Process of X-raying a joint, usually after injection of a contrast medium into the joint space.
<b>bone scan</b>		Nuclear medicine procedure in which the patient is given a radioactive dye and then scanning equipment is used to visualize bones. It is especially useful in identifying stress fractures, observing progress of treatment for osteomyelitis, and locating cancer metastases to the bone.
<b>dual-energy absorptiometry (DXA)</b> (ab-sorp-she-AHM-eh-tree)	<b>-metry</b> = process of measuring	Measurement of bone density using low-dose X-ray for the purpose of detecting osteoporosis.
<b>myelography</b> (my-eh-LOG-rah-fee)	<b>myel/o</b> = spinal cord <b>-graphy</b> = process of recording	Study of the spinal column after injecting opaque contrast material; particularly useful in identifying herniated nucleus pulposus pinching a spinal nerve.
<b>Med Term Tip</b> ..... The combining form <i>myel/o</i> means “marrow” and is used for both the spinal cord and bone marrow. To the ancient Greek philosophers and physicians, the spinal cord appeared to be much like the marrow found in the medullary cavity of a long bone.		
<b>radiography</b>	<b>radi/o</b> = ray <b>-graphy</b> = process of recording	Diagnostic imaging procedure using X-rays to study the internal structure of the body; especially useful for visualizing bones and joints.
<b>Endoscopic Procedures</b>		
<b>arthroscope</b> (AR-throh-skope)	<b>arthr/o</b> = joint <b>-scope</b> = instrument for viewing	Instrument used to view inside a joint.
<b>arthroscopy</b> (ar-THROS-koh-pee)	<b>arthr/o</b> = joint <b>-scopy</b> = process of visually examining	Examination of the interior of a joint by entering the joint with an <i>arthroscope</i> . The arthroscope contains a small television camera that allows the physician to view the interior of the joint on a monitor during the procedure. Some joint conditions can be repaired during arthroscopy.

## Therapeutic Procedures

Term	Word Part	Definition
<b>Medical Treatments</b>		
<b>arthrocentesis</b> (ar-throh-sen-TEE-sis)	<b>arthr/o</b> = joint <b>-centesis</b> = puncture to withdraw fluid	Involves the insertion of a needle into the joint cavity in order to remove or aspirate fluid. May be done to remove excess fluid from a joint or to obtain fluid for examination.
<b>orthotic</b> (or-THOT-ik)	<b>orth/o</b> = straight <b>-tic</b> = pertaining to	Orthopedic appliance, such as a brace or splint, used to prevent or correct deformities.
<b>prosthesis</b> (pross-THÉE-sis)	<b>prosthet/o</b> = addition	Artificial device used as a substitute for a body part that is either congenitally missing or absent as a result of accident or disease. An example would be an artificial leg.
<b>Surgical Procedures</b>		
<b>amputation</b> (am-pew-TAY-shun)		Partial or complete removal of a limb for a variety of reasons, including tumors, gangrene, intractable pain, crushing injury, or uncontrollable infection.
<b>arthroclasia</b> (ar-throh-KLAY-see-ah)	<b>arthr/o</b> = joint <b>-clasia</b> = surgically break	To forcibly break loose a fused joint while the patient is under anesthetic. Fusion is usually caused by the buildup of scar tissue or adhesions.
<b>arthrodesis</b> (ar-throh-DEE-sis)	<b>arthr/o</b> = joint <b>-desis</b> = to fuse	Procedure to stabilize a joint by fusing the bones together.
<b>arthroscopic surgery</b> (ar-throh-SKOP-ic)	<b>arthr/o</b> = joint <b>-scopic</b> = pertaining to visually examining	Performing a surgical procedure while using an arthroscope to view the internal structure, such as a joint.
<b>arthrotomy</b> (ar-THROT-oh-mee)	<b>arthr/o</b> = joint <b>-otomy</b> = cutting into	Surgical procedure that cuts into a joint capsule.
<b>bone graft</b>		Piece of bone taken from the patient used to take the place of a removed bone or a bony defect at another site.
<b>bunionectomy</b> (bun-yun-ECK-toh-mee)	<b>-ectomy</b> = surgical removal	Removal of the bursa at the joint of the great toe.
<b>bursectomy</b> (ber-SEK-toh-mee)	<b>burs/o</b> = bursa <b>-ectomy</b> = surgical removal	Surgical removal of a bursa.
<b>chondrectomy</b> (kon-DREK-toh-mee)	<b>chondr/o</b> = cartilage <b>-ectomy</b> = surgical removal	Surgical removal of cartilage.
<b>chondroplasty</b> (KON-droh-plas-tee)	<b>chondr/o</b> = cartilage <b>-plasty</b> = surgical repair	Surgical repair of cartilage.
<b>craniotomy</b> (kray-nee-OTT-oh-mee)	<b>crani/o</b> = skull <b>-otomy</b> = cutting into	Surgical procedure that cuts into the skull.
<b>laminectomy</b> (lam-ih-NEK-toh-mee)	<b>lamin/o</b> = lamina <b>-ectomy</b> = surgical removal	Removal of the vertebral posterior arch to correct severe back problems and pain caused by compression of a spinal nerve.
<b>osteoclasia</b> (oss-tee-oh-KLAY-see-ah)	<b>oste/o</b> = bone <b>-clasia</b> = surgically break	Surgical procedure involving the intentional breaking of a bone to correct a deformity.
<b>osteotome</b> (OSS-tee-oh-tohm)	<b>oste/o</b> = bone <b>-tome</b> = instrument to cut	Instrument used to cut bone.



## Therapeutic Procedures (continued)

Term	Word Part	Definition
<b>osteotomy</b> (oss-tee-OTT-ah-mee)	<b>oste/o</b> = bone <b>-otomy</b> = cutting into	Surgical procedure that cuts into a bone.
<b>percutaneous disectomy</b> (per-kyoo-TAY-nee-us / disk-EK-toh-mee)	<b>per-</b> = through <b>cutane/o</b> = skin <b>-ous</b> = pertaining to <b>-ectomy</b> = surgical removal	A thin catheter tube is inserted into the intervertebral disk through the skin and the herniated or ruptured disk material is sucked out or a laser is used to vaporize it.
<b>spinal fusion</b>	<b>spin/o</b> = spine <b>-al</b> = pertaining to	Surgical immobilization of adjacent vertebrae. This may be done for several reasons, including correction for a herniated disk.
<b>synovectomy</b> (sih-no-VEK-toh-mee)	<b>synov/o</b> = synovial membrane <b>-ectomy</b> = surgical removal	Surgical removal of the synovial membrane.
<b>total hip arthroplasty (THA)</b> (ar-throh-PLAS-tee)	<b>arthr/o</b> = joint <b>-plasty</b> = surgical repair	Surgical reconstruction of a hip by implanting a prosthetic or artificial hip joint. Also called <i>total hip replacement (THR)</i> .
<div> </div> <div> <p>■ <b>Figure 4.20</b> Prosthetic hip joint. (Lawrence Livermore National Library/Science Photo Library/Science Source)</p> </div>		
<b>total knee arthroplasty (TKA)</b> (ar-throh-PLAS-tee)	<b>arthr/o</b> = joint <b>-plasty</b> = surgical repair	Surgical reconstruction of a knee joint by implanting a prosthetic knee joint. Also called <i>total knee replacement (TKR)</i> .
<b>Fracture Care</b>		
<b>cast</b>		Application of a solid material to immobilize an extremity or portion of the body as a result of a fracture, dislocation, or severe injury. It may be made of plaster of Paris or fiberglass.
<b>fixation</b>		Procedure to stabilize a fractured bone while it heals. <i>External fixation</i> includes casts, splints, and pins inserted through the skin. <i>Internal fixation</i> includes pins, plates, rods, screws, and wires that are applied during an <i>open reduction</i> .

## Therapeutic Procedures (continued)

Term	Word Part	Definition
reduction		Correcting a fracture by realigning the bone fragments. <i>Closed reduction</i> is doing this manipulation without entering the body. <i>Open reduction</i> is the process of making a surgical incision at the site of the fracture to do the reduction. This is necessary when bony fragments need to be removed or <i>internal fixation</i> such as plates or pins are required.
traction		Applying a pulling force on a fractured or dislocated limb or the vertebral column in order to restore normal alignment.

## Pharmacology

Classification	Word Parts	Action	Examples
bone reabsorption inhibitors		Conditions that result in weak and fragile bones, such as osteoporosis and Paget's disease, are improved by medications that reduce the reabsorption of bones.	alendronate, Fosamax; ibandronate, Boniva
calcium supplements and vitamin D therapy		Maintaining high blood levels of calcium in association with vitamin D helps maintain bone density; used to treat osteomalacia, osteoporosis, and rickets.	calcium carbonate, Oystercal, Tums; calcium citrate, Cal-Citrate, Citracal
corticosteroids	<b>cortic/o</b> = outer layer	A hormone produced by the adrenal cortex that has very strong anti-inflammatory properties. It is particularly useful in treating rheumatoid arthritis.	prednisone; methylprednisolone, Medrol; dexamethasone, Decadron
nonsteroidal anti-inflammatory drugs (NSAIDs)	<b>non-</b> = not <b>-al</b> = pertaining to <b>anti-</b> = against <b>-ory</b> = pertaining to	A large group of drugs (other than corticosteroids) that provide mild pain relief and anti-inflammatory benefits for conditions such as arthritis.	ibuprofen, Advil, Motrin; naproxen, Aleve, Naprosyn; salicylates, Aspirin

## Abbreviations

<b>AE</b>	above elbow	<b>NSAID</b>	nonsteroidal anti-inflammatory drug
<b>AK</b>	above knee	<b>OA</b>	osteoarthritis
<b>BDT</b>	bone density testing	<b>ORIF</b>	open reduction–internal fixation
<b>BE</b>	below elbow	<b>Orth, ortho</b>	orthopedics
<b>BK</b>	below knee	<b>P</b>	phosphorus
<b>C1, C2, etc.</b>	first cervical vertebra, second cervical vertebra, etc.	<b>RA</b>	rheumatoid arthritis
<b>Ca</b>	calcium	<b>RLE</b>	right lower extremity
<b>DJD</b>	degenerative joint disease	<b>RUE</b>	right upper extremity
<b>DXA</b>	dual-energy absorptiometry	<b>SLE</b>	systemic lupus erythematosus
<b>FX, Fx</b>	fracture	<b>T1, T2, etc.</b>	first thoracic vertebra, second thoracic vertebra, etc.
<b>HNP</b>	herniated nucleus pulposus	<b>THA</b>	total hip arthroplasty
<b>JRA</b>	juvenile rheumatoid arthritis	<b>THR</b>	total hip replacement
<b>L1, L2, etc.</b>	first lumbar vertebra, second lumbar vertebra, etc.	<b>TKA</b>	total knee arthroplasty
<b>LE</b>	lower extremity	<b>TKR</b>	total knee replacement
<b>LLE</b>	left lower extremity	<b>UE</b>	upper extremity
<b>LUE</b>	left upper extremity		

## Practice As You Go

### D. What's the Abbreviation?

- total knee replacement \_\_\_\_\_
- herniated nucleus pulposus \_\_\_\_\_
- upper extremity \_\_\_\_\_
- fifth lumbar vertebra \_\_\_\_\_
- above the knee \_\_\_\_\_
- fracture \_\_\_\_\_
- nonsteroidal anti-inflammatory drug \_\_\_\_\_



# Section II: Muscular System at a Glance

## Function

Muscles are bundles, sheets, or rings of tissue that produce movement by contracting and pulling on the structures to which they are attached.

## Organs

Here is the primary structure that comprises the muscular system:

**muscles**

## Word Parts

Here are the most common word parts (with their meanings) used to build muscular system terms. For a more comprehensive list, refer to the Terminology section of this chapter.

### Combining Forms

<b>duct/o</b>	to bring	<b>myos/o</b>	muscle
<b>extens/o</b>	to stretch out	<b>plant/o</b>	sole of foot
<b>fasci/o</b>	fibrous band	<b>rotat/o</b>	to revolve
<b>fibr/o</b>	fibers	<b>ten/o</b>	tendon
<b>flex/o</b>	to bend	<b>tend/o</b>	tendon
<b>kinesi/o</b>	movement	<b>tendin/o</b>	tendon
<b>muscul/o</b>	muscle	<b>vers/o</b>	to turn
<b>my/o</b>	muscle		

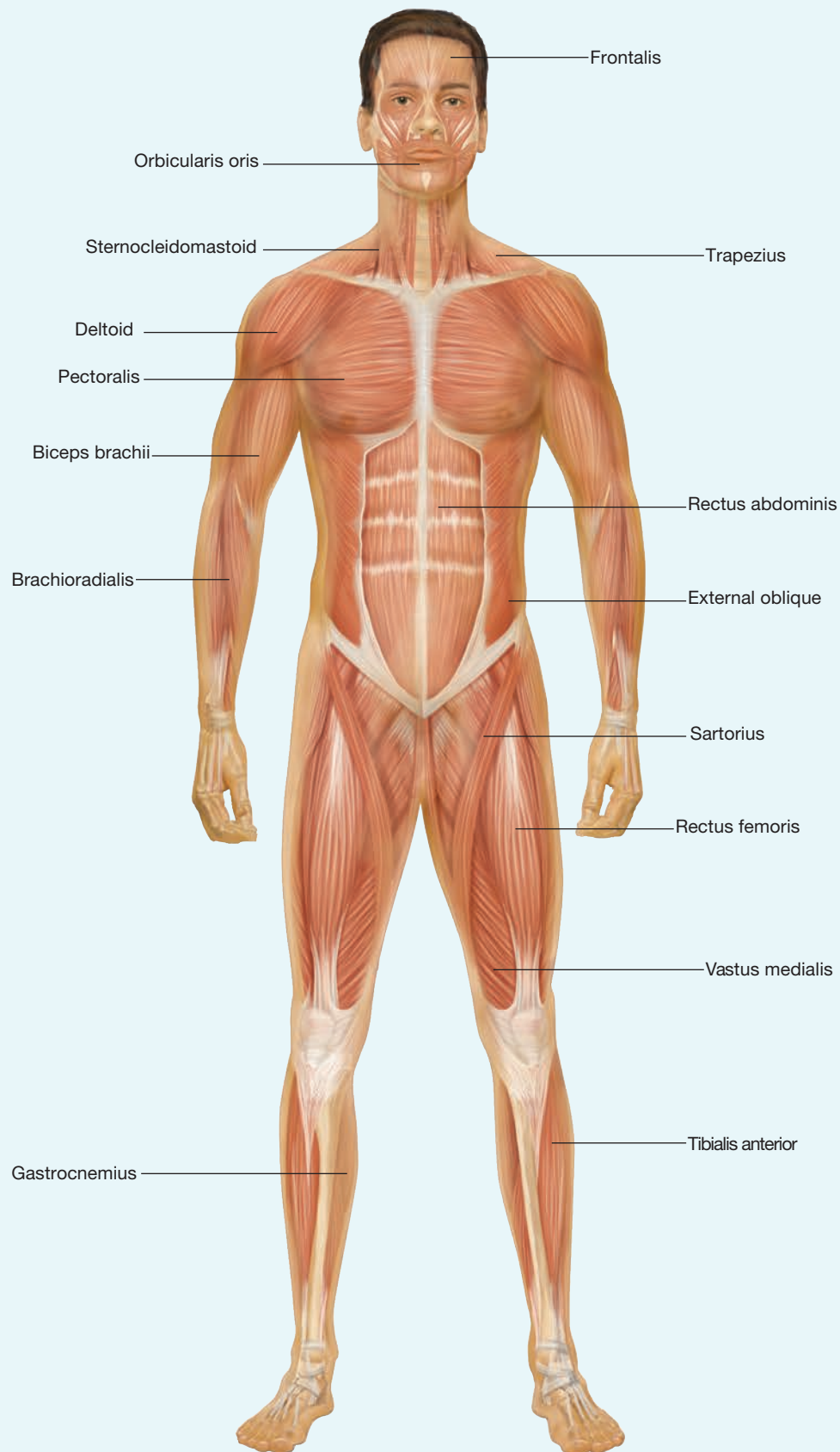
### Suffixes

<b>-asthenia</b>	weakness
<b>-ion</b>	action
<b>-kinesia</b>	movement
<b>-tonia</b>	tone
<b>-trophic</b>	pertaining to development

### Prefixes

<b>ab-</b>	away from
<b>ad-</b>	toward
<b>circum-</b>	around
<b>e-</b>	outward

# Muscular System Illustrated



# Anatomy and Physiology of the Muscular System

## Med Term Tip

The term *muscle* is the diminutive form of the Latin word *mus* or “little mouse.” This is thought to describe how the skin ripples when a muscle contracts, like a little mouse running.

## What's In A Name?

Look for these word parts:

**cardi/o** = heart

**-ac** = pertaining to

**in-** = not

muscle tissue fibers

muscles

**Muscles** are bundles of parallel **muscle tissue fibers**. As these fibers contract (shorten in length) they produce movement of or within the body. The movement may take the form of bringing two bones closer together, pushing food through the digestive system, or pumping blood through blood vessels. In addition to producing movement, muscles also hold the body erect and generate heat.

## Types of Muscles

cardiac muscle

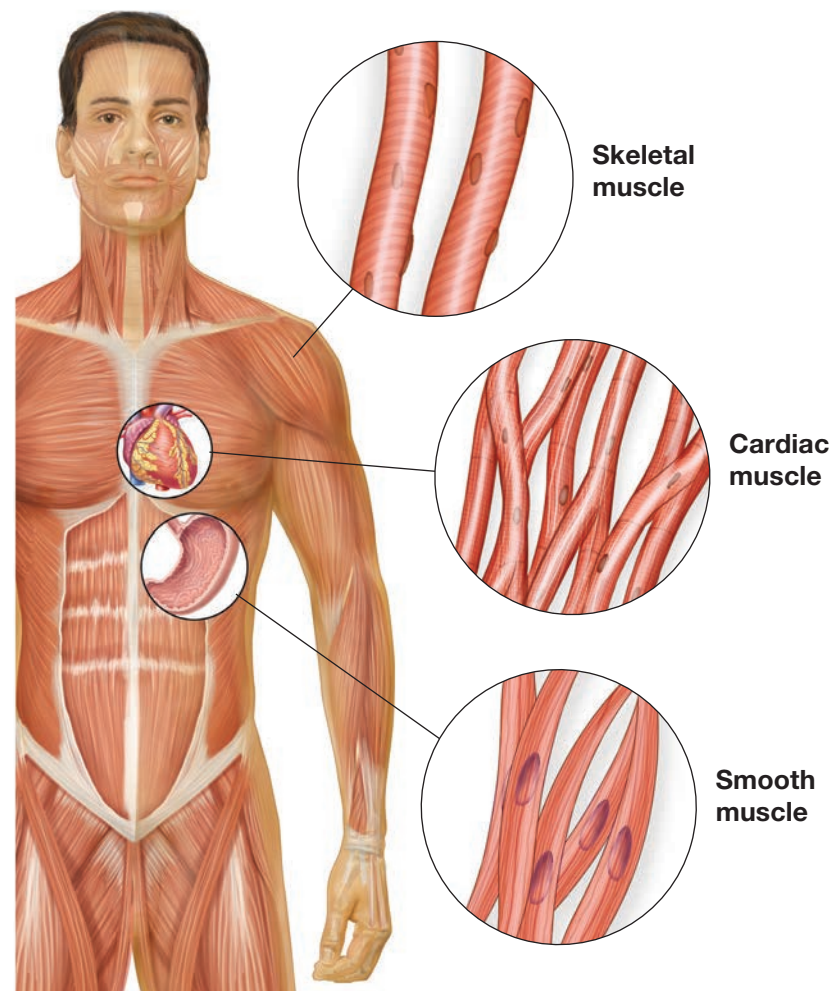
involuntary muscles

skeletal muscle

smooth muscle

voluntary muscles

The three types of muscle tissue are **skeletal muscle**, **smooth muscle**, and **cardiac muscle** (see Figure 4.21 ■). Muscle tissue may be either voluntary or involuntary. **Voluntary muscles** are those muscles for which a person consciously chooses to contract and for how long and how hard to contract them. The skeletal muscles of the arm and leg are examples of this type of muscle. **Involuntary muscles** are the muscles under the control of the subconscious regions of the brain. The smooth muscles found in internal organs and cardiac muscles are examples of involuntary muscle tissue.



■ **Figure 4.21** The three types of muscles: skeletal, smooth, and cardiac.



## Skeletal Muscle

**fascia** (FASH-ee-ah)

**motor neurons**

**myoneural junction** (MY-oh-NOO-rall)

**striated muscles** (stry-a-ted)

**tendon** (TEN-dun)

A skeletal muscle is directly or indirectly attached to a bone and produces voluntary movement of the skeleton. It is also referred to as a **striated muscle** because of its striped appearance under the microscope (see Figure 4.22 ■). Each muscle is wrapped in layers of fibrous connective tissue called **fascia**. The fascia tapers at each end of a skeletal muscle to form a very strong **tendon**. The tendon then inserts into the periosteum covering a bone to anchor the muscle to the bone. Skeletal muscles are stimulated by **motor neurons** of the nervous system. The point at which the motor nerve contacts a muscle fiber is called the **myoneural junction**.

### Med Term Tip

The human body has more than 400 skeletal muscles, which account for almost 50% of the body's weight.

## Smooth Muscle

**visceral muscle** (vis-seh-ral)

Smooth muscle tissue is found in association with internal organs. For this reason, it is also referred to as **visceral muscle**. The name smooth muscle refers to the muscle's microscopic appearance; it lacks the striations of skeletal muscle (see again Figure 4.22). Smooth muscle is found in the walls of the hollow organs, such as the stomach, tube-shaped organs, such as the respiratory airways, and blood vessels. It is responsible for the involuntary muscle action associated with movement of the internal organs, such as churning food, constricting a blood vessel, and uterine contractions.

### What's In A Name?

Look for these word parts:

**cardi/o** = heart

**my/o** = muscle

**neur/o** = nerve

**viscer/o** = internal organ

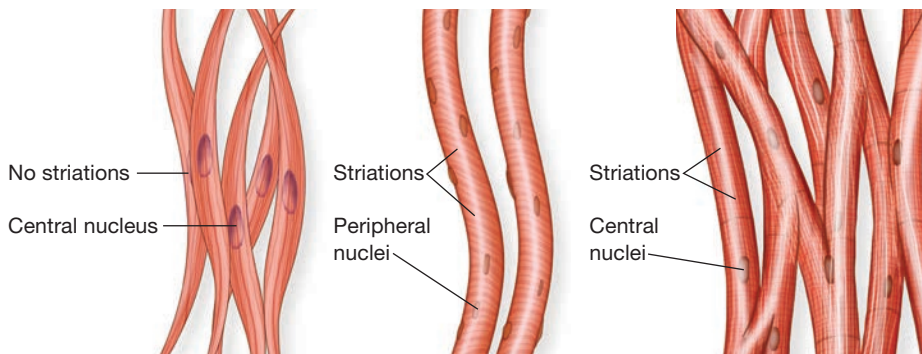
**-al** = pertaining to

## Cardiac Muscle

**myocardium** (my-oh-CAR-dee-um)

Cardiac muscle, or **myocardium**, makes up the wall of the heart (see again Figure 4.22). With each involuntary contraction the heart squeezes to pump blood out of its chambers and through the blood vessels. This muscle is more thoroughly described in Chapter 5, Cardiovascular System.

	<b>Visceral</b> (smooth)	<b>Skeletal</b> (striated)	<b>Cardiac</b>
<b>Contracts</b>	Slowly	Rapidly	Rapidly
<b>Found</b>	Viscera, blood vessels	Trunk, extremities, head and neck	Heart
<b>Control</b>	Involuntary	Voluntary	Involuntary



■ **Figure 4.22**

Characteristics of the three types of muscles.

## Practice As You Go

### E. Complete the Statement

1. Another name for visceral muscle is \_\_\_\_\_ muscle.
2. Nerves contact skeletal muscle fibers at the \_\_\_\_\_ junction.
3. The three types of muscle are \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.

## Naming Skeletal Muscles

**biceps** (BYE-seps)

**extensor carpi**

**external oblique**

**flexor carpi**

**gluteus maximus** (GLOO-tee-us /  
MACKS-ih-mus)

**rectus abdominis** (REK-tus / ab-DOM-ih-nis)

**sternocleidomastoid** (STER-noh-KLY-doh  
MASS-toid)

The name of a muscle often reflects its location, origin and insertion, size, action, fiber direction, or number of attachment points, as illustrated by the following examples:

- **Location:** the term *rectus abdominis* means straight (rectus) abdominal muscle.
- **Origin and insertion:** the *sternocleidomastoid* is named for its two origins (**stern/o** for sternum and **cleid/o** for clavicle) and single insertion (mastoid process).
- **Size:** when *gluteus*, meaning rump area, is combined with *maximus*, meaning large, we have the term *gluteus maximus*.
- **Action:** the *flexor carpi* and *extensor carpi* muscles are named as such because they produce flexion and extension at the wrist.
- **Fiber direction:** the *external oblique* muscle is an abdominal muscle whose fibers run at an oblique angle.
- **Number of attachment points:** the prefix **bi-**, meaning two, can form the medical term *biceps*, which refers to the muscle in the upper arm that has two heads or connecting points.

### What's In A Name?

Look for these word parts:

**cleid/o** = clavicle

**extens/o** = to stretch out

**flex/o** = to bend

**stern/o** = sternum

**-al** = pertaining to

**bi-** = two

**ex-** = outward

## Skeletal Muscle Actions

**action**

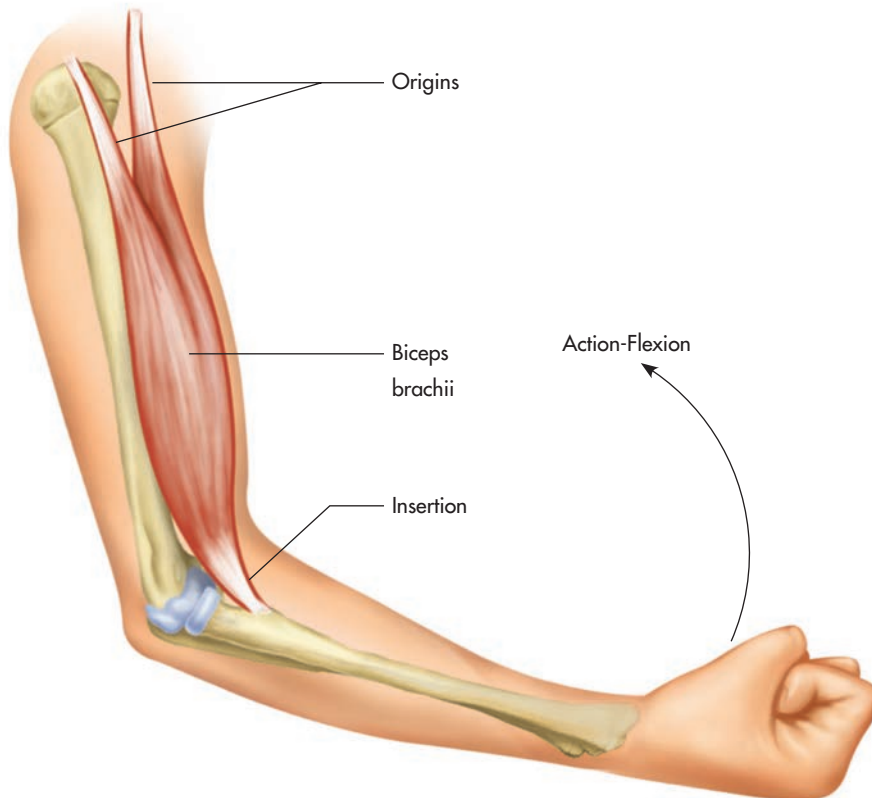
**antagonistic pairs**

**insertion**

**origin**

Skeletal muscles are attached to two different bones and overlap a joint. When a muscle contracts, the two bones move, but not usually equally. The less movable of the two bones is considered to be the starting point of the muscle and is called the **origin**. The more movable bone is considered to be where the

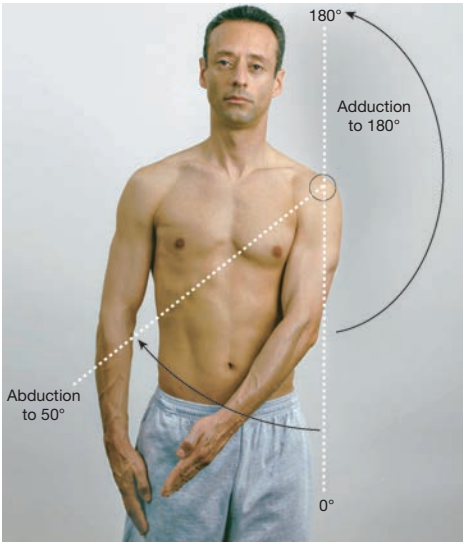
muscle ends and is called the **insertion** (see Figure 4.23 ■). The type of movement a muscle produces is called its **action**. Muscles are often arranged around joints in **antagonistic pairs**, meaning that they produce opposite actions. For example, one muscle will bend a joint while its antagonist is responsible for straightening the joint. Some common terminology for muscle actions are described in Table 4.5 ■.



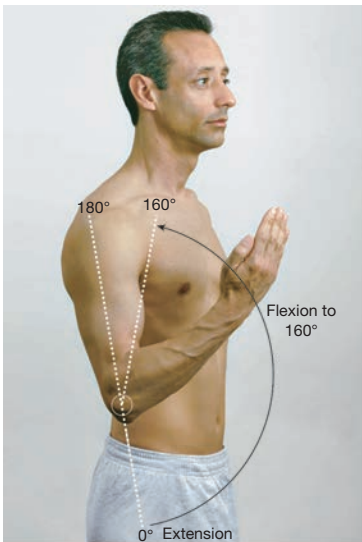
■ **Figure 4.23** Origin and insertion of a muscle

**Table 4.5** Muscle Actions Grouped by Antagonistic Pairs

Action	Word Parts	Description
abduction (ab-DUCK-shun)	<b>ab-</b> = away from <b>duct/o</b> = to bring <b>-ion</b> = action	Movement away from midline of the body (see Figure 4.24 ■)
adduction (ah-DUCK-shun)	<b>ad-</b> = toward <b>duct/o</b> = to bring <b>-ion</b> = action	Movement toward midline of the body (see again Figure 4.24)
flexion (FLEK-shun)	<b>flex/o</b> = to bend <b>-ion</b> = action	Act of bending or being bent (see Figure 4.25 ■)



■ **Figure 4.24** Abduction and adduction of the shoulder joint. (Patrick Watson, Pearson Education)



■ **Figure 4.25** Flexion and extension of the elbow joint. (Patrick Watson, Pearson Education)

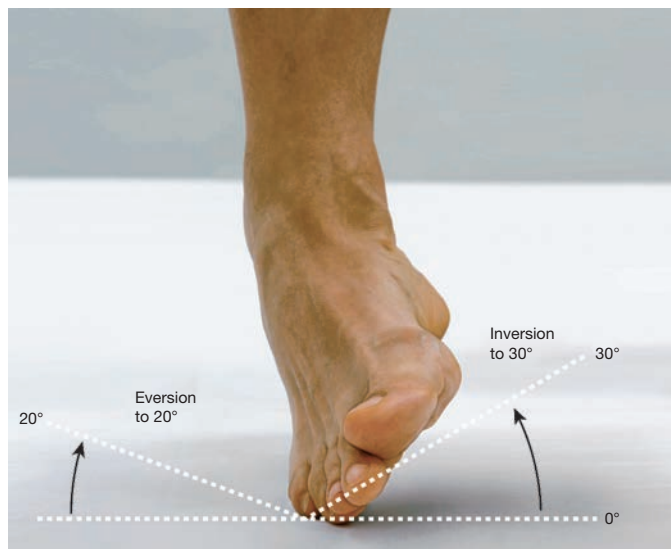
extension (eks-TEN-shun)	<b>extens/o</b> = to stretch out <b>-ion</b> = action	Movement that brings limb into or toward a straight condition (see again Figure 4.25)
dorsiflexion (dor-see-FLEK-shun)	<b>dors/o</b> = back of body <b>flex/o</b> = to bend <b>-ion</b> = action	Backward bending, as of hand or foot (see Figure 4.26A ■)
plantar flexion (PLAN-tar / FLEK-shun)	<b>plant/o</b> = sole of foot <b>-ar</b> = pertaining to <b>flex/o</b> = to bend <b>-ion</b> = action	Bending sole of foot; pointing toes downward (see Figure 4.26B ■)



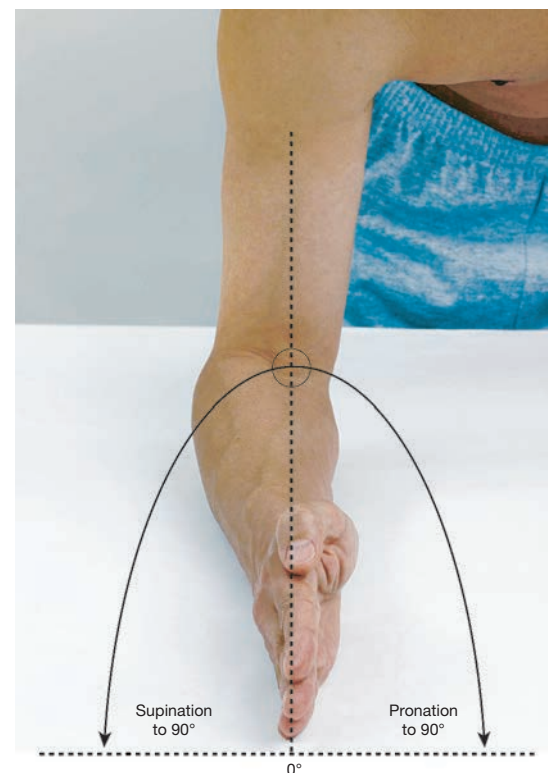
**A** ■ **Figure 4.26** Dorsiflexion (A) and plantar flexion (B) of the ankle joint. (Poulsons Photography/Shutterstock)

**Table 4.5** Muscle Actions Grouped by Antagonistic Pairs (continued)

Action	Word Parts	Description
eversion (ee-VER-zhun)	e- = outward vers/o = to turn -ion = action	Turning outward (see Figure 4.27 ■)
inversion (in-VER-zhun)	in- = inward vers/o = to turn -ion = action	Turning inward (see again Figure 4.27 )
pronation (proh-NAY-shun)		To turn downward or backward as with the hand or foot (see Figure 4.28 ■)
supination (soo-pin-NAY-shun)		Turning the palm or foot upward (see again Figure 4.28)
elevation		To raise a body part, as in shrugging the shoulders
depression		A downward movement, as in dropping the shoulders
<i>The circular actions described below are an exception to the antagonistic pair arrangement.</i>		
circumduction (sir-kum-DUCK-shun)	circum- = around duct/o = to bring -ion = action	Movement in a circular direction from a central point as if drawing a large, imaginary circle in the air
opposition	<b>Med Term Tip</b> ..... Primates are the only animals with opposable thumbs.	Moving thumb away from palm; the ability to move the thumb into contact with the other fingers
rotation	rotat/o = to revolve -ion = action	Moving around a central axis



■ **Figure 4.27** Eversion and inversion of the foot.  
(Patrick Watson, Pearson Education)



■ **Figure 4.28** Pronation and supination of the forearm.  
(Patrick Watson, Pearson Education)

## Practice As You Go

### F. Terminology Matching

Match each term to its definition.

- |                          |   |
|--------------------------|---|
| 1. _____ abduction       | a. backward bending of the foot                     |
| 2. _____ rotation        | b. bending the foot to point toes toward the ground |
| 3. _____ plantar flexion | c. straightening motion                             |
| 4. _____ extension       | d. motion around a central axis                     |
| 5. _____ dorsiflexion    | e. motion away from the body                        |
| 6. _____ flexion         | f. moving the thumb away from the palm              |
| 7. _____ adduction       | g. motion toward the body                           |
| 8. _____ opposition      | h. bending motion                                   |

## Terminology

### Word Parts Used to Build Muscular System Terms

The following lists contain the combining forms, suffixes, and prefixes used to build terms in the remaining sections of this chapter.

#### Combining Forms

<b>bi/o</b> = life	<b>kinesi/o</b> = movement	<b>ten/o</b> = tendon
<b>carp/o</b> = carpus	<b>later/o</b> = side	<b>tend/o</b> = tendon
<b>electr/o</b> = electricity	<b>muscul/o</b> = muscle	<b>tendin/o</b> = tendon
<b>fasci/o</b> = fibrous band	<b>my/o</b> = muscle	
<b>fibr/o</b> = fibers	<b>myos/o</b> = muscle	

#### Suffixes

<b>-al</b> = pertaining to	<b>-desis</b> = to fuse	<b>-itis</b> = inflammation
<b>-algia</b> = pain	<b>-dynia</b> = pain	<b>-kinesia</b> = movement
<b>-ar</b> = pertaining to	<b>-gram</b> = record	<b>-logy</b> = study of
<b>-asthenia</b> = weakness	<b>-graphy</b> = process of recording	<b>-opsy</b> = view of



## Suffixes (continued)

<b>-otomy</b> = cutting into	<b>-rrhaphy</b> = suture	<b>-trophic</b> = pertaining to development
<b>-ous</b> = pertaining to	<b>-rrhexis</b> = rupture	<b>-trophy</b> = development
<b>-pathy</b> = disease	<b>-tonia</b> = tone	
<b>-plasty</b> = surgical repair		

## Prefixes

<b>a-</b> = without	<b>epi-</b> = above	<b>poly-</b> = many
<b>brady-</b> = slow	<b>hyper-</b> = excessive	<b>pseudo-</b> = false
<b>dys-</b> = abnormal; difficult	<b>hypo-</b> = insufficient	

## Adjective Forms of Anatomical Terms

Term	Word Parts	Definition
<b>fascial</b> (FAS-ee-all)	<b>fasci/o</b> = fibrous band <b>-al</b> = pertaining to	Pertaining to fascia.
<b>muscular</b> (MUSS-kew-lar)	<b>muscul/o</b> = muscle <b>-ar</b> = pertaining to	Pertaining to muscles.
<b>musculoskeletal</b> (MUSS-kew-loh-SKEL-eh-tal)	<b>muscul/o</b> = muscle <b>-al</b> = pertaining to	Pertaining to the muscles and skeleton.
<b>tendinous</b> (TEN-din-us)	<b>tendin/o</b> = tendon <b>-ous</b> = pertaining to	Pertaining to tendons.

## Pathology

Term	Word Parts	Definition
<b>Medical Specialties</b>		
<b>kinesiology</b> (kih-NEE-see-oh-loh-jee)	<b>kinesi/o</b> = movement <b>-logy</b> = study of	The science that studies movement, how it is produced, and the muscles involved.
<b>Signs and Symptoms</b>		
<b>adhesion</b>		Scar tissue forming in the fascia surrounding a muscle, making it difficult to stretch the muscle.
<b>atonia</b>	<b>a-</b> = without <b>-tonia</b> = tone	The lack of muscle tone.
<b>atrophy</b> (AT-rah-fee)	<b>a-</b> = without <b>-trophy</b> = development	Poor muscle development as a result of muscle disease, nervous system disease, or lack of use; commonly referred to as <i>muscle wasting</i> .
<b>bradykinesia</b> (brad-ee-kih-NEE-see-ah)	<b>brady-</b> = slow <b>-kinesia</b> = movement	Having slow movements.

## Pathology (continued)

Term	Word Parts	Definition
<b>contracture</b> (kon-TRACK-chur)		Abnormal shortening of muscle fibers, tendons, or fascia, making it difficult to stretch the muscle.
<b>dyskinesia</b> (dis-kih-NEE-see-ah)	<b>dys-</b> = difficult, abnormal <b>-kinesia</b> = movement	Having difficult or abnormal movement.
<b>dystonia</b>	<b>dys-</b> = abnormal <b>-tonia</b> = tone	Having abnormal muscle tone.
<b>hyperkinesia</b> (high-per-kih-NEE-see-ah)	<b>hyper-</b> = excessive <b>-kinesia</b> = movement	Having an excessive amount of movement.
<b>hypertonia</b>	<b>hyper-</b> = excessive <b>-tonia</b> = tone	Having excessive muscle tone.
<b>hypertrophy</b> (high-PER-troh-fee)	<b>hyper-</b> = excessive <b>-trophy</b> = development	Increase in muscle bulk as a result of use, as with lifting weights.
<b>hypokinesia</b> (HI-poh-kih-NEE-see-ah)	<b>hypo-</b> = insufficient <b>-kinesia</b> = movement	Having an insufficient amount of movement.
<b>hypotonia</b>	<b>hypo-</b> = insufficient <b>-tonia</b> = tone	Having insufficient muscle tone.
<b>intermittent claudication</b> (klaw-dih-KAY-shun)		Attacks of severe pain and lameness caused by ischemia of the muscles, typically the calf muscles; brought on by walking even very short distances.
<b>myalgia</b> (my-AL-jee-ah)	<b>my/o</b> = muscle <b>-algia</b> = pain	Muscle pain.
<b>myasthenia</b> (my-ass-THEE-nee-ah)	<b>my/o</b> = muscle <b>-asthenia</b> = weakness	Muscle weakness.
<b>myotonia</b>	<b>my/o</b> = muscle <b>-tonia</b> = tone	Muscle tone.
<b>spasm</b>		Sudden, involuntary, strong muscle contraction.
<b>tenodynia</b> (ten-oh-DIN-ee-ah)	<b>ten/o</b> = tendon <b>-dynia</b> = pain	Tendon pain.
<b>Muscles</b>		
<b>fasciitis</b> (fas-ee-EYE-tis)	<b>fasci/o</b> = fibrous band <b>-itis</b> = inflammation	Inflammation of fascia.
<b>fibromyalgia</b> (figh-broh-my-AL-jee-ah)	<b>fibr/o</b> = fibers <b>my/o</b> = muscle <b>-algia</b> = pain	Condition with widespread aching and pain in the muscles and soft tissue.
<b>lateral epicondylitis</b> (ep-ih-kon-dih-LYE-tis)	<b>later/o</b> = side <b>-al</b> = pertaining to <b>epi-</b> = above <b>-itis</b> = inflammation	Inflammation of the muscle attachment to the lateral epicondyle of the elbow. Often caused by strongly gripping. Commonly called <i>tennis elbow</i> .
<b>muscular dystrophy</b> (MD) (MUSS-kew-ler / DIS-troh-fee)	<b>muscul/o</b> = muscle <b>-ar</b> = pertaining to <b>dys-</b> = abnormal <b>-trophy</b> = development	Inherited disease causing a progressive muscle degeneration, weakness, and atrophy.
<b>myopathy</b> (my-OPP-ah-thee)	<b>my/o</b> = muscle <b>-pathy</b> = disease	A general term for muscle disease.

## Pathology (continued)

Term	Word Parts	Definition
<b>myorrhexis</b> (my-oh-REK-sis)	<b>my/o</b> = muscle <b>-rrhexis</b> = rupture	Tearing a muscle.
<b>polymyositis</b> (pol-ee-my-oh-SIGH-tis)	<b>poly-</b> = many <b>myos/o</b> = muscle <b>-itis</b> = inflammation	The simultaneous inflammation of two or more muscles.
<b>pseudohypertrophic muscular dystrophy</b> (soo-doh-HIGH-per-troh-fic)	<b>pseudo-</b> = false <b>hyper-</b> = excessive <b>-trophic</b> = pertaining to development <b>muscul/o</b> = muscle <b>-ar</b> = pertaining to <b>dys-</b> = abnormal <b>-trophy</b> = development	A type of inherited muscular dystrophy in which the muscle tissue is gradually replaced by fatty tissue, giving the appearance of a healthy and strong muscle. Also called <i>Duchenne's muscular dystrophy</i> .
<b>torticollis</b> (tore-tih-KOLL-iss)		Severe neck spasms pulling the head to one side. Commonly called <i>wryneck</i> or a <i>crick in the neck</i> .
<b>Tendons, Muscles, and/or Ligaments</b>		
<b>carpal tunnel syndrome (CTS)</b>	<b>carp/o</b> = carpus <b>-al</b> = pertaining to	Repetitive motion disorder with pain caused by compression of the finger flexor tendons and median nerve as they pass through the carpal tunnel of the wrist.
<b>ganglion cyst</b> (GANG-lee-on)		Cyst that forms on tendon sheath, usually on hand, wrist, or ankle.
<b>repetitive motion disorder</b>		Group of chronic disorders involving the tendon, muscle, joint, and nerve damage, resulting from the tissue being subjected to pressure, vibration, or repetitive movements for prolonged periods.
<b>rotator cuff injury</b>		The rotator cuff consists of the joint capsule of the shoulder joint reinforced by the tendons from several shoulder muscles. The high degree of flexibility at the shoulder joint puts the rotator cuff at risk for strain and tearing.
<b>strain</b>		Damage to the muscle, tendons, or ligaments due to overuse or overstretching.
<b>tendinitis</b> (ten-dih-NIGH-tis)	<b>tendin/o</b> = tendon <b>-itis</b> = inflammation	Inflammation of a tendon.

## Diagnostic Procedures

Term	Word Parts	Definition
<b>Clinical Laboratory Test</b>		
<b>creatine phosphokinase (CPK)</b> (KREE-ah-teen / foss-foe-KYE-nase)		Muscle enzyme found in skeletal muscle and cardiac muscle. Blood levels become elevated in disorders such as heart attack, muscular dystrophy, and other skeletal muscle pathologies.

## Diagnostic Procedures (continued)

Term	Word Parts	Definition
<b>Additional Diagnostic Procedures</b>		
<b>deep tendon reflexes (DTR)</b>		Muscle contraction in response to a stretch caused by striking the muscle tendon with a reflex hammer. Test used to determine if muscles are responding properly.
<b>electromyogram (EMG)</b> (ee-lek-troh-MY-oh-gram)	<b>electr/o</b> = electricity <b>my/o</b> = muscle <b>-gram</b> = record	The hardcopy record produced by electromyography.
<b>electromyography (EMG)</b> (ee-lek-troh-my-OG-rah-fee)	<b>electr/o</b> = electricity <b>my/o</b> = muscle <b>-graphy</b> = process of recording	Study and record of the strength and quality of muscle contractions as a result of electrical stimulation.
<b>muscle biopsy</b> (BYE-op-see)	<b>bi/o</b> = life <b>-opsy</b> = view of	Removal of muscle tissue for pathological examination.

## Therapeutic Procedures

Term	Word Parts	Definition
<b>Surgical Procedures</b>		
<b>carpal tunnel release</b>	<b>carp/o</b> = carpus <b>-al</b> = pertaining to	Surgical cutting of the ligament in the wrist to relieve nerve pressure caused by carpal tunnel syndrome, which can result from repetitive motion such as typing.
<b>fasciotomy</b> (fas-ee-OT-oh-mee)	<b>fasci/o</b> = fibrous band <b>-otomy</b> = cutting into	A surgical procedure that cuts into fascia.
<b>myoplasty</b> (MY-oh-plas-tee)	<b>my/o</b> = muscle <b>-plasty</b> = surgical repair	A surgical procedure to repair a muscle.
<b>myorrhaphy</b> (MY-or-ah-fee)	<b>my/o</b> = muscle <b>-rrhaphy</b> = suture	To suture a muscle.
<b>tendoplasty</b> (TEN-doh-plas-tee)	<b>tend/o</b> = tendon <b>-plasty</b> = surgical repair	A surgical procedure to repair a tendon.
<b>tendotomy</b> (tend-OT-oh-mee)	<b>tend/o</b> = tendon <b>-otomy</b> = cutting into	A surgical procedure that cuts into a tendon.
<b>tenodesis</b> (ten-oh-DEE-sis)	<b>ten/o</b> = tendon <b>-desis</b> = fuse	Surgical procedure to stabilize a joint by anchoring down the tendons of the muscles that move the joint.
<b>tenoplasty</b> (TEN-oh-plas-tee)	<b>ten/o</b> = tendon <b>-plasty</b> = surgical repair	A surgical procedure to repair a tendon.
<b>tenorrhaphy</b> (tah-NOR-ah-fee)	<b>ten/o</b> = tendon <b>-rrhaphy</b> = suture	To suture a tendon.

## Pharmacology

Classification	Word Parts	Action	Examples
<b>skeletal muscle relaxants</b>	<b>-al</b> = pertaining to	Medication to relax skeletal muscles in order to reduce muscle spasms. Also called <i>antispasmodics</i> .	cyclobenzaprine, Flexeril; carisoprodol, Soma

## Abbreviations

<b>CTS</b>	carpal tunnel syndrome	<b>EMG</b>	electromyogram
<b>CPK</b>	creatine phosphokinase	<b>IM</b>	intramuscular
<b>DTR</b>	deep tendon reflex	<b>MD</b>	muscular dystrophy

## Practice As You Go

### G. What's the Abbreviation?

1. intramuscular \_\_\_\_\_
2. deep tendon reflex \_\_\_\_\_
3. muscular dystrophy \_\_\_\_\_
4. electromyogram \_\_\_\_\_
5. carpal tunnel syndrome \_\_\_\_\_



# Chapter Review

## Real-World Applications

### Medical Record Analysis

This Discharge Summary contains 10 medical terms. Underline each term and write it in the list below the report. Then define each term. You will find Chapter 14 of your textbook helpful with the rehabilitation terms.

#### Discharge Summary












Admitting Diagnosis:	Osteoarthritis bilateral knees.
Final Diagnosis:	Osteoarthritis bilateral knees with right TKA
History of Present Illness:	Patient is a 68-year-old male. He reports he has experienced occasional knee pain and swelling since he injured his knees playing football in high school. These symptoms became worse while he was in his 50s and working on a concrete surface. The right knee has always been more painful than the left. He saw his orthopedic surgeon six months ago because of constant knee pain and swelling severe enough to interfere with sleep and all activities. He required a cane to walk. CT scan indicated severe bilateral osteoarthritis. He is admitted to the hospital at this time for TKR right knee.
Summary of Hospital Course:	Patient tolerated the surgical procedure well. He began intensive physical therapy for lower extremity ROM and strengthening exercises and gait training with a walker. He received occupational therapy instruction in ADLs, especially dressing and personal care. He was able to transfer himself out of bed by the third post-op day and was able to ambulate 150 ft with a walker and dress himself on the fifth post-op day.
Discharge Plans:	Patient was discharged home with his wife one week post-op. He will continue rehabilitation as an outpatient. Return to office for post-op checkup in one week.

Term	Definition
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____
7. _____	_____
8. _____	_____
9. _____	_____
10. _____	_____



### Chart Note Transcription

The chart note below contains 11 phrases that can be reworded with a medical term that you learned in this chapter. Each phrase is identified with an underline. Determine the medical term and write your answers in the space provided.

Pearson General Hospital Emergency Room Record	
Task	Edit View Time Scale Options Help Download Archive Date: 17 May 2015
          	
Current Complaint:	An 82-year-old female was transported to the Emergency Room via ambulance with severe left hip pain following a fall on the ice.
Past History:	Patient suffered a <u>broken wrist bone</u> <b>1</b> 2 years earlier that required <u>immobilization by solid material</u> . <b>2</b> Following this <u>broken bone</u> , <b>3</b> her <u>physician who specializes in treatment of bone conditions</u> <b>4</b> diagnosed her with moderate <u>porous bones</u> <b>5</b> on the basis of a <u>computer-assisted X-ray</u> . <b>6</b>
Signs and Symptoms:	Patient reported severe left hip pain, rating it as 8 on a scale of 1 to 10. She held her hip <u>in a bent position</u> <b>7</b> and could not tolerate <u>movement toward a straight position</u> . <b>8</b> X-rays of the left hip and leg were taken.
Diagnosis:	<u>Shattered broken bone</u> <b>9</b> in the neck of the left <u>thigh bone</u> . <b>10</b>
Treatment:	<u>Implantation of an artificial hip joint</u> <b>11</b> on the left.
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____
6.	_____
7.	_____
8.	_____
9.	_____
10.	_____
11.	_____

## Case Study

Below is a case study presentation of a patient with a condition covered by this chapter. Read the case study and answer the questions below. Some questions will ask for information not included within this chapter. Use your text, a medical dictionary, or any other reference material you choose to answer these questions.



(Monkey Business Images/Shutterstock)

Mary Pearl, age 60, has come into the physician's office complaining of swelling, stiffness, and arthralgia, especially in her elbows, wrists, and hands. A bone scan revealed acute inflammation in multiple joints with damaged articular cartilage and an erythrocyte sedimentation rate blood test indicated a significant level of acute inflammation in the body. A diagnosis of acute episode of rheumatoid arthritis was made. The physician ordered nonsteroidal anti-inflammatory medication and physical therapy. The therapist initiated a treatment program of hydrotherapy and AROM exercises.

## Questions

1. What pathological condition does this patient have? Look this condition up in a reference source and include a short description of it.

---

---

2. What type of long-term damage may occur in a patient with rheumatoid arthritis?

---

---

3. Describe the other major type of arthritis mentioned in your textbook.

---

---

4. What two diagnostic procedures did the physician order? Describe them in your own words. What were the results? (One of these procedures is described in Chapter 6 of your text.)

---

---

5. What treatments were ordered? Explain what the physical therapy procedures involve (refer to Chapter 14).

---

---

6. This patient is experiencing an acute episode. Explain what this phrase means and contrast it with chronic.

---

---

## Practice Exercises

### A. Word Building Practice

The combining form **oste/o** refers to bone. Use it to write a term that means:

1. bone cell \_\_\_\_\_
2. immature bone cell \_\_\_\_\_
3. porous bone \_\_\_\_\_
4. disease of the bone \_\_\_\_\_
5. cutting into a bone \_\_\_\_\_
6. instrument to cut bone \_\_\_\_\_
7. inflammation of the bone and bone marrow \_\_\_\_\_
8. abnormal softening of bone \_\_\_\_\_
9. bone and cartilage tumor \_\_\_\_\_

The combining form **my/o** refers to muscle. Use it to write a term that means:

10. muscle disease \_\_\_\_\_
11. surgical repair of muscle \_\_\_\_\_
12. suture of muscle \_\_\_\_\_
13. record of muscle electricity \_\_\_\_\_
14. muscle weakness \_\_\_\_\_

The combining form **ten/o** refers to tendons. Use it to write a term that means:

15. tendon pain \_\_\_\_\_
16. tendon suture \_\_\_\_\_

The combining form **arthr/o** refers to the joints. Use it to write a term that means:

17. to fuse a joint \_\_\_\_\_
18. surgical repair of a joint \_\_\_\_\_
19. cutting into a joint \_\_\_\_\_
20. inflammation of a joint \_\_\_\_\_
21. puncture to withdraw fluid from a joint \_\_\_\_\_
22. pain in the joints \_\_\_\_\_

The combining form **chondr/o** refers to cartilage. Use it to write a term that means:

23. surgical removal of cartilage \_\_\_\_\_
24. cartilage tumor \_\_\_\_\_
25. abnormal softening of cartilage \_\_\_\_\_

**B. Name That Suffix**

	Suffix	Example from Chapter
1. to fuse	_____	_____
2. weakness	_____	_____
3. slipping	_____	_____
4. to surgically break	_____	_____
5. movement	_____	_____
6. porous	_____	_____

**C. Spinal Column Practice**

Name the five regions of the spinal column and indicate the number of bones in each area.

Name	Number of Bones
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____

**D. Prefix and Suffix Practice**

Circle the prefix and/or suffix. Place a *P* for prefix or an *S* for suffix over these word parts, then define the term.

- arthroscopy\_\_\_\_\_
- intervertebral\_\_\_\_\_
- chondromalacia\_\_\_\_\_
- discectomy\_\_\_\_\_
- intracranial\_\_\_\_\_
- spondylosis\_\_\_\_\_

**E. Define the Combining Form**

	Definition	Example from Chapter
1. <b>lamin/o</b>	_____	_____
2. <b>ankyl/o</b>	_____	_____
3. <b>chondr/o</b>	_____	_____

	Definition	Example from Chapter
4. <b>spondyl/o</b>	_____	_____
5. <b>my/o</b>	_____	_____
6. <b>orth/o</b>	_____	_____
7. <b>kyph/o</b>	_____	_____
8. <b>tend/o</b>	_____	_____
9. <b>myel/o</b>	_____	_____
10. <b>articul/o</b>	_____	_____

### F. Fill in the Blank

carpal tunnel syndrome	rickets	lateral epicondylitis	systemic lupus erythematosus
scoliosis	osteogenic sarcoma	pseudohypertrophic	
herniated nucleus pulposus	osteoporosis	muscular dystrophy	
	spondylolisthesis		

- Mrs. Lewis, age 84, broke her hip. Her physician will be running tests for what potential ailment? \_\_\_\_\_
- Jamie, age six months, is being given orange juice and vitamin supplements to avoid what condition? \_\_\_\_\_
- George has severe elbow pain after playing tennis four days in a row. He may have \_\_\_\_\_.
- Marshall's doctor told him that he had a ruptured disk. The medical term for this is \_\_\_\_\_.
- Mr. Jefferson's physician has discovered a tumor at the end of his femur. He has been admitted to the hospital for a biopsy to rule out what type of bone cancer? \_\_\_\_\_
- The school nurse has asked Janelle to bend over so that she may examine her back to see if she is developing a lateral curve. What is the nurse looking for? \_\_\_\_\_
- Gerald has experienced a gradual loss of muscle strength over the past five years even though his muscles look large and healthy. The doctors believe he has an inherited muscle disease. What is that disease? \_\_\_\_\_
- Roberta has suddenly developed arthritis in her hands and knees. Rheumatoid arthritis had been ruled out, but what other autoimmune disease might Roberta have? \_\_\_\_\_
- Mark's X-ray demonstrated forward sliding of a lumbar vertebra; the radiologist diagnosed \_\_\_\_\_.
- The orthopedist determined that Marcia's repetitive wrist movements at work caused her to develop \_\_\_\_\_

### G. Name That Anatomical Name

- kneecap \_\_\_\_\_
- ankle bones \_\_\_\_\_
- collar bone \_\_\_\_\_
- thigh bone \_\_\_\_\_

5. toe bones \_\_\_\_\_
6. wrist bones \_\_\_\_\_
7. shin bone \_\_\_\_\_
8. shoulder blade \_\_\_\_\_
9. finger bones \_\_\_\_\_

## H. What Does it Stand For?

1. DJD \_\_\_\_\_
2. EMG \_\_\_\_\_
3. C1 \_\_\_\_\_
4. T6 \_\_\_\_\_
5. IM \_\_\_\_\_
6. DTR \_\_\_\_\_
7. JRA \_\_\_\_\_
8. LLE \_\_\_\_\_
9. ortho \_\_\_\_\_
10. CTS \_\_\_\_\_

## I. Define the Term

1. chondroplasty \_\_\_\_\_
2. bradykinesia \_\_\_\_\_
3. osteoporosis \_\_\_\_\_
4. lordosis \_\_\_\_\_
5. atrophy \_\_\_\_\_
6. myeloma \_\_\_\_\_
7. prosthesis \_\_\_\_\_
8. craniotomy \_\_\_\_\_
9. arthrocentesis \_\_\_\_\_
10. bursitis \_\_\_\_\_



**J. Pharmacology Challenge**

Fill in the classification for each drug description, then match the brand name.

Drug Description	Classification	Brand Name
1. _____ Treats mild pain and is an anti-inflammatory	_____	a. Flexeril
2. _____ Hormone with anti-inflammatory properties	_____	b. Aleve
3. _____ Reduces muscle spasms	_____	c. Fosamax
4. _____ Treats conditions of weakened bones	_____	d. Oysterical
5. _____ Maintains blood calcium levels	_____	e. Medrol

## MyMedicalTerminologyLab™

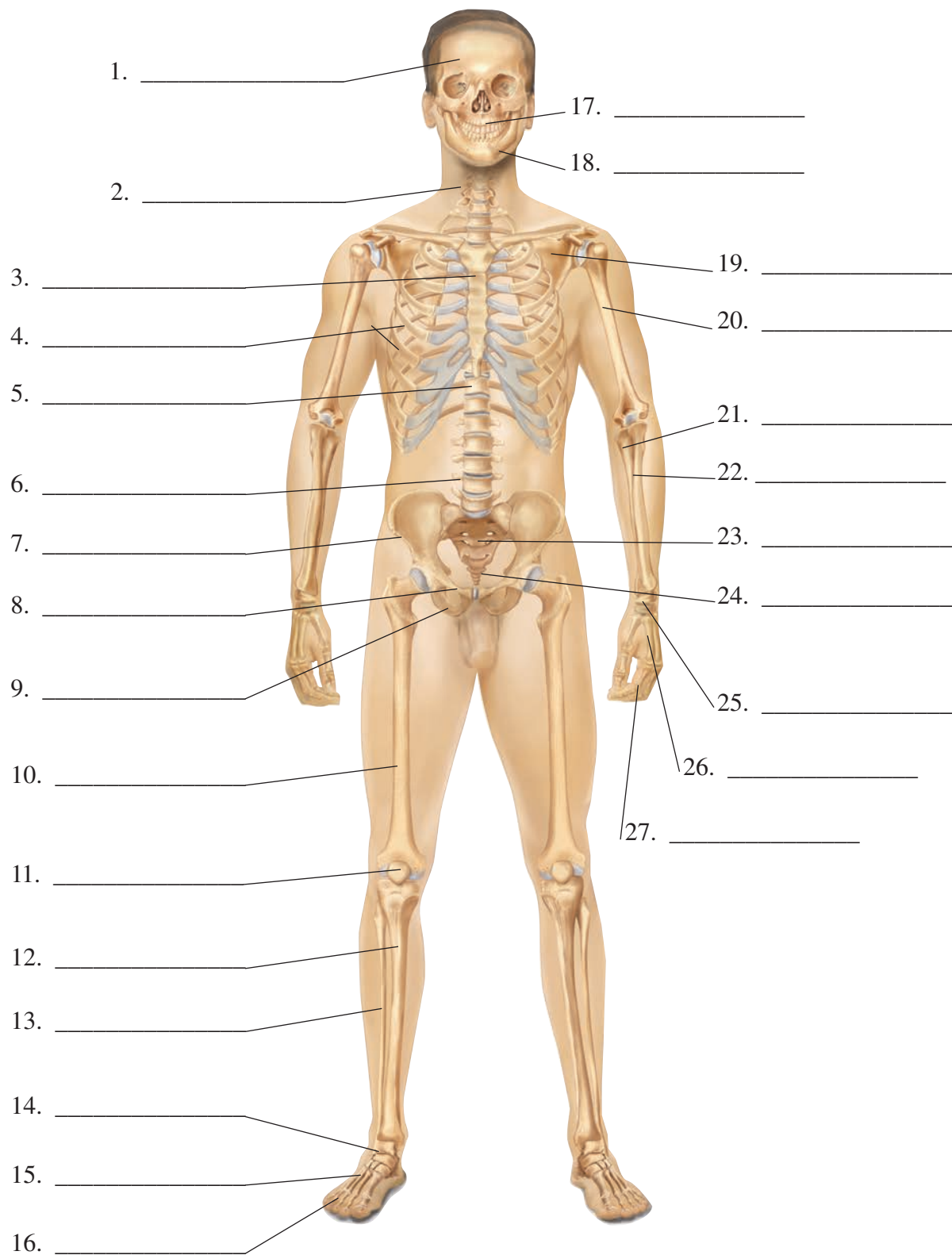
MyMedicalTerminologyLab is a premium online homework management system that includes a host of features to help you study. Registered users will find:

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## Labeling Exercise

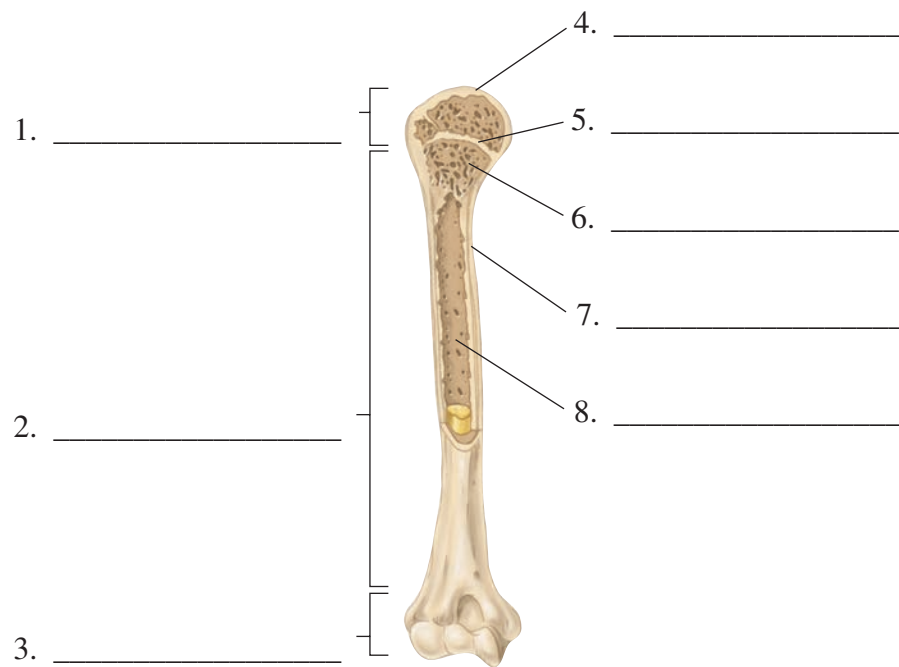
### Image A

Write the labels for this figure on the numbered lines provided.

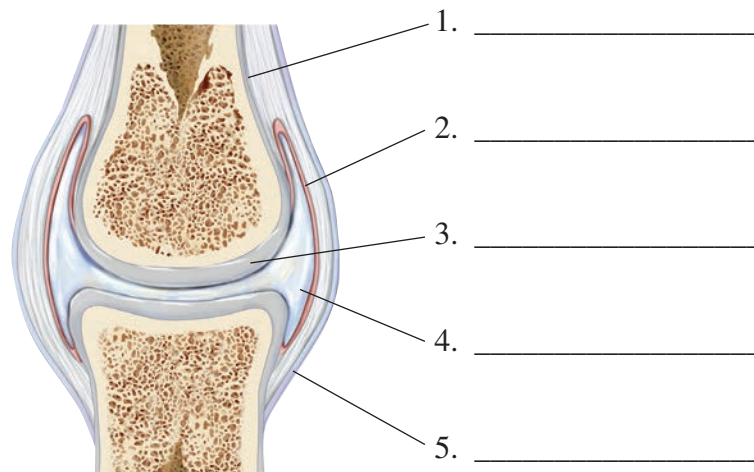


**Image B**

Write the labels for this figure on the numbered lines provided.

**Image C**

Write the labels for this figure on the numbered lines provided.



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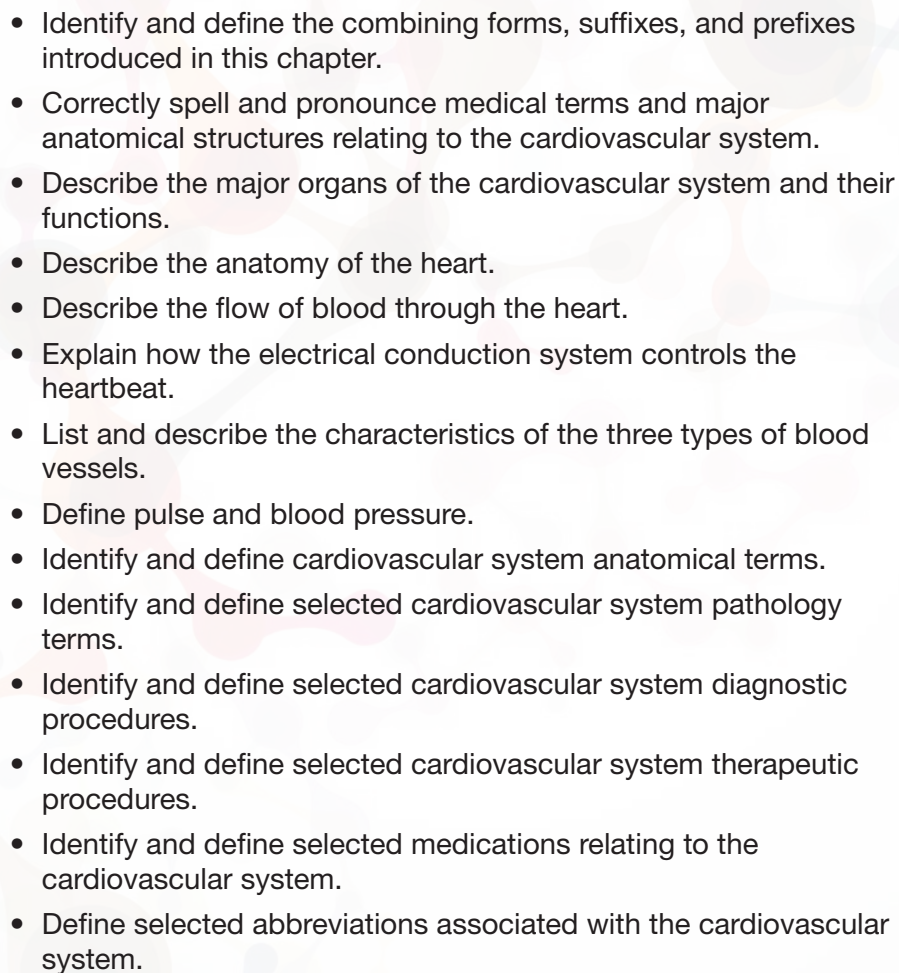


# 5

## Cardiovascular System

### Learning Objectives

*Upon completion of this chapter, you will be able to*

- Identify and define the combining forms, suffixes, and prefixes introduced in this chapter.
  - Correctly spell and pronounce medical terms and major anatomical structures relating to the cardiovascular system.
  - Describe the major organs of the cardiovascular system and their functions.
  - Describe the anatomy of the heart.
  - Describe the flow of blood through the heart.
  - Explain how the electrical conduction system controls the heartbeat.
  - List and describe the characteristics of the three types of blood vessels.
  - Define pulse and blood pressure.
  - Identify and define cardiovascular system anatomical terms.
  - Identify and define selected cardiovascular system pathology terms.
  - Identify and define selected cardiovascular system diagnostic procedures.
  - Identify and define selected cardiovascular system therapeutic procedures.
  - Identify and define selected medications relating to the cardiovascular system.
  - Define selected abbreviations associated with the cardiovascular system.
- 



# Cardiovascular System at a Glance

## Function

The cardiovascular system consists of the pump and vessels that distribute blood to all areas of the body. This system allows for the delivery of needed substances to the cells of the body as well as for the removal of wastes.

## Organs

Here are the primary structures that comprise the cardiovascular system:

### blood vessels

- **arteries**
- **capillaries**
- **veins**

### heart

## Word Parts

Here are the most common word parts (with their meanings) used to build cardiovascular system terms. For a more comprehensive list, refer to the Terminology section of this chapter.

### Combining Forms

<b>angi/o</b>	vessel	<b>sept/o</b>	wall
<b>aort/o</b>	aorta	<b>son/o</b>	sound
<b>arteri/o</b>	artery	<b>sphygm/o</b>	pulse
<b>ather/o</b>	fatty substance	<b>steth/o</b>	chest
<b>atri/o</b>	atrium	<b>thromb/o</b>	clot
<b>cardi/o</b>	heart	<b>valv/o</b>	valve
<b>coron/o</b>	heart	<b>valvul/o</b>	valve
<b>corpor/o</b>	body	<b>varic/o</b>	dilated vein
<b>embol/o</b>	plug	<b>vascul/o</b>	blood vessel
<b>isch/o</b>	to hold back	<b>vas/o</b>	vessel
<b>myocardi/o</b>	heart muscle	<b>ven/o</b>	vein
<b>phleb/o</b>	vein	<b>ventricul/o</b>	ventricle

### Suffixes

<b>-cardia</b>	heart condition
<b>-manometer</b>	instrument to measure pressure
<b>-ole</b>	small
<b>-spasm</b>	involuntary muscle contraction
<b>-tension</b>	pressure
<b>-tonic</b>	pertaining to tone
<b>-ule</b>	small

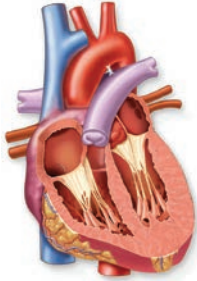
### Prefixes

<b>di-</b>	two
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# Cardiovascular System Illustrated

**heart, p. 141**



Pumps blood through blood vessels

**artery, p. 147**



Carries blood away from the heart

**vein, p. 149**

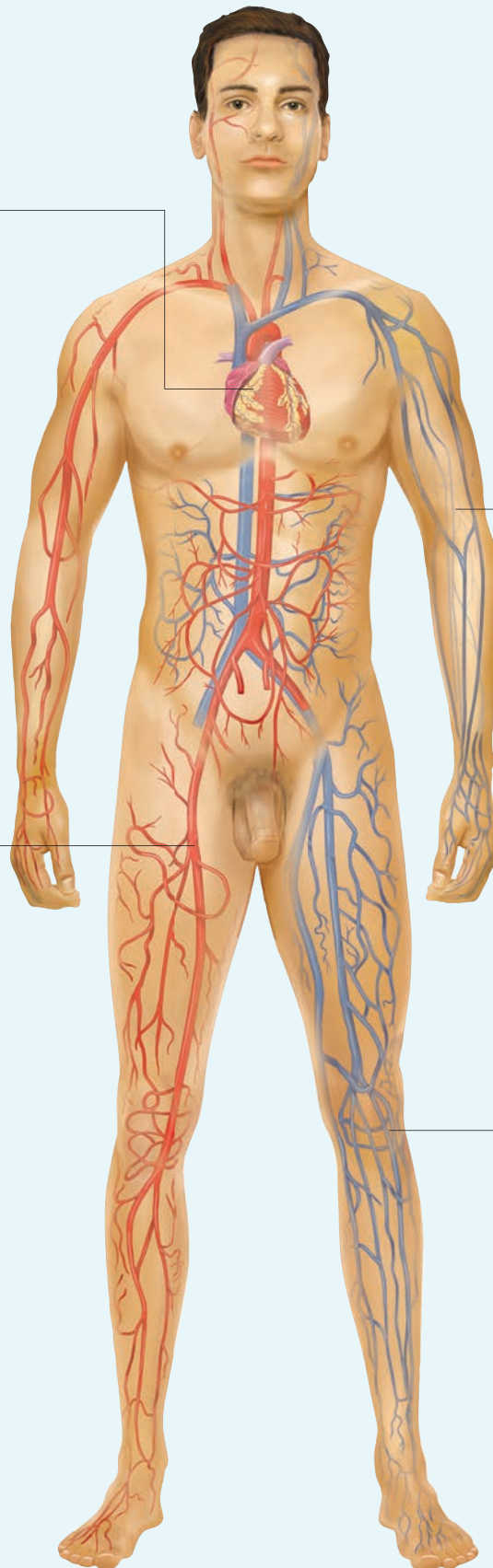


Carries blood towards the heart

**capillary, p. 149**



Exchange site between blood and tissues



# Anatomy and Physiology of the Cardiovascular System

arteries

blood vessels

capillaries

carbon dioxide

circulatory system

deoxygenated (dee-OK-sih-jen-ay-ted)

heart

oxygen

oxygenated (OK-sih-jen-ay-ted)

pulmonary circulation (PULL-mon-air-ee / ser-kew-LAY-shun)

systemic circulation (sis-TEM-ik / ser-kew-LAY-shun)

veins

## What's In A Name?

Look for these word parts:

ox/o = oxygen

pulmon/o = lung

system/o = system

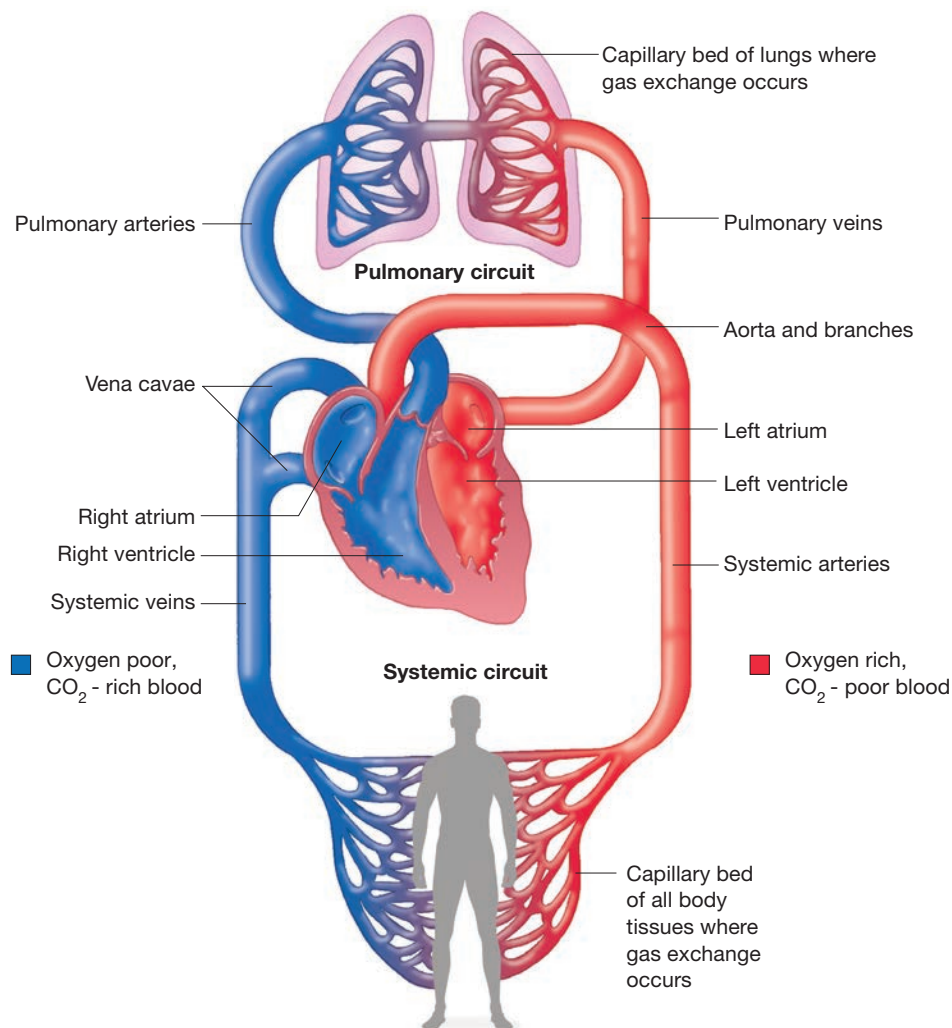
-ary = pertaining to

-ic = pertaining to

di- = two

The cardiovascular (CV) system, also called the **circulatory system**, maintains the distribution of blood throughout the body and is composed of the **heart** and the **blood vessels**—**arteries**, **capillaries**, and **veins**.

The circulatory system is composed of two parts: the **pulmonary circulation** and the **systemic circulation**. The pulmonary circulation, between the heart and lungs, transports **deoxygenated** blood to the lungs to get oxygen, and then back to the heart. The systemic circulation carries **oxygenated** blood away from the heart to the tissues and cells, and then back to the heart (see Figure 5.1 ■). In this way all the body's cells receive blood and oxygen.



■ **Figure 5.1** A schematic of the circulatory system illustrating the pulmonary circulation picking up oxygen from the lungs and the systemic circulation delivering oxygen to the body.

In addition to distributing **oxygen** and other nutrients, such as glucose and amino acids, the cardiovascular system also collects the waste products from the body's cells. **Carbon dioxide** and other waste products produced by metabolic reaction are transported by the cardiovascular system to the lungs, liver, and kidneys where they are eliminated from the body.

## Heart

**apex** (AY-peks)

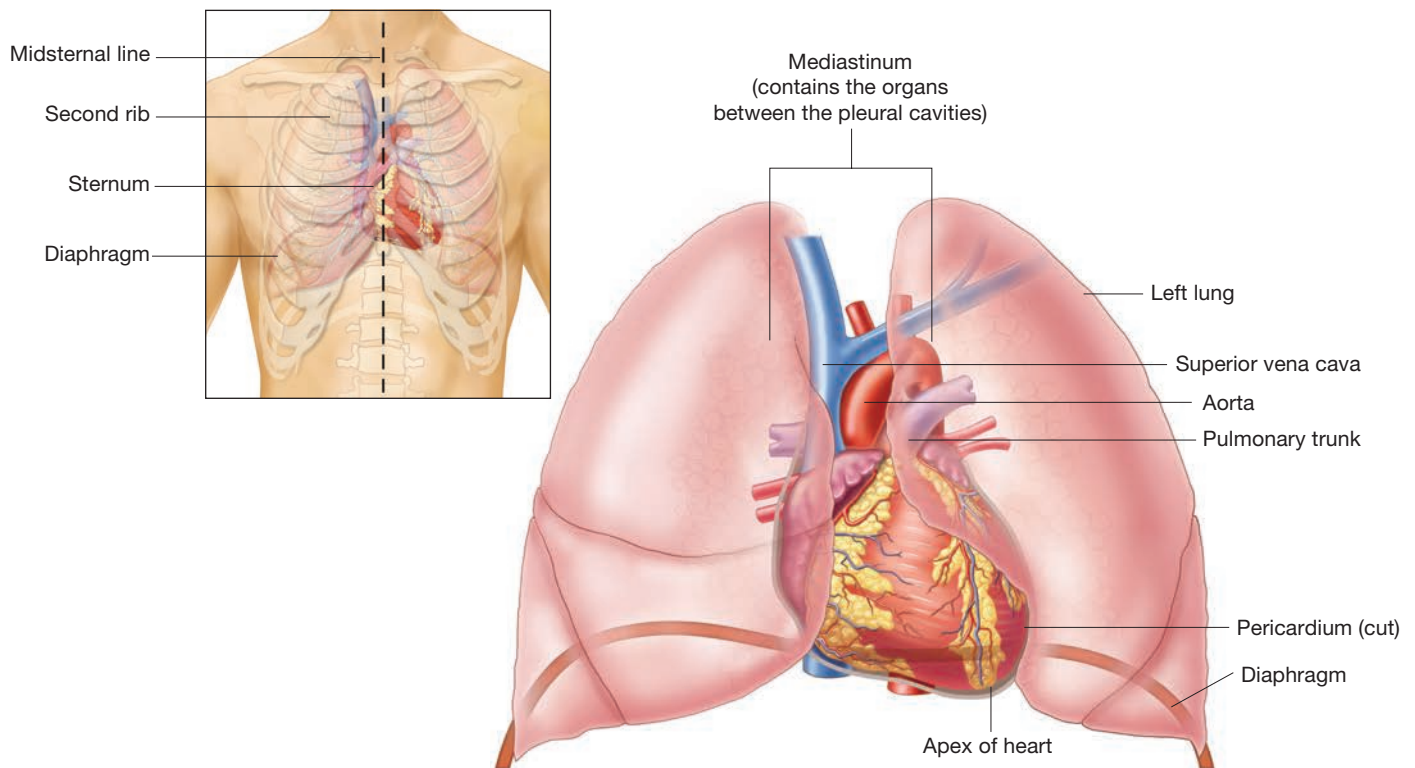
**cardiac muscle** (CAR-dee-ak)

The heart is a muscular pump made up of **cardiac muscle** fibers that could be considered a muscle rather than an organ. It has four chambers, or cavities, and beats an average of 60–100 beats per minute (bpm) or about 100,000 times in one day. Each time the cardiac muscle contracts, blood is ejected from the heart and pushed throughout the body within the blood vessels.

The heart is located in the mediastinum in the center of the chest cavity; however, it is not exactly centered; more of the heart is on the left side of the mediastinum than the right (see Figure 5.2 ■). At about the size of a fist and shaped like an upside-down pear, the heart lies directly behind the sternum. The tip of the heart at the lower edge is called the **apex**.

### Med Term Tip

Your heart is approximately the size of your clenched fist and pumps 4,000 gallons of blood each day. It will beat at least three billion times during your lifetime.



■ **Figure 5.2** Location of the heart within the mediastinum of the thoracic cavity.

## What's In A Name?

Look for these word parts:

**cardi/o** = heart

**pariet/o** = cavity wall

**viscer/o** = internal organ

**-al** = pertaining to

**epi-** = above

## Med Term Tip

These layers become important when studying the disease conditions affecting the heart. For instance, when the prefix **endo-** is added to *carditis*, forming *endocarditis*, we know that the inflammation is within the “inner layer of the heart.” In discussing the muscular action of the heart, the combining form **my/o**, meaning “muscle,” is added to *cardium* to form the word *myocardium*. The diagnosis *myocardial infarction* (MI), or heart attack, means that the patient has an infarct or “dead tissue in the muscle of the heart.” The prefix **peri-**, meaning “around,” when added to the word *cardium* refers to the sac “surrounding the heart.” Therefore, *pericarditis* is an “inflammation of the outer sac of the heart.”

## Heart Layers

**endocardium** (en-doh-CAR-dee-um)

**epicardium** (ep-ih-CAR-dee-um)

**myocardium** (my-oh-CAR-dee-um)

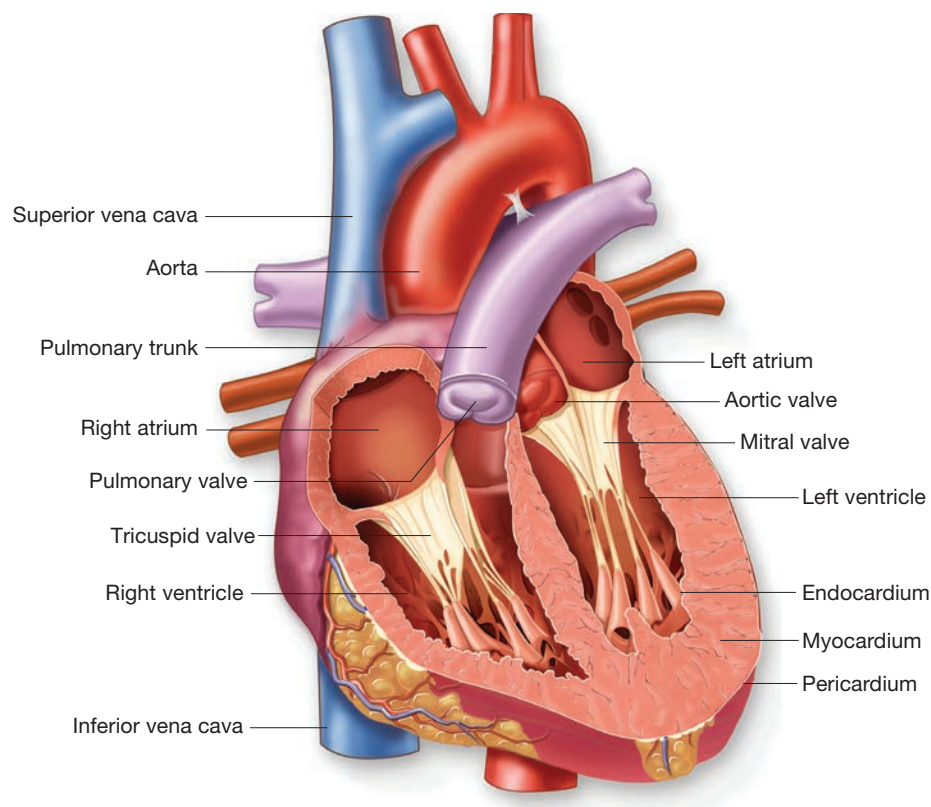
**parietal pericardium** (pah-RYE-eh-tal /  
pair-ih-CAR-dee-um)

**pericardium** (pair-ih-CAR-dee-um)

**visceral pericardium** (VISS-er-al /  
pair-ih-CAR-dee-um)

The wall of the heart is quite thick and composed of three layers (see Figure 5.3 ■):

1. The **endocardium** is the inner layer of the heart lining the heart chambers. It is a very smooth, thin layer that serves to reduce friction as the blood passes through the heart chambers.
2. The **myocardium** is the thick, muscular middle layer of the heart. Contraction of this muscle layer develops the pressure required to pump blood through the blood vessels.
3. The **epicardium** is the outer layer of the heart. The heart is enclosed within a double-layered pleural sac, called the **pericardium**. The epicardium is the **visceral pericardium**, or inner layer of the sac. The outer layer of the sac is the **parietal pericardium**. Fluid between the two layers of the sac reduces friction as the heart beats.



■ **Figure 5.3** Internal view of the heart illustrating the heart chambers, heart layers, and major blood vessels associated with the heart.



## Heart Chambers

**atria** (AY-tree-ah)

**interatrial septum** (in-ter-AY-tree-al / SEP-tum)

**interventricular septum** (in-ter-ven-TRIK-yoo-lar / SEP-tum)

**ventricles** (VEN-trik-lz)

The heart is divided into four chambers or cavities (see Figures 5.3 and 5.4). There are two **atria**, or upper chambers, and two **ventricles**, or lower chambers. These chambers are divided into right and left sides by walls called the **interatrial septum** and the **interventricular septum**. The atria are the receiving chambers of the heart. Blood returning to the heart via veins first collects in the atria. The ventricles are the pumping chambers. They have a much thicker myocardium and their contraction ejects blood out of the heart and into the great arteries.

### Med Term Tip

The term *ventricle* comes from the Latin term *venter*, which means “little belly.” Although it originally referred to the abdomen and then the stomach, it came to stand for any hollow region inside an organ.

## Heart Valves

**aortic valve** (ay-OR-tik)

**atrioventricular valve**

(ay-tree-oh-ven-TRIK-yoo-lar)

**bicuspid valve** (bye-CUSS-pid)

**cusps**

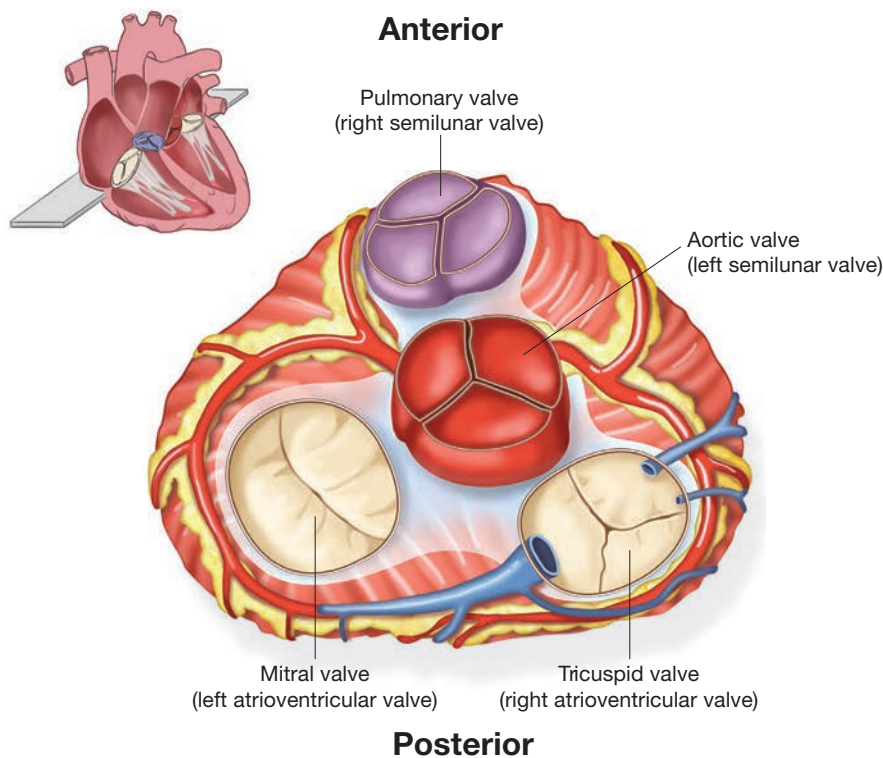
**mitral valve** (MY-tral)

**pulmonary valve** (PULL-mon-air-ee)

**semilunar valve** (sem-ih-LOO-nar)

**tricuspid valve** (try-CUSS-pid)

Four valves act as restraining gates to control the direction of blood flow. They are situated at the entrances and exits to the ventricles (see Figure 5.4 ■). Properly functioning valves allow blood to flow only in the forward direction by blocking it from returning to the previous chamber.



■ **Figure 5.4** Superior view of heart valves illustrating position, size, and shape of each valve.

**What's In A Name?**

Look for these word parts:

pulmon/o = lung

-al = pertaining to

-ar = pertaining to

bi- = two

semi- = partial

tri- = three

**Med Term Tip**

The heart makes two distinct sounds referred to as “lub-dupp.” These sounds are produced by the forceful snapping shut of the heart valves. *Lub* is the closing of the atrioventricular valves. *Dupp* is the closing of the semilunar valves.

The four valves are as follows:

1. **Tricuspid valve:** an **atrioventricular valve** (AV), meaning that it controls the opening between the right atrium and the right ventricle. Once the blood enters the right ventricle, it cannot go back up into the atrium again. The prefix *tri-*, meaning three, indicates that this valve has three leaflets or **cusps**.
2. **Pulmonary valve:** a **semilunar valve**. The prefix *semi-*, meaning half, and the term **lunar**, meaning moon, indicate that this valve looks like a half moon. Located between the right ventricle and the pulmonary artery, this valve prevents blood that has been ejected into the pulmonary artery from returning to the right ventricle as it relaxes.
3. **Mitral valve:** also called the **bicuspid valve**, indicating that it has two cusps. Blood flows through this atrioventricular valve to the left ventricle and cannot go back up into the left atrium.
4. **Aortic valve:** a semilunar valve located between the left ventricle and the aorta. Blood leaves the left ventricle through this valve and cannot return to the left ventricle.

**Blood Flow Through the Heart**

**aorta** (ay-OR-tah)

**diastole** (dye-ASS-toe-lee)

**inferior vena cava** (VEE-nah / KAY-vah)

**pulmonary artery** (PULL-mon-air-ee)

**pulmonary veins**

**superior vena cava**

**systole** (SIS-toe-lee)

The flow of blood through the heart is very orderly (see Figure 5.5 ■). It progresses through the heart to the lungs, where it receives oxygen; then goes back to the heart; and then out to the body tissues and parts. The normal process of blood flow is:

**What's In A Name?**

Look for these word parts:

infer/o = below

pulmon/o = lung

super/o = above

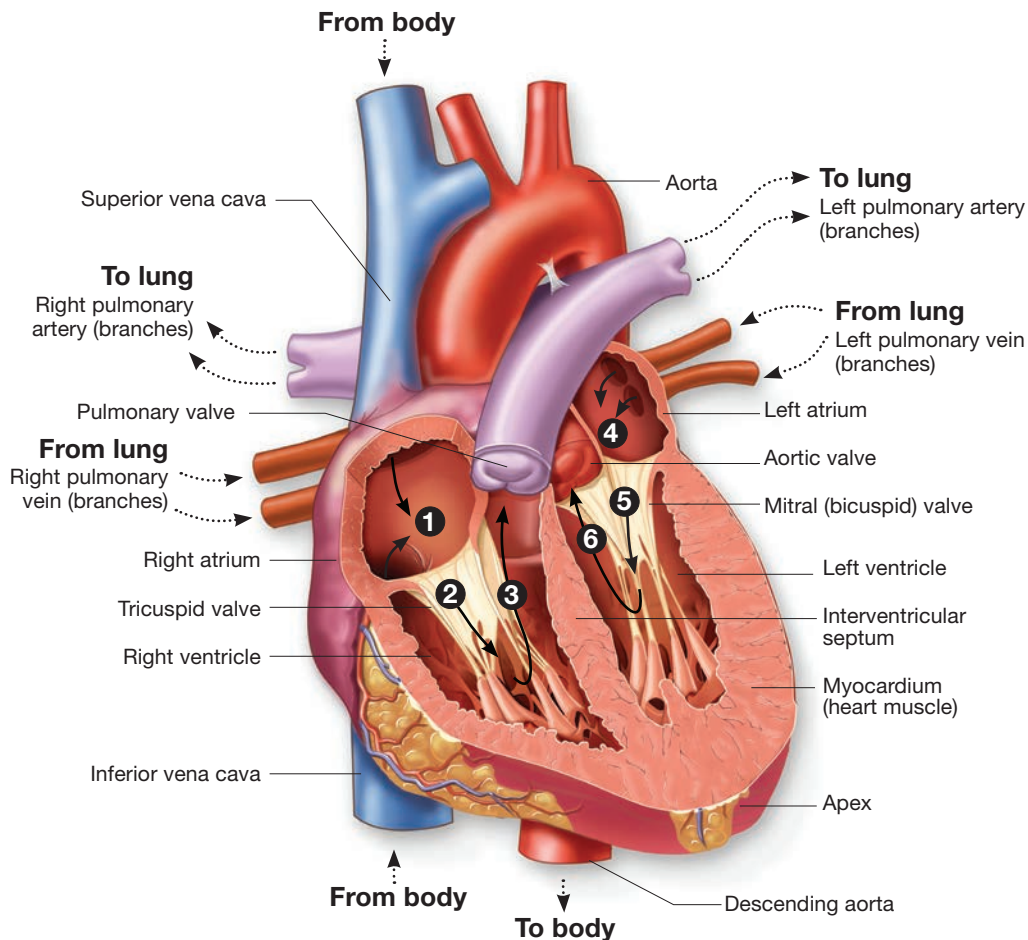
-ary = pertaining to

-ior = pertaining to

1. Deoxygenated blood from all the tissues in the body enters a relaxed right atrium via two large veins called the **superior vena cava** and **inferior vena cava**.
2. The right atrium contracts and blood flows through the tricuspid valve into the relaxed right ventricle.
3. The right ventricle then contracts and blood is pumped through the pulmonary valve into the **pulmonary artery**, which carries it to the lungs for oxygenation.
4. The left atrium receives blood returning to the heart after being oxygenated by the lungs. This blood enters the relaxed left atrium from the four **pulmonary veins**.
5. The left atrium contracts and blood flows through the mitral valve into the relaxed left ventricle.
6. When the left ventricle contracts, the blood is pumped through the aortic valve and into the **aorta**, the largest artery in the body. The aorta carries blood to all parts of the body.

It can be seen that the heart chambers alternate between relaxing, in order to fill, and contracting to push blood forward. The period of time a chamber is relaxed is **diastole**. The contraction phase is **systole**.





■ **Figure 5.5** The path of blood flow through the chambers of the left and right side of the heart, including the veins delivering blood to the heart and arteries receiving blood ejected from the heart.

## Conduction System of the Heart

atrioventricular bundle

atrioventricular node

autonomic nervous system (aw-toh-NOM-ik /  
NER-vus / SIS-tem)

bundle branches

bundle of His

pacemaker

Purkinje fibers (per-KIN-gee)

sinoatrial node (sigh-noh-AY-tree-al)

The heart rate is regulated by the **autonomic nervous system**; therefore, we have no voluntary control over the beating of our heart. Special tissue within the heart is responsible for conducting an electrical impulse stimulating the different chambers to contract in the correct order.

The path that the impulses travel is as follows (see Figure 5.6 ■):

1. The **sinoatrial** (SA, S-A) **node**, or **pacemaker**, is where the electrical impulses begin. From the sinoatrial node a wave of electricity travels through the atria, causing them to contract, or go into systole.
2. The **atrioventricular node** is stimulated.
3. This node transfers the stimulation wave to the **atrioventricular bundle** (formerly called **bundle of His**).
4. The electrical signal next travels down the **bundle branches** within the interventricular septum.
5. The **Purkinje fibers** out in the ventricular myocardium are stimulated, resulting in ventricular systole.

### What's In A Name?

Look for these word parts:

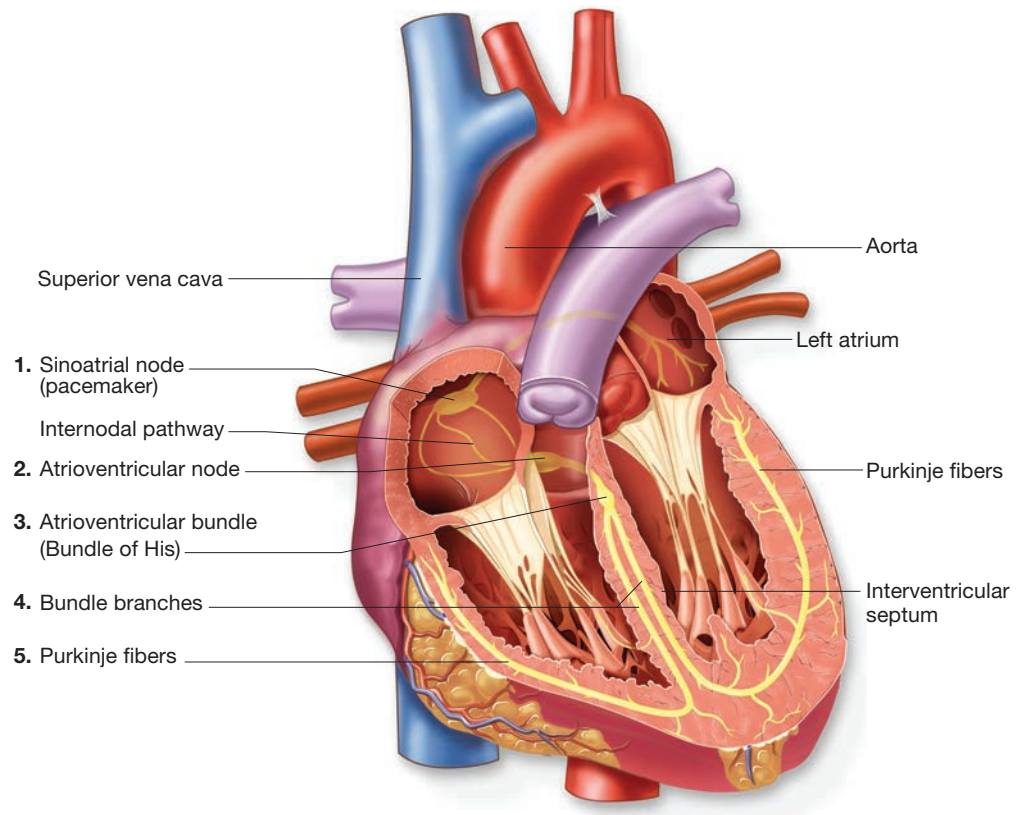
atri/o = atrium

-al = pertaining to

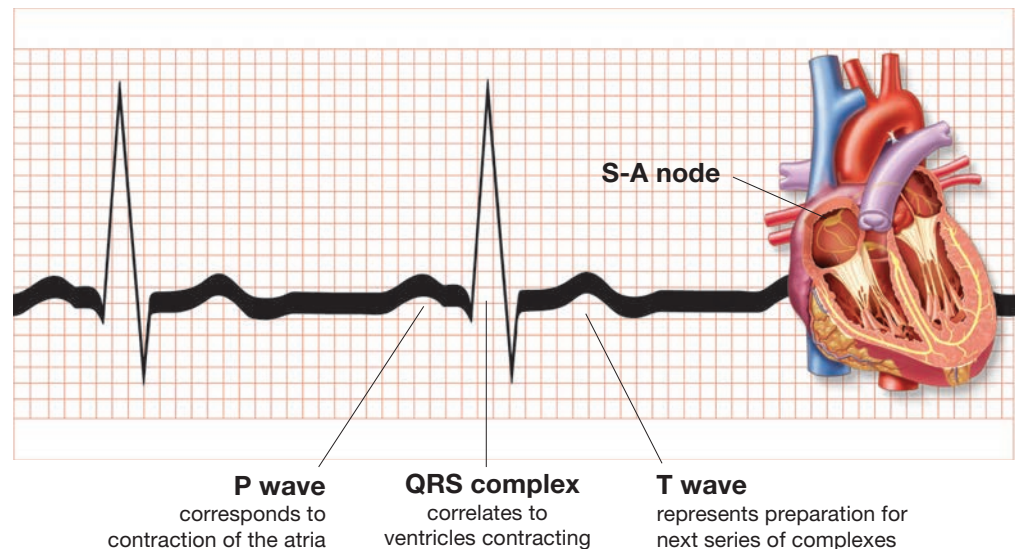
-ic = pertaining to

auto- = self

■ **Figure 5.6** The conduction system of the heart; traces the path of the electrical impulse that stimulates the heart chambers to contract in the correct sequence.



■ **Figure 5.7** An electrocardiogram (EKG) wave record of the electrical signal as it moves through the conduction system of the heart. This signal stimulates the chambers of the heart to contract and relax in the proper sequence.



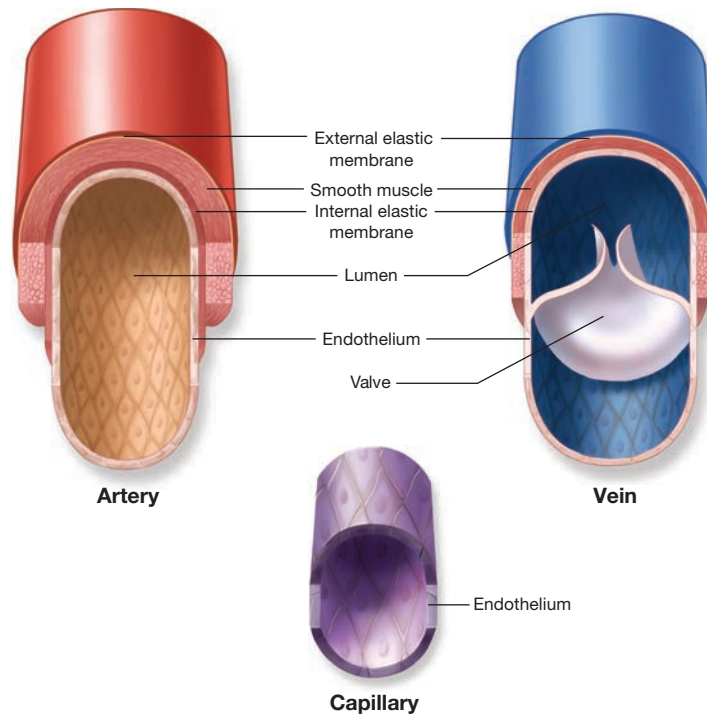
#### Med Term Tip

The electrocardiogram, referred to as an EKG or ECG, is a measurement of the electrical activity of the heart (see Figure 5.7 ■). This can give the physician information about the health of the heart, especially the myocardium.

## Blood Vessels

**lumen** (LOO-men)

There are three types of blood vessels: arteries, capillaries, and veins (see Figure 5.8 ■). These are the pipes that circulate blood throughout the body. The **lumen** is the channel within these vessels through which blood flows.



■ **Figure 5.8** Comparative structure of arteries, capillaries, and veins.

## Arteries

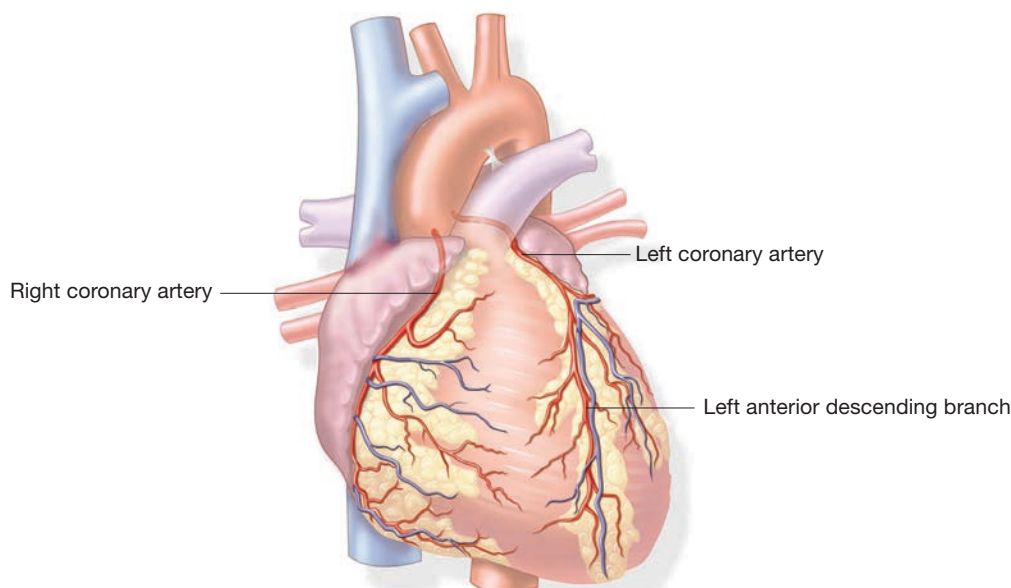
**arterioles** (ar-TEE-ree-ohlz)

**coronary arteries** (KOR-ah-nair-ee / AR-te-reez)

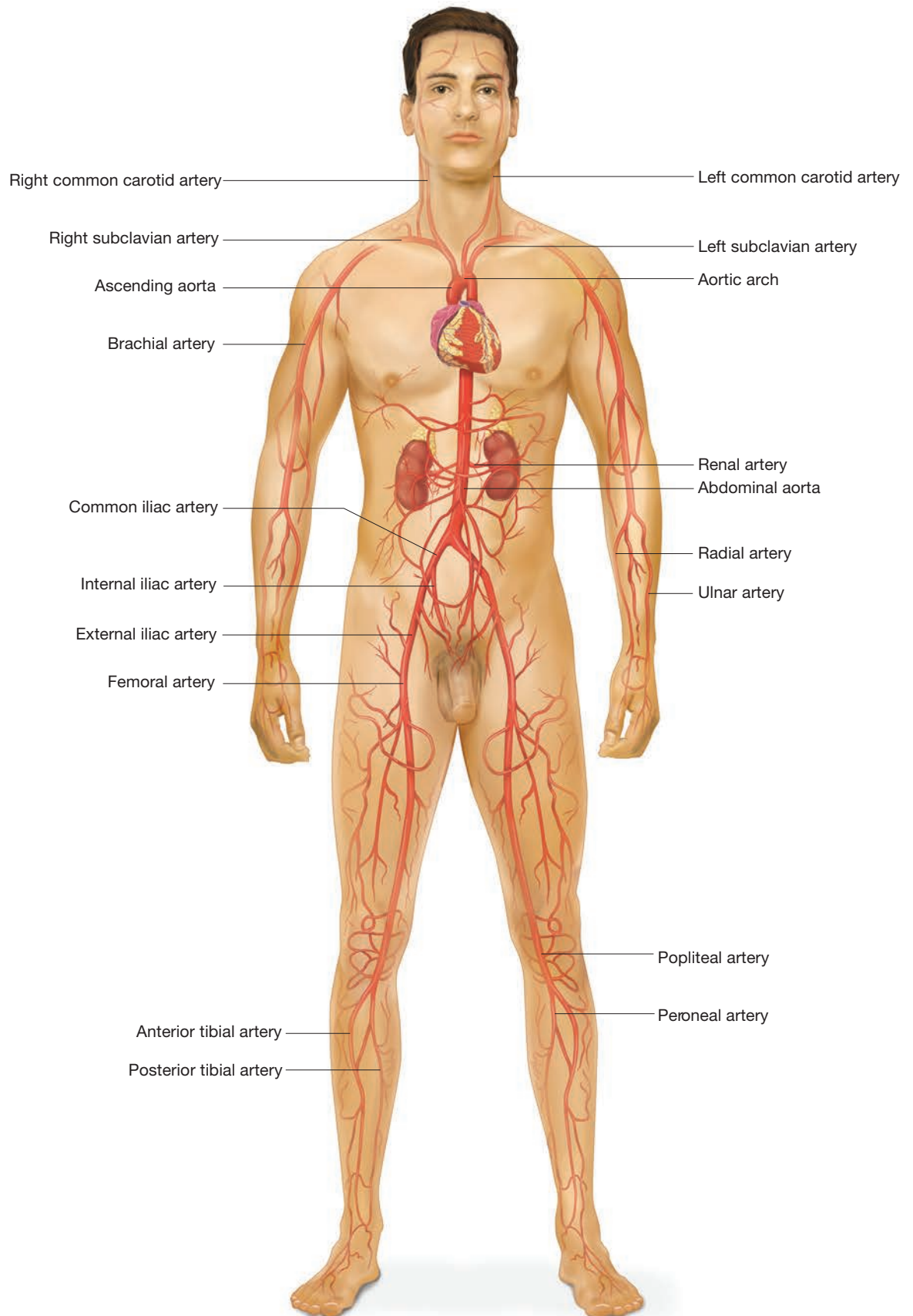
The arteries are the large, thick-walled vessels that carry the blood away from the heart. The walls of arteries contain a thick layer of smooth muscle that can contract or relax to change the size of the arterial lumen. The pulmonary artery carries deoxygenated blood from the right ventricle to the lungs. The largest artery, the aorta, begins from the left ventricle of the heart and carries oxygenated blood to all the body systems. The **coronary arteries** then branch from the aorta and provide blood to the myocardium (see Figure 5.9 ■). As they travel through the body, the arteries branch into progressively smaller-sized arteries. The smallest of the arteries, called **arterioles**, deliver blood to the capillaries. Figure 5.10 ■ illustrates the major systemic arteries.

### Med Term Tip

The term *coronary*, from the Latin word for crown, describes how the great vessels encircle the heart as they emerge from the top of the heart.



■ **Figure 5.9** The coronary arteries.



■ **Figure 5.10** The major arteries of the body.



## Capillaries

### capillary bed

Capillaries are a network of tiny blood vessels referred to as a **capillary bed**. Arterial blood flows into a capillary bed, and venous blood flows back out. Capillaries are very thin walled, allowing for the diffusion of the oxygen and nutrients from the blood into the body tissues (see Figure 5.8). Likewise, carbon dioxide and waste products are able to diffuse out of the body tissues and into the bloodstream to be carried away. Since the capillaries are so small in diameter, the blood will not flow as quickly through them as it does through the arteries and veins. This means that the blood has time for an exchange of nutrients, oxygen, and waste material to take place. As blood exits a capillary bed, it returns to the heart through a vein.

## Veins

### venules (VEN-yools)

The veins carry blood back to the heart (see Figure 5.8). Blood leaving capillaries first enters small **venules**, which then merge into larger veins. Veins have much thinner walls than arteries, causing them to collapse easily. The veins also have valves that allow the blood to move only toward the heart. These valves prevent blood from backflowing, ensuring that blood always flows toward the heart. The two large veins that enter the heart are the superior vena cava, which carries blood from the upper body, and the inferior vena cava, which carries blood from the lower body. Blood pressure in the veins is much lower than in the arteries. Muscular action against the veins and skeletal muscle contractions help in the movement of blood. Figure 5.11 ■ illustrates the major systemic veins.

## Pulse and Blood Pressure

### blood pressure (BP)

#### diastolic pressure (dye-ah-STOL-ik)

### pulse

#### systolic pressure (sis-TOL-ik)

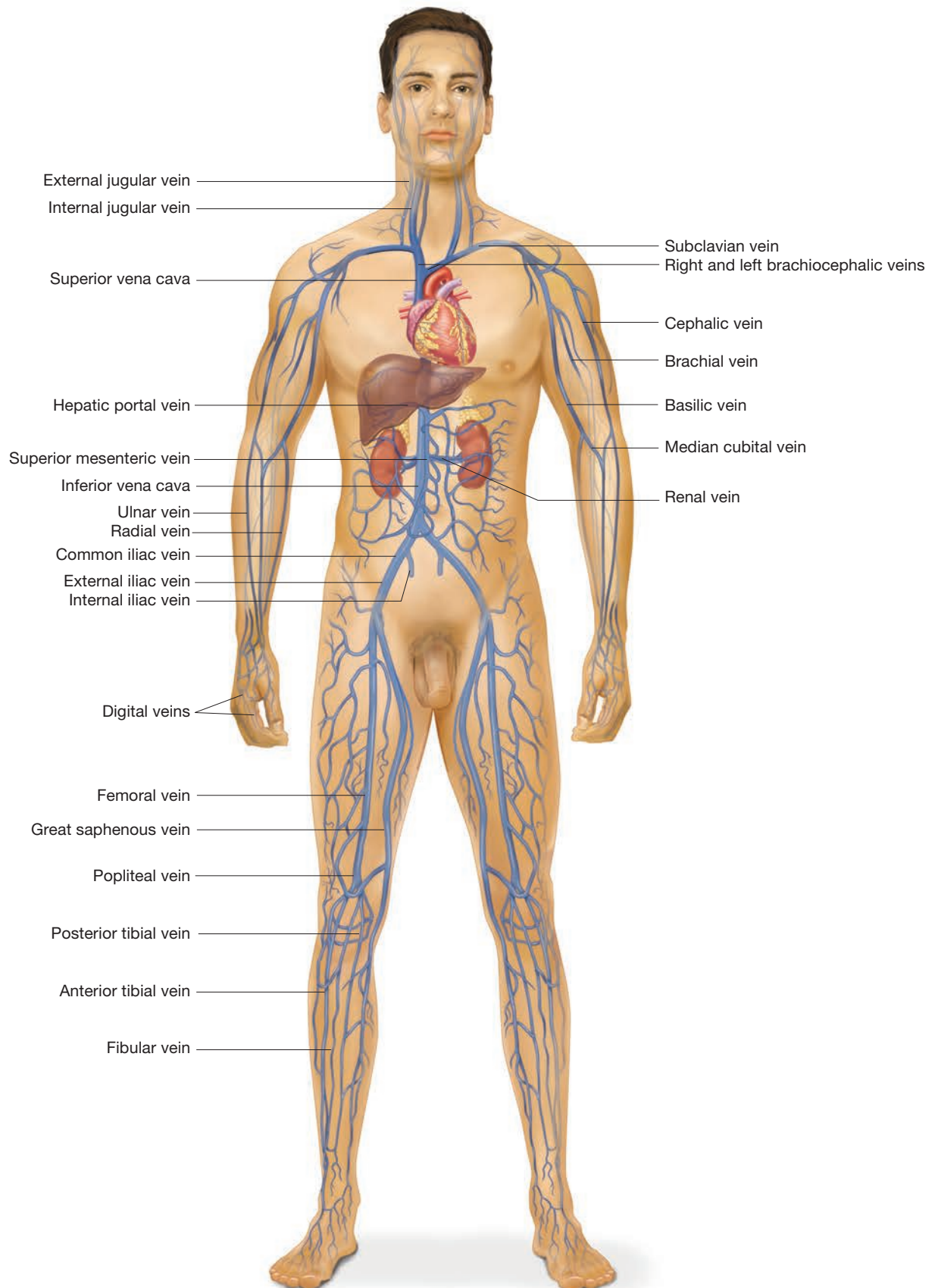
**Blood pressure (BP)** is a measurement of the force exerted by blood against the wall of a blood vessel. During ventricular systole, blood is under a lot of pressure from the ventricular contraction, giving the highest blood pressure reading—the **systolic pressure**. The **pulse** felt at the wrist or throat is the surge of blood caused by the heart contraction. This is why pulse rate is normally equal to heart rate. During ventricular diastole, blood is not being pushed by the heart at all and the blood pressure reading drops to its lowest point—the **diastolic pressure**. Therefore, to see the full range of what is occurring with blood pressure, both numbers are required. Blood pressure is also affected by several other characteristics of the blood and the blood vessels. These include the elasticity of the arteries, the diameter of the blood vessels, the viscosity of the blood, the volume of blood flowing through the vessels, and the amount of resistance to blood flow.

### What's In A Name?

Look for these word parts:  
-ic = pertaining to

### Med Term Tip

The instrument used to measure blood pressure is called a *sphygmomanometer*. The combining form *sphygm/o* means “pulse” and the suffix *-manometer* means “instrument to measure pressure.” A blood pressure reading is reported as two numbers, for example, 120/80. The 120 is the systolic pressure and the 80 is the diastolic pressure. There is no one “normal” blood pressure number. The normal blood pressure for an adult is a systolic pressure less than 120 and diastolic pressure less than 80.



■ **Figure 5.11** The major veins of the body.

## Practice As You Go

### A. Complete the Statement

1. The study of the heart is called \_\_\_\_\_.
2. The three layers of the heart are \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
3. The impulse for the heartbeat (the pacemaker) originates in the \_\_\_\_\_.
4. Arteries carry blood \_\_\_\_\_ the heart.
5. The four heart valves are \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
6. The \_\_\_\_\_ are the receiving chambers of the heart and the \_\_\_\_\_ are the pumping chambers.
7. The \_\_\_\_\_ circulation carries blood to and from the lungs.
8. The pointed tip of the heart is called the \_\_\_\_\_.
9. The \_\_\_\_\_ divides the heart into left and right halves.
10. \_\_\_\_\_ is the contraction phase of the heartbeat and \_\_\_\_\_ is the relaxation phase.

## Terminology

### Word Parts Used to Build Cardiovascular System Terms

The following lists contain the combining forms, suffixes, and prefixes used to build terms in the remaining sections of this chapter.

#### Combining Forms

<b>angi/o</b>	vessel
<b>aort/o</b>	aorta
<b>arteri/o</b>	artery
<b>ather/o</b>	fatty substance
<b>atri/o</b>	atrium
<b>cardi/o</b>	heart
<b>coron/o</b>	heart
<b>corpor/o</b>	body
<b>cutane/o</b>	skin
<b>cyan/o</b> (see Chapter 7)	blue
<b>duct/o</b>	to bring
<b>electr/o</b>	electricity

<b>embol/o</b>	plug
<b>hem/o</b> (see Chapter 6)	blood
<b>isch/o</b>	to hold back
<b>lip/o</b>	fat
<b>my/o</b>	muscle
<b>myocardi/o</b>	heart muscle
<b>orth/o</b>	straight
<b>pector/o</b>	chest
<b>peripher/o</b> (see Chapter 12)	away from center
<b>phleb/o</b>	vein
<b>pulmon/o</b>	lung

<b>sept/o</b>	a wall
<b>son/o</b>	sound
<b>sphygm/o</b>	pulse
<b>steth/o</b>	chest
<b>thromb/o</b>	clot
<b>valv/o</b>	valve
<b>valvul/o</b>	valve
<b>varic/o</b>	dilated vein
<b>vas/o</b>	vessel
<b>vascul/o</b>	blood vessel
<b>ven/o</b>	vein
<b>ventricul/o</b>	ventricle



## Suffixes

<b>-ac</b>	pertaining to
<b>-al</b>	pertaining to
<b>-ar</b>	pertaining to
<b>-ary</b>	pertaining to
<b>-cardia</b>	heart condition
<b>-eal</b>	pertaining to
<b>-ectomy</b>	surgical removal
<b>-gram</b>	record
<b>-graphy</b>	process of recording
<b>-ia</b>	condition
<b>-ic</b>	pertaining to

<b>-itis</b>	inflammation
<b>-logy</b>	study of
<b>-lytic</b>	destruction
<b>-manometer</b>	instrument to measure pressure
<b>-megaly</b>	enlarged
<b>-ole</b>	small
<b>-oma</b>	mass
<b>-ose</b>	pertaining to
<b>-osis</b>	abnormal condition
<b>-ous</b>	pertaining to
<b>-pathy</b>	disease

<b>-plasty</b>	surgical repair
<b>-rrhexis</b>	rupture
<b>-sclerosis</b>	hardening
<b>-scope</b>	instrument for viewing
<b>-spasm</b>	involuntary muscle contraction
<b>-stenosis</b>	narrowing
<b>-tension</b>	pressure
<b>-tic</b>	pertaining to
<b>-tonic</b>	pertaining to tone
<b>-ule</b>	small

## Prefixes

<b>a-</b>	without
<b>anti-</b>	against
<b>brady-</b>	slow
<b>de-</b>	without
<b>endo-</b>	inner
<b>extra-</b>	outside of

<b>hyper-</b>	excessive
<b>hypo-</b>	insufficient
<b>inter-</b>	between
<b>intra-</b>	within
<b>per-</b>	through
<b>peri-</b>	around

<b>poly-</b>	many
<b>re-</b>	again
<b>tachy-</b>	fast
<b>tetra-</b>	four
<b>trans-</b>	across
<b>ultra-</b>	beyond

## Adjective Forms of Anatomical Terms

Term	Word Parts	Definition
<b>aortic</b> (ay-OR-tik)	<b>aort/o</b> = aorta <b>-ic</b> = pertaining to	Pertaining to the aorta.
<b>arterial</b> (ar-TEE-ree-al)	<b>arteri/o</b> = artery <b>-al</b> = pertaining to	Pertaining to an artery.
<b>arteriole</b> (ar-TEE-ree-ohl)	<b>arteri/o</b> = artery <b>-ole</b> = small	A small (narrow in diameter) artery.
<b>atrial</b> (AY-tree-al)	<b>atri/o</b> = atrium <b>-al</b> = pertaining to	Pertaining to the atrium.
<b>atrioventricular</b> (AV, A-V) (AY-tree-oh-ven-TRIK-yoo-lar)	<b>atri/o</b> = atrium <b>ventricul/o</b> = ventricle <b>-ar</b> = pertaining to	Pertaining to the atrium and ventricle.
<b>cardiac</b> (CAR-dee-ak)	<b>cardi/o</b> = heart <b>-ac</b> = pertaining to	Pertaining to the heart.
<b>coronary</b> (KOR-ah-nair-ee)	<b>coron/o</b> = heart <b>-ary</b> = pertaining to	Pertaining to the heart.

## Adjective Forms of Anatomical Terms (continued)

Term	Word Parts	Definition
<b>interatrial</b> (in-ter-AY-tree-al)	<b>inter-</b> = between <b>atri/o</b> = atrium <b>-al</b> = pertaining to	Pertaining to between the atria.
<b>interventricular</b> (in-ter-ven-TRIK-yoo-lar)	<b>inter-</b> = between <b>ventricul/o</b> = ventricle <b>-ar</b> = pertaining to	Pertaining to between the ventricles.
<b>myocardial</b> (my-oh-CAR-dee-al)	<b>myocardi/o</b> = heart muscle <b>-al</b> = pertaining to	Pertaining to heart muscle.
<b>valvular</b> (VAL-view-lar)	<b>valvul/o</b> = valve <b>-ar</b> = pertaining to	Pertaining to a valve.
<b>vascular</b> (VAS-kwee-lar)	<b>vascul/o</b> = blood vessel <b>-ar</b> = pertaining to	Pertaining to a blood vessel.
<b>venous</b> (VEE-nus)	<b>ven/o</b> = vein <b>-ous</b> = pertaining to	Pertaining to a vein.
<b>ventricular</b> (ven-TRIK-yoo-lar)	<b>ventricul/o</b> = ventricle <b>-ar</b> = pertaining to	Pertaining to a ventricle.
<b>venule</b> (VEN-yool)	<b>ven/o</b> = vein <b>-ule</b> = small	A small (narrow in diameter) vein.

## Practice As You Go

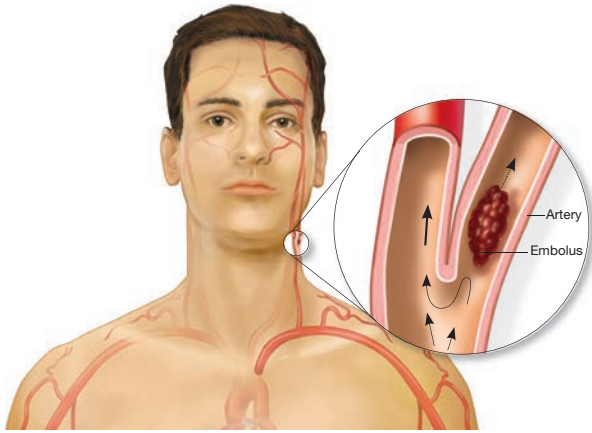
### B. Give the adjective form for each anatomical structure

1. The heart \_\_\_\_\_
2. Between the ventricles \_\_\_\_\_
3. An artery \_\_\_\_\_
4. A small vein \_\_\_\_\_
5. The heart muscle \_\_\_\_\_
6. An atrium \_\_\_\_\_

## Pathology

Term	Word Parts	Definition
<b>Medical Specialties</b>		
<b>cardiology</b> (car-dee-ALL-oh-jee)	<b>cardi/o</b> = heart <b>-logy</b> = study of	The branch of medicine involving diagnosis and treatment of conditions and diseases of the cardiovascular system. Physician is a <i>cardiologist</i> .

## Pathology (continued)

Term	Word Parts	Definition
<b>cardiovascular technologist/technician</b>	<b>cardi/o</b> = heart <b>vascul/o</b> = blood vessel <b>-ar</b> = pertaining to	Healthcare professional trained to perform a variety of diagnostic and therapeutic procedures including electrocardiography, echocardiography, and exercise stress tests.
<b>Signs and Symptoms</b>		
<b>angiitis</b> (an-jee-EYE-tis)	<b>angi/o</b> = vessel <b>-itis</b> = inflammation	Inflammation of a vessel.
<b>angiospasm</b> (AN-jee-oh-spazm)	<b>angi/o</b> = vessel <b>-spasm</b> = involuntary muscle contraction	An involuntary muscle contraction of the smooth muscle in the wall of a vessel; narrows the vessel.
<b>angiostenosis</b> (an-jee-oh-sten-OH-sis)	<b>angi/o</b> = vessel <b>-stenosis</b> = narrowing	The narrowing of a vessel.
<b>bradycardia</b> (brad-ee-CAR-dee-ah)	<b>brady-</b> = slow <b>-cardia</b> = heart condition	The condition of having a slow heart rate, typically less than 60 beats/minute; highly trained aerobic persons may normally have a slow heart rate.
<b>embolus</b> (EM-boh-lus)	<b>embol/o</b> = plug	The obstruction of a blood vessel by a blood clot that has broken off from a thrombus somewhere else in the body and traveled to the point of obstruction. If it occurs in a coronary artery, it may result in a myocardial infarction.
 <p>■ <b>Figure 5.12</b> Illustration of an embolus floating in an artery. The embolus will become lodged in a blood vessel that is smaller than it is, resulting in occlusion of that artery.</p>		
<b>infarct</b> (IN-farkt)		An area of tissue within an organ or part that undergoes necrosis (death) following the loss of its blood supply.
<b>ischemia</b> (ih-SKEE-mee-uh)	<b>isch/o</b> = to hold back <b>hem/o</b> = blood <b>-ia</b> = condition	The localized and temporary deficiency of blood supply due to an obstruction to the circulation.
<b>murmur</b> (MUR-mur)		A sound, in addition to the normal heart sounds, arising from blood flowing through the heart. This extra sound may or may not indicate a heart abnormality.
<b>orthostatic hypotension</b> (or-thoh-STAT-ik)	<b>orth/o</b> = straight <b>hypo-</b> = insufficient <b>-tension</b> = pressure	The sudden drop in blood pressure a person experiences when standing straight up suddenly.
<b>palpitations</b> (pal-pih-TAY-shunz)		Pounding, racing heartbeats.

## Pathology (continued)

Term	Word Parts	Definition
<b>plaque</b> (plak)		A yellow, fatty deposit of lipids in an artery that is the hallmark of atherosclerosis. Also called an <i>atheroma</i> .
<b>regurgitation</b> (re-ger-gih-TAY-shun)	<b>re-</b> = again	To flow backward. In the cardiovascular system this refers to the backflow of blood through a valve.
<b>tachycardia</b> (tak-ee-CAR-dee-ah)	<b>tachy-</b> = fast <b>-cardia</b> = heart condition	The condition of having a fast heart rate, typically more than 100 beats/minute while at rest.
<b>thrombus</b> (THROM-bus)	<b>thromb/o</b> = clot	A blood clot forming within a blood vessel. May partially or completely occlude the blood vessel.

■ **Figure 5.13** Development of an atherosclerotic plaque that progressively narrows the lumen of an artery to the point that a thrombus fully occludes the lumen.

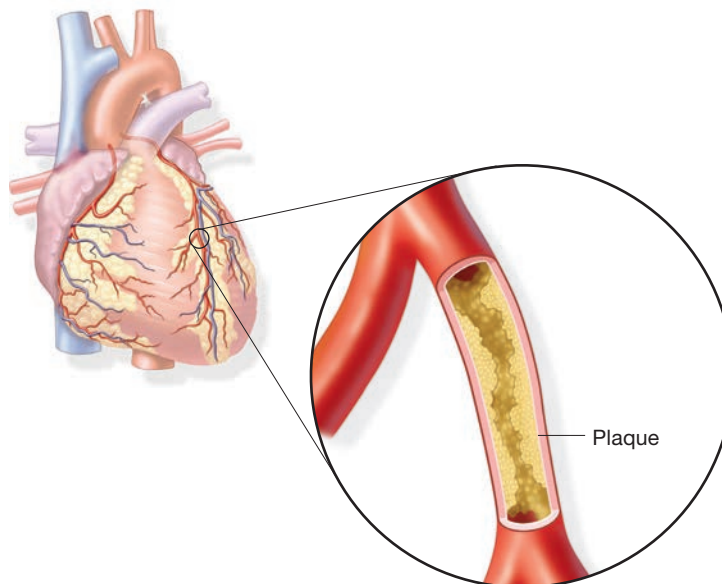
Heart		
<b>angina pectoris</b> (an-JYE-nah / PECK-tor-is)	<b>pector/o</b> = chest	Condition in which there is severe pain with a sensation of constriction around the heart. Caused by a deficiency of oxygen to the heart muscle. Commonly called <i>chest pain</i> (CP).
<b>arrhythmia</b> (ah-RITH-mee-ah)	<b>a-</b> = without <b>-ia</b> = condition	Irregularity in the heartbeat or action. Comes in many different forms; some are not serious, while others are life-threatening.
<b>bundle branch block (BBB)</b>		Occurs when the electrical impulse is blocked from traveling down the bundle of His or bundle branches. Results in the ventricles beating at a different rate than the atria. Also called a <i>heart block</i> .

## Pathology (continued)

Term	Word Parts	Definition
<b>cardiac arrest</b>	<b>cardi/o</b> = heart <b>-ac</b> = pertaining to	Complete stopping of heart activity.
<b>cardiomegaly</b> (car-dee-oh-MEG-ah-lee)	<b>cardi/o</b> = heart <b>-megaly</b> = enlarged	An enlarged heart.
<b>cardiomyopathy</b> (car-dee-oh-my-OP-ah-thee)	<b>cardi/o</b> = heart <b>my/o</b> = muscle <b>-pathy</b> = disease	General term for a disease of the myocardium. Can be caused by alcohol abuse, parasites, viral infection, and congestive heart failure. One of the most common reasons a patient may require a heart transplant.
<b>congenital septal defect (CSD)</b>	<b>sept/o</b> = a wall <b>-al</b> = pertaining to	A hole, present at birth, in the septum between two heart chambers; results in a mixture of oxygenated and deoxygenated blood. There can be an <i>atrial septal defect</i> (ASD) and a <i>ventricular septal defect</i> (VSD).
<b>congestive heart failure (CHF)</b> (kon-JESS-tiv)		Pathological condition of the heart in which there is a reduced outflow of blood from the left side of the heart because the left ventricle myocardium has become too weak to efficiently pump blood. Results in weakness, breathlessness, and edema.
<b>coronary artery disease (CAD)</b> (KOR-ah-nair-ee)	<b>coron/o</b> = heart <b>-ary</b> = pertaining to	Insufficient blood supply to the heart muscle due to an obstruction of one or more coronary arteries. May be caused by atherosclerosis and may cause angina pectoris and myocardial infarction.

### Med Term Tip

All types of cardiovascular disease have been the number one killer of Americans since the 19th century. This disease kills more people annually than the next six causes of death combined.



■ **Figure 5.14** Formation of an atherosclerotic plaque within a coronary artery; may lead to coronary artery disease, angina pectoris, and myocardial infarction.

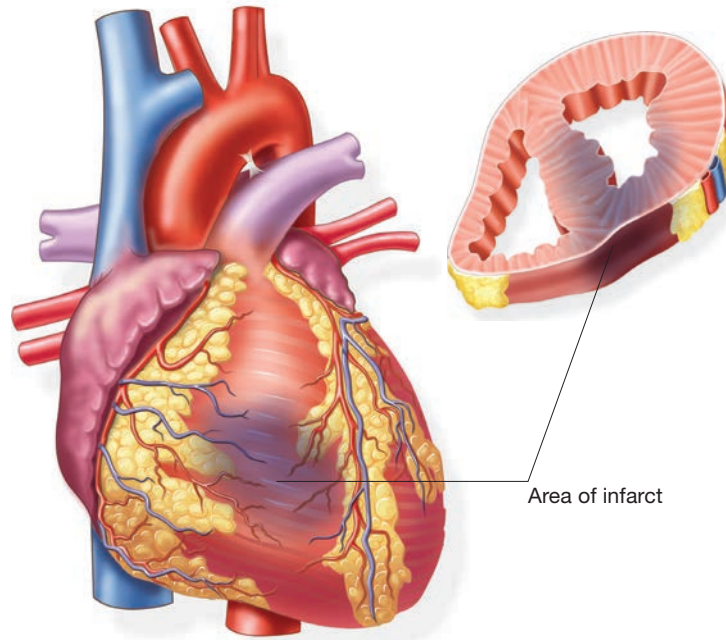
## Pathology (continued)

Term	Word Parts	Definition
<b>endocarditis</b> (en-doh-car-DYE-tis)	<b>endo-</b> = inner <b>cardi/o</b> = heart <b>-itis</b> = inflammation	Inflammation of the lining membranes of the heart. May be due to bacteria or to an abnormal immunological response. In bacterial endocarditis, the mass of bacteria that forms is referred to as <i>vegetation</i> .
<b>fibrillation</b> (fih-brill-AY-shun)		An extremely serious arrhythmia characterized by an abnormal quivering or contraction of heart fibers. When this occurs in the ventricles, cardiac arrest and death can occur. Emergency equipment to defibrillate, or convert the heart to a normal beat, is necessary.
<b>flutter</b>		An arrhythmia in which the atria beat too rapidly, but in a regular pattern.
<b>heart valve prolapse</b> (PROH-laps)		Condition in which the cusps or flaps of the heart valve are too loose and fail to shut tightly, allowing blood to flow backward through the valve when the heart chamber contracts. Most commonly occurs in the mitral valve, but may affect any of the heart valves.
<b>heart valve stenosis</b> (steh-NOH-sis)	<b>-stenosis</b> = narrowing	Condition in which the cusps or flaps of the heart valve are too stiff and are unable to open fully (making it difficult for blood to flow through) or shut tightly (allowing blood to flow backward). This condition may affect any of the heart valves.
<b>myocardial infarction (MI)</b> (my-oh-CAR-dee-al / in-FARC-shun)	<b>myocardi/o</b> = heart muscle <b>-al</b> = pertaining to	Condition caused by the partial or complete occlusion or closing of one or more of the coronary arteries. Symptoms include a squeezing pain or heavy pressure in the middle of the chest (angina pectoris). A delay in treatment could result in death. Also referred to as a <i>heart attack</i> . See Figure 5.15 ■.



## Pathology (continued)

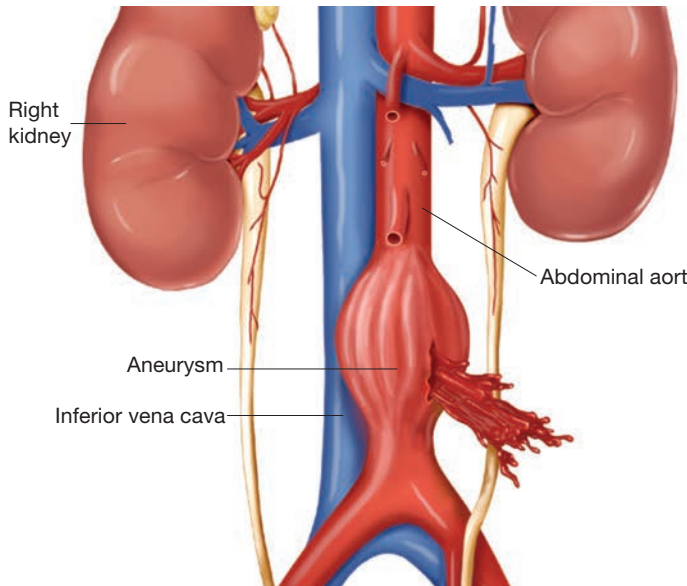
Term	Word Parts	Definition
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■ **Figure 5.15** External and cross-sectional view of an infarct caused by a myocardial infarction.

<b>myocarditis</b> (my-oh-car-DYE-tis)	<b>myocardi/o</b> = heart muscle <b>-itis</b> = inflammation	Inflammation of the muscle layer of the heart wall.
<b>pericarditis</b> (pair-ih-car-DYE-tis)	<b>peri-</b> = around <b>cardi/o</b> = heart <b>-itis</b> = inflammation	Inflammation of the pericardial sac around the heart.
<b>tetralogy of Fallot</b> (teh-TRALL-oh-jee / fal-LOH)	<b>tetra-</b> = four <b>-logy</b> = study of	Combination of four congenital anomalies: pulmonary stenosis, an interventricular septal defect, improper placement of the aorta, and hypertrophy of the right ventricle. Needs immediate surgery to correct.
<b>valvulitis</b> (val-view-LYE-tis)	<b>valvul/o</b> = valve <b>-itis</b> = inflammation	The inflammation of a heart valve.
<b>Blood Vessels</b>		
<b>aneurysm</b> (AN-yoo-rizm)		Weakness in the wall of an artery resulting in localized widening of the artery. Although an aneurysm may develop in any artery, common sites include the aorta in the abdomen and the cerebral arteries in the brain. See Figure 5.16 ■.

## Pathology (continued)

Term	Word Parts	Definition
 <p>■ <b>Figure 5.16</b> Illustration of a large aneurysm in the abdominal aorta that has ruptured.</p>		
<b>arteriorrhexis</b> (ar-tee-ree-oh-REK-sis)	<b>arteri/o</b> = artery <b>-rrhexis</b> = rupture	A ruptured artery; may occur if an aneurysm ruptures an arterial wall.
<b>arteriosclerosis</b> (ar-tee-ree-oh-skleh-ROH-sis)	<b>arteri/o</b> = artery <b>-sclerosis</b> = hardening	Thickening, hardening, and loss of elasticity of the walls of the arteries. Most often due to atherosclerosis.
<b>atheroma</b> (ath-er-OH-mah)	<b>ather/o</b> = fatty substance <b>-oma</b> = mass	A deposit of fatty substance in the wall of an artery that bulges into and narrows the lumen of the artery; a characteristic of atherosclerosis. Also called a <i>plaque</i> .
<b>atherosclerosis</b> (ath-er-oh-skleh-ROH-sis)	<b>ather/o</b> = fatty substance <b>-sclerosis</b> = hardening	The most common form of arteriosclerosis. Caused by the formation of yellowish plaques of cholesterol on the inner walls of arteries (see again Figures 5.13 and 5.14).
<b>coarctation of the aorta (CoA)</b> (koh-ark-TAY-shun)		Severe congenital narrowing of the aorta.
<b>deep vein thrombosis (DVT)</b> (THROM-boh-sis)	<b>thromb/o</b> = clot	The formation of a blood clot in a vein deep in the body, most commonly the legs. An embolus breaking off from this thrombosis would travel to the lungs and block blood flow through the lungs.
<b>hemorrhoid</b> (HEM-oh-royd)	<b>hem/o</b> = blood	Varicose veins in the anal region.
<b>hypertension (HTN)</b> (high-per-TEN-shun)	<b>hyper-</b> = excessive <b>-tension</b> = pressure	Blood pressure (BP) above the normal range. <i>Essential</i> or <i>primary hypertension</i> occurs directly from cardiovascular disease. <i>Secondary hypertension</i> refers to high blood pressure resulting from another disease such as kidney disease.

## Pathology (continued)

Term	Word Parts	Definition
<b>hypotension</b> (high-poh-TEN-shun)	<b>hypo-</b> = insufficient <b>-tension</b> = pressure	Decrease in blood pressure (BP). Can occur in shock, infection, cancer, anemia, or as death approaches.
<b>patent ductus arteriosus (PDA)</b> (PAY-tent / DUCK-tus / ar-tee-ree-OH-sis)	<b>duct/o</b> = to bring <b>arteri/o</b> = artery	Congenital heart anomaly in which the fetal connection between the pulmonary artery and the aorta fails to close at birth. This condition may be treated with medication and resolve with time. However, in some cases surgery is required.
<b>peripheral vascular disease (PVD)</b>	<b>peripher/o</b> = away from center <b>-al</b> = pertaining to <b>vascul/o</b> = blood vessel <b>-ar</b> = pertaining to	Any abnormal condition affecting blood vessels outside the heart. Symptoms may include pain, pallor, numbness, and loss of circulation and pulses.
<b>phlebitis</b> (fleh-BYE-tis)	<b>phleb/o</b> = vein <b>-itis</b> = inflammation	The inflammation of a vein.
<b>polyarteritis</b> (pol-ee-ar-ter-EYE-tis)	<b>poly-</b> = many <b>arteri/o</b> = artery <b>-itis</b> = inflammation	Inflammation of several arteries.
<b>Raynaud's phenomenon</b> (ray-NOZ)		Periodic ischemic attacks affecting the extremities of the body, especially the fingers, toes, ears, and nose. The affected extremities become cyanotic and very painful. These attacks are brought on by arterial constriction due to extreme cold or emotional stress.
<b>thrombophlebitis</b> (throm-boh-fleh-BYE-tis)	<b>thromb/o</b> = clot <b>phleb/o</b> = vein <b>-itis</b> = inflammation	Inflammation of a vein resulting in the formation of blood clots within the vein.
<b>varicose veins</b> (VAIR-ih-kohs)	<b>varic/o</b> = dilated vein <b>-ose</b> = pertaining to	Swollen and distended veins, usually in the legs.

## Practice As You Go


### C. Terminology Matching

Match each term to its definition.

- |                      |                               |
|----------------------|-------------------------------|
| 1. _____ arrhythmia  | a. swollen, distended veins   |
| 2. _____ thrombus    | b. inflammation of vein       |
| 3. _____ bradycardia | c. serious congenital anomaly |
| 4. _____ murmur      | d. slow heart rate            |
| 5. _____ phlebitis   | e. cusps are too loose        |

- |                              |                            |
|------------------------------|----------------------------|
| 6. _____ hypotension         | f. irregular heartbeat     |
| 7. _____ varicose vein       | g. an extra heart sound    |
| 8. _____ tetralogy of Fallot | h. clot in blood vessel    |
| 9. _____ valve prolapse      | i. low blood pressure      |
| 10. _____ plaque             | j. fatty deposit in artery |

## Diagnostic Procedures

Term	Word Parts	Definition
<b>Medical Procedures</b>		
<b>auscultation</b> (oss-kul-TAY-shun)		Process of listening to the sounds within the body by using a stethoscope.
<b>sphygmomanometer</b> (sfig-moh-mah-NOM-eh-ter)	<b>sphygm/o</b> = pulse <b>-manometer</b> = instrument to measure pressure	Instrument for measuring blood pressure (BP). Also referred to as a <i>blood pressure cuff</i> .
<div>  </div>		
■ <b>Figure 5.17</b> Using a sphygmomanometer to measure blood pressure. (Michal Heron, Pearson Education)		
<b>stethoscope</b> (STETH-oh-scope)	<b>steth/o</b> = chest <b>-scope</b> = instrument for viewing	Instrument for listening to body sounds (auscultation), such as the chest, heart, or intestines.
<b>Clinical Laboratory Tests</b>		
<b>cardiac enzymes</b> (CAR-dee-ak / EN-zyms)	<b>cardi/o</b> = heart <b>-ac</b> = pertaining to	Blood test to determine the level of enzymes specific to heart muscles in the blood. An increase in the enzymes may indicate heart muscle damage such as a myocardial infarction. These enzymes include creatine phosphokinase (CPK), lactate dehydrogenase (LDH), and glutamic oxaloacetic transaminase (GOT).
<b>serum lipoprotein level</b> (SEE-rum / lip-oh-PROH-teen)	<b>lip/o</b> = fat	Blood test to measure the amount of cholesterol and triglycerides in the blood. An indicator of atherosclerosis risk.

## Diagnostic Procedures (continued)

Term	Word Parts	Definition
<b>Diagnostic Imaging</b>		
<b>angiogram</b> (AN-jee-oh-gram)	<b>angi/o</b> = vessel <b>-gram</b> = record	X-ray record of a vessel taken during angiography.
<b>angiography</b> (an-jee-OG-rah-fee)	<b>angi/o</b> = vessel <b>-graphy</b> = process of recording	X-rays taken after the injection of an opaque material into a blood vessel. Can be performed on the aorta as an aortic angiography, on the heart as angiocardiology, and on the brain as a cerebral angiography.
<b>cardiac scan</b>	<b>cardi/o</b> = heart <b>-ac</b> = pertaining to	Patient is given radioactive thallium intravenously and then scanning equipment is used to visualize the heart. It is especially useful in determining myocardial damage.
<b>Doppler ultrasonography</b> (DOP-ler / ul-trah-son-OG-rah-fee)	<b>ultra-</b> = beyond <b>son/o</b> = sound <b>-graphy</b> = process of recording	Measurement of sound-wave echoes as they bounce off tissues and organs to produce an image. This procedure is used to measure velocity of blood moving through blood vessels to look for blood clots or deep vein thromboses.
<b>echocardiography</b> (ECHO) (ek-oh-car-dee-OG-rah-fee)	<b>cardi/o</b> = artery <b>-graphy</b> = process of recording	Noninvasive diagnostic procedure using ultrasound to visualize internal cardiac structures. Cardiac valve activity can be evaluated using this method.
<b>Cardiac Function Tests</b>		
<b>catheter</b> (KATH-eh-ter)		Flexible tube inserted into the body for the purpose of moving fluids into or out of the body. In the cardiovascular system a catheter is used to place dye into blood vessels so they may be visualized on X-rays.
<b>cardiac catheterization</b> (CC, cath) (CAR-dee-ak / cath-eh-ter-ih-ZAY-shun)	<b>cardi/o</b> = heart <b>-ac</b> = pertaining to	Passage of a thin-tube catheter through a blood vessel leading to the heart. Done to detect abnormalities, to collect cardiac blood samples, and to determine the blood pressure within the heart.
<b>electrocardiogram</b> (ECG, EKG) (ee-lek-tro-CAR-dee-oh-gram)	<b>electr/o</b> = electricity <b>cardi/o</b> = heart <b>-gram</b> = record	Hardcopy record produced by electrocardiology.
<b>electrocardiology</b> (ECG, EKG) (ee-lek-troh-car-dee-OG-rah-fee)	<b>electr/o</b> = electricity <b>cardi/o</b> = heart <b>-graphy</b> = process of recording	Process of recording the electrical activity of the heart. Useful in the diagnosis of abnormal cardiac rhythm and heart muscle (myocardium) damage.
<b>Holter monitor</b>		Portable ECG monitor worn by a patient for a period of a few hours to a few days to assess the heart and pulse activity as the person goes through the activities of daily living. Used to assess a patient who experiences chest pain and unusual heart activity during exercise and normal activities.



## Diagnostic Procedures (continued)

Term	Word Parts	Definition
<b>stress testing</b>		Method for evaluating cardiovascular fitness. The patient is placed on a treadmill or a bicycle and then subjected to steadily increasing levels of work. An EKG and oxygen levels are taken while the patient exercises. The test is stopped if abnormalities occur on the EKG. Also called an <i>exercise test</i> or a <i>treadmill test</i> .



■ **Figure 5.18** Man undergoing a stress test on a treadmill while physician monitors his condition. (Jonathan Nourok/PhotoEdit Inc.)

## Therapeutic Procedures

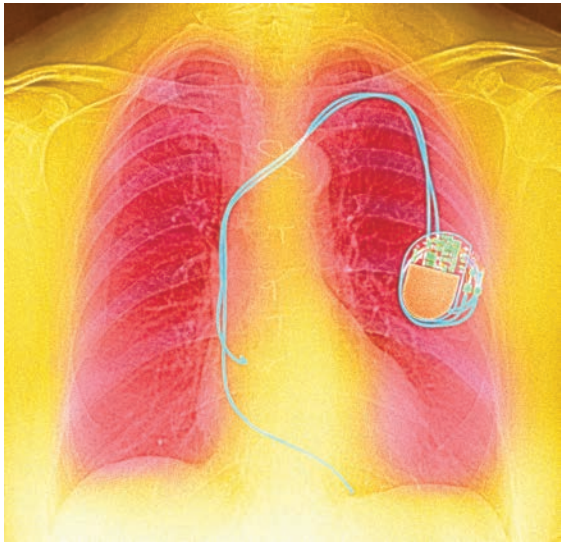
Term	Word Parts	Definition
<b>Medical Procedures</b>		
<b>cardiopulmonary resuscitation (CPR)</b> (car-dee-oh-PULL-mon-air-ee / ree-suss-ih-TAY-shun)	<b>cardi/o</b> = heart <b>pulmon/o</b> = lung <b>-ary</b> = pertaining to	Procedure to restore cardiac output and oxygenated air to the lungs for a person in cardiac arrest. A combination of chest compressions (to push blood out of the heart) and artificial respiration (to blow air into the lungs) is performed by one or two CPR-trained rescuers.
<b>defibrillation</b> (dee-fib-rih-LAY-shun)	<b>de-</b> = without	Procedure that converts serious irregular heartbeats, such as fibrillation, by giving electric shocks to the heart using an instrument called a defibrillator. Also called <i>cardioversion</i> . Automated external defibrillators (AED) are portable devices that automatically detect life-threatening arrhythmias and deliver the appropriate electrical shock. They are designed to be used by nonmedical personnel and are found in public places such as shopping malls and schools.



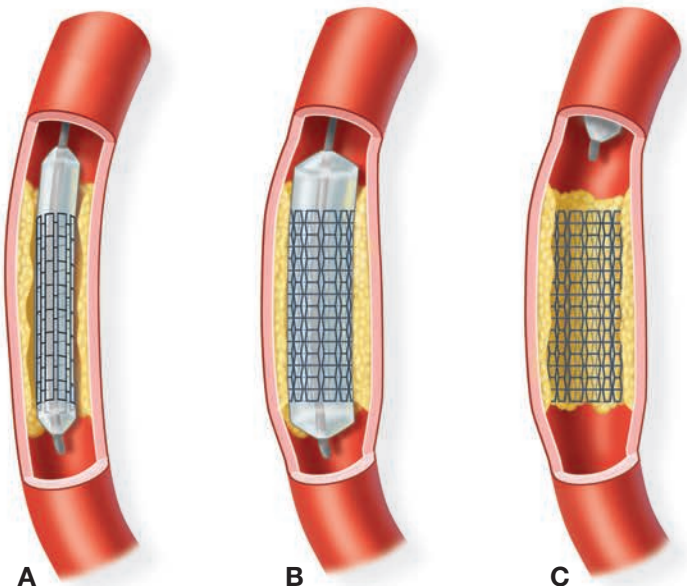
■ **Figure 5.19** An emergency medical technician positions defibrillator paddles on the chest of a supine male patient. (Floyd Jackson, Pearson Education)



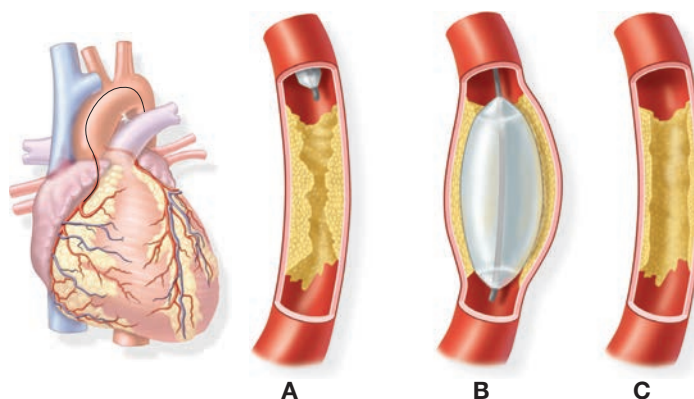
## Therapeutic Procedures (continued)

Term	Word Parts	Definition
<b>extracorporeal circulation</b> (ECC) (EX-tra-core-poor-EE-al)	<b>extra-</b> = outside of <b>corpor/o</b> = body <b>-eal</b> = pertaining to	During open-heart surgery, the routing of blood to a heart-lung machine so it can be oxygenated and pumped to the rest of the body.
<b>implantable cardioverter-defibrillator</b> (ICD) (CAR-dee-oh-ver-ter / de-FIB-rih-lay-tor)	<b>cardi/o</b> = heart <b>de-</b> = without	Device implanted in the heart that delivers an electrical shock to restore a normal heart rhythm. Particularly useful for persons who experience ventricular fibrillation.
<b>pacemaker implantation</b>		Electrical device that substitutes for the natural pacemaker of the heart. It controls the beating of the heart by a series of rhythmic electrical impulses. An external pacemaker has the electrodes on the outside of the body. An internal pacemaker has the electrodes surgically implanted within the chest wall.
 <p>■ <b>Figure 5.20</b> Color enhanced X-ray showing a pacemaker implanted in the left side of the chest and the electrode wires running to the heart muscle. (UHB Trust/Getty Images)</p>		
<b>thrombolytic therapy</b> (throm-boh-LIT-ik / THAIR-ah-pee)	<b>thromb/o</b> = clot <b>-lytic</b> = destruction	Process in which drugs, such as streptokinase (SK) or tissue plasminogen activator (tPA), are injected into a blood vessel to dissolve clots and restore blood flow.
<b>Surgical Procedures</b>		
<b>aneurysmectomy</b> (an-yoo-riz-MEK-toh-mee)	<b>-ectomy</b> = surgical removal	Surgical removal of the sac of an aneurysm.
<b>arterial anastomosis</b> (ar-TEE-ree-all / ah-nas-toe-MOE-sis)	<b>arteri/o</b> = artery <b>-al</b> = pertaining to	Surgical joining together of two arteries. Performed if an artery is severed or if a damaged section of an artery is removed.
<b>atherectomy</b> (ath-er-EK-toh-mee)	<b>ather/o</b> = fatty substance <b>-ectomy</b> = surgical removal	Surgical procedure to remove a deposit of fatty substance, an atheroma, from an artery.
<b>coronary artery bypass graft</b> (CABG) (KOR-ah-nair-ee)	<b>coron/o</b> = heart <b>-ary</b> = pertaining to	Open-heart surgery in which a blood vessel from another location in the body (often a leg vein) is grafted to route blood around a blocked coronary artery.
<b>embolectomy</b> (em-boh-LEK-toh-mee)	<b>embol/o</b> = plug <b>-ectomy</b> = surgical removal	Removal of an embolus or clot from a blood vessel.

## Therapeutic Procedures (continued)

Term	Word Parts	Definition
<b>endarterectomy</b> (end-ar-teh-REK-toh-mee)	<b>endo-</b> = inner <b>arteri/o</b> = artery <b>-ectomy</b> = surgical removal	Removal of the diseased or damaged inner lining of an artery. Usually performed to remove atherosclerotic plaques.
<b>heart transplantation</b>		Replacement of a diseased or malfunctioning heart with a donor's heart.
<b>intracoronary artery stent</b> (in-trah-KOR-ah-nair-ee / AR-ter-ee)	<b>intra-</b> = within <b>coron/o</b> = heart <b>-ary</b> = pertaining to	Placement of a stent within a coronary artery to treat coronary ischemia due to atherosclerosis.
<p>■ <b>Figure 5.21</b> The process of placing a stent in a blood vessel. A) A catheter is used to place a collapsed stent next to an atherosclerotic plaque; B) stent is expanded; C) catheter is removed, leaving the expanded stent behind.</p> 		
<b>ligation and stripping</b> (lye-GAY-shun)		Surgical treatment for varicose veins. The damaged vein is tied off (ligation) and removed (stripping).
<b>percutaneous transluminal coronary angioplasty</b> (PTCA) (per-kyoo-TAY-nee-us / trans-LOO-mih-nal / KOR-ah-nair-ee / AN-jee-oh-plas-tee)	<b>per-</b> = through <b>cutane/o</b> = skin <b>-ous</b> = pertaining to <b>trans-</b> = across <b>-al</b> = pertaining to <b>angi/o</b> = vessel <b>-plasty</b> = surgical repair	Method for treating localized coronary artery narrowing. A balloon catheter is inserted through the skin into the coronary artery and inflated to dilate the narrow blood vessel.

■ **Figure 5.22** Balloon angioplasty: A) deflated balloon catheter is approaching an atherosclerotic plaque; B) plaque is compressed by inflated balloon; C) plaque remains compressed after balloon catheter is removed.



## Therapeutic Procedures (continued)

Term	Word Parts	Definition
<b>stent</b>		Stainless steel tube placed within a blood vessel or a duct to widen the lumen (see again Figure 5.21 ■).
<b>valve replacement</b>		Removal of a diseased heart valve and replacement with an artificial valve.
<b>valvoplasty</b> (VAL-voh-plas-tee)	<b>valv/o</b> = valve <b>-plasty</b> = surgical repair	Surgical procedure to repair a heart valve.

## Pharmacology

Classification	Word Parts	Action	Examples
<b>ACE inhibitor drugs</b>		Produce vasodilation and decrease blood pressure.	benazepril, Lotensin; catopril, Capoten
<b>antiarrhythmic</b> (an-tye-a-RHYTH-mik)	<b>anti-</b> = against <b>a-</b> = without <b>-ic</b> = pertaining to	Reduces or prevents cardiac arrhythmias.	flecainide, Tambocor; ibutilide, Corvert
<b>anticoagulant</b> (an-tye-koh-AG-you-lant)	<b>anti-</b> = against	Prevents blood clot formation.	heparin; warfarin, Coumadin
<b>antilipidemic</b> (an-tye-lip-ih-DEM-ik)	<b>anti-</b> = against <b>lip/o</b> = fat <b>-ic</b> = pertaining to	Reduces amount of cholesterol and lipids in the bloodstream; treats hyperlipidemia.	atorvastatin, Lipitor; simvastatin, Zocor
<b>antiplatelet agents</b>	<b>anti-</b> = against	Inhibit the ability of platelets to clump together as part of a blood clot.	clopidogrel, Plavix; aspirin; ticlopidine, Ticlid
<b>beta-blocker drugs</b>		Treat hypertension and angina pectoris by lowering the heart rate.	metoprolol, Lopressor; propranolol, Inderal
<b>calcium channel blocker drugs</b>		Treat hypertension, angina pectoris, and congestive heart failure by causing the heart to beat less forcefully and less often.	diltiazem, Cardizem; nifedipine, Procardia
<b>cardiotonic</b> (card-ee-oh-TAHN-ik)	<b>cardi/o</b> = heart <b>-tonic</b> = pertaining to tone	Increases the force of cardiac muscle contraction; treats congestive heart failure.	digoxin, Lanoxin
<b>diuretic</b> (dye-you-RET-ik)	<b>-tic</b> = pertaining to	Increases urine production by the kidneys, which works to reduce plasma and therefore blood volume, resulting in lower blood pressure.	furosemide, Lasix
<b>thrombolytic</b> (throm-boh-LIT-ik)	<b>thromb/o</b> = clot <b>-lytic</b> = destruction	Dissolves existing blood clots.	tissue plasminogen activator (tPA); alteplase, Activase
<b>vasoconstrictor</b> (vaz-oh-kon-STRICK-tor)	<b>vas/o</b> = vessel	Contracts smooth muscle in walls of blood vessels; raises blood pressure.	metaraminol, Aramine
<b>vasodilator</b> (vaz-oh-DYE-late-or)	<b>vas/o</b> = vessel	Relaxes the smooth muscle in the walls of arteries, thereby increasing diameter of the blood vessel. Used for two main purposes: increasing circulation to an ischemic area and reducing blood pressure.	nitroglycerine, Nitro-Dur; isoxsuprine, Vasodilan

## Practice As You Go

### D. Procedure Matching

Match each procedure to its definition.

- |                                     |   |
|-------------------------------------|---|
| 1. _____ cardiac enzymes            | a. visualizes heart after patient is given radioactive thallium |
| 2. _____ Doppler ultrasound         | b. uses ultrasound to visualize heart beating                   |
| 3. _____ Holter monitor             | c. blood test that indicates heart muscle damage                |
| 4. _____ cardiac scan               | d. uses treadmill to evaluate cardiac fitness                   |
| 5. _____ stress testing             | e. removes varicose veins                                       |
| 6. _____ echocardiography           | f. clot-dissolving drugs  |
| 7. _____ extracorporeal circulation | g. measures velocity of blood moving through blood vessels      |
| 8. _____ ligation and stripping     | h. balloon angioplasty  |
| 9. _____ thrombolytic therapy       | i. use of a heart-lung machine                                  |
| 10. _____ PTAC                      | j. portable EKG monitor   |

## Abbreviations

<b>AED</b>	automated external defibrillator	<b>CP</b>	chest pain
<b>AF</b>	atrial fibrillation	<b>CPR</b>	cardiopulmonary resuscitation
<b>AMI</b>	acute myocardial infarction	<b>CSD</b>	congenital septal defect
<b>AS</b>	arteriosclerosis	<b>CV</b>	cardiovascular
<b>ASD</b>	atrial septal defect	<b>DVT</b>	deep vein thrombosis
<b>ASHD</b>	arteriosclerotic heart disease	<b>ECC</b>	extracorporeal circulation
<b>AV, A-V</b>	atrioventricular	<b>ECG, EKG</b>	electrocardiogram
<b>BBB</b>	bundle branch block (L for left; R for right)	<b>ECHO</b>	echocardiogram
<b>BP</b>	blood pressure	<b>GOT</b>	glutamic oxaloacetic transaminase
<b>bpm</b>	beats per minute	<b>HTN</b>	hypertension
<b>CABG</b>	coronary artery bypass graft	<b>ICD</b>	implantable cardioverter-defibrillator
<b>CAD</b>	coronary artery disease	<b>ICU</b>	intensive care unit
<b>cath</b>	catheterization	<b>IV</b>	intravenous
<b>CC</b>	cardiac catheterization, chief complaint	<b>LVH</b>	left ventricular hypertrophy
<b>CCU</b>	coronary care unit	<b>MI</b>	myocardial infarction, mitral insufficiency
<b>CHF</b>	congestive heart failure	<b>mm Hg</b>	millimeters of mercury
<b>CoA</b>	coarctation of the aorta	<b>MR</b>	mitral regurgitation

## Abbreviations (continued)

<b>MS</b>	mitral stenosis	<b>S1</b>	first heart sound
<b>Word Watch</b>       Be careful using the abbreviation <i>MS</i> , which can mean either “mitral stenosis” or “multiple sclerosis.”		<b>S2</b>	second heart sound
<b>MVP</b>	mitral valve prolapse	<b>SA, S-A</b>	sinoatrial
<b>P</b>	pulse	<b>SK</b>	streptokinase
<b>PAC</b>	premature atrial contraction	<b>tPA</b>	tissue plasminogen activator
<b>PDA</b>	patent ductus arteriosus	<b>V fib</b>	ventricular fibrillation
<b>PTCA</b>	percutaneous transluminal coronary angioplasty	<b>VSD</b>	ventricular septal defect
<b>PVC</b>	premature ventricular contraction	<b>VT</b>	ventricular tachycardia

## Practice As You Go

### E. What's the Abbreviation?

1. mitral valve prolapse \_\_\_\_\_
2. ventricular septal defect \_\_\_\_\_
3. percutaneous transluminal coronary angioplasty \_\_\_\_\_
4. ventricular fibrillation \_\_\_\_\_
5. deep vein thrombosis \_\_\_\_\_
6. lactate dehydrogenase \_\_\_\_\_
7. coarctation of the aorta \_\_\_\_\_
8. tissue plasminogen activator \_\_\_\_\_
9. cardiovascular \_\_\_\_\_
10. extracorporeal circulation \_\_\_\_\_



# Chapter Review

## Real-World Applications

### Medical Record Analysis

This Discharge Summary contains 12 medical terms. Underline each term and write it in the list below the report. Then define each term.

Date: 6/1/2015

Patient: Jorge Johnson

Patient complaint: Severe pain in the right ankle with any movement of lower limb.

#### Discharge Summary












Admitting Diagnosis:	Difficulty breathing, hypertension, tachycardia
Final Diagnosis:	CHF secondary to mitral valve prolapse
History of Present Illness:	Patient was brought to the Emergency Room by her family because of difficulty breathing and palpitations. Patient reports that she has experienced these symptoms for the past six months, but this episode is more severe than any previous. Upon admission in the ER, heart rate was 120 beats per minute and blood pressure was 180/110. The results of an EKG and cardiac enzyme blood tests were normal. She was admitted for a complete workup for tachycardia and hypertension.
Summary of Hospital Course:	Patient underwent a full battery of diagnostic tests. A prolapsed mitral valve was observed by echocardiography. A stress test had to be stopped early due to onset of severe difficulty in breathing. Angiocardiology failed to demonstrate significant CAD. Blood pressure and tachycardia were controlled with medications. At discharge, HR was 88 beats per minute and blood pressure was 165/98.
Discharge Plans:	There was no evidence of a myocardial infarction or significant CAD. Patient was placed on a low-salt and low-cholesterol diet. She received instructions on beginning a carefully graded exercise program. She is to continue her medications. If symptoms are not controlled by these measures, a mitral valve replacement will be considered.

Term	Definition
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____
7. _____	_____
8. _____	_____
9. _____	_____
10. _____	_____
11. _____	_____
12. _____	_____



## Chart Note Transcription

The chart note below contains 11 phrases that can be reworded with a medical term that you learned in this chapter. Each phrase is identified with an underline. Determine the medical term and write your answers in the space provided.

Pearson General Hospital Coronary Care Unit	
Task	Edit View Time Scale Options Help Download Archive Date: 17 May 2015
          	
Current Complaint:	A 56-year-old male was admitted to the Cardiac Care Unit from the Emergency Room with left arm pain, severe <u>pain around the heart</u> , <u>1 an abnormally slow heartbeat</u> , <u>2</u> nausea, and vomiting.
Past History:	Patient reports no heart problems prior to this episode. He has taken medication for <u>high blood pressure</u> <u>3</u> for the past five years. His family history is significant for a father and brother who both died in their 50s from <u>death of heart muscle</u> . <u>4</u>
Signs and Symptoms:	Patient reports severe pain around the heart that radiates into his left jaw and arm. A <u>record of the heart's electrical activity</u> <u>5</u> and a <u>blood test to determine the amount of heart damage</u> <u>6</u> were abnormal.
Diagnosis:	An acute <u>death of heart muscle</u> <u>4</u> resulting from <u>insufficient blood flow to heart muscle due to obstruction of coronary artery</u> . <u>7</u>
Treatment:	First, provide supportive care during the acute phase. Second, evaluate heart damage by <u>passing a thin tube through a blood vessel into the heart to detect abnormalities</u> <u>8</u> and <u>evaluate heart fitness by having patient exercise on a treadmill</u> . <u>9</u> Finally, perform surgical intervention by either <u>inflating a balloon catheter to dilate a narrow vessel</u> <u>10</u> or by <u>open heart surgery to create a shunt around a blocked vessel</u> . <u>11</u>
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____
6.	_____
7.	_____
8.	_____
9.	_____
10.	_____
11.	_____

## Case Study

Below is a case study presentation of a patient with a condition covered by this chapter. Read the case study and answer the questions below. Some questions will ask for information not included within this chapter. Use your text, a medical dictionary, or any other reference material you choose to answer these questions.



(Christopher Oates/Shutterstock)

Mr. Thomas is a 62-year-old man who has been diagnosed with an acute myocardial infarction with the following symptoms and history. His chief complaint is a persistent, crushing chest pain that radiates to his left arm, jaw, neck, and shoulder blade. He describes the pain, which he has had for the past 12 hours, as a “squeezing” sensation around his heart. He has also suffered nausea, dyspnea, and diaphoresis. He has a low-grade temperature and his blood pressure is within a normal range at 130/82. He states that he smokes two packs of cigarettes a day, is overweight by 50 pounds, and has a family history of hypertension and coronary artery disease. He leads a relatively sedentary lifestyle.

## Questions

1. What is the common name for Mr. Thomas’s acute condition? Look this condition up in a reference source and include a short description of it.

---



---

2. What do you think the phrase “chief complaint” means?

---



---

3. What is the medical term for this patient’s chief complaint? Define this term.

---



---

4. List and define each of the patient’s additional symptoms in your own words. (These terms appear in other chapters of the book or use a medical dictionary.)

---



---

5. Using your text as a resource, name and describe three diagnostic tests that may be performed to determine the extent of the patient’s heart damage.

---



---

6. What risk factors for developing heart disease does Mr. Thomas have? What changes should he make?

---



---

## Practice Exercises

### A. Word Building Practice

The combining form **cardi/o** refers to the heart. Use it to write a term that means:

1. pertaining to the heart \_\_\_\_\_
2. disease of the heart muscle \_\_\_\_\_
3. enlargement of the heart \_\_\_\_\_
4. fast heart condition \_\_\_\_\_
5. slow heart condition \_\_\_\_\_
6. record of heart electricity \_\_\_\_\_

The combining form **angi/o** refers to the vessel. Use it to write a term that means:

7. vessel narrowing \_\_\_\_\_
8. vessel inflammation \_\_\_\_\_
9. involuntary muscle contraction of a vessel \_\_\_\_\_

The combining form **arteri/o** refers to the artery. Use it to write a term that means:

10. pertaining to an artery \_\_\_\_\_
11. hardening of an artery \_\_\_\_\_
12. small artery \_\_\_\_\_

Add the appropriate prefix to **carditis** to form the term that matches each definition:

13. inflammation of the inner lining of the heart \_\_\_\_\_
14. inflammation of the outer layer of the heart \_\_\_\_\_
15. inflammation of the muscle of the heart \_\_\_\_\_

**B. Define the Combining Form**

	Definition	Example from Chapter
1. <b>cardi/o</b>	_____	_____
2. <b>valvul/o</b>	_____	_____
3. <b>steth/o</b>	_____	_____
4. <b>arteri/o</b>	_____	_____
5. <b>phleb/o</b>	_____	_____
6. <b>angi/o</b>	_____	_____
7. <b>ventricul/o</b>	_____	_____
8. <b>thromb/o</b>	_____	_____
9. <b>atri/o</b>	_____	_____
10. <b>ather/o</b>	_____	_____

**C. Name That Term**

1. pertaining to a vein \_\_\_\_\_
2. study of the heart \_\_\_\_\_
3. record of a vein \_\_\_\_\_
4. process of recording electrical activity of the heart \_\_\_\_\_
5. high blood pressure \_\_\_\_\_
6. low blood pressure \_\_\_\_\_
7. surgical repair of valve \_\_\_\_\_
8. pertaining to between ventricles \_\_\_\_\_
9. removal of fatty substance \_\_\_\_\_
10. narrowing of the arteries \_\_\_\_\_

**D. Name That Suffix**

	Suffix	Example from Chapter
1. pressure	_____	_____
2. abnormal narrowing	_____	_____
3. instrument to measure pressure	_____	_____
4. small	_____	_____
5. hardening	_____	_____

**E. What Does it Stand For?**

1. BP \_\_\_\_\_
2. CHF \_\_\_\_\_
3. MI \_\_\_\_\_
4. CCU \_\_\_\_\_
5. PVC \_\_\_\_\_
6. CPR \_\_\_\_\_
7. CAD \_\_\_\_\_
8. CP \_\_\_\_\_
9. EKG \_\_\_\_\_
10. S1 \_\_\_\_\_

**F. Define the Term**

1. catheter \_\_\_\_\_
2. infarct \_\_\_\_\_
3. thrombus \_\_\_\_\_
4. palpitation \_\_\_\_\_
5. regurgitation \_\_\_\_\_
6. aneurysm \_\_\_\_\_
7. cardiac arrest \_\_\_\_\_
8. fibrillation \_\_\_\_\_
9. myocardial infarction \_\_\_\_\_
10. hemorrhoid \_\_\_\_\_

**G. Fill in the Blank**

angiography	murmur	varicose veins	echocardiogram
pacemaker	CHF	defibrillation	angina pectoris
Holter monitor	hypertension	MI	CCU

1. Tiffany was born with a congenital condition resulting in an abnormal heart sound called a(n) \_\_\_\_\_.
2. Joseph suffered an arrhythmia resulting in cardiac arrest. The emergency team used an instrument to give electric shocks to the heart to create a normal heart rhythm. This procedure is called \_\_\_\_\_.
3. Marguerite has been placed on a low-sodium diet and medication to bring her blood pressure down to a normal range. She suffers from \_\_\_\_\_.

4. Tony has had an artificial device called a(n) \_\_\_\_\_ inserted to control the beating of his heart by producing rhythmic electrical impulses.
5. Derrick's physician determined that he had \_\_\_\_\_ after examining his legs and finding swollen, tortuous veins.
6. Laura has persistent chest pains that require medication. The term for the pain is \_\_\_\_\_.
7. La Tonya will be admitted to what hospital unit after surgery to correct her heart condition? \_\_\_\_\_.
8. Stephen is going to have a coronary artery bypass graft to correct the blockage in his coronary arteries. He recently suffered a heart attack as a result of this occlusion. His attack is called a(n) \_\_\_\_\_.
9. Stephen's physician scheduled a(n) \_\_\_\_\_, an X-ray to determine the extent of his blood vessel damage.
10. Maria is scheduled to have a diagnostic procedure that uses ultrasound to produce an image of the heart valves is going to have a(n) \_\_\_\_\_.
11. Eric must wear a device for 24 hours that will keep track of his heart activity as he performs his normal daily routine. This device is called a(n) \_\_\_\_\_.
12. Lydia is 82 years old and is suffering from a heart condition that causes weakness, edema, and breathlessness. Her heart failure is the cause of her lung congestion. This condition is called \_\_\_\_\_.

## H. Pharmacology Challenge

Fill in the classification for each drug description, then match the brand name.

Drug Description	Classification	Brand Name
1. _____ prevents arrhythmia	_____	a. tPA
2. _____ reduces cholesterol	_____	b. Coumadin
3. _____ increases force of heart contraction	_____	c. Cardizem
4. _____ increases urine production	_____	d. Nitro-Dur
5. _____ prevents blood clots	_____	e. Tambocor
6. _____ dissolves blood clots	_____	f. Lanoxin
7. _____ relaxes smooth muscle in artery wall	_____	g. Lipitor
8. _____ cause heart to beat less forcefully	_____	h. Lasix



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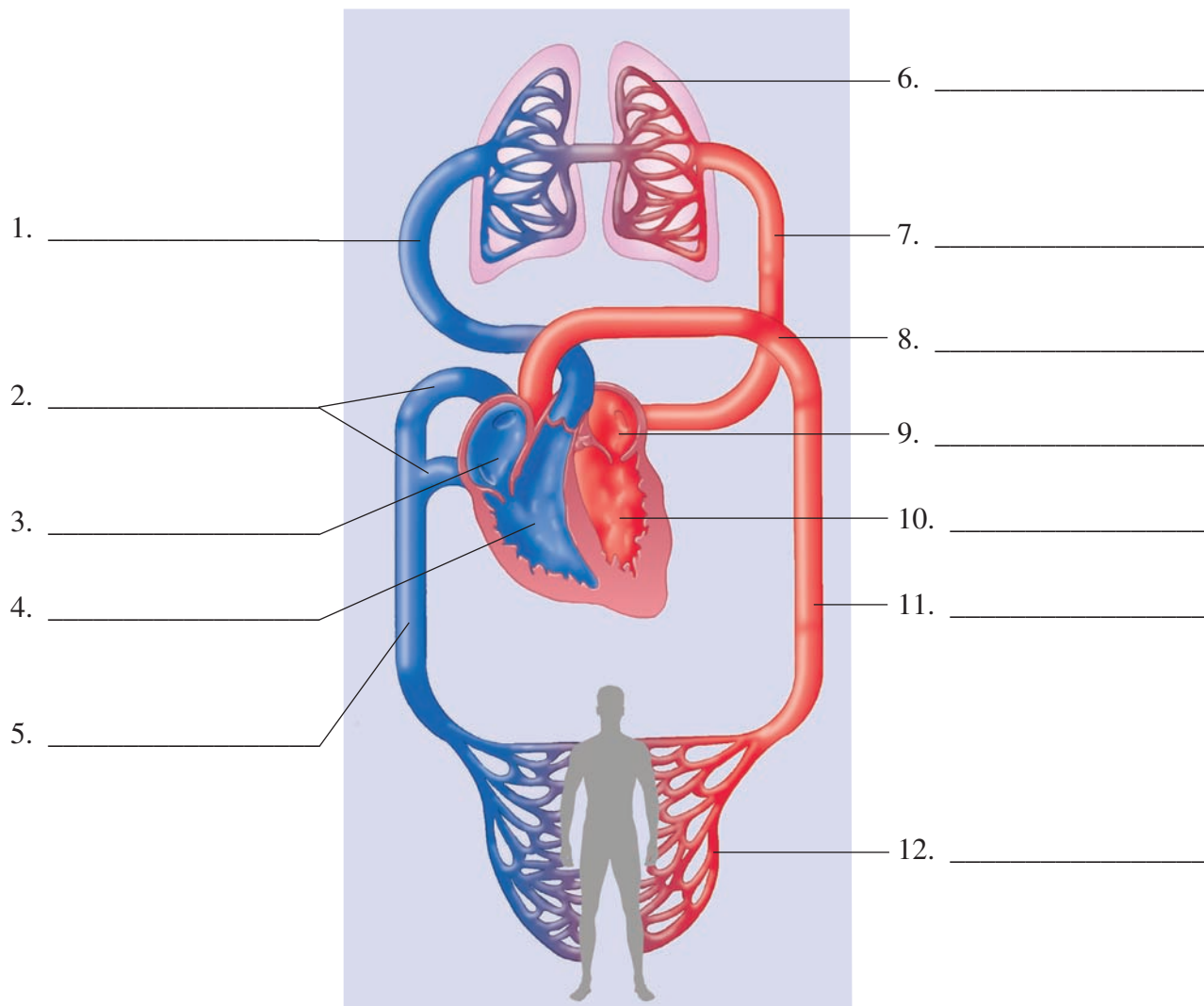
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## Labeling Exercise

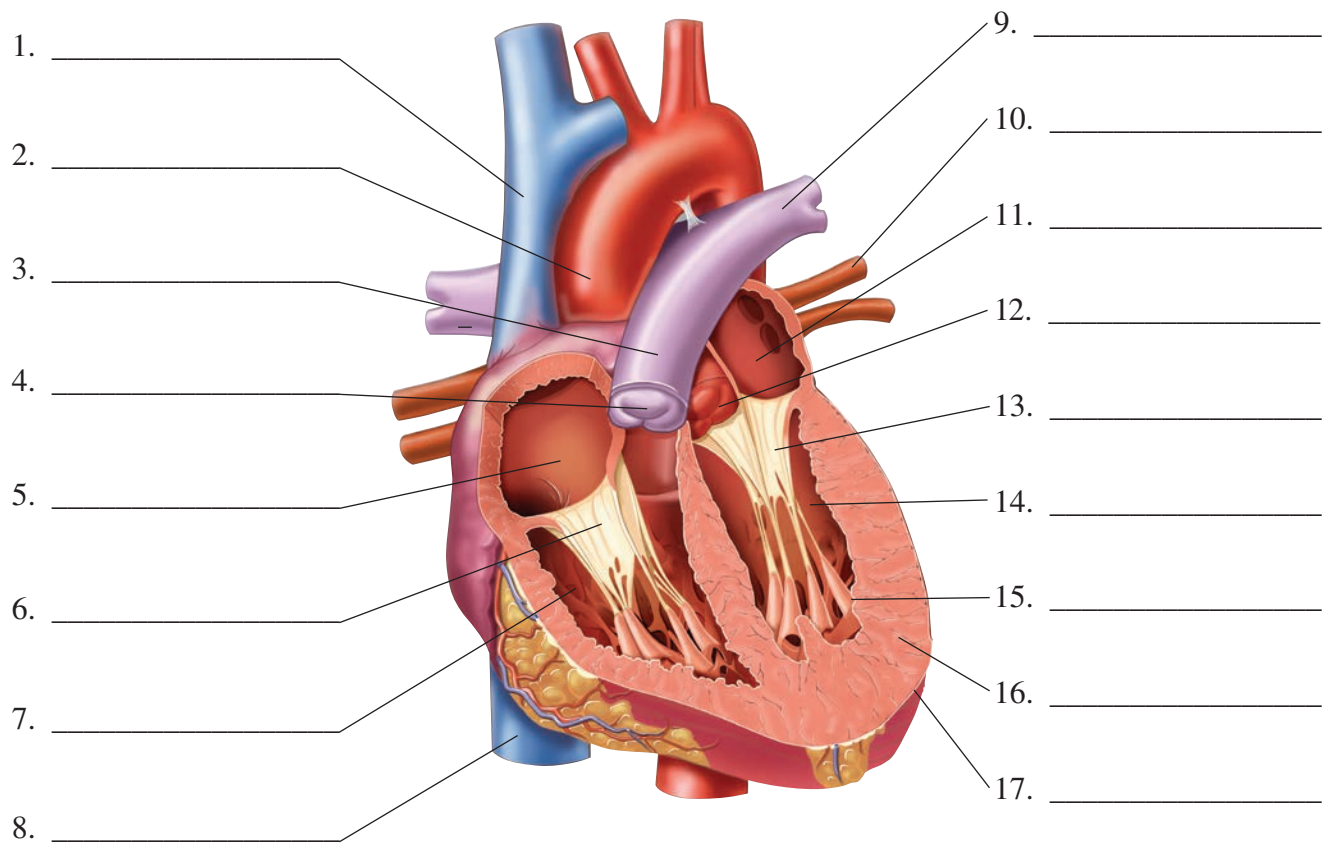
### Image A

Write the labels for this figure on the numbered lines provided.



**Image B**

Write the labels for this figure on the numbered lines provided.



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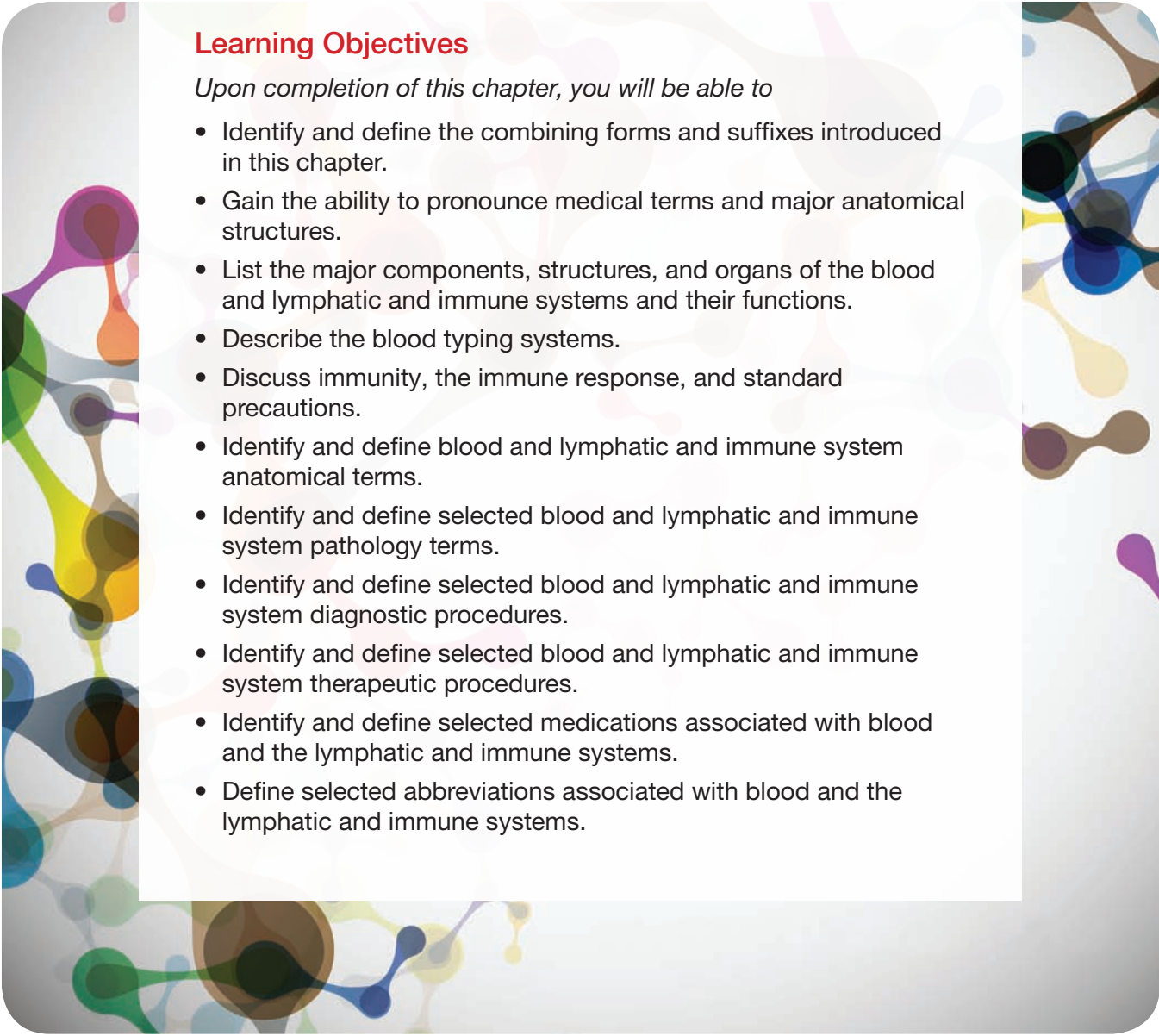


# 6

## Blood and the Lymphatic and Immune Systems

### Learning Objectives

*Upon completion of this chapter, you will be able to*

- Identify and define the combining forms and suffixes introduced in this chapter.
  - Gain the ability to pronounce medical terms and major anatomical structures.
  - List the major components, structures, and organs of the blood and lymphatic and immune systems and their functions.
  - Describe the blood typing systems.
  - Discuss immunity, the immune response, and standard precautions.
  - Identify and define blood and lymphatic and immune system anatomical terms.
  - Identify and define selected blood and lymphatic and immune system pathology terms.
  - Identify and define selected blood and lymphatic and immune system diagnostic procedures.
  - Identify and define selected blood and lymphatic and immune system therapeutic procedures.
  - Identify and define selected medications associated with blood and the lymphatic and immune systems.
  - Define selected abbreviations associated with blood and the lymphatic and immune systems.
- 



# Section I: Blood at a Glance

## Function

Blood transports gases, nutrients, and wastes to all areas of the body either attached to red blood cells or dissolved in the plasma. White blood cells fight infection and disease, and platelets initiate the blood clotting process.

## Organs

Here are the primary components that comprise blood:

### formed elements

- **erythrocytes**
- **leukocytes**
- **platelets**

### plasma

## Word Parts

Here are the most common word parts (with their meanings) used to build blood terms. For a more comprehensive list, refer to the Terminology section of this chapter.

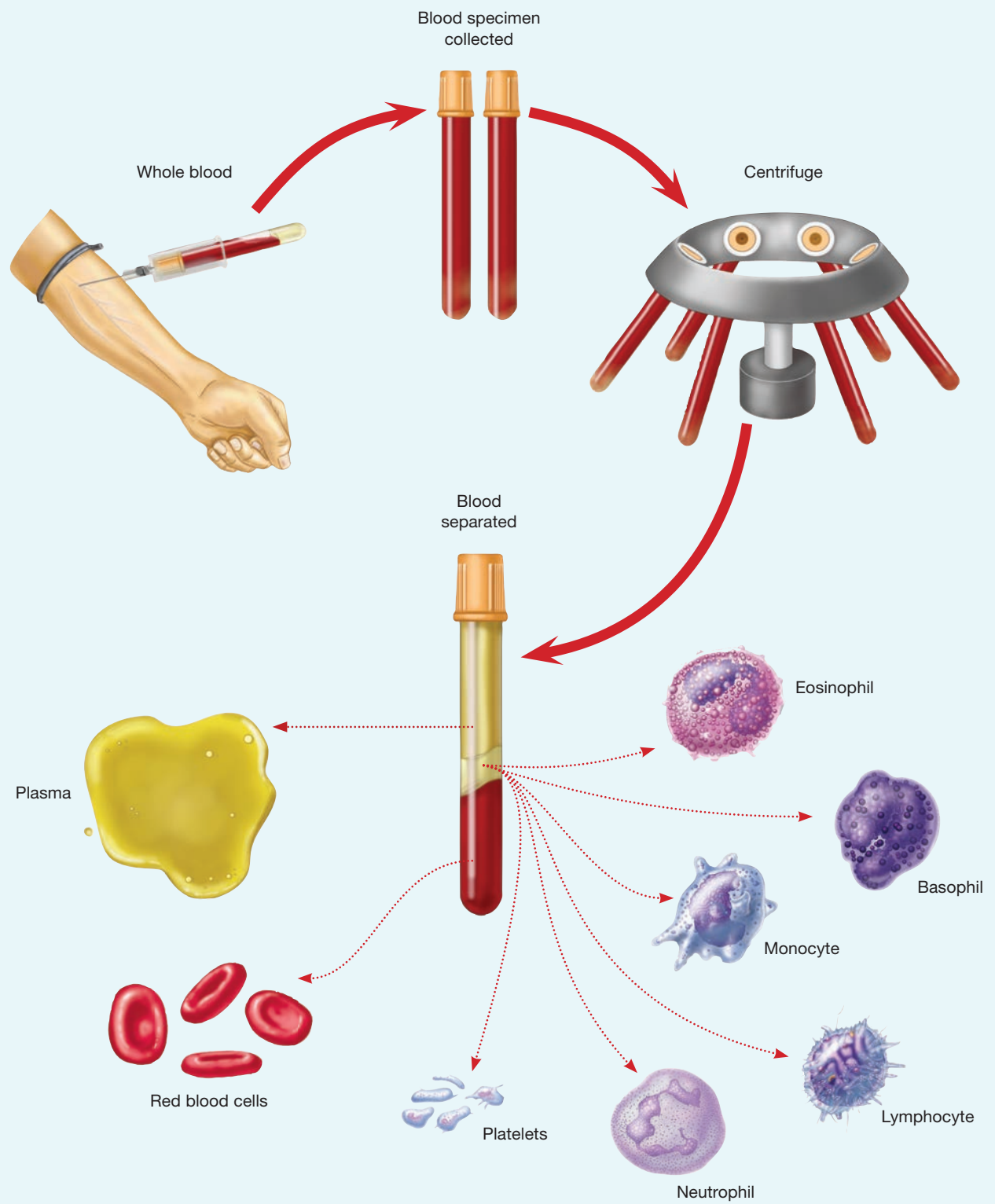
### Combining Forms

<b>agglutin/o</b>	clumping	<b>hem/o</b>	blood
<b>bas/o</b>	base	<b>hemat/o</b>	blood
<b>chrom/o</b>	color	<b>morph/o</b>	shape
<b>coagul/o</b>	clotting	<b>neutr/o</b>	neutral
<b>eosin/o</b>	rosy red	<b>phag/o</b>	eat, swallow
<b>fibrin/o</b>	fibers	<b>sanguin/o</b>	blood
<b>fus/o</b>	pouring	<b>septic/o</b>	infection
<b>granul/o</b>	granules		

### Suffixes

<b>-apheresis</b>	removal, carry away	<b>-philia</b>	condition of being attracted to
<b>-crit</b>	separation of	<b>-philic</b>	pertaining to being attracted to
<b>-cytic</b>	pertaining to cells	<b>-plastic</b>	pertaining to formation
<b>-cytosis</b>	more than the normal number of cells	<b>-plastin</b>	formation
<b>-emia</b>	blood condition	<b>-poiesis</b>	formation
<b>-globin</b>	protein	<b>-rrhagic</b>	pertaining to abnormal flow
<b>-penia</b>	abnormal decrease, too few	<b>-stasis</b>	standing still
<b>-phil</b>	attracted to		

# Blood Illustrated





# Anatomy and Physiology of Blood

**erythrocytes** (eh-RITH-roh-sights)  
**formed elements**  
**hematopoiesis** (hee-mah-toh-poy-EE-sis)  
**leukocytes** (LOO-koh-sights)

**plasma** (PLAZ-mah)  
**platelets** (PLAYT-lets)  
**red blood cells**  
**white blood cells**

## What's In A Name?

Look for these word parts:

**erythr/o** = red

**hemat/o** = blood

**leuk/o** = white

**-cyte** = cell

**-poiesis** = formation

The average adult has about five liters of blood that circulates throughout the body within the blood vessels of the cardiovascular system. Blood is a mixture of cells floating in watery **plasma**. As a group, these cells are referred to as **formed elements**, but there are three different kinds: **erythrocytes** (or **red blood cells**), **leukocytes** (or **white blood cells**), and **platelets**. Blood cells are produced in the red bone marrow by a process called **hematopoiesis**. Plasma and erythrocytes are responsible for transporting substances, leukocytes protect the body from invading microorganisms, and platelets play a role in controlling bleeding.

## Plasma

**albumin** (al-BEW-min)  
**amino acids** (ah-MEE-noh)  
**calcium** (KAL-see-um)  
**creatinine** (kree-AT-in-in)  
**fats**  
**fibrinogen** (fye-BRIN-oh-jen)  
**gamma globulin** (GAM-ah / GLOB-yoo-lin)

**globulins** (GLOB-yew-lenz)  
**glucose** (GLOO-kohs)  
**plasma proteins**  
**potassium** (poh-TASS-ee-um)  
**sodium**  
**urea** (yoo-REE-ah)

## What's In A Name?

Look for these word parts:

**fibrin/o** = fibers

**-gen** = that which produces

## Word Watch

*Plasma* and *serum* are not interchangeable words. Serum is plasma, but with fibrinogen removed or inactivated. This way it can be handled and tested without it clotting. The term *serum* is also sometimes used to mean antiserum or antitoxin.

Liquid plasma composes about 55% of whole blood in the average adult and is 90–92% water. The remaining 8–10% portion of plasma is dissolved substances, especially **plasma proteins** such as **albumin**, **globulins**, and **fibrinogen**. Albumin helps transport fatty substances that cannot dissolve in the watery plasma. There are three main types of globulins; the most commonly known one, **gamma globulin**, acts as an antibody. Fibrinogen is a blood-clotting protein. In addition to the plasma proteins, smaller amounts of other important substances are also dissolved in the plasma for transport: **calcium**, **potassium**, **sodium**, **glucose**, **amino acids**, **fats**, and waste products such as **urea** and **creatinine**.

## Erythrocytes

**bilirubin** (bil-ly-ROO-bin)  
**enucleated** (ee-NEW-klee-ate-ed)

**hemoglobin** (hee-moh-GLOH-bin)

## What's In A Name?

Look for these word parts:

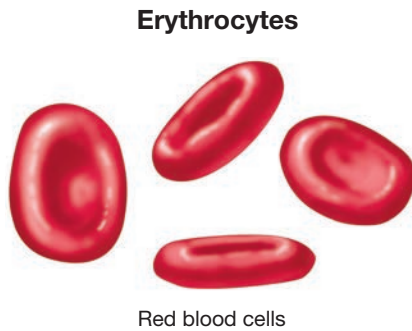
**hem/o** = blood

**-globin** = protein

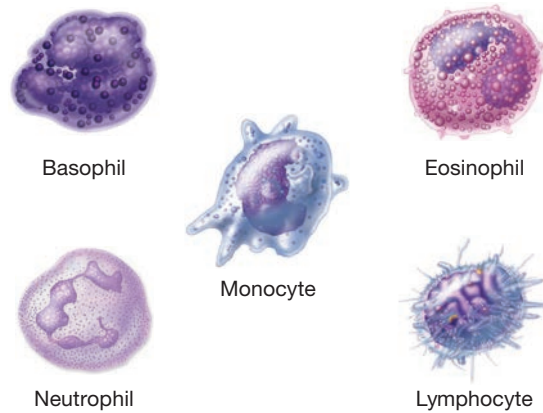
Erythrocytes, or red blood cells (RBCs), are biconcave disks that are **enucleated**, meaning they no longer contain a nucleus (see Figure 6.1 ■). Red blood cells appear red in color because they contain **hemoglobin**, an iron-containing pigment. Hemoglobin is the part of the red blood cell that picks up oxygen from the lungs and delivers it to the tissues of the body.

There are about five million erythrocytes per cubic millimeter of blood. The total number in an average-sized adult is 35 trillion, with males having more red blood cells than females. Erythrocytes have an average lifespan of 120 days,

## Leukocytes



■ **Figure 6.1** The biconcave disk shape of erythrocytes (red blood cells).



■ **Figure 6.2** The five different types of leukocytes (white blood cells).

and then the spleen removes the wornout and damaged ones from circulation. Much of the red blood cell, such as the iron, can be reused, but one portion, **bilirubin**, is a waste product disposed of by the liver.

## Leukocytes

**agranulocytes** (ah-GRAN-yew-loh-sights)

**granulocytes** (GRAN-yew-loh-sights)

**pathogens** (PATH-oh-ginz)

Leukocytes, also referred to as white blood cells (WBCs), provide protection against the invasion of **pathogens** such as bacteria, viruses, and other foreign material. In general, white blood cells have a spherical shape with a large nucleus, and there are about 8,000 per cubic millimeter of blood (see Figure 6.2 ■). There are five different types of white blood cells, each with its own strategy for protecting the body. The five can be subdivided into two categories: **granulocytes** (with granules in the cytoplasm) and **agranulocytes** (without granules in the cytoplasm). The name and function of each type is presented in Table 6.1 ■.

### Med Term Tip

Your body makes about two million erythrocytes every second. Of course, it must then destroy two million every second to maintain a relatively constant 30 trillion red blood cells.

### What's In A Name?

Look for these word parts:

**bas/o** = base

**eosin/o** = rosy red

**granul/o** = granules

**lymph/o** = lymph

**neutr/o** = neutral

**path/o** = disease

**-cyte** = cell

**-gen** = that which produces

**-phil** = attracted to

**a-** = without

**mono-** = one

### Med Term Tip

A **phagocyte** is a cell that has the ability to ingest (**phag/o** = eat; **-cyte** = cell) and digest bacteria and other foreign particles. This process, **phagocytosis**, is critical for the control of bacteria within the body.

**Table 6.1 Leukocyte Classification**

Leukocyte	Function
<b>Granulocytes</b>	
<b>Basophils</b> (basos) (BAY-soh-fillz)	Release histamine and heparin to damaged tissues
<b>Eosinophils</b> (eosins, eos) (ee-oh-SIN-oh-fillz)	Destroy parasites and increase during allergic reactions
<b>Neutrophils</b> (N00-troh-fillz)	Engulfs foreign and damaged cells (phagocytosis); most numerous of the leukocytes
<b>Agranulocytes</b>	
<b>Monocytes</b> (monos) (MON-oh-sights)	Engulfs foreign and damaged cells (phagocytosis)
<b>Lymphocytes</b> (lymphs) (LIM-foh-sights)	Plays several different roles in immune response



■ **Figure 6.3** Platelet structure.

#### What's In A Name?

Look for these word parts:

**agglutin/o** = clumping

**hem/o** = blood

**thromb/o** = clot

**-cyte** = cell

**-plastin** = formation

**-stasis** = standing still

**pro-** = before

## Platelets

**agglutinate** (ah-GLOO-tih-nayt)

**fibrin** (FYE-brin)

**hemostasis** (hee-moh-STAY-sis)

**prothrombin** (proh-THROM-bin)

**thrombin** (THROM-bin)

**thrombocyte** (THROM-boh-sight)

**thromboplastin** (throm-boh-PLAS-tin)

Platelet, the modern term for **thrombocyte**, refers to the smallest of all the formed blood elements. Platelets are not whole cells, but rather are formed when the cytoplasm of a large precursor cell shatters into small platelike fragments (see Figure 6.3 ■). There are between 200,000 and 300,000 per cubic millimeter in the body.

Platelets play a critical part in the blood-clotting process or **hemostasis**. They **agglutinate** or clump together into small clusters when a blood vessel is cut or damaged. Platelets also release a substance called **thromboplastin**, which, in the presence of calcium, reacts with **prothrombin** (a clotting protein in the blood) to form **thrombin**. Then thrombin, in turn, works to convert fibrinogen to **fibrin**, which eventually becomes the meshlike blood clot.

## Blood Typing

ABO system

blood typing

Rh factor

Each person's blood is different due to the presence of antigens or markers on the surface of erythrocytes. Before a person receives a blood transfusion, it is important to do **blood typing**. This laboratory test determines if the donated blood is compatible with the recipient's blood. There are many different subgroups of blood markers, but the two most important ones are the **ABO system** and **Rh factor**.

### ABO System

type A

type AB

type B

type O

universal donor

universal recipient

In the ABO blood system there are two possible red blood cell markers, A and B. A marker is one method by which cells identify themselves. A person with an A marker is said to have **type A** blood. Type A blood produces anti-B antibodies that will attack type B blood. The presence of a B marker gives **type B** blood and anti-A antibodies (that will attack type A blood). If both markers are present, the blood is **type AB** and does not contain any antibodies. Therefore, type AB blood will not attack any other blood type. The absence of either an A or a B marker results in **type O** blood, which contains both anti-A and anti-B antibodies. Type O blood will attack all other blood types (A, B, and AB). For further information on antibodies, refer to the lymphatic section later in this chapter.

Because type O blood does not have either marker A or B, it will not react with anti-A or anti-B antibodies. For this reason, a person with type O blood is referred to as a **universal donor**. In extreme cases, type O blood may be given to a person with any of the other blood types. Similarly, type AB blood is the **universal recipient**. A person with type AB blood has no antibodies against the other blood types and, therefore, in extreme cases, can receive any type of blood.

## Rh Factor

### Rh-negative

### Rh-positive

Rh factor is not as difficult to understand as the ABO system. A person with the Rh factor on his or her red blood cells is said to be **Rh-positive** (Rh+). Since this person has the factor, he or she will not make anti-Rh antibodies. A person without the Rh factor is **Rh-negative** (Rh-) and will produce anti-Rh antibodies. Therefore, an Rh+ person may receive both an Rh+ and an Rh- transfusion, but an Rh- person can receive only Rh- blood.

## Practice As You Go

### A. Complete the Statement

1. The study of the blood is called \_\_\_\_\_.
2. The process whereby cells ingest and destroy bacteria within the body is \_\_\_\_\_.
3. The formed elements of blood are the \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
4. The fluid portion of blood is called \_\_\_\_\_.
5. The medical term for blood clotting is \_\_\_\_\_.

## Terminology

### Word Parts Used to Build Blood Terms

The following lists contain the combining forms, suffixes, and prefixes used to build terms in the remaining sections of this chapter.

#### Combining Forms

<b>bas/o</b>	base
<b>chrom/o</b>	color
<b>coagul/o</b>	clotting
<b>cyt/o</b>	cell
<b>eosin/o</b>	rosy red
<b>erythr/o</b>	red
<b>fibrin/o</b>	fibers

<b>fus/o</b>	pouring
<b>hem/o</b>	blood
<b>hemat/o</b>	blood
<b>leuk/o</b>	white
<b>lip/o</b>	fat
<b>lymph/o</b>	lymph
<b>morph/o</b>	shape

<b>neutr/o</b>	neutral
<b>phleb/o</b>	vein
<b>sanguin/o</b>	blood
<b>septic/o</b>	infection
<b>thromb/o</b>	clot

#### Suffixes

<b>-apheresis</b>	removal, carry away
<b>-crit</b>	separation of
<b>-cyte</b>	cell
<b>-cytic</b>	pertaining to cells

<b>-cytosis</b>	more than the normal number of cells
<b>-emia</b>	blood condition
<b>-globin</b>	protein

<b>-ia</b>	condition
<b>-ic</b>	pertaining to
<b>-ion</b>	action
<b>-logy</b>	study of

## Suffixes (continued)

<b>-lytic</b>	destruction
<b>-oma</b>	mass
<b>-otomy</b>	cutting into
<b>-ous</b>	pertaining to
<b>-penia</b>	too few

<b>-phil</b>	attracted to
<b>-philia</b>	condition of being attracted to
<b>-philic</b>	pertaining to being attracted to

<b>-plastic</b>	pertaining to formation
<b>-rrhage</b>	abnormal flow
<b>-rrhagic</b>	pertaining to abnormal flow

## Prefixes

<b>a-</b>	without
<b>an-</b>	without
<b>anti-</b>	against
<b>auto-</b>	self

<b>dys-</b>	abnormal
<b>homo-</b>	same
<b>hyper-</b>	excessive
<b>hypo-</b>	insufficient

<b>mono-</b>	one
<b>pan-</b>	all
<b>poly-</b>	many
<b>trans-</b>	across

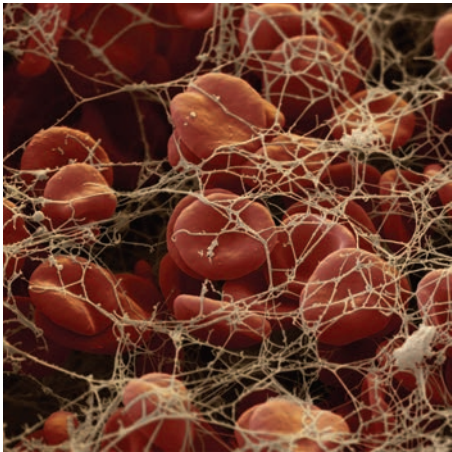
## Adjective Forms of Anatomical Terms

Term	Word Parts	Definition
<b>basophilic</b> (bay-soh-FILL-ik)	<b>bas/o</b> = base <b>-philic</b> = pertaining to being attracted to	A granulocytic leukocyte that attracts a basic pH stain.
<b>eosinophilic</b> (ee-oh-sin-oh-FILL-ik)	<b>eosin/o</b> = rosy red <b>-philic</b> = pertaining to being attracted to	A granulocytic leukocyte that attracts a rosy red stain.
<b>erythrocytic</b> (eh-rith-roh-SIT-ik)	<b>erythr/o</b> = red <b>-cytic</b> = pertaining to cells	A red blood cell.
<b>fibrinous</b> (fye-brin-us)	<b>fibrin/o</b> = fibers <b>-ous</b> = pertaining to	Pertaining to fibers.
<b>hematic</b> (hee-MAT-ik)	<b>hemat/o</b> = blood <b>-ic</b> = pertaining to	Pertaining to blood.
<b>leukocytic</b> (loo-koh-SIT-ik)	<b>leuk/o</b> = white <b>-cytic</b> = pertaining to cells	A white blood cell.
<b>lymphocytic</b> (lim-foh-SIT-ik)	<b>lymph/o</b> = lymph <b>-cytic</b> = pertaining to cells	An agranulocytic leukocyte formed in lymphatic tissue.
<b>monocytic</b> (mon-oh-SIT-ik)	<b>mono-</b> = one <b>-cytic</b> = pertaining to cells	An agranulocytic leukocyte with a single, large nucleus.
<b>neutrophilic</b> (noo-troh-FILL-ik)	<b>neutr/o</b> = neutral <b>-philic</b> = pertaining to being attracted to	A granulocytic leukocyte that attracts a neutral pH stain.
<b>sanguinous</b> (SANG-gwih-nus)	<b>sanguin/o</b> = blood <b>-ous</b> = pertaining to	Pertaining to blood.
<b>thrombocytic</b> (throm-boh-SIT-ik)	<b>thromb/o</b> = clot <b>-cytic</b> = pertaining to cells	A clotting cell; a platelet.

**B. Give the adjective form for each anatomical structure**

1. Blood \_\_\_\_\_ or \_\_\_\_\_
2. White cell \_\_\_\_\_
3. Clotting cell \_\_\_\_\_
4. Fibers \_\_\_\_\_
5. Red cell \_\_\_\_\_

# Pathology


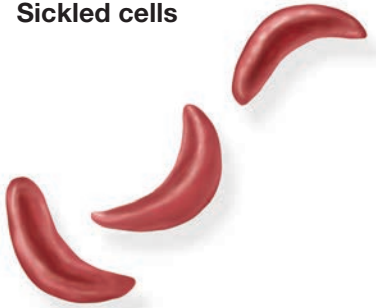
Term	Word Parts	Definition
<b>Medical Specialties</b>		
<b>hematology</b> (hee-mah-TALL-oh-jee)	<b>hemat/o</b> = blood <b>-logy</b> = study of	The branch of medicine specializing in treatment of diseases and conditions of the blood. Physician is a <i>hematologist</i> .
<b>Signs and Symptoms</b>		
<b>blood clot</b>		The hard collection of fibrin, blood cells, and tissue debris that is the end result of hemostasis or the blood-clotting process.
■ <b>Figure 6.4</b> Electronmicrograph showing a blood clot composed of fibrin, red blood cells, and tissue debris. ( <i>Eye of Science/Science Source</i> )		
<b>coagulate</b> (koh-ag-YOO-late)	<b>coagul/o</b> = clotting	To convert from a liquid to a gel or solid, as in blood coagulation.
<b>dyscrasia</b> (dis-CRAZ-ee-ah)	<b>dys-</b> = abnormal <b>-ia</b> = condition	A general term indicating the presence of a disease affecting blood.
<b>hematoma</b> (hee-mah-TOH-mah)	<b>hemat/o</b> = blood <b>-oma</b> = mass	The collection of blood under the skin as the result of blood escaping into the tissue from damaged blood vessels. Commonly referred to as a <i>bruise</i> .
<b>Word Watch</b>       <p>The term <i>hematoma</i> is confusing. Its simple translation is “blood mass.” However, it is used to refer to blood that has leaked out of a blood vessel and has pooled in the tissues causing swelling.</p>		



## Pathology (continued)

Term	Word Parts	Definition
<b>hemorrhage</b> (HEM-er-rij)	<b>hem/o</b> = blood <b>-rrhage</b> = abnormal flow	Blood flowing out of a blood vessel (i.e., bleeding).
<b>Blood</b>		
<b>hemophilia</b> (hee-moh-FILL-ee-ah)	<b>hem/o</b> = blood <b>-philia</b> = condition of being attracted to	Hereditary blood disease in which blood-clotting time is prolonged due to a lack of one vital clotting factor. It is transmitted by a sex-linked trait from females to males, appearing almost exclusively in males.
<b>hyperlipidemia</b> (HYE-per-lip-id-ee-mee-ah)	<b>hyper-</b> = excessive <b>lip/o</b> = fat <b>-emia</b> = blood condition	Condition of having too high a level of lipids such as cholesterol in the bloodstream. A risk factor for developing atherosclerosis and coronary artery disease.
<b>pancytopenia</b> (pan-sigh-toe-PEN-ee-ah)	<b>pan-</b> = all <b>cyt/o</b> = cell <b>-penia</b> = too few	Having too few of all cells.
<b>septicemia</b> (sep-tih-SEE-mee-ah)	<b>septic/o</b> = infection <b>-emia</b> = blood condition	Having bacteria or their toxins in the bloodstream. <i>Sepsis</i> is a term that means putrefaction or infection. Commonly referred to as <i>blood poisoning</i> .
<b>Erythrocytes</b>		
<b>anemia</b> (an-NEE-mee-ah)	<b>an-</b> = without <b>-emia</b> = blood condition	A large group of conditions characterized by a reduction in the number of red blood cells or the amount of hemoglobin in the blood; results in less oxygen reaching the tissues.
<b>aplastic anemia</b> (a-PLAS-tik / an-NEE-mee-ah)	<b>a-</b> = without <b>-plastic</b> = pertaining to formation <b>an-</b> = without <b>-emia</b> = blood condition	Severe form of anemia that develops as a consequence of loss of functioning red bone marrow. Results in a decrease in the number of all the formed elements. Treatment may eventually require a bone marrow transplant.
<b>erythrocytosis</b> (ee-RITH-row-sigh-toe-sis)	<b>erythr/o</b> = red <b>-cytosis</b> = more than normal number of cells	The condition of having too many red blood cells.
<b>erythropenia</b> (ee-RITH-row-pen-ee-ah)	<b>erythr/o</b> = red <b>-penia</b> = too few	The condition of having too few red blood cells.
<b>hemolytic anemia</b> (hee-moh-LIT-ik / an-NEE-mee-ah)	<b>hem/o</b> = blood <b>-lytic</b> = destruction <b>an-</b> = without <b>-emia</b> = blood condition	An anemia that develops as the result of the destruction of erythrocytes.
<b>hemolytic reaction</b> (hee-moh-LIT-ik)	<b>hem/o</b> = blood <b>-lytic</b> = destruction	The destruction of a patient's erythrocytes that occurs when receiving a transfusion of an incompatible blood type. Also called a <i>transfusion reaction</i> .

## Pathology (continued)

Term	Word Parts	Definition
<b>hypochromic anemia</b> (hi-poe-CHROME-ik / an-NEE-mee-ah)	<b>hypo-</b> = insufficient <b>chrom/o</b> = color <b>-ic</b> = pertaining to <b>an-</b> = without <b>-emia</b> = blood condition	Anemia resulting from having insufficient hemoglobin in the erythrocytes. Named because the hemoglobin molecule is responsible for the dark red color of the erythrocytes.
<b>iron-deficiency anemia</b>	<b>an-</b> = without <b>-emia</b> = blood condition	Anemia resulting from not having sufficient iron to manufacture hemoglobin.
<b>pernicious anemia</b> (PA) (per-NISH-us / an-NEE-mee-ah)	<b>an-</b> = without <b>-emia</b> = blood condition	Anemia associated with insufficient absorption of vitamin B <sub>12</sub> by the digestive system. Vitamin B <sub>12</sub> is necessary for erythrocyte production.
<b>polycythemia vera</b> (pol-ee-sigh-THÉE-mee-ah / VAIR-rah)	<b>poly-</b> = many <b>cyt/o</b> = cell <b>hem/o</b> = blood <b>-ia</b> = condition	Production of too many red blood cells by the bone marrow. Blood becomes too thick to easily flow through the blood vessels.
<b>sickle cell anemia</b>	<b>an-</b> = without <b>-emia</b> = blood condition	A genetic disorder in which erythrocytes take on an abnormal curved or “sickle” shape. These cells are fragile and are easily damaged, leading to hemolytic anemia.
<div> <div> <p><b>Normal red blood cells</b></p>  </div> <div> <p><b>Sickled cells</b></p>  </div> </div> <p>■ <b>Figure 6.5</b> Comparison of normal-shaped erythrocytes and the abnormal sickle shape noted in patients with sickle cell anemia.</p>		
<b>thalassemia</b> (thal-ah-SEE-mee-ah)	<b>-emia</b> = blood condition	A genetic disorder in which the body is unable to make functioning hemoglobin, resulting in anemia.
<b>Leukocytes</b>		
<b>leukemia</b> (loo-KEE-mee-ah)	<b>leuk/o</b> = white <b>-emia</b> = blood condition	Cancer of the white blood cell-forming red bone marrow resulting in a large number of abnormal and immature white blood cells circulating in the blood.
<b>leukocytosis</b> (LOO-koh-sigh-toh-sis)	<b>leuk/o</b> = white <b>-cytosis</b> = more than normal number of cells	The condition of having too many white blood cells.
<b>leukopenia</b> (LOO-koh-pen-ee-ah)	<b>leuk/o</b> = white <b>-penia</b> = too few	The condition of having too few white blood cells.

## Pathology (continued)

Term	Word Parts	Definition
<b>Platelets</b>		
<b>thrombocytosis</b> (throm-boh-sigh-TOH-sis)	<b>thromb/o</b> = clot <b>-cytosis</b> = more than normal number of cells	The condition of having too many platelets.
<b>thrombopenia</b> (THROM-boh-pen-ee-ah)	<b>thromb/o</b> = clot <b>-penia</b> = too few	The condition of having too few platelets.

## Practice As You Go

### C. Terminology Matching

Match each term to its definition.

- |                      |  |
|----------------------|--|
| 1. _____ thalassemia | a. disease in which blood does not clot  |
| 2. _____ dyscrasia   | b. condition with reduced number of RBCs |
| 3. _____ hematoma    | c. mass of blood                         |
| 4. _____ anemia      | d. type of anemia                        |
| 5. _____ hemophilia  | e. general term for blood disorders      |

## Diagnostic Procedures

Term	Word Parts	Definition
<b>Clinical Laboratory Tests</b>		
<b>blood culture and sensitivity</b> (C&S)		Sample of blood is incubated in the laboratory to check for bacterial growth. If bacteria are present, they are identified and tested to determine which antibiotics they are sensitive to.
<b>complete blood count</b> (CBC)		Combination of blood tests including red blood cell count (RBC), white blood cell count (WBC), hemoglobin (Hgb), hematocrit (Hct), white blood cell differential, and platelet count.
<b>erythrocyte sedimentation rate</b> (ESR, SR, sed rate) (eh-RITH-roh-sight / sed-ih-men-TAY-shun)	<b>erythr/o</b> = red <b>-cyte</b> = cell	Blood test to determine the rate at which mature red blood cells settle out of the blood after the addition of an anticoagulant. This is an indicator of the presence of an inflammatory disease.
<b>hematocrit</b> (HCT, Hct, crit) (hee-MAT-oh-krit)	<b>hemat/o</b> = blood <b>-crit</b> = separation of	Blood test to measure the volume of red blood cells (erythrocytes) within the total volume of blood.
<b>hemoglobin</b> (Hgb, hb, HGB) (hee-moh-GLOH-bin)	<b>hem/o</b> = blood <b>-globin</b> = protein	A blood test to measure the amount of hemoglobin present in a given volume of blood.

## Diagnostic Procedures (continued)

Term	Word Parts	Definition
<b>platelet count</b> (PLAYT-let)		Blood test to determine the number of platelets in a given volume of blood.
<b>prothrombin time</b> (pro-time, PT) (proh-THROM-bin)	<b>thromb/o</b> = clot	A measure of the blood's coagulation abilities by measuring how long it takes for a clot to form after prothrombin has been activated.
<b>red blood cell count (RBC)</b>		Blood test to determine the number of erythrocytes in a volume of blood. A decrease in red blood cells may indicate anemia; an increase may indicate polycythemia.
<b>red blood cell morphology</b>	<b>morph/o</b> = shape <b>-logy</b> = study of	Examination of a specimen of blood for abnormalities in the shape (morphology) of the erythrocytes. Used to determine diseases such as sickle cell anemia.
<b>sequential multiple analyzer computer (SMAC)</b>		Machine for doing multiple blood chemistry tests automatically.
<b>white blood cell count (WBC)</b>		Blood test to measure the number of leukocytes in a volume of blood. An increase may indicate the presence of infection or a disease such as leukemia. A decrease in white blood cells may be caused by radiation therapy or chemotherapy.
<b>white blood cell differential (diff)</b> (diff-er-EN-shal)		Blood test to determine the number of each variety of leukocytes.
<b>Medical Procedures</b>		
<b>bone marrow aspiration</b> (as-pih-RAY-shun)		Sample of bone marrow is removed by aspiration with a needle and examined for diseases such as leukemia or aplastic anemia.
<b>phlebotomy</b> (fleh-BOT-oh-me)	<b>phleb/o</b> = vein <b>-otomy</b> = cutting into	Incision into a vein in order to remove blood for a diagnostic test. Also called <i>venipuncture</i> .



■ **Figure 6.6** Phlebotomist using a needle to withdraw blood. (Michal Heron, Pearson Education)

## Therapeutic Procedures

Term	Word Parts	Definition
<b>Medical Procedures</b>		
<b>autologous transfusion</b> (aw-TALL-oh-gus / trans-FYOO-zhun)	<b>auto-</b> = self	Procedure for collecting and storing a patient's own blood several weeks prior to the actual need. It can then be used to replace blood lost during a surgical procedure.
<b>blood transfusion</b> (trans-FYOO-zhun)	<b>trans-</b> = across <b>fus/o</b> = pouring <b>-ion</b> = action	Artificial transfer of blood into the bloodstream.  <b>Med Term Tip</b> Before a patient receives a blood transfusion, the laboratory performs a <b>type and cross-match</b> . This test first double-checks the blood type of both the donor's and recipient's blood. Then a cross-match is performed. This process mixes together small samples of both bloods and observes the mixture for adverse reactions.
<b>bone marrow transplant</b> (BMT)		Patient receives red bone marrow from a donor after the patient's own bone marrow has been destroyed by radiation or chemotherapy.
<b>homologous transfusion</b> (hoh-MALL-oh-gus / trans-FYOO-zhun)	<b>homo-</b> = same	Replacement of blood by transfusion of blood received from another person.
<b>packed red cells</b>		A transfusion in which most of the plasma, leukocytes, and platelets have been removed, leaving only erythrocytes.
<b>plasmapheresis</b> (plaz-mah-fah-REE-sis)	<b>-apheresis</b> = removal, carry away	Method of removing plasma from the body without depleting the formed elements. Whole blood is removed and the cells and plasma are separated. The cells are returned to the patient along with a donor plasma transfusion.
<b>whole blood</b>		Refers to the mixture of both plasma and formed elements.

## Pharmacology

Classification	Word Parts	Action	Examples
<b>anticoagulant</b> (an-tih-koh-AG-yoo-lant)	<b>anti-</b> = against <b>coagul/o</b> = clotting	Substance that prevents blood clot formation. Commonly referred to as a <i>blood thinner</i> .	heparin, HepLock; warfarin, Coumadin
<b>antihemorrhagic</b> (an-tih-hem-er-RAJ-ik)	<b>anti-</b> = against <b>hem/o</b> = blood <b>-rrhagic</b> = pertaining to abnormal flow	Substance that prevents or stops hemorrhaging; a <i>hemostatic agent</i> .	aminocaproic acid, Amicar; vitamin K
<b>antiplatelet agents</b> (an-tih-PLATE-let)	<b>anti-</b> = against	Substance that interferes with the action of platelets. Prolongs bleeding time. Used to prevent heart attacks and strokes.	clopidogrel, Plavix; ticlopidine, Ticlid
<b>hematinic</b> (hee-mah-TIN-ik)	<b>hemat/o</b> = blood <b>-ic</b> = pertaining to	Substance that increases the number of erythrocytes or the amount of hemoglobin in the blood.	epoetin alfa, Procrit; darbepoetin alfa, Aranesp
<b>thrombolytic</b> (throm-boh-LIT-ik)	<b>thromb/o</b> = clot <b>-lytic</b> = destruction	Term meaning able to dissolve existing blood clots.	alteplase, Activase; streptokinase, Streptase

## Practice As You Go

### D. Match each procedure term with its definition

- |                                  |   |
|----------------------------------|---|
| 1. _____ phlebotomy              | a. method of removing plasma from the body  |
| 2. _____ SMAC                    | b. mixture of plasma and formed elements    |
| 3. _____ plasmapheresis          | c. removal of blood from a vein             |
| 4. _____ whole blood             | d. test for bacterial growth                |
| 5. _____ culture and sensitivity | e. machine to conduct blood chemistry tests |

## Abbreviations

<b>ALL</b>	acute lymphocytic leukemia	<b>lymphs</b>	lymphocytes
<b>AML</b>	acute myelogenous leukemia	<b>monos</b>	monocytes
<b>basos</b>	basophils	<b>PA</b>	pernicious anemia
<b>BMT</b>	bone marrow transplant	<b>PCV</b>	packed cell volume
<b>CBC</b>	complete blood count	<b>PMN, polys</b>	polymorphonuclear neutrophil
<b>CLL</b>	chronic lymphocytic leukemia	<b>PT, pro-time</b>	prothrombin time
<b>CML</b>	chronic myelogenous leukemia	<b>RBC</b>	red blood cell
<b>diff</b>	differential	<b>Rh+</b>	Rh-positive
<b>eosins, eos</b>	eosinophils	<b>Rh-</b>	Rh-negative
<b>ESR, SR, sed rate</b>	erythrocyte sedimentation rate	<b>segs</b>	segmented neutrophils
<b>HCT, Hct, crit</b>	hematocrit	<b>SMAC</b>	sequential multiple analyzer computer
<b>Hgb, Hb, HGB</b>	hemoglobin	<b>WBC</b>	white blood cell

## Practice As You Go

### E. What's the Abbreviation?

- acute lymphocytic leukemia \_\_\_\_\_
- bone marrow transplant \_\_\_\_\_
- eosinophils \_\_\_\_\_
- hematocrit \_\_\_\_\_
- pernicious anemia \_\_\_\_\_
- complete blood count \_\_\_\_\_
- differential \_\_\_\_\_
- white blood cell \_\_\_\_\_





## Section II: The Lymphatic and Immune Systems at a Glance

### Function

The lymphatic system consists of a network of lymph vessels that pick up excess tissue fluid, cleanse it, and return it to the circulatory system. It also picks up fats that have been absorbed by the digestive system. The immune system fights disease and infections.

### Organs

Here are the primary structures that comprise the lymphatic and immune systems:

**lymph nodes**  
**lymphatic vessels**  
**spleen**  
**thymus gland**  
**tonsils**

### Word Parts

Here are the most common word parts (with their meanings) used to build lymphatic and immune system terms. For a more comprehensive list, refer to the Terminology section of this chapter.

### Combining Forms

<b>adenoid/o</b>	adenoids	<b>lymphangi/o</b>	lymph vessel
<b>axill/o</b>	axilla (underarm)	<b>nucle/o</b>	nucleus
<b>immun/o</b>	protection	<b>splen/o</b>	spleen
<b>inguin/o</b>	groin region	<b>thym/o</b>	thymus gland
<b>lymph/o</b>	lymph	<b>tonsill/o</b>	tonsils
<b>lymphaden/o</b>	lymph node		

### Suffixes

<b>-edema</b>	swelling	<b>-phage</b>	to eat
<b>-globulin</b>	protein	<b>-toxic</b>	pertaining to poison

# The Lymphatic and Immune Systems Illustrated

**thymus, p. 199**



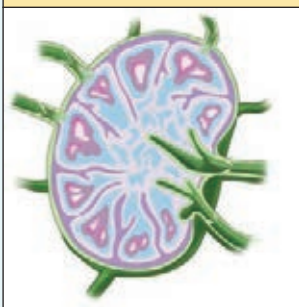
Necessary for development of immune system

**tonsil, p. 199**



Protects against pathogens in the pharynx

**lymph node, p. 197**



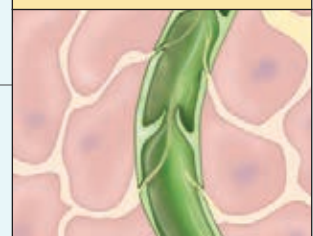
Cleanses lymph fluid

**spleen, p. 199**



Cleanses blood and removes old red blood cells

**lymphatic vessel, p. 196**



Transports lymph fluid

**What's In A Name?**

Look for these word parts:

**lact/o** = milk

**-eal** = pertaining to

**Med Term Tip**

The term *lymph* comes from the Latin word *lymph*a meaning “clear spring water.” Although a very pale, clear yellow, lymph appears crystal clear when compared to the other body fluid, blood.

**Med Term Tip**

The term *lacteal* describes the appearance of lymph fluid inside the lacteal vessels. After absorbing fats from a meal, the suspended fat molecules turn the lymph fluid a milky white.

## Anatomy and Physiology of the Lymphatic and Immune Systems

**lacteals** (lack-TEE-als)

**lymph** (LIMF)

**lymph nodes**

**lymphatic vessels** (lim-FAT-ik)

**spleen**

**thymus gland** (THIGH-mus)

**tonsils** (TON-sulls)

The lymphatic system consists of a network of **lymphatic vessels**, **lymph nodes**, the **spleen**, the **thymus gland**, and the **tonsils**. These organs perform several quite diverse functions for the body. First, they collect excess tissue fluid throughout the body and return it to the circulatory system. The fluid, once inside a lymphatic vessel, is referred to as **lymph**. Lymph vessels located around the small intestines, called **lacteals**, are able to pick up absorbed fats for transport. Additionally, the lymphatic system works with the immune system to form the groups of cells, tissues, organs, and molecules that serve as the body's primary defense against the invasion of pathogens. These systems work together defending the body against foreign invaders and substances, as well as removing our own cells that have become diseased.

### Lymphatic Vessels

**lymphatic capillaries** (CAP-ih-lair-eez)

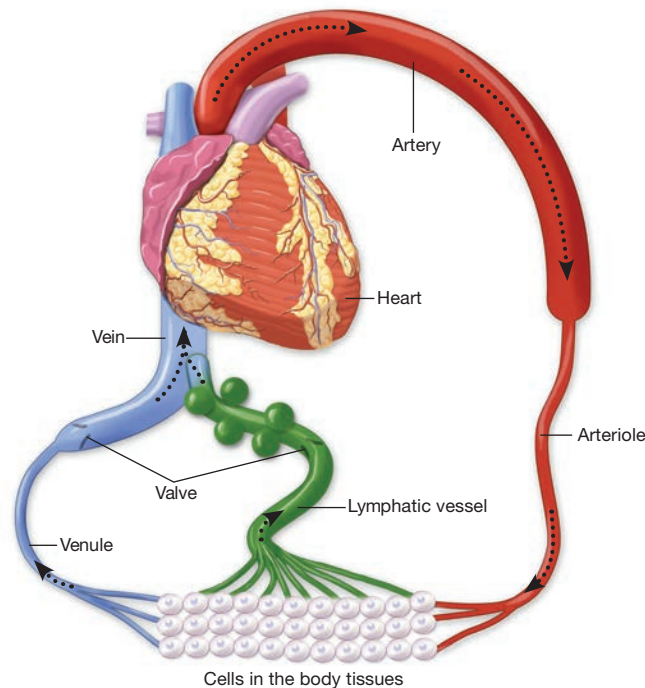
**lymphatic ducts**

**right lymphatic duct**

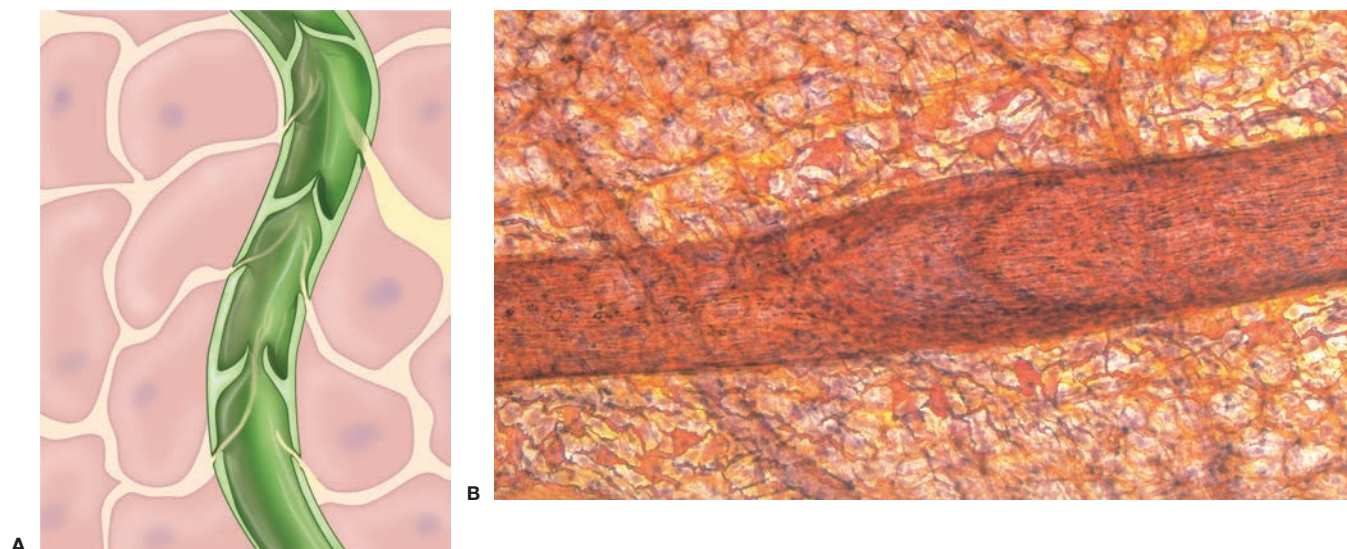
**thoracic duct**

**valves**

The lymphatic vessels form an extensive network of ducts throughout the entire body. However, unlike the circulatory system, these vessels are not in a closed loop. Instead, they serve as one-way pipes conducting lymph from the tissues toward the thoracic cavity (see Figure 6.7 ■). These vessels begin as very small **lymphatic capillaries** in the tissues. Excessive tissue fluid enters these capillaries to



■ **Figure 6.7** Lymphatic vessels (green) pick up excess tissue fluid, purify it in lymph nodes, and return it to the circulatory system.



■ **Figure 6.8** A - Lymphatic vessel with valves within tissue cells; B - Photomicrograph of lymphatic vessel with valve clearly visible. (Michael Abbey/Photo Researchers, Inc.)

begin the trip back to the circulatory system. The capillaries merge into larger lymphatic vessels. This is a very low-pressure system, so these vessels have **valves** along their length to ensure that lymph can only move forward toward the thoracic cavity (see Figure 6.8 ■). These vessels finally drain into one of two large **lymphatic ducts**, the **right lymphatic duct** or the **thoracic duct**. The smaller right lymphatic duct drains the right arm and the right side of the head, neck, and chest. This duct empties lymph into the right subclavian vein. The larger thoracic duct drains lymph from the rest of the body and empties into the left subclavian vein (see Figure 6.9 ■).

## Lymph Nodes

### lymph glands

Lymph nodes are small organs composed of lymphatic tissue located along the route of the lymphatic vessels. These nodes, also referred to as **lymph glands**, house lymphocytes and antibodies and therefore work to remove pathogens and cell debris as lymph passes through them on its way back to the thoracic cavity (see Figure 6.10 ■). Lymph nodes also serve to trap and destroy cells from cancerous tumors. Although found throughout the body, lymph nodes are particularly concentrated in several regions. For example, lymph nodes concentrated in the neck region drain lymph from the head. See again Figure 6.9 and Table 6.2 ■ for a description of some of the most important sites for lymph nodes.

### What's In A Name?

Look for these word parts:

thorac/o = chest

-ic = pertaining to

### Med Term Tip

The term *capillary* is also used to describe the minute blood vessels within the circulatory system. This is one of several general medical terms, such as valves, cilia, and hair, that are used in several systems.

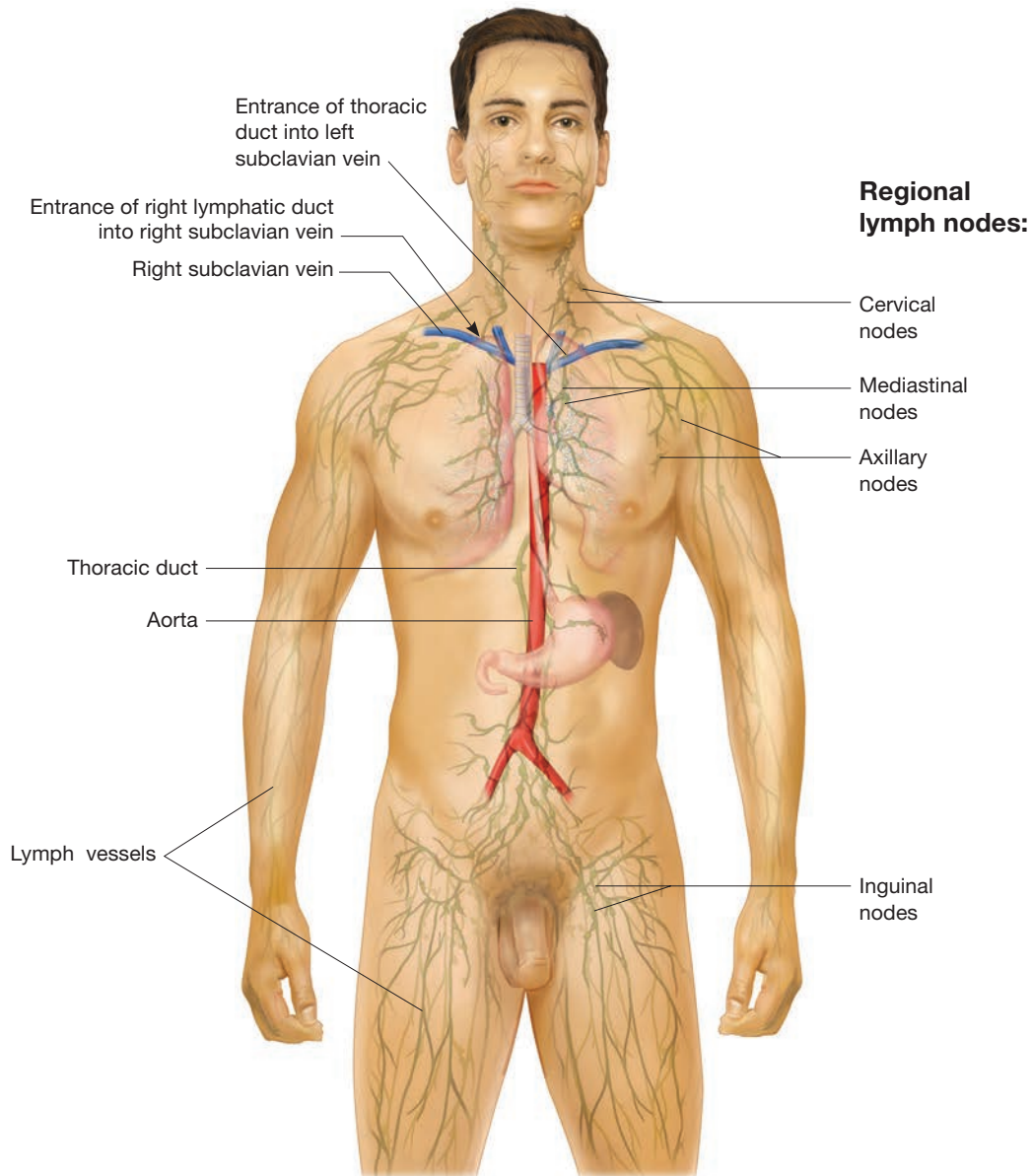
### Med Term Tip

In surgical procedures to remove a malignancy from an organ, such as a breast, the adjacent lymph nodes are also tested for cancer. If cancerous cells are found in the tested lymph nodes, the disease is said to have spread or *metastasized*. Tumor cells may then spread to other parts of the body by means of the lymphatic system.

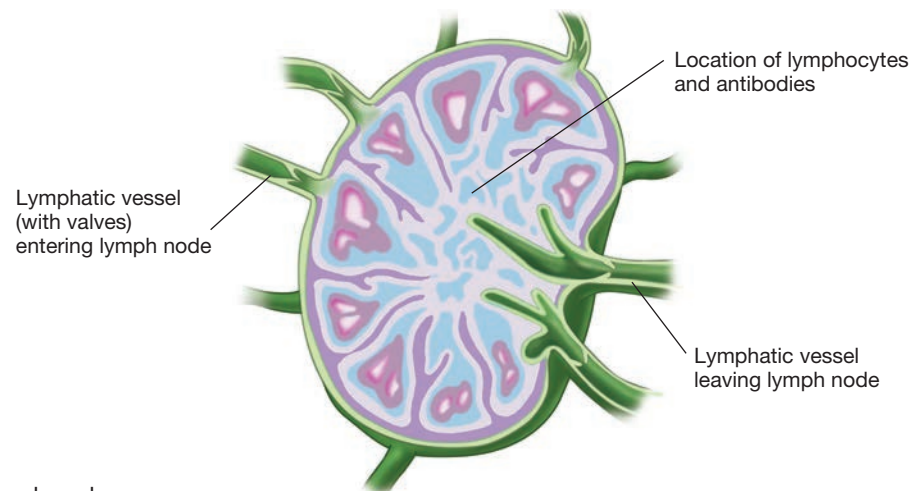
**Table 6.2** Sites for Lymph Nodes

Name	Location	Function
axillary (AK-sih-lair-ee)	armpits	Drain arms and shoulder region; cancer cells from breasts may be present
cervical (SER-vih-kal)	neck	Drain head and neck; may be enlarged during upper respiratory infections
inguinal (ING-gwih-nal)	groin	Drain legs and lower pelvis
mediastinal (mee-dee-ass-TYE-nal)	chest	Drain chest cavity





■ **Figure 6.9** Location of lymph vessels, lymphatic ducts, and areas of lymph node concentrations.



■ **Figure 6.10** Structure of a lymph node.

## Tonsils

**adenoids** (ADD-eh-noydz)

**lingual tonsils** (LING-gwal)

**palatine tonsils** (PAL-ah-tyne)

**pharyngeal tonsils** (fair-IN-jee-al)

**pharynx** (FAIR-inks)

The tonsils are collections of lymphatic tissue located on each side of the throat or **pharynx** (see Figure 6.11 ■). There are three sets of tonsils: **palatine tonsils**, **pharyngeal tonsils** (commonly referred to as the **adenoids**), and **lingual tonsils**. All tonsils contain a large number of leukocytes and act as filters to protect the body from the invasion of pathogens through the digestive or respiratory systems. Tonsils are not vital organs and can safely be removed if they become a continuous site of infection.

## Spleen

**blood sinuses**

**macrophages** (MACK-roh-fayj-ez)

The spleen, located in the upper left quadrant of the abdomen, consists of lymphatic tissue that is highly infiltrated with blood vessels (see Figure 6.12 ■). These vessels spread out into slow-moving **blood sinuses**. The spleen filters out and destroys old red blood cells, recycles the iron, and also stores some of the blood supply for the body. Phagocytic **macrophages** line the blood sinuses in the spleen to engulf and remove pathogens. Because the blood is moving through the organ slowly, the macrophages have time to carefully identify pathogens and worn-out red blood cells. The spleen is also not a vital organ and can be removed due to injury or disease. However, without the spleen, a person's susceptibility to a bloodstream infection may be increased.

## Thymus Gland

**T cells**

**T lymphocytes**

**thymosin** (thigh-MOH-sin)

The thymus gland, located in the upper portion of the mediastinum, is essential for the proper development of the immune system (see Figure 6.13 ■). It assists the body with the immune function and the development of antibodies. This organ's hormone, **thymosin**, changes lymphocytes to **T lymphocytes** (simply called **T cells**), which play an important role in the immune response. The thymus is active in the unborn child and throughout childhood until adolescence, when it begins to shrink in size.

## Immunity

**acquired immunity**

**active acquired immunity**

**bacteria** (bak-TEE-ree-ah)

**cancerous tumors**

**fungi** (FUN-jee)

**immune response**

**immunity** (im-YOO-nih-tee)

**immunizations** (im-yoo-nih-ZAY-shuns)

**natural immunity**

**passive acquired immunity**

**protozoans** (proh-toh-ZOH-anz)

**toxins**

**vaccinations** (vak-sih-NAY-shuns)

**viruses**

**Immunity** is the body's ability to defend itself against pathogens, such as **bacteria**, **viruses**, **fungi**, **protozoans**, **toxins**, and **cancerous tumors**. Immunity comes in two forms: **natural immunity** and **acquired immunity**. Natural immunity, also called



■ **Figure 6.11** The shape of a tonsil.

### What's In A Name?

Look for these word parts:

lingu/o = tongue

palat/o = palate

pharyng/o = pharynx

-al = pertaining to

-eal = pertaining to

-ine = pertaining to

### What's In A Name?

Look for these word parts:

macro- = large

-phage = to eat



■ **Figure 6.12** The shape of the spleen.

### What's In A Name?

Look for these word parts:

lymph/o = lymph

-cyte = cell



■ **Figure 6.13** The shape of the thymus gland.

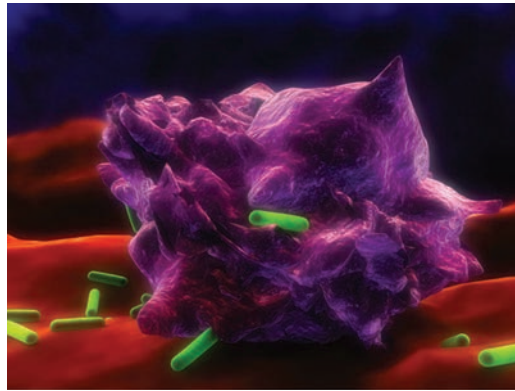
### What's In A Name?

Look for this word part:

-ous = pertaining to



■ **Figure 6.14** Enhanced photomicrograph showing a macrophage (purple) attacking bacillus Escherichia coli (green). (Sebastian Kaulitzki/Shutterstock)



*innate immunity*, is not specific to a particular disease and does not require prior exposure to the pathogenic agent. A good example of natural immunity is the macrophage. These leukocytes are present throughout all the tissues of the body, but are concentrated in areas of high exposure to invading bacteria, like the lungs and digestive system. They are very active phagocytic cells, ingesting and digesting any pathogen they encounter (see Figure 6.14 ■).

Acquired immunity is the body's response to a specific pathogen and may be established either passively or actively. **Passive acquired immunity** results when a person receives protective substances produced by another human or animal. This may take the form of maternal antibodies crossing the placenta to a baby or an antitoxin or gamma globulin injection. **Active acquired immunity** develops following direct exposure to the pathogenic agent. The agent stimulates the body's **immune response**, a series of different mechanisms all geared to neutralize the agent. For example, a person typically can catch chickenpox only once because once the body has successfully fought the virus, it will be able to more quickly recognize and kill it in the future. **Immunizations** or **vaccinations** are special types of active acquired immunity. Instead of actually being exposed to the infectious agent and having the disease, a person is exposed to a modified or weakened pathogen that is still capable of stimulating the immune response but not actually causing the disease.

## Immune Response

### What's In A Name?

Look for these word parts:

cyt/o = cell  
 immun/o = protection  
 lymph/o = lymph  
 path/o = disease  
 -al = pertaining to  
 -ar = pertaining to  
 -cyte = cell  
 -gen = that which produces  
 -genic = producing  
 -globulin = protein  
 -toxic = pertaining to poison  
 anti- = against

### Med Term Tip

The term *humoral* comes from the Latin word for "liquid." It is the old-fashioned term to refer to the fluids of the body.

antibody (AN-tih-bod-ee)  
 antibody-mediated immunity  
 antigen–antibody complex  
 antigens (AN-tih-jens)  
 B cells  
 B lymphocytes  
 cell-mediated immunity

cellular immunity  
 cytotoxic (sigh-toh-TOK-sik)  
 humoral immunity (HYOO-mor-al)  
 immunoglobulin (Ig)  
 (im-yoo-noh-GLOB-yoo-lin)  
 natural killer (NK) cells  
 pathogenic (path-oh-JEN-ik)

Disease-causing, or **pathogenic**, agents are recognized as being foreign because they display proteins that are different from a person's own natural proteins. Those foreign proteins, called **antigens**, stimulate the immune response. The immune response consists of two distinct and different processes: **humoral immunity** (also called **antibody-mediated immunity**) and **cellular immunity** (also called **cell-mediated immunity**).

Humoral immunity refers to the production of **B lymphocytes**, also called **B cells**, which respond to antigens by producing a protective protein, called an **antibody** (also called an **immunoglobulin**). Antibodies combine with the antigen to form

an **antigen–antibody complex**. This complex either targets the foreign substance for phagocytosis or prevents the infectious agent from damaging healthy cells.

Cellular immunity involves the production of T cells and **natural killer (NK) cells**. These defense cells are **cytotoxic**, meaning that they physically attack and destroy pathogenic cells.

## Standard Precautions

**cross-infection**

**nosocomial infection** (no-so-KOH-mee-all)

**Occupational Safety and Health Administration (OSHA)**

**reinfection**

**self-inoculation**

Hospitals and other healthcare settings contain a large number of infective pathogens. Patients and healthcare workers are exposed to each other's pathogens and sometimes become infected. An infection acquired in this manner, as a result of hospital exposure, is referred to as a **nosocomial infection**. Nosocomial infections can spread in several ways. **Cross-infection** occurs when a person, either a patient or healthcare worker, acquires a pathogen from another patient or healthcare worker. **Reinfection** takes place when a patient becomes infected again with the same pathogen that originally brought him or her to the hospital. **Self-inoculation** occurs when a person becomes infected in a different part of the body by a pathogen from another part of his or her own body—such as intestinal bacteria spreading to the urethra.

With the appearance of the hepatitis B virus (HBV) in the mid-1960s and the human immunodeficiency virus (HIV) in the mid-1980s, the fight against spreading infections took on even greater significance. In 1987 the **Occupational Safety and Health Administration (OSHA)** issued mandatory guidelines to ensure that all employees at risk of exposure to body fluids are provided with personal protective equipment. These guidelines state that all human blood, tissue, and body fluids must be treated as if they were infected with HIV, HBV, or other bloodborne pathogens. These guidelines were expanded in 1992 and 1996 to encourage the fight against not just bloodborne pathogens, but all nosocomial infections spread by contact with blood, mucous membranes, nonintact skin, and all body fluids (including amniotic fluid, vaginal secretions, pleural fluid, cerebrospinal fluid, peritoneal fluid, pericardial fluid, and semen). These guidelines are commonly referred to as the Standard Precautions:

1. Wash hands before putting on and after removing gloves and before and after working with each patient or patient equipment.
2. Wear gloves when in contact with any body fluid, mucous membrane, or nonintact skin or if you have chapped hands, a rash, or open sores.
3. Wear a nonpermeable gown or apron during procedures that are likely to expose you to any body fluid, mucous membrane, or nonintact skin.
4. Wear a mask and protective equipment or a face shield when patients are coughing often or if body fluid droplets or splashes are likely.
5. Wear a facemask and eyewear that seal close to the face during procedures that cause body tissues to be vaporized.
6. Remove for proper cleaning any shared equipment—such as a thermometer, stethoscope, or blood pressure cuff—that has come into contact with body fluids, mucous membrane, or nonintact skin.

### What's In A Name?

Look for these word parts:

-al = pertaining to

re- = again

### Med Term Tip

The term *nosocomial* comes from the Greek word *nosoko-meion*, meaning hospital.

### Med Term Tip

The simple act of thoroughly washing your hands is the most effective method of preventing the spread of infectious diseases.

## Practice As You Go

### F. Complete the Statement

1. The organs of the lymphatic system other than lymphatic vessels and lymph nodes are the \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
2. The two lymph ducts are the \_\_\_\_\_ and \_\_\_\_\_.
3. The primary concentrations of lymph nodes are the \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ regions.
4. \_\_\_\_\_ immunity develops following direct exposure to a pathogen.
5. Humoral immunity is also referred to as \_\_\_\_\_ immunity.

## Terminology

### Word Parts Used to Build Lymphatic and Immune System Terms

The following lists contain the combining forms, suffixes, and prefixes used to build terms in the remaining sections of this chapter.

#### Combining Forms

<b>adenoid/o</b>	adenoids
<b>axill/o</b>	axilla, underarm
<b>cortic/o</b>	outer layer
<b>immun/o</b>	protection
<b>inguin/o</b>	groin
<b>lymph/o</b>	lymph

<b>lymphaden/o</b>	lymph node
<b>lymphangi/o</b>	lymph vessel
<b>nucle/o</b>	nucleus
<b>path/o</b>	disease
<b>pneumon/o</b> (see Chapter 7)	lung

<b>sarc/o</b>	flesh
<b>splen/o</b>	spleen
<b>thym/o</b>	thymus gland
<b>tonsill/o</b>	tonsils

#### Suffixes

<b>-al</b>	pertaining to
<b>-ar</b>	pertaining to
<b>-ary</b>	pertaining to
<b>-atic</b>	pertaining to
<b>-ectomy</b>	surgical removal
<b>-edema</b>	swelling
<b>-gram</b>	record
<b>-graphy</b>	process of recording

<b>-ia</b>	condition
<b>-iasis</b>	abnormal condition
<b>-ic</b>	pertaining to
<b>-itis</b>	inflammation
<b>-logy</b>	study of
<b>-megaly</b>	enlarged
<b>-oma</b>	tumor

<b>-osis</b>	abnormal condition
<b>-pathy</b>	disease
<b>-therapy</b>	treatment

#### Prefixes

<b>anti-</b>	against
--------------	---------

<b>auto-</b>	self
--------------	------

<b>mono-</b>	one
--------------	-----

## Adjective Form of Anatomical Terms

Term	Word Parts	Definition
<b>axillary</b> (AK-sih-lair-ee)	<b>axill/o</b> = axilla, underarm <b>-ary</b> = pertaining to	Pertaining to the underarm region.
<b>inguinal</b> (ING-gwih-nal)	<b>inguin/o</b> = groin <b>-al</b> = pertaining to	Pertaining to the groin region.
<b>lymphangial</b> (lim-FAN-gee-al)	<b>lymphangi/o</b> = lymph vessel <b>-al</b> = pertaining to	Pertaining to lymph vessels.
<b>lymphatic</b> (lim-FAT-ik)	<b>lymph/o</b> = lymph <b>-atic</b> = pertaining to	Pertaining to lymph.
<b>splenic</b> (SPLEN-ik)	<b>splen/o</b> = spleen <b>-ic</b> = pertaining to	Pertaining to the spleen.
<b>thymic</b> (THIGH-mik)	<b>thym/o</b> = thymus gland <b>-ic</b> = pertaining to	Pertaining to the thymus gland.
<b>tonsillar</b> (ton-sih-lar)	<b>tonsill/o</b> = tonsils <b>-ar</b> = pertaining to	Pertaining to the tonsils.

## Practice As You Go


### G. Give the adjective form for each anatomical structure

1. Spleen \_\_\_\_\_
2. Lymph \_\_\_\_\_
3. Tonsil \_\_\_\_\_
4. Thymus gland \_\_\_\_\_
5. Lymph vessel \_\_\_\_\_

## Pathology

Term	Word Parts	Definition
<b>Medical Specialties</b>		
<b>allergist</b> (AL-er-jist)		A physician who specializes in testing for and treating allergies.
<b>immunology</b> (im-yoo-NALL-oh-jee)	<b>immun/o</b> = protection <b>-logy</b> = study of	A branch of medicine concerned with diagnosis and treatment of infectious diseases and other disorders of the immune system. Physician is an <i>immunologist</i> .
<b>pathology</b> (path-OL-oh-gee)	<b>path/o</b> = disease <b>-logy</b> = study of	A branch of medicine concerned with determining the underlying causes and development of diseases. Physician is a <i>pathologist</i> .


## Pathology (continued)

Term	Word Parts	Definition
<b>Signs and Symptoms</b>		
<b>hives</b>		Appearance of wheals as part of an allergic reaction.
<b>inflammation</b> (in-flah-MAY-shun)		The tissues' response to injury from pathogens or physical agents. Characterized by redness, pain, swelling, and feeling hot to touch.
<p>■ <b>Figure 6.15</b> Inflammation as illustrated by cellulitis of the nose. Note that the area is red and swollen. It is also painful and hot to touch. (ARENA Creative/Shutterstock)</p>		
<b>lymphedema</b> (limf-eh-DEE-mah)	<b>lymph/o</b> = lymph <b>-edema</b> = swelling	Edema appearing in the extremities due to an obstruction of the lymph flow through the lymphatic vessels.
<b>splenomegaly</b> (splee-noh-MEG-ah-lee)	<b>splen/o</b> = spleen <b>-megaly</b> = enlarged	An enlarged spleen.
<b>urticaria</b> (er-tih-KAY-ree-ah)		Severe itching associated with hives, usually linked to food allergy, stress, or drug reactions.
<b>Allergic Reactions</b>		
<b>allergy</b> (AL-er-jee)		Hypersensitivity to a common substance in the environment or to a medication. The substance causing the allergic reaction is called an <i>allergen</i> .
<b>anaphylactic shock</b> (an-ah-fih-LAK-tik)		Life-threatening condition resulting from a severe allergic reaction. Examples of instances that may trigger this reaction include bee stings, medications, or the ingestion of foods. Circulatory and respiratory problems occur, including respiratory distress, hypotension, edema, tachycardia, and convulsions. Also called <b>anaphylaxis</b> .
<b>Lymphatic System</b>		
<b>adenoiditis</b> (add-eh-noyd-EYE-tis)	<b>adenoid/o</b> = adenoids <b>-itis</b> = inflammation	Inflammation of the adenoids.
<b>autoimmune disease</b>	<b>auto-</b> = self	A disease resulting from the body's immune system attacking its own cells as if they were pathogens. Examples include systemic lupus erythematosus, rheumatoid arthritis, and multiple sclerosis.

### Word Watch

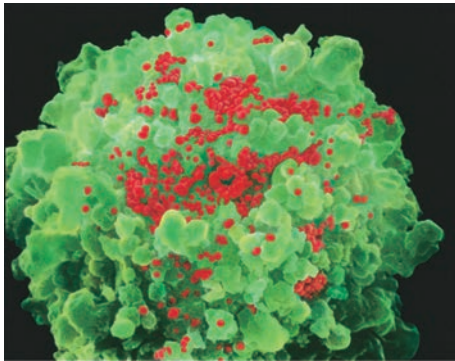
The terms *inflammation* and *inflammatory* are spelled with two *m*'s, while *inflamm* and *inflamed* each have only one *m*. These may be the most commonly misspelled terms by medical terminology students.

## Pathology (continued)

Term	Word Parts	Definition
<b>elephantiasis</b> (el-eh-fan-TYE-ah-sis)	<b>-iasis</b> = abnormal condition	Inflammation, obstruction, and destruction of the lymph vessels resulting in enlarged tissues due to edema.
<b>Hodgkin's disease</b> (HD) (HOJ-kins)		Also called <i>Hodgkin's lymphoma</i> . Cancer of the lymphatic cells found in concentration in the lymph nodes. Named after Thomas Hodgkin, a British physician, who first described it.
<b>lymphadenitis</b> (lim-fad-en-EYE-tis)	<b>lymphaden/o</b> = lymph node <b>-itis</b> = inflammation	Inflammation of the lymph nodes. Referred to as <i>swollen glands</i> .
<b>lymphadenopathy</b> (lim-fad-eh-NOP-ah-thee)	<b>lymphaden/o</b> = lymph node <b>-pathy</b> = disease	A general term for lymph node diseases.
<b>lymphangioma</b> (lim-fan-jee-OH-mah)	<b>lymphangi/o</b> = lymph vessel <b>-oma</b> = tumor	A tumor in a lymphatic vessel.
<b>lymphoma</b> (lim-FOH-mah)	<b>lymph/o</b> = lymph <b>-oma</b> = tumor	A tumor in lymphatic tissue.
<b>mononucleosis</b> (mono) (mon-oh-nook-lee-OH-sis)	<b>mono-</b> = one <b>nucle/o</b> = nucleus <b>-osis</b> = abnormal condition	Acute infectious disease with a large number of abnormal mononuclear lymphocytes. Caused by the Epstein-Barr virus. Abnormal liver function may occur.
<b>Med Term Tip</b> Mononuclear is a term occasionally used to describe any cell that has a large, single, round nucleus, including lymphocytes and monocytes. This is opposed to having a lobed nucleus like the other white blood cells.		
<b>non-Hodgkin's lymphoma (NHL)</b>	<b>lymph/o</b> = lymph <b>-oma</b> = tumor	Cancer of the lymphatic tissues other than Hodgkin's lymphoma.
<p>■ <b>Figure 6.16</b> Photo of the neck of a patient with non-Hodgkin's lymphoma showing swelling associated with enlarged lymph nodes. (Dr. P. Marazzi/Science Source)</p> 		
<b>thymoma</b> (thigh-MOH-mah)	<b>thym/o</b> = thymus gland <b>-oma</b> = tumor	A tumor of the thymus gland.
<b>tonsillitis</b> (ton-sil-EYE-tis)	<b>tonsill/o</b> = tonsils <b>-itis</b> = inflammation	Inflammation of the tonsils.
<b>Immune System</b>		
<b>acquired immunodeficiency syndrome (AIDS)</b> (ac-quired / im-you-noh-dee-FIH-shen-see / SIN-droh-m)	<b>immun/o</b> = protection	Disease involving a defect in the cell-mediated immunity system. A syndrome of opportunistic infections occurring in the final stages of infection with the human immunodeficiency virus (HIV). This virus attacks T4 lymphocytes and destroys them, reducing the person's ability to fight infection.



## Pathology (continued)

Term	Word Parts	Definition
<b>AIDS-related complex (ARC)</b>		Early stage of AIDS. There is a positive test for the virus, but only mild symptoms of weight loss, fatigue, skin rash, and anorexia.
<b>graft versus host disease (GVHD)</b>		Serious complication of bone marrow transplant (graft). Immune cells from the donor bone marrow attack the recipient's (host's) tissues.
<b>human immunodeficiency virus (HIV)</b> (im-yoo-noh-dee-FIH-shen-see)	<b>immun/o</b> = protection	Virus that causes AIDS; also known as a <b>retrovirus</b> .
<div> <div>  </div> <div> <p>■ <b>Figure 6.17</b> Color enhanced scanning electron micrograph of HIV virus (red) infecting T-helper cells (green). (NIBSC/Science Photo Library/Science Source)</p> </div> </div>		
<b>immunocompromised</b> (im-you-noh-KOM-pro-mized)	<b>immun/o</b> = protection	Having an immune system that is unable to respond properly to pathogens. Also called <i>immunodeficiency disorder</i> .
<b>Kaposi's sarcoma (KS)</b> (KAP-oh-seez / sar-KOH-mah)	<b>sarc/o</b> = flesh <b>-oma</b> = tumor	Form of skin cancer frequently seen in patients with AIDS. It consists of brownish-purple papules that spread from the skin and metastasize to internal organs. Named for dermatologist Moritz Kaposi.
<b>opportunistic infections</b>		Infectious diseases associated with patients who have compromised immune systems and therefore a lowered resistance to infections and parasites. May be the result of HIV infection.
<b>pneumocystis pneumonia (PCP)</b> (noo-moh-SIS-tis / noo-MOH-nee-ah)	<b>pneumon/o</b> = lung <b>-ia</b> = condition	Pneumonia common in patients with weakened immune systems, such as AIDS patients, caused by the <i>Pneumocystis jiroveci</i> fungus.
<b>sarcoidosis</b> (sar-koyd-OH-sis)	<b>-osis</b> = abnormal condition	Disease of unknown cause that forms fibrous lesions commonly appearing in the lymph nodes, liver, skin, lungs, spleen, eyes, and small bones of the hands and feet.
<b>severe combined immunodeficiency syndrome (SCIDS)</b>	<b>immun/o</b> = protection	Disease seen in children born with a nonfunctioning immune system. Often these children are forced to live in sealed sterile rooms.

## Practice As You Go

### H. Terminology Matching

Match each term to its definition.

- |                                 |   |
|---------------------------------|---|
| 1. _____ allergy                | a. seen in an allergic reaction           |
| 2. _____ hives                  | b. complication of bone marrow transplant |
| 3. _____ Hodgkin's disease      | c. a hypersensitivity reaction            |
| 4. _____ sarcoidosis            | d. a type of cancer                       |
| 5. _____ graft vs. host disease | e. autoimmune disease                     |

## Diagnostic Procedures

Term	Word Parts	Definition
<b>Clinical Laboratory Tests</b>		
<b>enzyme-linked immunosorbent assay (ELISA)</b> (EN-zym / LINKT / im-yoo-noh-sor-bent / ASS-say)	<b>immun/o</b> = protection	Blood test for an antibody to the HIV virus. A positive test means that the person has been exposed to the virus. There may be a false-positive reading, and then the Western blot test would be used to verify the results.
<b>Western blot</b>		Test used as a backup to the ELISA blood test to detect the presence of the antibody to HIV (AIDS virus) in the blood.
<b>Diagnostic Imaging</b>		
<b>lymphangiogram</b> (lim-FAN-jee-oh-gram)	<b>lymphangi/o</b> = lymph vessel <b>-gram</b> = record	X-ray record of the lymphatic vessels produced by lymphangiography.
<b>lymphangiography</b> (lim-FAN-jee-oh-graf-ee)	<b>lymphangi/o</b> = lymph vessel <b>-graphy</b> = process of recording	X-ray taken of the lymph vessels after the injection of dye into the foot. The lymph flow through the chest is traced.
<b>Additional Diagnostic Procedures</b>		
<b>Monospot</b>		Blood test for infectious mononucleosis.
<b>scratch test</b>		Form of allergy testing in which the body is exposed to an allergen through a light scratch on the skin. See Figure 6.18 ■.

## Diagnostic Procedures (continued)



A



B

■ **Figure 6.18** A - Scratch test; patient is exposed to allergens through light scratch in the skin. B - Positive scratch test results. Inflammation indicates person is allergic to that substance. (A - James King-Holmes/Science Photo Library/Science Source.; B - Southern Illinois University/Science Source.)

## Therapeutic Procedures

Term	Word Parts	Definition
<b>Medical Procedures</b>		
<b>immunotherapy</b> (IM-yoo-noh-thair-ah-pee)	<b>immun/o</b> = protection <b>-therapy</b> = treatment	Giving a patient an injection of immunoglobulins or antibodies in order to treat a disease. The antibodies may be produced by another person or animal, for example, antivenom for snake bites. More recent developments include treatments to boost the activity of the immune system, especially to treat cancer and AIDS.
<b>vaccination</b> (vak-sih-NAY-shun)		Exposure to a weakened pathogen that stimulates the immune response and antibody production in order to confer protection against the full-blown disease. Also called <i>immunization</i> .
<b>Surgical Procedures</b>		
<b>adenoidectomy</b> (add-eh-noyd-EK-toh-mee)	<b>adenoid/o</b> = adenoids <b>-ectomy</b> = surgical removal	Surgical removal of the adenoids.
<b>lymphadenectomy</b> (lim-fad-eh-NEK-toh-mee)	<b>lymphaden/o</b> = lymph node <b>-ectomy</b> = surgical removal	Removal of a lymph node. This is usually done to test for malignancy.
<b>splenectomy</b> (splee-NEK-toh-mee)	<b>splen/o</b> = spleen <b>-ectomy</b> = surgical removal	Surgical removal of the spleen.
<b>thymectomy</b> (thigh-MEK-toh-mee)	<b>thym/o</b> = thymus gland <b>-ectomy</b> = surgical removal	Surgical removal of the thymus gland.
<b>tonsillectomy</b> (ton-sih-LEK-toh-mee)	<b>tonsill/o</b> = tonsils <b>-ectomy</b> = surgical removal	Surgical removal of the tonsils.

## Pharmacology

Classification		Action	Examples
<b>antihistamine</b> (an-tih-HIST-ah-meen)	<b>anti-</b> = against	Blocks the effects of histamine released by the body during an allergic reaction.	cetirizine, Zyrtec; diphenhydramine, Benadryl
<b>corticosteroids</b> (core-tih-koh-STARE-royds)	<b>cortic/o</b> = outer layer	A hormone produced by the adrenal cortex that has very strong anti-inflammatory properties. Particularly useful in treating autoimmune diseases.	prednisone; methylprednisolone, Solu-Medrol
<b>immunosuppressants</b> (im-yoo-noh-sue-PRESS-antz)	<b>immun/o</b> = protection	Block certain actions of the immune system. Required to prevent rejection of a transplanted organ.	mycophenolate mofetil, CellCept; cyclosporine, Neoral
<b>protease inhibitor drugs</b> (PROH-tee-ace)		Inhibit protease, an enzyme viruses need to reproduce.	indinavir, Crixivan; saquinavir, Fortovase
<b>reverse transcriptase inhibitor drugs</b> (trans-KRIP-tays)		Inhibit reverse transcriptase, an enzyme needed by viruses to reproduce.	lamivudine, Epivir; zidovudine, Retrovir

## Practice As You Go

### I. Match each procedure term with its definition

- |                           |   |
|---------------------------|---|
| 1. _____ ELISA            | a. test for mononucleosis               |
| 2. _____ vaccination      | b. an X-ray                             |
| 3. _____ scratch test     | c. immunization                         |
| 4. _____ Monospot         | d. allergy testing                      |
| 5. _____ lymphangiography | e. blood test for antibody to HIV virus |

## Abbreviations

<b>AIDS</b>	acquired immunodeficiency syndrome	<b>KS</b>	Kaposi's sarcoma
<b>ARC</b>	AIDS-related complex	<b>mono</b>	mononucleosis
<b>ELISA</b>	enzyme-linked immunosorbent assay	<b>NHL</b>	non-Hodgkin's lymphoma
<b>GVHD</b>	graft versus host disease	<b>NK</b>	natural killer cells
<b>HD</b>	Hodgkin's disease	<b>PCP</b>	pneumocystis pneumonia
<b>HIV</b>	human immunodeficiency virus	<b>SCIDS</b>	severe combined immunodeficiency syndrome
<b>Ig</b>	immunoglobulins (IgA, IgD, IgE, IgG, IgM)		

## Practice As You Go

### J. What's the Abbreviation?

1. acquired immunodeficiency syndrome \_\_\_\_\_
2. AIDS-related complex \_\_\_\_\_
3. human immunodeficiency virus \_\_\_\_\_
4. mononucleosis \_\_\_\_\_
5. Kaposi's sarcoma \_\_\_\_\_
6. immunoglobulin \_\_\_\_\_
7. severe combined immunodeficiency syndrome \_\_\_\_\_
8. pneumocystis pneumonia \_\_\_\_\_



# Chapter Review

## Real-World Applications

### Medical Record Analysis

This Discharge Summary contains 11 medical terms. Underline each term and write it in the list below the report. Then define each term. Note: Some terms are defined in other chapters; use your glossary-index to locate and define these terms.

#### Discharge Summary


Admitting Diagnosis:	Splenomegaly, weight loss, diarrhea, fatigue, chronic cough
Final Diagnosis:	Non-Hodgkin's lymphoma of spleen; splenectomy
History of Present Illness:	Patient is a 36-year-old businessman who was first seen in the office with complaints of feeling generally "rundown," intermittent diarrhea, weight loss, and, more recently, a dry cough. He states he has been aware of these symptoms for approximately six months. Monospot and ELISA are both negative. In spite of a 35-pound weight loss, he has abdominal swelling and splenomegaly was detected. He was admitted to the hospital for further evaluation and treatment.
Summary of Hospital Course:	Full-body MRI confirmed splenomegaly and located a 3-cm encapsulated tumor in the spleen. Biopsies taken from the splenic tumor confirmed the diagnosis of non-Hodgkin's lymphoma. The patient underwent splenectomy for removal of the tumor.
Discharge Plans:	Patient was discharged home following recovery from the splenectomy. The abdominal swelling and diarrhea were resolved, but the dry cough persisted. He was referred to an oncologist for evaluation and surveillance for metastases.

Term	Definition
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____
7. _____	_____
8. _____	_____
9. _____	_____
10. _____	_____
11. _____	_____



### Chart Note Transcription

The chart note below contains 10 phrases that can be reworded with a medical term that you learned in this chapter. Each phrase is identified with an underline. Determine the medical term and write your answers in the space provided.

Pearson General Hospital Consultation Report	
Task	Edit View Time Scale Options Help Download Archive Date: 17 May 2015
	
Current Complaint:	Patient is a 22-year-old female referred to the <u>specialist in treating blood disorders</u> <b>1</b> by her internist. Her complaints include fatigue, weight loss, and easy bruising.
Past History:	Patient had normal childhood diseases. She is a college student and was feeling well until symptoms gradually appeared starting approximately three months ago.
Signs and Symptoms:	An <u>immunoassay test for HIV exposure</u> <b>2</b> was normal. The <u>measure of the blood's coagulation abilities</u> <b>3</b> indicated that the blood took too long to form a clot. A <u>blood test to count all the blood cells</u> <b>4</b> reported <u>too few red blood cells</u> <b>5</b> and <u>too few clotting cells</u> . <b>6</b> There were <u>too many white blood cells</u> , <b>7</b> but they were immature and abnormal. A <u>sample of bone marrow obtained for microscopic examination</u> <b>8</b> found an excessive number of immature white blood cells.
Diagnosis:	<u>Cancer of the white blood cell-forming bone marrow.</u> <b>9</b>
Treatment:	Aggressive chemotherapy for the <u>cancer of the white blood cell-forming bone marrow</u> <b>9</b> and <u>replacement blood from another person</u> <b>10</b> to replace the erythrocytes and platelets.
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____
6.	_____
7.	_____
8.	_____
9.	_____
10.	_____

## Case Study

Below is a case study presentation of a patient with a condition covered in this chapter. Read the case study and answer the questions below. Some questions will ask for information not included within this chapter. Use your text, a medical dictionary, or any other reference material you choose to answer these questions.



(Flashon Studio/Shutterstock)

A two-year-old boy is being seen by a hematologist. The child's symptoms include the sudden onset of high fevers, thrombopenia, epistaxis, gingival bleeding, petechiae, and ecchymoses after minor traumas. The physician has ordered a bone marrow aspiration to confirm the clinical diagnosis of acute lymphocytic leukemia. If the diagnosis is positive, the child will be placed immediately on intensive chemotherapy. The physician has informed the parents that treatment produces remission in 90% of children with ALL, especially those between the ages of two and eight.

## Questions

1. What pathological condition does the hematologist suspect? Look this condition up in a reference source and include a short description of it.

---



---

2. List and define each of the patient's presenting symptoms in your own words.

---



---

3. What diagnostic test did the physician perform? Describe it in your own words.

---



---

4. Explain the phrase "clinical diagnosis" in your own words.

---



---

5. If the suspected diagnosis is correct, explain the treatment that will begin.

---



---

6. What do you think the term "remission" means?

---



---

## Practice Exercises

### A. Word Building Practice

The combining form **splen/o** refers to the spleen. Use it to write a term that means:

1. enlargement of the spleen \_\_\_\_\_
2. surgical removal of the spleen \_\_\_\_\_
3. cutting into the spleen \_\_\_\_\_

The combining form **lymph/o** refers to the lymph. Use it to write a term that means:

4. lymph cells \_\_\_\_\_
5. tumor of the lymph system \_\_\_\_\_

The combining form **lymphaden/o** refers to the lymph nodes. Use it to write a term that means:

6. disease of a lymph gland \_\_\_\_\_
7. tumor of a lymph gland \_\_\_\_\_
8. inflammation of a lymph gland \_\_\_\_\_

The combining form **immun/o** refers to the immune system. Use it to write a term that means:

9. specialist in the study of the immune system \_\_\_\_\_
10. immune protein \_\_\_\_\_
11. study of the immune system \_\_\_\_\_

The combining form **hemat/o** refers to blood. Use it to write a term that means:

12. relating to the blood \_\_\_\_\_
13. blood tumor or mass \_\_\_\_\_
14. blood formation \_\_\_\_\_

The combining form **hem/o** refers to blood. Use it to write a term that means:

15. blood destruction \_\_\_\_\_
16. blood protein \_\_\_\_\_

The suffix **-penia** refers to too few (cells). Use it to write a term that means:

17. too few white (cells) \_\_\_\_\_
18. too few red (cells) \_\_\_\_\_
19. too few of all cells \_\_\_\_\_

The suffix **-cytosis** refers to more than the normal number of cells. Use it to write a term that means:

20. more than the normal number of white cells \_\_\_\_\_

21. more than the normal number of red cells \_\_\_\_\_

22. more than the normal number of clotting cells \_\_\_\_\_

The suffix **-cyte** refers to cells. Use it to write a term that means:

23. red cell \_\_\_\_\_

24. white cell \_\_\_\_\_

25. lymph cell \_\_\_\_\_

## B. What Does it Stand For?

1. basos \_\_\_\_\_

2. CBC \_\_\_\_\_

3. Hgb \_\_\_\_\_

4. PT \_\_\_\_\_

5. GVHD \_\_\_\_\_

6. RBC \_\_\_\_\_

7. PCV \_\_\_\_\_

8. ESR \_\_\_\_\_

9. diff \_\_\_\_\_

10. lymphs \_\_\_\_\_

## C. Identify the Combining Form

	Combining Form	Example from Chapter
1. lymph node	_____	_____
2. clot	_____	_____
3. blood	_____	_____
4. tonsil	_____	_____
5. eat/swallow	_____	_____
6. lymph vessel	_____	_____
7. disease	_____	_____
8. spleen	_____	_____
9. lymph	_____	_____

**D. Fill in the Blank**

Kaposi's sarcoma	mononucleosis	Hodgkin's disease	aplastic
polycythemia vera	anaphylactic shock	AIDS	pernicious
pneumocystis	HIV		

- The condition characterized by the production of too many red blood cells is called \_\_\_\_\_.
- The Epstein–Barr virus is thought to be responsible for what infectious disease? \_\_\_\_\_.
- A life-threatening allergic reaction is \_\_\_\_\_.
- The virus responsible for causing AIDS is \_\_\_\_\_.
- A cancer that is seen frequently in AIDS patients is \_\_\_\_\_.
- An ELISA is used to test for \_\_\_\_\_.
- Malignant tumors concentrate in lymph nodes with this disease: \_\_\_\_\_.
- A type of pneumonia seen in AIDS patients is \_\_\_\_\_ pneumonia.
- \_\_\_\_\_ anemia is a severe form of anemia caused by nonfunctioning red bone marrow.
- \_\_\_\_\_ anemia is the result of a vitamin B<sub>12</sub> deficiency.

**E. Pharmacology Challenge**

Fill in the classification for each drug description, then match the brand name.

Drug Description	Classification	Brand Name
1. _____ inhibits enzyme needed for viral reproduction	_____	a. HepLock
2. _____ prevents blood clot formation	_____	b. Activase
3. _____ stops bleeding	_____	c. Solu-Medrol
4. _____ blocks effects of histamine	_____	d. Amicar
5. _____ prevents rejection of a transplanted organ	_____	e. Epivir
6. _____ dissolves existing blood clots	_____	f. CellCept
7. _____ increases number of erythrocytes	_____	g. Procrit
8. _____ strong anti-inflammatory properties	_____	h. Zyrtec
9. _____ interferes with action of platelets	_____	i. Plavix

**F. Terminology Matching**

Match each term to its definition.

- |   |   |
|---|---|
| 1. _____ culture and sensitivity        | a. measure of blood's clotting ability                          |
| 2. _____ hematocrit                     | b. counts number of each type of blood cell                     |
| 3. _____ complete blood count           | c. examines cells for abnormal shape                            |
| 4. _____ erythrocyte sedimentation rate | d. checks blood for bacterial growth and best antibiotic to use |
| 5. _____ prothrombin time               | e. determines number of each type of white blood cell           |
| 6. _____ white cell differential        | f. measures percent of whole blood that is red blood cells      |
| 7. _____ red cell morphology            | g. an indicator of the presence of an inflammatory condition    |

**G. Define the Term**

1. immunotherapy \_\_\_\_\_
2. Western blot \_\_\_\_\_
3. opportunistic infection \_\_\_\_\_
4. urticaria \_\_\_\_\_
5. inflammation \_\_\_\_\_
6. homologous transfusion \_\_\_\_\_
7. pernicious anemia \_\_\_\_\_
8. leukemia \_\_\_\_\_
9. hemorrhage \_\_\_\_\_
10. septicemia \_\_\_\_\_

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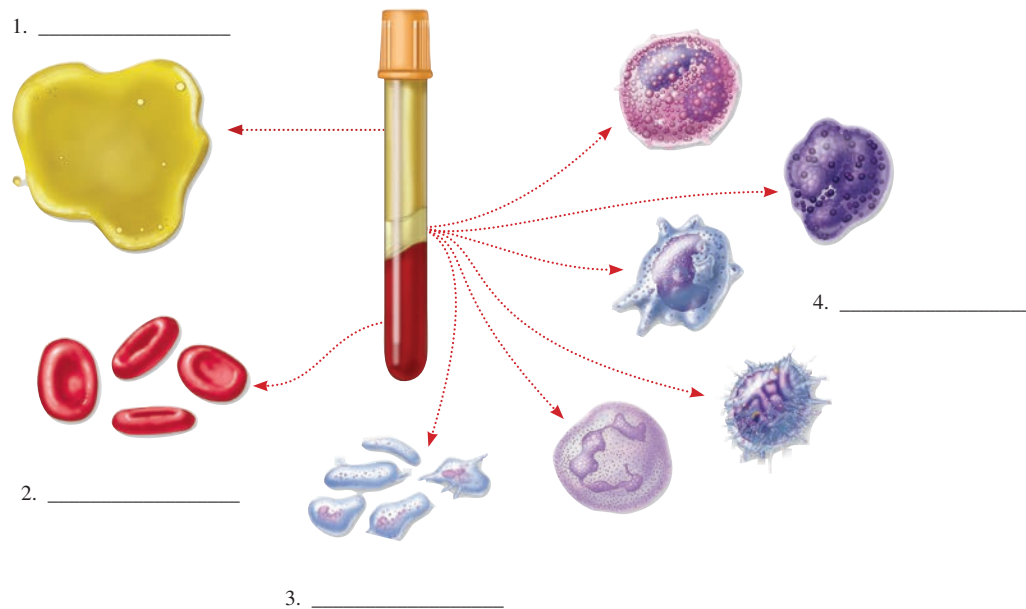
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## Labeling Exercise

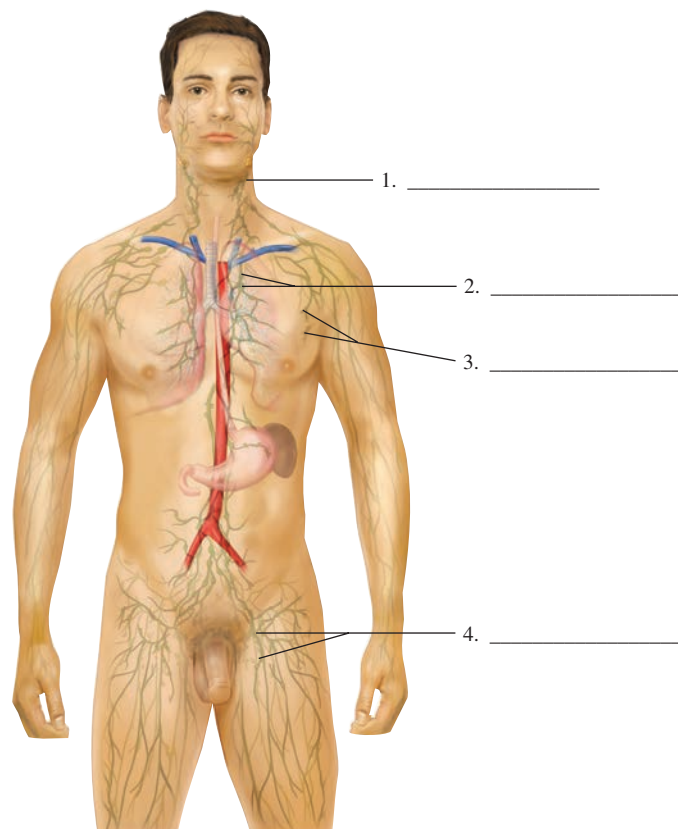
### Image A

Write the labels for this figure on the numbered lines provided.



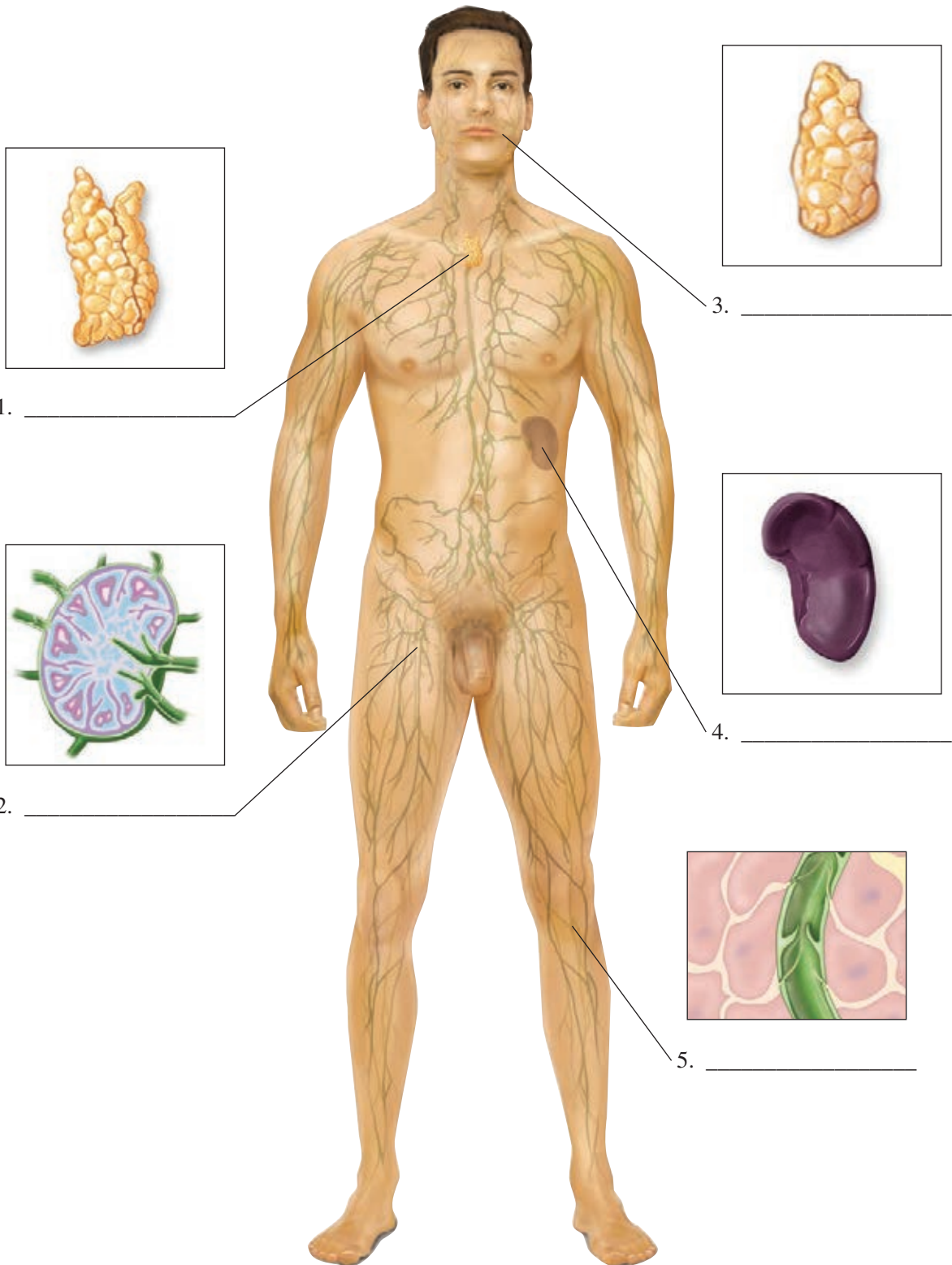
### Image B

Write the labels for this figure on the numbered lines provided.



### Image C

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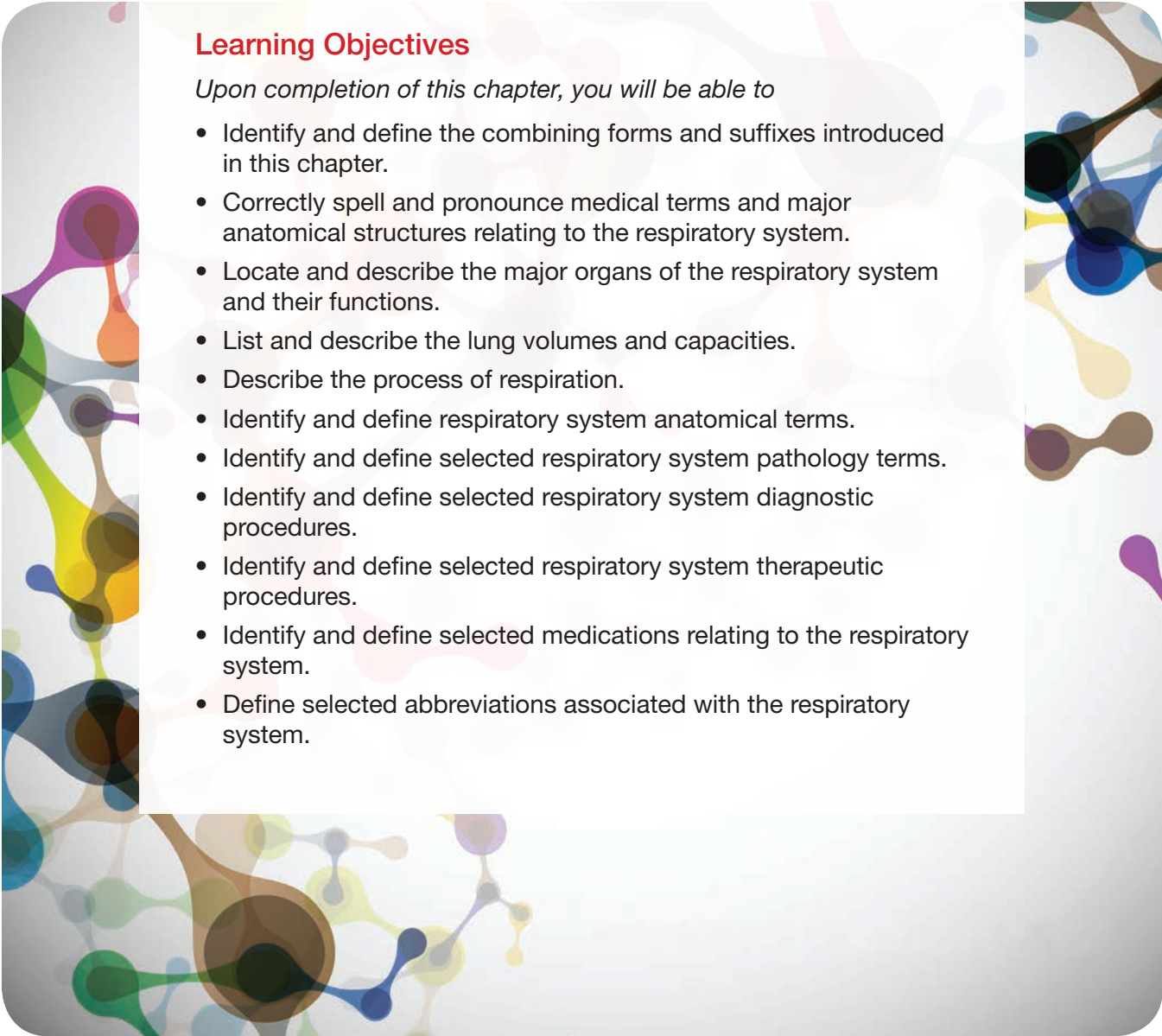


# 7

## Respiratory System

### Learning Objectives

*Upon completion of this chapter, you will be able to*

- Identify and define the combining forms and suffixes introduced in this chapter.
  - Correctly spell and pronounce medical terms and major anatomical structures relating to the respiratory system.
  - Locate and describe the major organs of the respiratory system and their functions.
  - List and describe the lung volumes and capacities.
  - Describe the process of respiration.
  - Identify and define respiratory system anatomical terms.
  - Identify and define selected respiratory system pathology terms.
  - Identify and define selected respiratory system diagnostic procedures.
  - Identify and define selected respiratory system therapeutic procedures.
  - Identify and define selected medications relating to the respiratory system.
  - Define selected abbreviations associated with the respiratory system.
- 



# Respiratory System at a Glance

## Function

The organs of the respiratory system are responsible for bringing fresh air into the lungs, exchanging oxygen for carbon dioxide between the air sacs of the lungs and the bloodstream, and exhaling the stale air.

## Organs

Here are the primary structures that comprise the respiratory system:

<b>nasal cavity</b>	<b>trachea</b>
<b>pharynx</b>	<b>bronchial tubes</b>
<b>larynx</b>	<b>lungs</b>

## Word Parts

Here are the most common word parts (with their meanings) used to build respiratory system terms. For a more comprehensive list, refer to the Terminology section of this chapter.

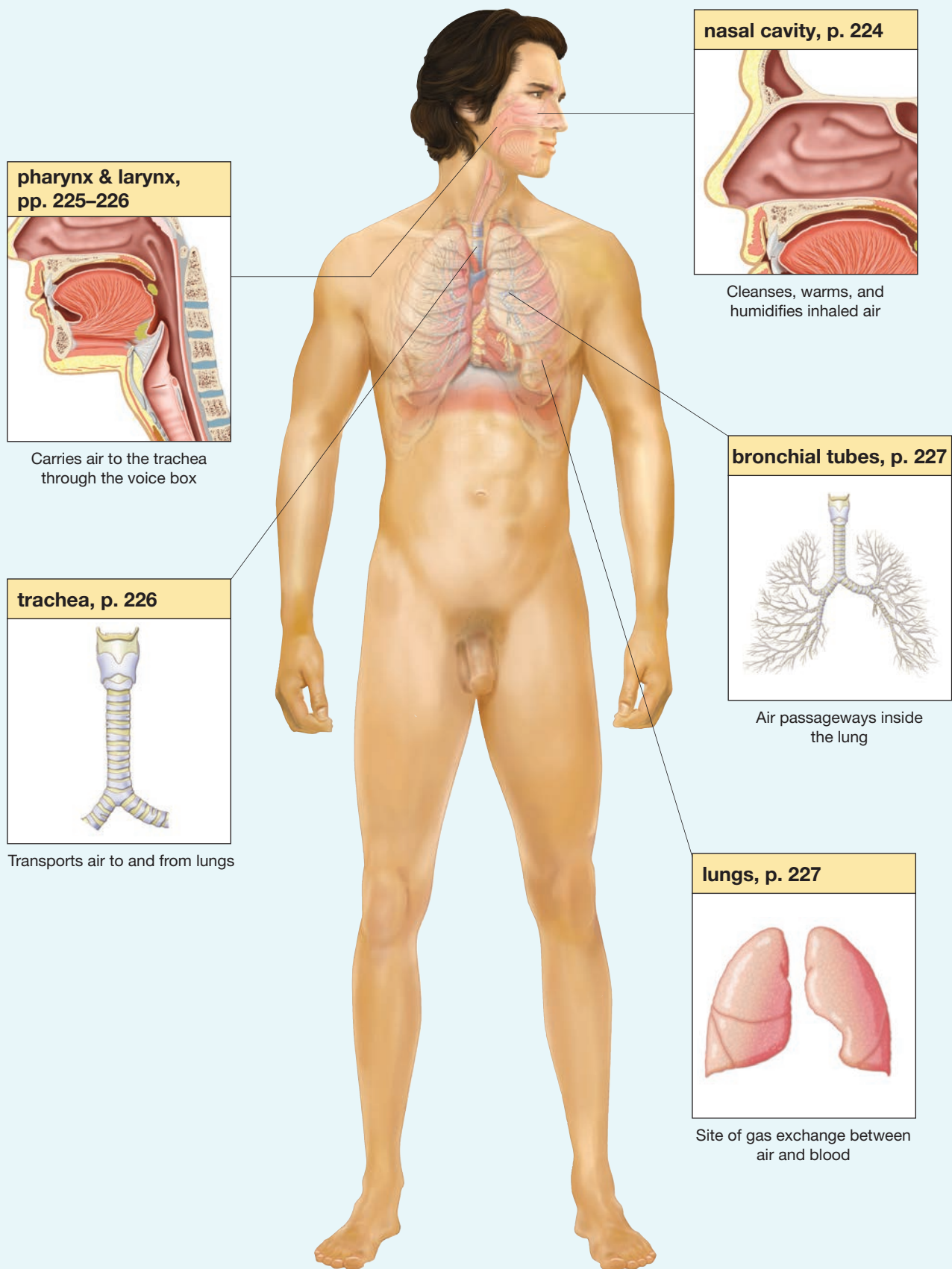
### Combining Forms

<b>aer/o</b>	air	<b>muc/o</b>	mucus
<b>alveol/o</b>	alveolus	<b>nas/o</b>	nose
<b>anthrac/o</b>	coal	<b>ox/o, ox/i</b>	oxygen
<b>atel/o</b>	incomplete	<b>pharyng/o</b>	pharynx
<b>bronch/o</b>	bronchus	<b>pleur/o</b>	pleura
<b>bronchi/o</b>	bronchus	<b>pneum/o</b>	lung, air
<b>bronchiol/o</b>	bronchiole	<b>pneumon/o</b>	lung, air
<b>coni/o</b>	dust	<b>pulmon/o</b>	lung
<b>cyan/o</b>	blue	<b>rhin/o</b>	nose
<b>cyst/o</b>	sac	<b>sept/o</b>	wall
<b>diaphragmat/o</b>	diaphragm	<b>sinus/o</b>	sinus
<b>epiglott/o</b>	epiglottis	<b>somn/o</b>	sleep
<b>hal/o</b>	to breathe	<b>spir/o</b>	breathing
<b>laryng/o</b>	larynx	<b>trache/o</b>	trachea
<b>lob/o</b>	lobe	<b>tuss/o</b>	cough

### Suffixes

<b>-capnia</b>	carbon dioxide	<b>-pnea</b>	breathing
<b>-osmia</b>	smell	<b>-ptysis</b>	spitting
<b>-phonia</b>	voice	<b>-thorax</b>	chest

# Respiratory System Illustrated





# Anatomy and Physiology of the Respiratory System

**bronchial tubes** (BRONG-key-all)  
**carbon dioxide**  
**exhalation** (eks-hah-LAY-shun)  
**external respiration**  
**inhalation** (in-hah-LAY-shun)  
**internal respiration**  
**larynx** (LAIR-inks)

**lungs**  
**nasal cavity** (NAY-zl)  
**oxygen** (OK-sih-jen)  
**pharynx** (FAIR-inks)  
**trachea** (TRAY-kee-ah)  
**ventilation**

The organs of the respiratory system include the **nasal cavity**, **pharynx**, **larynx**, **trachea**, **bronchial tubes**, and **lungs**. These organs function together to perform the mechanical and, for the most part, unconscious mechanism of respiration. The cells of the body require the continuous delivery of oxygen and removal of carbon dioxide. The respiratory system works in conjunction with the cardiovascular system to deliver oxygen to all the cells of the body. The process of respiration must be continuous; interruption for even a few minutes can result in brain damage and/or death.

The process of respiration can be subdivided into three distinct parts: **ventilation**, **external respiration**, and **internal respiration**. Ventilation is the flow of air between the outside environment and the lungs. **Inhalation** is the flow of air into the lungs, and **exhalation** is the flow of air out of the lungs. Inhalation brings fresh **oxygen** (O<sub>2</sub>) into the air sacs, while exhalation removes **carbon dioxide** (CO<sub>2</sub>) from the body.

External respiration refers to the exchange of oxygen and carbon dioxide that takes place in the lungs. These gases diffuse in opposite directions between the air sacs of the lungs and the bloodstream. Oxygen enters the bloodstream from the air sacs to be delivered throughout the body. Carbon dioxide leaves the bloodstream and enters the air sacs to be exhaled from the body.

Internal respiration is the process of oxygen and carbon dioxide exchange at the cellular level when oxygen leaves the bloodstream and is delivered to the tissues. Oxygen is needed for the body cells' metabolism, all the physical and chemical changes within the body that are necessary for life. The by-product of metabolism is the formation of a waste product, carbon dioxide. The carbon dioxide enters the bloodstream from the tissues and is transported back to the lungs for disposal.

## Nasal Cavity

**cilia** (SIL-ee-ah)  
**mucus** (MYOO-kus)  
**mucous membrane**  
**nares** (NAIR-eez)

**nasal septum**  
**palate** (PAL-at)  
**paranasal sinuses** (pair-ah-NAY-zl)

### What's In A Name?

Look for these word parts:

**hal/o** = to breathe

**ox/i** = oxygen

**-al** = pertaining to

**di-** = two

**ex-** = outward

**in-** = inward

### Word Watch

The terms *inhalation* and *inspiration* (**in-** = inward + **spir/o** = breathing) can be used interchangeably. Similarly, the terms *exhalation* and *expiration* (**ex-** = outward + **spir/o** = breathing) are interchangeable.

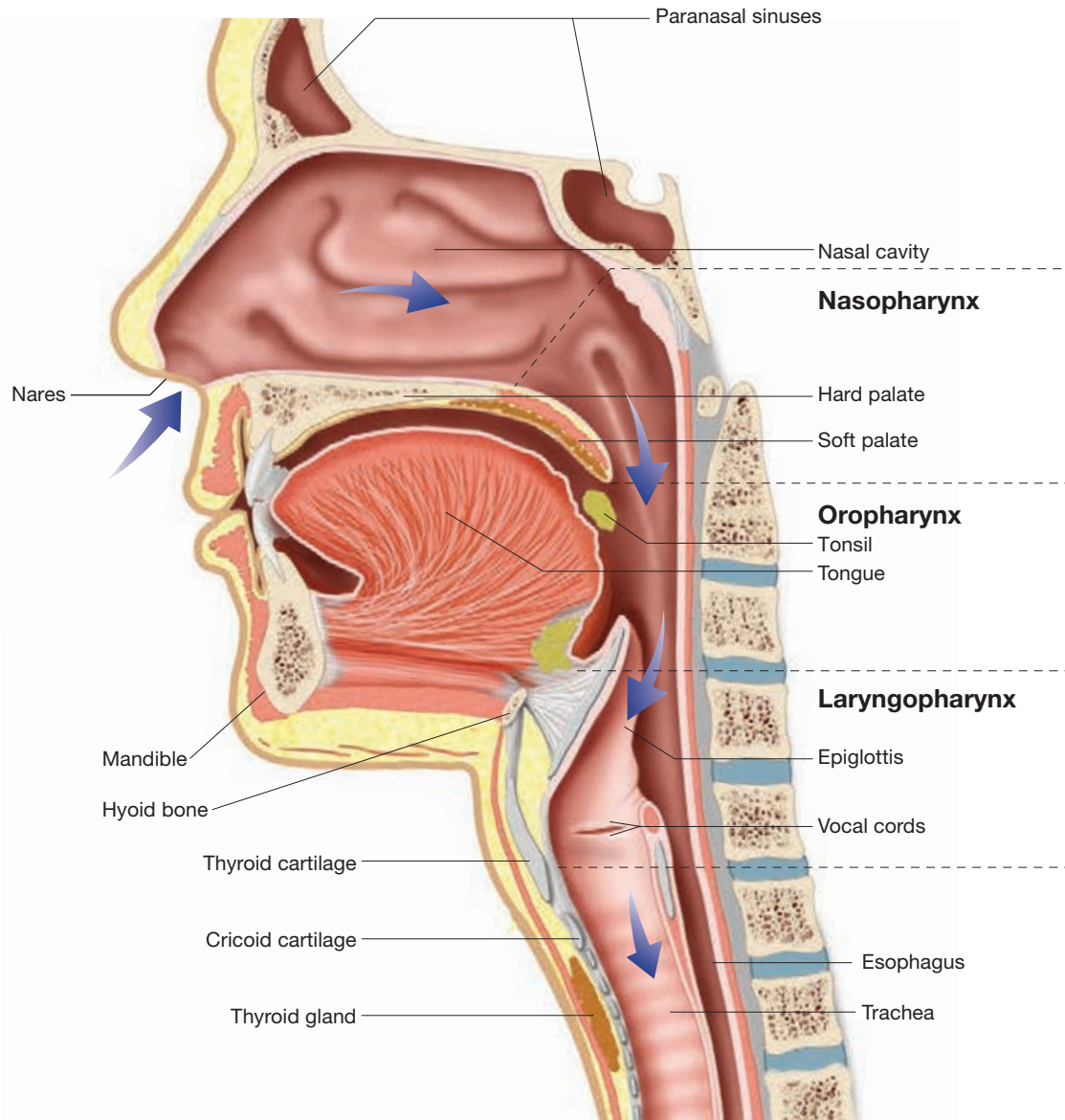
### What's In A Name?

Look for these word parts:

**muc/o** = mucus

**-ous** = pertaining to

The process of ventilation begins with the nasal cavity. Air enters through two external openings in the nose called the **nares**. The nasal cavity is divided down the middle by the **nasal septum**, a cartilaginous plate. The **palate** in the roof of the mouth separates the nasal cavity above from the mouth below. The walls of the nasal cavity and the nasal septum are made up of flexible cartilage covered with **mucous membrane** (see Figure 7.1 ■). In fact, much of the respiratory tract is covered with mucous membrane, which secretes a sticky fluid, **mucus**, to help



■ **Figure 7.1** Sagittal section of upper respiratory system illustrating the internal anatomy of the nasal cavity, pharynx, larynx, and trachea.

cleanse the air by trapping dust and bacteria. Since this membrane is also wet, it moisturizes inhaled air as it passes by the surface of the cavity. Very small hairs or **cilia** line the opening to the nose (as well as much of the airways), and filter out large dirt particles before they can enter the lungs. Capillaries in the mucous membranes warm inhaled air as it passes through the airways. Additionally, several **paranasal sinuses**, or air-filled cavities, are located within the facial bones. The sinuses act as an echo chamber during sound production and give resonance to the voice.

## Pharynx

**adenoids** (ADD-eh-noydz)

**auditory tube**

**eustachian tube** (yoo-STAY-she-en)

**laryngopharynx** (lair-ring-goh-FAIR-inks)

**lingual tonsils** (LING-gwal)

**nasopharynx** (nay-zoh-FAIR-inks)

**oropharynx** (or-oh-FAIR-inks)

**palatine tonsils** (PAL-ah-tine)

**pharyngeal tonsils** (fair-IN-jee-al)

### Med Term Tip

Anyone who has experienced a nosebleed, or *epistaxis*, is aware of the plentiful supply of blood vessels in the nose.

### Word Watch

The term *cilia* means hair, and there are other body systems that have cilia or cilia-like processes. For example, when discussing the eye, *cilia* means eyelashes.

**What's In A Name?**

Look for these word parts:

**audit/o** = hearing

**lingu/o** = tongue

**-al** = pertaining to

**-ory** = pertaining to

**Med Term Tip**

In the early 1970s it was common practice to remove the tonsils and adenoids in children suffering from repeated infections. However, it is now understood how important these organs are to remove pathogens from the air we breathe and the food we eat. Antibiotic treatment has also reduced the severity of infections.

**What's In A Name?**

Look for these word parts:

**epi-** = above

**Med Term Tip**

Stuttering may actually result from faulty neuromuscular control of the larynx. Some stutterers can sing or whisper without difficulty. Both singing and whispering involve movements of the larynx that differ from those required for regular speech.

**Med Term Tip**

The term *Adam's apple* is thought to come from a fable that when Adam realized he had sinned in the Garden of Eden, he was unable to swallow the apple in his throat.

Air next enters the pharynx, also called the *throat*, which is used by both the respiratory and digestive systems. At the end of the pharynx, air enters the trachea while food and liquids are shunted into the esophagus.

The pharynx is roughly a five inch-long tube consisting of three parts: the upper **nasopharynx**, middle **oropharynx**, and lower **laryngopharynx** (see again Figure 7.1). Three pairs of tonsils (collections of lymphatic tissue) are located in the pharynx. Tonsils are strategically placed to help keep pathogens from entering the body through either the air breathed or food and liquid swallowed. The nasopharynx, behind the nose, contains the **adenoids** or **pharyngeal tonsils**. The oropharynx, behind the mouth, contains the **palatine tonsils** and the **lingual tonsils**. Tonsils are considered a part of the lymphatic system and are discussed in Chapter 6.

The opening of the **eustachian** or **auditory tube** is also found in the nasopharynx. The other end of this tube is in the middle ear. Each time you swallow, this tube opens to equalize air pressure between the middle ear and the outside atmosphere.

## Larynx

**epiglottis** (ep-ih-GLOT-iss)

**glottis** (GLOT-iss)

**thyroid cartilage** (THIGH-royd / CAR-tih-lij)

**vocal cords**

The larynx, or *voice box*, is a muscular structure located between the pharynx and the trachea and contains the **vocal cords** (see again Figure 7.1 and Figure 7.2 ■). The vocal cords are not actually cordlike in structure, but rather they are folds of membranous tissue that produce sound by vibrating as air passes through the **glottis**, the opening between the two vocal cords.

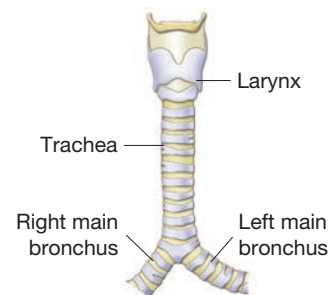
A flap of cartilaginous tissue, the **epiglottis**, sits above the glottis and provides protection against food and liquid being inhaled into the lungs. The epiglottis covers the larynx and trachea during swallowing and shunts food and liquid from the pharynx into the esophagus. The walls of the larynx are composed of several cartilage plates held together with ligaments and muscles. One of these cartilages, the **thyroid cartilage**, forms what is known as the *Adam's apple*. The thyroid cartilage is generally larger in males than in females and helps to produce the deeper male voice.

## Trachea

The trachea, also called the *windpipe*, is the passageway for air that extends from the pharynx and larynx down to the main bronchi (see Figure 7.3 ■). Measuring approximately four inches in length, it is composed of smooth muscle and



■ **Figure 7.2** The vocal cords within the larynx, superior view from the pharynx. (CNRI/Science Source)



■ **Figure 7.3** Structure of the trachea which extends from the larynx above to the main bronchi below.

cartilage rings and is lined by mucous membrane and cilia. Therefore, it also assists in cleansing, warming, and moisturizing air as it travels to the lungs.

## Bronchial Tubes

**alveoli** (al-VEE-oh-lye)

**bronchioles** (BRONG-key-ohlz)

**bronchus** (BRONG-kus)

**pulmonary capillaries**

**respiratory membrane**

The distal end of the trachea divides to form the left and right main (primary) bronchi. Each **bronchus** enters one of the lungs and branches repeatedly to form secondary and tertiary bronchi. Each branch becomes narrower until the narrowest branches, the **bronchioles**, are formed (see Figure 7.4 ■). Each bronchiole terminates in a small group of air sacs, called **alveoli**. Each lung has approximately 150 million alveoli. The walls of alveoli are elastic, giving them the ability to expand to hold air and then recoil to their original size. A network of **pulmonary capillaries** from the pulmonary blood vessels tightly encases each alveolus (see Figure 7.5 ■). In fact, the walls of the alveoli and capillaries are so tightly associated with each other they are referred to as a single unit, the **respiratory membrane**. The exchange of oxygen and carbon dioxide between the air within the alveolus and the blood inside the capillaries takes place across the respiratory membrane.

## Lungs

**apex**

**base**

**hilum** (HYE-lum)

**lobes**

**mediastinum** (mee-dee-ass-TYE-num)

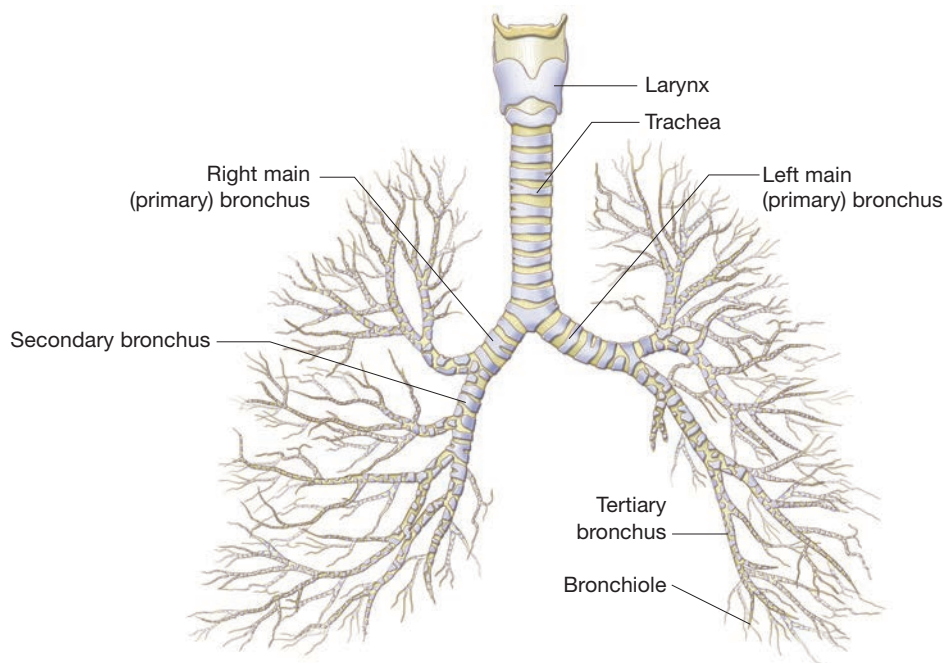
**parietal pleura** (pah-RYE-eh-tal)

**pleura** (PLOO-rah)

**pleural cavity**

**serous fluid** (SEER-us)

**visceral pleura** (VISS-er-al)



### What's In A Name?

Look for these word parts:

**bronchi/o** = bronchus

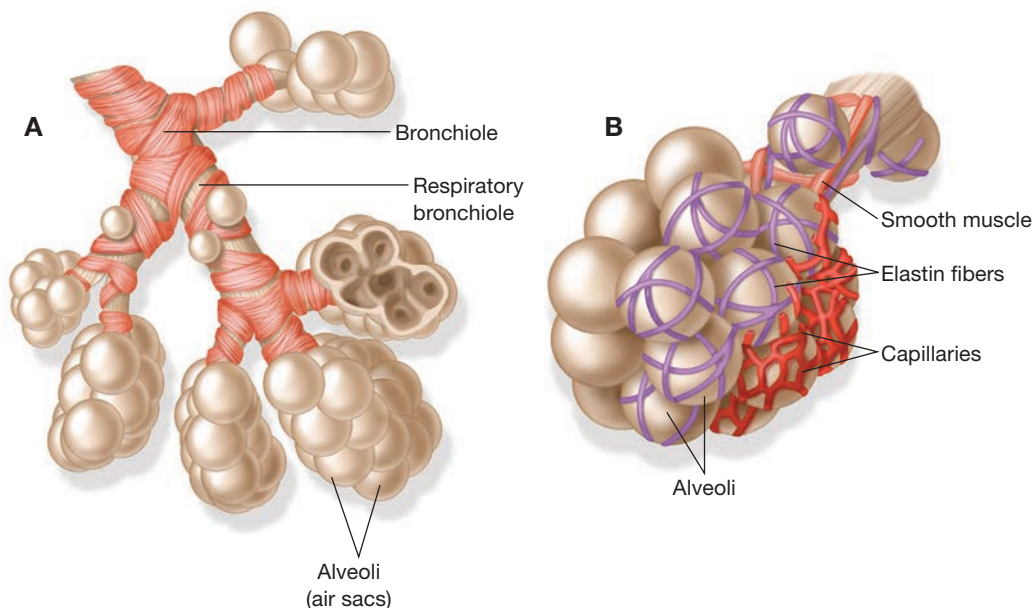
**-ole** = small

### Med Term Tip

The respiratory system can be thought of as an upside-down tree and its branches. The trunk of the tree consists of the pharynx, larynx, and trachea. The trachea then divides into two branches, the bronchi. Each bronchus divides into smaller and smaller branches. In fact, this branching system of tubes is referred to as the *bronchial tree*.

■ **Figure 7.4** The bronchial tree, note how each main bronchus enters a lung and then branches into smaller and smaller primary bronchi, secondary bronchi, and bronchioles.





■ **Figure 7.5** A) Each bronchiole terminates in an alveolar sac, a group of alveoli. B) Alveoli encased by network capillaries, forming the respiratory membrane.

#### What's In A Name?

Look for these word parts:

**pariet/o** = cavity wall

**viscer/o** = internal organs

**-al** = pertaining to

**-ous** = pertaining to

#### Med Term Tip

Some of the abnormal lung sounds heard with a stethoscope, such as crackling and rubbing, are made when the parietal and/or visceral pleura become inflamed and rub against one another.

Each lung is the total collection of the bronchi, bronchioles, and alveoli. They are spongy to the touch because they contain air. The lungs are protected by a double membrane called the **pleura**. The pleura's outer membrane is the **parietal pleura**, which also lines the wall of the chest cavity. The inner membrane, or **visceral pleura**, adheres to the surface of the lungs. The pleural membrane is folded in such a way that it forms a sac around each lung, referred to as the **pleural cavity**. There is normally slippery, watery **serous fluid** between the two layers of the pleura that reduces friction when the two layers rub together as the lungs repeatedly expand and contract.

The lungs contain divisions or **lobes**. There are three lobes in the larger right lung (right upper, right middle, and right lower lobes) and two in the left lung (left upper and left lower lobes). The pointed superior portion of each lung is the **apex**, while the broader lower area is the **base**. Entry of structures like the bronchi, pulmonary blood vessels, and nerves into each lung occurs along its medial border in an area called the **hilum**. The lungs within the thoracic cavity are protected from puncture and damage by the ribs. The area between the right and left lung is called the **mediastinum** and contains the heart, aorta, esophagus, thymus gland, and trachea. See Figure 7.6 ■ for an illustration of the lungs within the chest cavity.

## Lung Volumes and Capacities

pulmonary function test

respiratory therapist

For some types of medical conditions, like emphysema, it is important to measure the volume of air flowing in and out of the lungs to determine lung capacity. Lung volumes are measured by **respiratory therapists** to aid in determining the functioning level of the respiratory system. Collectively, these measurements are called **pulmonary function tests**. Table 7.1 ■ lists and defines the four lung volumes and four lung capacities.

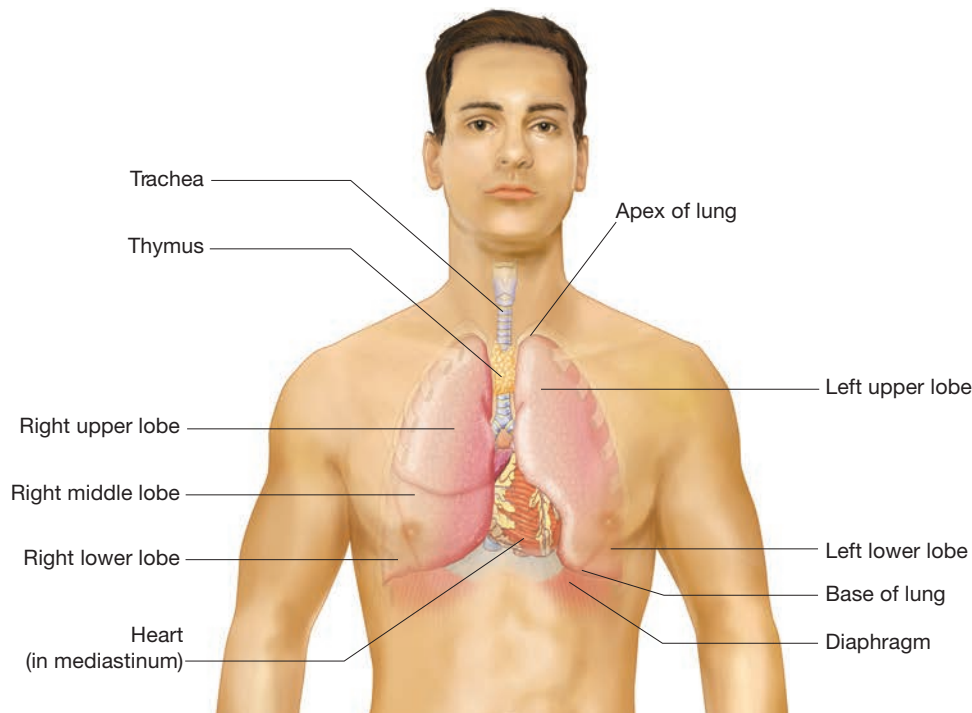
#### What's In A Name?

Look for these word parts:

**spir/o** = breathing

**-ory** = pertaining to

**re-** = again



■ **Figure 7.6** Position of the lungs within the thoracic cavity, anterior view illustrating regions of the lungs and their relationship to other thoracic organs.

## Respiratory Muscles

### diaphragm

### intercostal muscles (in-ter-KOS-tal)

Air moves in and out of the lungs due to the difference between the atmospheric pressure and the pressure within the chest cavity. The **diaphragm**, the muscle separating the abdomen from the thoracic cavity, produces this difference in pressure. To do this, the diaphragm contracts and moves downward. This increase in thoracic cavity volume causes a decrease in pressure, or negative thoracic pressure, within the chest cavity. Air then flows into the lungs (inhalation) to equalize the pressure. The **intercostal muscles** between the ribs assist in inhalation by raising the rib cage to further enlarge the thoracic cavity. See Figure 7.7 ■ for

### What's In A Name?

Look for these word parts:

cost/o = ribs

-al = pertaining to

inter- = between

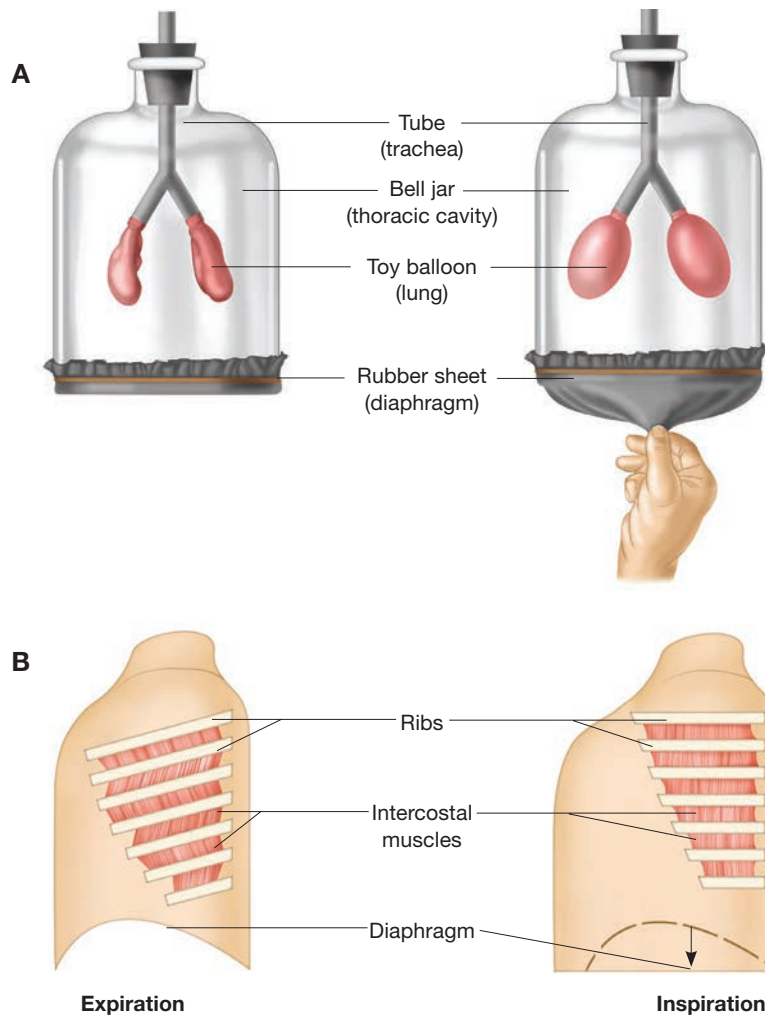
**Table 7.1** Lung Volumes and Capacities

Term	Definition
<b>Tidal volume (TV)</b>	The amount of air that enters the lungs in a single inhalation or leaves the lungs in a single exhalation of quiet breathing. In an adult this is normally 500 mL.*
<b>Inspiratory reserve volume (IRV)</b>	The amount of air that can be forcibly inhaled after a normal inspiration. Also called complemental air; generally measures around 3,000 mL.*
<b>Expiratory reserve volume (ERV)</b>	The amount of air that can be forcibly exhaled after a normal quiet exhalation. This is also called supplemental air; approximately 1,000 mL.*
<b>Residual volume (RV)</b>	The air remaining in the lungs after a forced exhalation; about 1,500 mL* in an adult.
<b>Inspiratory capacity (IC)</b>	The volume of air inhaled after a normal exhale.
<b>Functional residual capacity (FRC)</b>	The air that remains in the lungs after a normal exhalation has taken place.
<b>Vital capacity (VC)</b>	The total volume of air that can be exhaled after a maximum inhalation. This amount will be equal to the sum of TV, IRV, and ERV.
<b>Total lung capacity (TLC)</b>	The volume of air in the lungs after a maximal inhalation.

\* There is a normal range for measurements of the volume of air exchanged. The numbers given are for the average measurement.



■ **Figure 7.7** A) Bell jar apparatus demonstrating how downward movement of the diaphragm results in air flowing into the lungs. B) Action of the intercostal muscles lifts the ribs to assist the diaphragm in enlarging the volume of the thoracic cavity.



#### Med Term Tip

Diaphragmatic breathing is taught to singers and public speakers. You can practice this type of breathing by allowing your abdomen to expand during inhalation and contract during exhalation while your shoulders remain motionless.

an illustration of the role of the diaphragm in inhalation. Similarly, when the diaphragm and intercostal muscles relax, the thoracic cavity becomes smaller. This produces an increase in pressure within the cavity, or positive thoracic pressure, and air flows out of the lungs, resulting in exhalation. Therefore, a quiet, unforced exhalation is a passive process since it does not require any muscle contraction. When a forceful inhalation or exhalation is required, additional chest and neck muscles become active to create larger changes in thoracic pressure.

## Respiratory Rate

### vital signs

Respiratory rate (measured in breaths per minute) is one of our **vital signs** (VS), along with heart rate, temperature, and blood pressure. The respiratory rate is normally regulated by the level of  $\text{CO}_2$  in the blood. When the  $\text{CO}_2$  level is high, we breathe more rapidly to expel the excess. Likewise, when  $\text{CO}_2$  levels drop, our respiratory rate will also drop.

When the respiratory rate falls outside the range of normal, it may indicate an illness or medical condition. For example, when a patient is running an elevated temperature and has shortness of breath (SOB) due to pneumonia, the respiratory rate may increase dramatically. Or a brain injury or some medications, such as those for pain, can cause a decrease in the respiratory rate. See Table 7.2 ■ for normal respiratory rate ranges for different age groups.

**Table 7.2** Respiratory Rates for Different Age Groups

Age	Respirations Per Minute
Newborn	30–60
1-year-old	18–30
16-year-old	16–20
Adult	12–20

## Practice As You Go

### A. Complete the Statement

- The organs of the respiratory system are \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
- The passageway for food, liquids, and air is the \_\_\_\_\_.
- The \_\_\_\_\_ helps to keep food out of the respiratory tract.
- The muscle that divides the thoracic cavity from the abdominal cavity is the \_\_\_\_\_.
- The right lung has \_\_\_\_\_ lobes; the left lung has \_\_\_\_\_ lobes.
- The air sacs at the ends of the bronchial tree are called \_\_\_\_\_.
- The term for the double membrane around the lungs is \_\_\_\_\_.
- The small branches of the bronchi are the \_\_\_\_\_ and the air sacs are the \_\_\_\_\_.

## Terminology

### Word Parts Used to Build Respiratory System Terms

The following lists contain the combining forms, suffixes, and prefixes used to build terms in the remaining sections of this chapter.

#### Combining Forms

<b>aer/o</b>	air
<b>alveol/o</b>	alveolus
<b>angi/o</b>	vessel
<b>anthrac/o</b>	coal
<b>arteri/o</b>	artery
<b>atel/o</b>	incomplete
<b>bi/o</b>	life
<b>bronch/o</b>	bronchus
<b>bronchi/o</b>	bronchus
<b>bronchiol/o</b>	bronchiole

<b>carcin/o</b>	cancer
<b>cardi/o</b>	heart
<b>coni/o</b>	dust
<b>cortic/o</b>	outer layer
<b>cyan/o</b>	blue
<b>cyst/o</b>	sac
<b>cyt/o</b>	cell
<b>diaphragmat/o</b>	diaphragm
<b>embol/o</b>	plug

<b>epiglott/o</b>	epiglottis
<b>fibr/o</b>	fibers
<b>hem/o</b>	blood
<b>hist/o</b>	tissue
<b>laryng/o</b>	larynx
<b>lob/o</b>	lobe
<b>muc/o</b>	mucus
<b>myc/o</b>	fungus
<b>nas/o</b>	nose
<b>orth/o</b>	straight

## Combining Forms (continued)

<b>ot/o</b>	ear
<b>ox/i</b>	oxygen
<b>ox/o</b>	oxygen
<b>pharyng/o</b>	pharynx
<b>pleur/o</b>	pleura
<b>pneum/o</b>	air

<b>pneumon/o</b>	lung
<b>pulmon/o</b>	lung
<b>py/o</b>	pus
<b>rhin/o</b>	nose
<b>sept/o</b>	wall
<b>sinus/o</b>	sinus

<b>somn/o</b>	sleep
<b>spir/o</b>	breathing
<b>thorac/o</b>	chest
<b>trache/o</b>	trachea
<b>tuss/o</b>	cough

## Suffixes

<b>-al</b>	pertaining to
<b>-algia</b>	pain
<b>-ar</b>	pertaining to
<b>-ary</b>	pertaining to
<b>-capnia</b>	carbon dioxide
<b>-centesis</b>	puncture to with- draw fluid
<b>-dynia</b>	pain
<b>-eal</b>	pertaining to
<b>-ectasis</b>	dilation
<b>-ectomy</b>	surgical removal
<b>-emia</b>	blood condition
<b>-genic</b>	produced by
<b>-gram</b>	record
<b>-graphy</b>	process of recording
<b>-ia</b>	condition
<b>-ic</b>	pertaining to

<b>-ism</b>	state of
<b>-itis</b>	inflammation
<b>-logy</b>	study of
<b>-lytic</b>	destruction
<b>-meter</b>	instrument to measure
<b>-metry</b>	process of measuring
<b>-oma</b>	tumor
<b>-ory</b>	pertaining to
<b>-osis</b>	abnormal condition
<b>-osmia</b>	smell
<b>-ostomy</b>	surgically create an opening
<b>-otomy</b>	cutting into
<b>-phonia</b>	voice
<b>-plasm</b>	formation

<b>-plasty</b>	surgical repair
<b>-plegia</b>	paralysis
<b>-pnea</b>	breathing
<b>-ptysis</b>	spitting
<b>-rrhagia</b>	abnormal flow condition
<b>-rrhea</b>	discharge
<b>-scope</b>	instrument for viewing
<b>-scopy</b>	process of visually examining
<b>-spasm</b>	involuntary muscle contraction
<b>-stenosis</b>	narrowing
<b>-thorax</b>	chest
<b>-tic</b>	pertaining to

## Prefixes

<b>a-</b>	without
<b>an-</b>	without
<b>anti-</b>	against
<b>brady-</b>	slow
<b>de-</b>	without

<b>dys-</b>	difficult, abnormal
<b>endo-</b>	within
<b>eu-</b>	normal
<b>hyper-</b>	excessive
<b>hypo-</b>	insufficient

<b>pan-</b>	all
<b>para-</b>	beside
<b>poly-</b>	many
<b>re-</b>	again
<b>tachy-</b>	fast

## Adjective Forms of Anatomical Terms

Term	Word Parts	Definition
<b>alveolar</b> (al-VEE-oh-lar)	<b>alveol/o</b> = alveolus <b>-ar</b> = pertaining to	Pertaining to the alveoli.
<b>bronchial</b> (BRONG-ee-all)	<b>bronchi/o</b> = bronchus <b>-al</b> = pertaining to	Pertaining to a bronchus.
<b>bronchiolar</b> (brong-KEY-oh-lar)	<b>bronchiol/o</b> = bronchiole <b>-ar</b> = pertaining to	Pertaining to a bronchiole.
<b>diaphragmatic</b> (dye-ah-frag-MAT-ik)	<b>diaphragmat/o</b> = diaphragm <b>-ic</b> = pertaining to	Pertaining to the diaphragm.
<b>epiglottic</b> (ep-ih-GLOT-ik)	<b>epiglott/o</b> = epiglottis <b>-ic</b> = pertaining to	Pertaining to the epiglottis.
<b>laryngeal</b> (lair-in-GEE-all)	<b>laryng/o</b> = larynx <b>-eal</b> = pertaining to	Pertaining to the larynx.
<b>nasal</b> (NAY-zal)	<b>nas/o</b> = nose <b>-al</b> = pertaining to	Pertaining to the nose or nasal cavity.
<b>nasopharyngeal</b> (NAY-zoh-fah-RIN-gee-all)	<b>nas/o</b> = nose <b>pharyng/o</b> = pharynx <b>-eal</b> = pertaining to	Pertaining to the nose and pharynx.
<b>paranasal</b> (pair-ah-NAY-zal)	<b>para-</b> = beside <b>nas/o</b> = nose <b>-al</b> = pertaining to	Pertaining to beside the nose.
<b>pharyngeal</b> (fair-in-GEE-all)	<b>pharyng/o</b> = pharynx <b>-eal</b> = pertaining to	Pertaining to the pharynx.
<b>pleural</b> (PLOO-ral)	<b>pleur/o</b> = pleura <b>-al</b> = pertaining to	Pertaining to the pleura.
<b>pulmonary</b> (PULL-mon-air-ee)	<b>pulmon/o</b> = lung <b>-ary</b> = pertaining to	Pertaining to the lung.
<b>septal</b> (SEP-tal)	<b>sept/o</b> = wall <b>-al</b> = pertaining to	Pertaining to the nasal septum.
<b>thoracic</b> (tho-RASS-ik)	<b>thorac/o</b> = chest <b>-ic</b> = pertaining to	Pertaining to the chest.
<b>tracheal</b> (TRAY-key-al)	<b>trache/o</b> = trachea <b>-al</b> = pertaining to	Pertaining to the trachea.

## Practice As You Go

### B. Give the adjective form for each anatomical structure

1. The larynx \_\_\_\_\_
2. The lung \_\_\_\_\_
3. Beside the sinuses \_\_\_\_\_
4. An alveolus \_\_\_\_\_
5. The nose \_\_\_\_\_
6. The diaphragm \_\_\_\_\_

## Pathology


Term	Word Parts	Definition
<b>Medical Specialties</b>		
<b>internal medicine</b>		Branch of medicine involving the diagnosis and treatment of diseases and conditions of internal organs such as the respiratory system. The physician is an <i>internist</i> .
<b>otorhinolaryngology</b> (ENT) (oh-toh-rye-noh-lair-in-GOL-oh-jee)	<b>ot/o</b> = ear <b>rhin/o</b> = nose <b>laryng/o</b> = larynx <b>-logy</b> = study of	Branch of medicine involving the diagnosis and treatment of conditions and diseases of the ear, nose, and throat region. The physician is an <i>otorhinolaryngologist</i> . This medical specialty may also be referred to as <i>otolaryngology</i> .
<b>pulmonology</b> (pull-mon-ALL-oh-jee)	<b>pulmon/o</b> = lung <b>-logy</b> = study of	Branch of medicine involved in the diagnosis and treatment of diseases and disorders of the respiratory system. Physician is a <i>pulmonologist</i> .
<b>respiratory therapy</b>	<b>re-</b> = again <b>spir/o</b> = breathing <b>-ory</b> = pertaining to	Allied health specialty that assists patients with respiratory and cardiopulmonary disorders. Duties of a <i>respiratory therapist</i> include conducting pulmonary function tests, monitoring oxygen and carbon dioxide levels in the blood, administering breathing treatments, and ventilator management.
<b>thoracic surgery</b> (tho-RASS-ik)	<b>thorac/o</b> = chest <b>-ic</b> = pertaining to	Branch of medicine involving the diagnosis and treatment of conditions and diseases of the respiratory system by surgical means. Physician is a <i>thoracic surgeon</i> .

## Pathology (continued)

Term	Word Parts	Definition
<b>Signs and Symptoms</b>		
<b>anosmia</b> (ah-NOZ-mee-ah)	<b>an-</b> = without <b>-osmia</b> = smell	Lack of the sense of smell.
<b>anoxia</b> (ah-NOK-see-ah)	<b>an-</b> = without <b>ox/o</b> = oxygen <b>-ia</b> = condition	Condition of receiving almost no oxygen from inhaled air.
<b>aphonia</b> (a-FOH-nee-ah)	<b>a-</b> = without <b>-phonia</b> = voice	Condition of being unable to produce sounds.
<b>apnea</b> (AP-nee-ah)	<b>a-</b> = without <b>-pnea</b> = breathing	Not breathing.
<b>asphyxia</b> (as-FIK-see-ah)	<b>a-</b> = without <b>-ia</b> = condition	Lack of oxygen that can lead to unconsciousness and death if not corrected immediately; also called <i>asphyxiation</i> or <i>suffocation</i> . Common causes include drowning, foreign body in the respiratory tract, poisoning, and electric shock.
<b>aspiration</b> (as-peer-RAY-shun)	<b>spir/o</b> = breathing	Refers to withdrawing fluid from a body cavity using suction. For example, using a long needle and syringe to withdraw fluid from the pleural cavity, or using a vacuum pump to remove phlegm from a patient's airway. Additionally, it refers to inhaling food, liquid, or a foreign object into the airways, which may lead to the development of pneumonia.
<b>bradypnea</b> (bray-DIP-nee-ah)	<b>brady-</b> = slow <b>-pnea</b> = breathing	Breathing too slowly; a low respiratory rate.
<b>bronchiectasis</b> (brong-key-EK-tah-sis)	<b>bronchi/o</b> = bronchus <b>-ectasis</b> = dilation	Dilated bronchus.
<b>bronchospasm</b> (BRONG-koh-spazm)	<b>bronch/o</b> = bronchus <b>-spasm</b> = involuntary muscle contraction	Involuntary muscle spasm of the smooth muscle in the wall of the bronchus.
<b>Cheyne–Stokes respiration</b> (CHAIN / STOHKS / res-pir-AY-shun)	<b>re-</b> = again <b>spir/o</b> = breathing	Abnormal breathing pattern in which there are long periods (10–60 seconds) of apnea followed by deeper, more rapid breathing. Named for John Cheyne, a Scottish physician, and Sir William Stokes, an Irish surgeon.
<b>clubbing</b>		Abnormal widening and thickening of the ends of the fingers and toes associated with chronic oxygen deficiency. Seen in patients with chronic respiratory conditions or circulatory problems.
<b>crackles</b>		Abnormal crackling or bubbling sound made during inspiration. Usually indicates the presence of fluid or mucus in the small airways. Also called <i>rales</i> .



## Pathology (continued)


Term	Word Parts	Definition
<b>cyanosis</b> (sigh-ah-NO-sis)	<b>cyan/o</b> = blue <b>-osis</b> = abnormal condition 	Refers to the bluish tint of skin that is receiving an insufficient amount of oxygen or circulation.
<b>dysphonia</b> (dis-FOH-nee-ah)	<b>dys-</b> = difficult, abnormal <b>-phonia</b> = voice	Condition of having difficulty producing sounds or producing abnormal sounds.
<b>dyspnea</b> (DISP-nee-ah)	<b>dys-</b> = difficult <b>-pnea</b> = breathing	Term describing difficult or labored breathing.
<b>epistaxis</b> (ep-ih-STAKS-is)		Nosebleed.
<b>eupnea</b> (yooop-NEE-ah)	<b>eu-</b> = normal <b>-pnea</b> = breathing	Normal breathing and respiratory rate.
<b>hemoptysis</b> (hee-MOP-tih-sis)	<b>hem/o</b> = blood <b>-ptysis</b> = spitting	To cough up blood or blood-stained sputum.
<b>hemothorax</b> (hee-moh-THOH-raks)	<b>hem/o</b> = blood <b>-thorax</b> = chest	Presence of blood in the chest cavity.
<b>hypercapnia</b> (high-per-CAP-nee-ah)	<b>hyper-</b> = excessive <b>-capnia</b> = carbon dioxide	Condition of having excessive carbon dioxide in the body.
<b>hyperpnea</b> (high-per-NEE-ah)	<b>hyper-</b> = excessive <b>-pnea</b> = breathing	Taking deep breaths.
<b>hyperventilation</b> (HYE-per-vent-ill-a-shun)	<b>hyper-</b> = excessive	Breathing both too fast (tachypnea) and too deep (hyperpnea).
<b>Med Term Tip</b> When divers wish to hold their breath longer, they first hyperventilate (breathe faster and deeper) in order to get rid of as much CO <sub>2</sub> as possible. This will hold off the urge to breathe, allowing a diver to stay submerged longer.		
<b>hypocapnia</b> (high-poh-CAP-nee-ah)	<b>hypo-</b> = insufficient <b>-capnia</b> = carbon dioxide	An insufficient level of carbon dioxide in the body; a very serious problem because it is the presence of carbon dioxide that stimulates respiration, not the absence of oxygen. Therefore, a person with low carbon dioxide levels would respond with an increased respiratory rate.
<b>hypopnea</b> (high-POP-nee-ah)	<b>hypo-</b> = insufficient <b>-pnea</b> = breathing	Taking shallow breaths.

Pathology (continued)		
Term	Word Parts	Definition
<b>hypoventilation</b> (HYE-poh-vent-ill-a-shun)	<b>hypo-</b> = insufficient	Breathing both too slow (bradypnea) and too shallow (hypopnea).
<b>hypoxemia</b> (high-pox-EE-mee-ah)	<b>hypo-</b> = insufficient <b>ox/o</b> = oxygen <b>-emia</b> = blood condition	Condition of having an insufficient amount of oxygen in the bloodstream.
<b>hypoxia</b> (high-POX-ee-ah)	<b>hypo-</b> = insufficient <b>ox/o</b> = oxygen <b>-ia</b> = condition	Condition of receiving an insufficient amount of oxygen from inhaled air.
<b>laryngoplegia</b> (lair-RING-goh-plee-gee-ah)	<b>laryng/o</b> = larynx <b>-plegia</b> = paralysis	Paralysis of the muscles controlling the larynx.
<b>orthopnea</b> (or-THOP-nee-ah)	<b>orth/o</b> = straight <b>-pnea</b> = breathing	Term describing dyspnea that is worsened by lying flat. The patient feels able to breathe easier while sitting straight up; a common occurrence in those with pulmonary disease.
<b>pansinusitis</b> (pan-sigh-nus-EYE-tis)	<b>pan-</b> = all <b>sinus/o</b> = sinus <b>-itis</b> = inflammation	Inflammation of all the paranasal sinuses.
<b>patent</b> (PAY-tent)		Open or unblocked, such as a patent airway.
<b>phlegm</b> (FLEM)		Thick mucus secreted by the membranes lining the respiratory tract. When phlegm is coughed through the mouth, it is called <i>sputum</i> . Phlegm is examined for color, odor, and consistency and tested for the presence of bacteria, viruses, and fungi.
<b>pleural rub</b> (PLOO-ral)	<b>pleur/o</b> = pleura <b>-al</b> = pertaining to	Grating sound made when the two layers of the pleura rub together during respiration. It is caused when one of the surfaces becomes thicker as a result of inflammation or other disease conditions. This rub can be felt through the fingertips when placed on the chest wall or heard through a stethoscope.
<b>pleurodynia</b> (ploor-oh-DIN-ee-ah)	<b>pleur/o</b> = pleura <b>-dynia</b> = pain	Pleural pain.
<b>pyothorax</b> (pye-oh-THOH-raks)	<b>py/o</b> = pus <b>-thorax</b> = chest	Presence of pus in the chest cavity; indicates a bacterial infection.
<b>rhinitis</b> (rye-NYE-tis)	<b>rhin/o</b> = nose <b>-itis</b> = inflammation	Inflammation of the nasal cavity.
<b>rhinorrhagia</b> (rye-noh-RAH-jee-ah)	<b>rhin/o</b> = nose <b>-rrhagia</b> = abnormal flow condition	Rapid flow of blood from the nose.
<b>rhinorrhea</b> (rye-noh-REE-ah)	<b>rhin/o</b> = nose <b>-rrhea</b> = discharge	Discharge from the nose; commonly called a <i>runny nose</i> .

## Pathology (continued)

Term	Word Parts	Definition
<b>rhonchi</b> (RONG-kigh)		Somewhat musical sound during expiration, often found in asthma or infection. Caused by spasms of the bronchial tubes. Also called <i>wheezing</i> .
<b>shortness of breath</b> (SOB)		Term used to indicate that a patient is having some difficulty breathing; also called <i>dyspnea</i> . The causes can range from mild SOB after exercise to SOB associated with heart disease.
<b>sputum</b> (SPEW-tum)	<b>Med Term Tip</b> The term <i>sputum</i> , from the Latin word meaning “to spit,” now refers to the material coughed up and spit out from the respiratory system.	Mucus or phlegm coughed up from the lining of the respiratory tract.
<b>stridor</b> (STRIGH-dor)		Harsh, high-pitched, noisy breathing sound made when there is an obstruction of the bronchus or larynx. Found in conditions such as croup in children.
<b>tachypnea</b> (tak-ip-NEE-ah)	<b>tachy-</b> = fast <b>-pnea</b> = breathing	Breathing fast; a high respiratory rate.
<b>thoracalgia</b> (thor-ah-KAL-jee-ah)	<b>thorac/o</b> = chest <b>-algia</b> = pain	Chest pain. Does not refer to angina pectoris.
<b>tracheostenosis</b> (tray-kee-ohsteh-NOH-sis)	<b>trache/o</b> = trachea <b>-stenosis</b> = narrowing	Narrowing of the trachea.
<b>Upper Respiratory System</b>		
<b>croup</b> (KROOP)		Acute respiratory condition found in infants and children characterized by a barking type of cough or stridor.
<b>diphtheria</b> (dif-THEAR-ee-ah)	<b>-ia</b> = condition	Bacterial upper respiratory infection characterized by the formation of a thick membranous film across the throat and a high mortality rate. Rare now due to the childhood diphtheria, pertussis, tetanus (DPT) vaccine.
<b>laryngitis</b> (lair-in-JYE-tis)	<b>laryng/o</b> = larynx <b>-itis</b> = inflammation	Inflammation of the larynx.
<b>nasopharyngitis</b> (nay-zoh-fair-in-JYE-tis)	<b>nas/o</b> = nose <b>pharyng/o</b> = pharynx <b>-itis</b> = inflammation	Inflammation of the nasal cavity and pharynx; commonly called the <i>common cold</i> .
<b>pertussis</b> (per-TUH-sis)	<b>tuss/o</b> = cough	Commonly called <i>whooping cough</i> , due to the whoop sound made when coughing. An infectious bacterial disease of the upper respiratory system that children receive immunization against as part of their DPT shots.
<b>pharyngitis</b> (fair-in-JYE-tis)	<b>pharyng/o</b> = pharynx <b>-itis</b> = inflammation	Inflammation of the pharynx; commonly called a <i>sore throat</i> .

## Pathology (continued)

Term	Word Parts	Definition
<b>rhinomycosis</b> (rye-noh-my-KOH-sis)	<b>rhin/o</b> = nose <b>myc/o</b> = fungus <b>-osis</b> = abnormal condition	Fungal infection of the nasal cavity.
<b>Bronchial Tubes</b>		
<b>asthma</b> (AZ-mah)  <b>Med Term Tip</b> ..... The term <i>asthma</i> , from the Greek word meaning “panting,” describes the breathing pattern of a person having an asthma attack.		Disease caused by various conditions, like allergens, and resulting in constriction of the bronchial airways, dyspnea, coughing, and wheezing. Can cause violent spasms of the bronchi (bronchospasms) but is generally not a life-threatening condition. Medication can be very effective.
<b>bronchiectasis</b> (brong-key-EK-tah-sis)	<b>bronchi/o</b> = bronchus <b>-ectasis</b> = dilation	Abnormal enlargement of bronchi; may be the result of a lung infection. This condition can be irreversible and result in destruction of the bronchial walls. Major symptoms include coughing up a large amount of purulent sputum, crackles, and hemoptysis.
<b>bronchitis</b> (brong-KIGH-tis)	<b>bronch/o</b> = bronchus <b>-itis</b> = inflammation	Inflammation of a bronchus.
<b>bronchogenic carcinoma</b> (brong-koh-JEN-ik / car-sin-OH-mah)	<b>bronch/o</b> = bronchus <b>-genic</b> = produced by <b>carcin/o</b> = cancer <b>-oma</b> = tumor	Malignant tumor originating in the bronchi. Usually associated with a history of cigarette smoking.
		
<p>■ <b>Figure 7.9</b> Color enhanced X-ray of large malignant tumor in the right lung. (Du Cane Medical Imaging Ltd./Science Source)</p>		
<b>Lungs</b>		
<b>adult respiratory distress syndrome</b> (ARDS)	<b>re-</b> = again <b>spir/o</b> = breathing <b>-ory</b> = pertaining to	Acute respiratory failure in adults characterized by tachypnea, dyspnea, cyanosis, tachycardia, and hypoxemia. May follow trauma, pneumonia, or septic infections. Also called <i>acute respiratory distress syndrome</i> .

## Pathology (continued)

Term	Word Parts	Definition
<b>anthracosis</b> (an-thra-KOH-sis)	<b>anthrac/o</b> = coal <b>-osis</b> = abnormal condition	Type of pneumoconiosis that develops from the collection of coal dust in the lung. Also called <i>black lung</i> or <i>miner's lung</i> .
<b>asbestosis</b> (az-bes-TOH-sis)	<b>-osis</b> = abnormal condition	Type of pneumoconiosis that develops from collection of asbestos fibers in the lungs. May lead to the development of lung cancer.
<b>atelectasis</b> (at-eh-LEK-tah-sis)	<b>atel/o</b> = incomplete <b>-ectasis</b> = dilation	Condition in which the alveoli in a portion of the lung collapse, preventing the respiratory exchange of oxygen and carbon dioxide. Can be caused by a variety of conditions, including pressure on the lung from a tumor or other object. Term also used to describe the failure of a newborn's lungs to expand.
<b>chronic obstructive pulmonary disease (COPD)</b> (PULL-mon-air-ee)	<b>pulmon/o</b> = lung <b>-ary</b> = pertaining to	Progressive, chronic, and usually irreversible group of conditions, like emphysema, in which the lungs have a diminished capacity for inspiration (inhalation) and expiration (exhalation). The person may have dyspnea upon exertion and a cough.
<b>cystic fibrosis (CF)</b> (SIS-tik / fye-BROH-sis)	<b>cyst/o</b> = sac <b>-ic</b> = pertaining to <b>fibr/o</b> = fibers <b>-osis</b> = abnormal condition	Hereditary condition causing the exocrine glands to malfunction. The patient produces very thick mucus that causes severe congestion within the lungs, pancreas, and intestine. Through more advanced treatment, many children are now living into adulthood with this disease.
<b>Med Term Tip</b> Cystic fibrosis received its name from fibrotic cysts that are visible in the pancreas as scarred areas.		
<b>emphysema</b> (em-fih-SEE-mah)		Pulmonary condition characterized by the destruction of the walls of the alveoli, resulting in fewer, overexpanded air sacs. Can occur as a result of long-term heavy smoking. Air pollution also worsens this disease. The patient may not be able to breathe except in a sitting or standing position.
<b>histoplasmosis</b> (his-toh-plaz-MOH-sis)	<b>hist/o</b> = tissue <b>-plasm</b> = formation <b>-osis</b> = abnormal condition	Pulmonary infection caused by the fungus <i>Histoplasma capsulatum</i> , found in dust and in the droppings of pigeons and chickens. The translation of the name of this condition reflects the microscopic appearance of the fungus.

## Pathology (continued)

Term	Word Parts	Definition
<b>infant respiratory distress syndrome</b> (IRDS)	re- = again spir/o = breathing -ory = pertaining to	Lung condition most commonly found in premature infants that is characterized by tachypnea and respiratory grunting. The condition is caused by a lack of surfactant necessary to keep the lungs inflated. Also called <i>hyaline membrane disease</i> (HMD) and <i>respiratory distress syndrome of the newborn</i> .
<b>influenza</b> (flu) (in-floo-EN-za)		Viral infection of the respiratory system characterized by chills, fever, body aches, and fatigue. Commonly called the <i>flu</i> .
<b>Legionnaires' disease</b> (lee-jen-AYRZ)		Severe, often fatal bacterial infection characterized by pneumonia and liver and kidney damage. Named after people who came down with it at an American Legion convention in 1976.
<b>Mycoplasma pneumonia</b> (MY-koh-plaz-ma)	myc/o = fungus -plasm = formation	Less severe but longer lasting form of pneumonia caused by the <i>Mycoplasma pneumoniae</i> bacteria. Also called <i>walking pneumonia</i> . The translation of the name of this condition reflects the microscopic appearance of the bacteria (in spite of its name, the pathologic agent is a bacterium).
<b>pneumoconiosis</b> (noo-moh-koh-nee-OH-sis)	pneum/o = lung coni/o = dust -osis = abnormal condition	Condition resulting from inhalation of environmental particles that become toxic. Can be the result of inhaling coal dust (anthracosis) or asbestos (asbestosis).
<b>pneumonia</b> (noo-MOH-nee-ah)	pneumon/o = lung -ia = condition	Inflammatory condition of the lung that can be caused by bacteria, viruses, fungi, and aspirated substances. Results in the filling of the alveoli and air spaces with fluid.
<b>pulmonary edema</b> (PULL-mon-air-ee / eh-DEE-mah)	pulmon/o = lung -ary = pertaining to	Condition in which lung tissue retains an excessive amount of fluid, especially in the alveoli. Results in dyspnea.
<b>pulmonary embolism</b> (EM-boh-lizm)	pulmon/o = lung -ary = pertaining to embol/o = plug -ism = state of	Obstruction of the pulmonary artery or one of its branches by an embolus (often a blood clot broken away from another area of the body). May cause an infarct in the lung tissue.
<b>pulmonary fibrosis</b> (figh-BROH-sis)	pulmon/o = lung -ary = pertaining to fibr/o = fibers -osis = abnormal condition	Formation of fibrous scar tissue in the lungs that leads to decreased ability to expand the lungs. May be caused by infections, pneumoconiosis, autoimmune diseases, and toxin exposure.

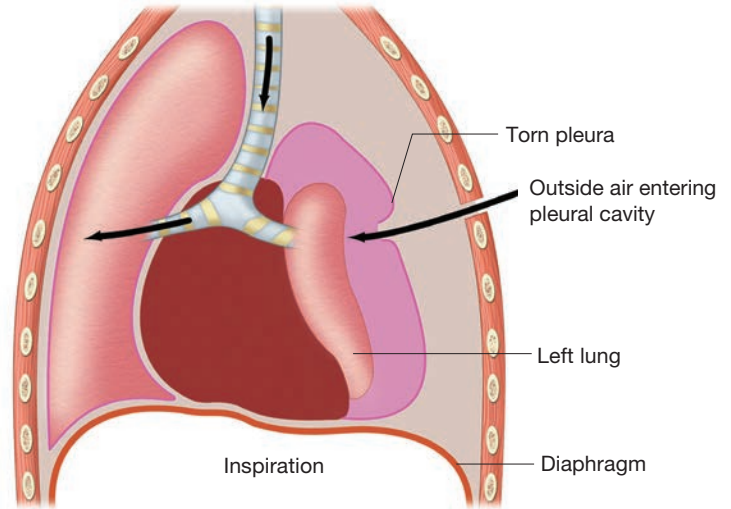


## Pathology (continued)

Term	Word Parts	Definition
<b>severe acute respiratory syndrome</b> (SARS)	<b>re-</b> = again <b>spir/o</b> = breathing <b>-ory</b> = pertaining to	Acute viral respiratory infection that begins like the flu but quickly progresses to severe dyspnea; high fatality rate in persons over age 65. First appeared in China in 2003.
<b>silicosis</b> (sil-ih-KOH-sis)	<b>-osis</b> = abnormal condition	Type of pneumoconiosis that develops from the inhalation of silica (quartz) dust found in quarrying, glasswork, sandblasting, and ceramics.
<b>sleep apnea</b> (AP-nee-ah)	<b>a-</b> = without <b>-pnea</b> = breathing	Condition in which breathing stops repeatedly during sleep long enough to cause a drop in oxygen levels in the blood.
<b>sudden infant death syndrome</b> (SIDS)		Unexpected and unexplained death of an apparently well infant under one year of age. The child suddenly stops breathing for unknown reasons.
<b>tuberculosis</b> (TB) (too-ber-kyoo-LOH-sis)	<b>-osis</b> = abnormal condition	Infectious disease caused by the bacteria <i>Mycobacterium tuberculosis</i> . Most commonly affects the respiratory system and causes inflammation and calcification in the lungs. Tuberculosis incidence is on the increase and is seen in many patients with weakened immune systems. Multidrug-resistant tuberculosis is a particularly dangerous form of the disease because some bacteria have developed a resistance to the standard drug therapy.
<b>Pleural Cavity</b>		
<b>empyema</b> (em-pye-EE-mah)	<b>py/o</b> = pus	Pus within the pleural space usually associated with a bacterial infection. Also called <i>pyothorax</i> .
<b>pleural effusion</b> (PLOO-ral / eh-FYOO-zhun)	<b>pleur/o</b> = pleura <b>-al</b> = pertaining to	Abnormal accumulation of fluid in the pleural cavity preventing the lungs from fully expanding. Physicians can detect the presence of fluid by tapping the chest (percussion) or listening with a stethoscope (auscultation).
<b>pleurisy</b> (PLOOR-ih-see)	<b>pleur/o</b> = pleura	Inflammation of the pleura characterized by sharp chest pain with each breath. Also called <i>pleuritis</i> .

## Pathology (continued)

Term	Word Parts	Definition
<b>pneumothorax</b> (noo-moh-THOH-raks)	<b>pneum/o</b> = air <b>-thorax</b> = chest	Collection of air or gas in the pleural cavity, which may result in collapse of the lung.



■ **Figure 7.10** Pneumothorax. Figure illustrates how puncture of thoracic wall and tearing of pleural membrane allows air into lung and results in collapsed lung.

## Practice As You Go

### C. Terminology Matching

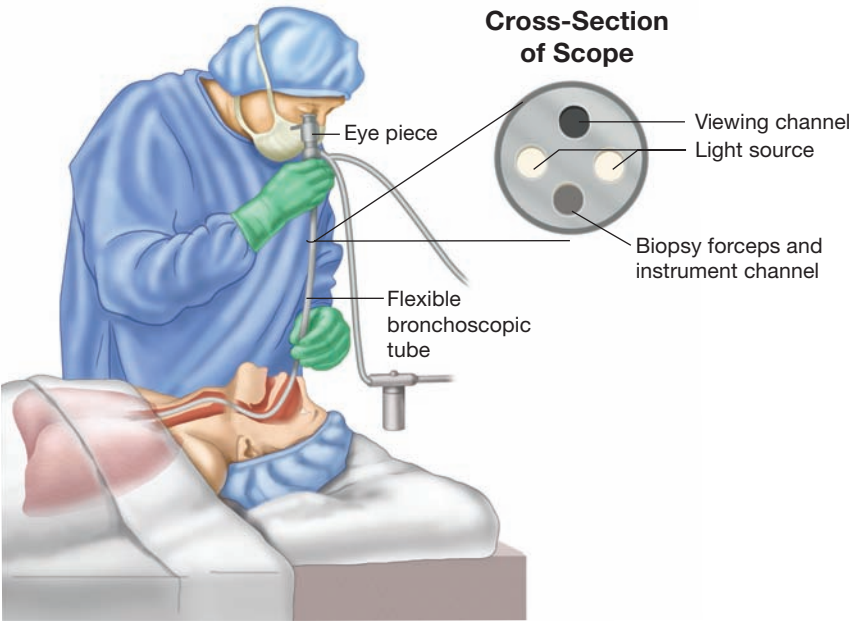
Match each term to its definition.

- |   |                          |
|---|--------------------------|
| 1. _____ inhaling environmental particles   | a. empyema               |
| 2. _____ whooping cough                     | b. blue tint to the skin |
| 3. _____ may result in collapsed lung       | c. caused by a fungus    |
| 4. _____ pus in the pleural space           | d. epistaxis             |
| 5. _____ respiratory tract mucus            | e. pneumoconiosis        |
| 6. _____ nosebleed                          | f. emphysema             |
| 7. _____ cyanosis                           | g. walking pneumonia     |
| 8. _____ <i>Mycoplasma pneumonia</i>        | h. pneumothorax          |
| 9. _____ disease with overexpanded air sacs | i. pertussis             |
| 10. _____ histoplasmosis                    | j. phlegm                |

## Diagnostic Procedures

Term	Word Parts	Definition
<b>Clinical Laboratory Tests</b>		
<b>arterial blood gases</b> (ABGs) (ar-TEE-ree-al)	<b>arteri/o</b> = artery <b>-al</b> = pertaining to	Testing for the gases present in the blood. Generally used to assist in determining the levels of oxygen (O <sub>2</sub> ) and carbon dioxide (CO <sub>2</sub> ) in the blood.
<b>sputum culture and sensitivity</b> (C&S) (SPEW-tum)		Testing sputum by placing it on a culture medium and observing any bacterial growth. The specimen is then tested to determine antibiotic effectiveness.
<b>sputum cytology</b> (SPEW-tum / sigh-TALL-oh-jee)	<b>cyt/o</b> = cell <b>-logy</b> = study of	Examining sputum for malignant cells.
<b>Diagnostic Imaging</b>		
<b>bronchogram</b> (BRONG-koh-gram)	<b>bronch/o</b> = bronchus <b>-gram</b> = record	X-ray record of the bronchus produced by bronchography.
<b>bronchography</b> (brong-KOG-rah-fee)	<b>bronch/o</b> = bronchus <b>-graphy</b> = process of recording	X-ray of the lung after a radiopaque substance has been inserted into the trachea or bronchial tube. Resulting X-ray is called a <i>bronchogram</i> .
<b>chest X-ray</b> (CXR)		Taking a radiographic picture of the lungs and heart from the back and sides.
<b>pulmonary angiography</b> (PULL-mon-air-ee / an-jee-OG-rah-fee)	<b>pulmon/o</b> = lung <b>-ary</b> = pertaining to <b>angi/o</b> = vessel <b>-graphy</b> = process of recording	Injecting dye into a blood vessel for the purpose of taking an X-ray of the arteries and veins of the lungs.
<b>ventilation-perfusion scan</b> (per-FUSE-shun)		Nuclear medicine diagnostic test that is especially useful in identifying pulmonary emboli. Radioactive air is inhaled for the ventilation portion to determine if air is filling the entire lung. Radioactive intravenous injection shows if blood is flowing to all parts of the lung.
<b>Endoscopic Procedures</b>		
<b>bronchoscope</b> (BRONG-koh-scope)	<b>bronch/o</b> = bronchus <b>-scope</b> = instrument for viewing	Instrument used to view inside a bronchus during a <i>bronchoscopy</i> .
<b>bronchoscopy</b> (Bronch) (brong-KOSS-koh-pee)	<b>bronch/o</b> = bronchus <b>-scopy</b> = process of visually examining	Visual examination of the inside of the bronchi; uses an instrument called a <i>bronchoscope</i> (see Figure 7.11 ■).
<b>laryngoscope</b> (lair-RING-go-scope)	<b>laryng/o</b> = larynx <b>-scope</b> = instrument for viewing	Instrument used to view inside the larynx during a <i>laryngoscopy</i> .
<b>laryngoscopy</b> (lair-in-GOSS-koh-pee)	<b>laryng/o</b> = larynx <b>-scopy</b> = process of visually examining	Examination of the interior of the larynx with a lighted instrument called a <i>laryngoscope</i> .

## Diagnostic Procedures (continued)

Term	Word Parts	Definition
 <p><b>Figure 7.11</b> Bronchoscopy. Figure illustrates physician using a bronchoscope to inspect the patient's bronchial tubes. Advances in technology include using a videoscope which projects the internal view of the bronchus onto a video screen.</p>		

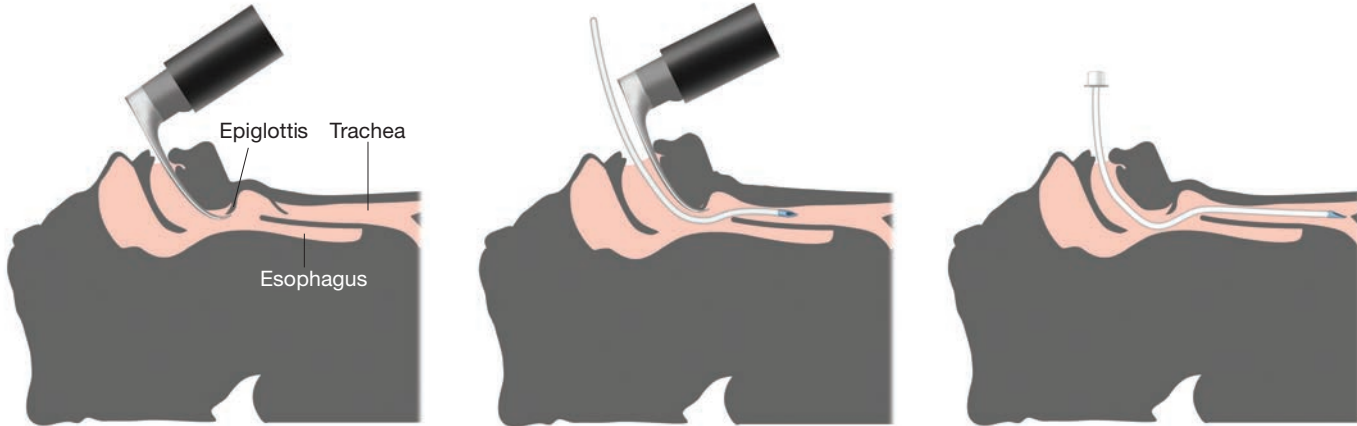
### Pulmonary Function Tests

<b>oximeter</b> (ox-IM-eh-ter)	<b>ox/i</b> = oxygen <b>-meter</b> = instrument to measure	Instrument that measures the amount of oxygen in the bloodstream.
<b>oximetry</b> (ox-IM-eh-tree)	<b>ox/i</b> = oxygen <b>-metry</b> = process of measuring	Procedure to measure the oxygen level in the blood using a device, an <i>oximeter</i> , placed on the patient's fingertip or earlobe.
<b>pulmonary function test (PFT)</b> (PULL-mon-air-ee)	<b>pulmon/o</b> = lung <b>-ary</b> = pertaining to	Group of diagnostic tests that give information regarding air flow in and out of the lungs, lung volumes, and gas exchange between the lungs and bloodstream.
<b>spirometer</b> (spy-ROM-eh-ter)	<b>spir/o</b> = breathing <b>-meter</b> = instrument to measure	Instrument to measure lung capacity used for <i>spirometry</i> .
<b>spirometry</b> (spy-ROM-eh-tree)	<b>spir/o</b> = breathing <b>-metry</b> = process of measuring	Procedure to measure lung capacity using a <i>spirometer</i> .

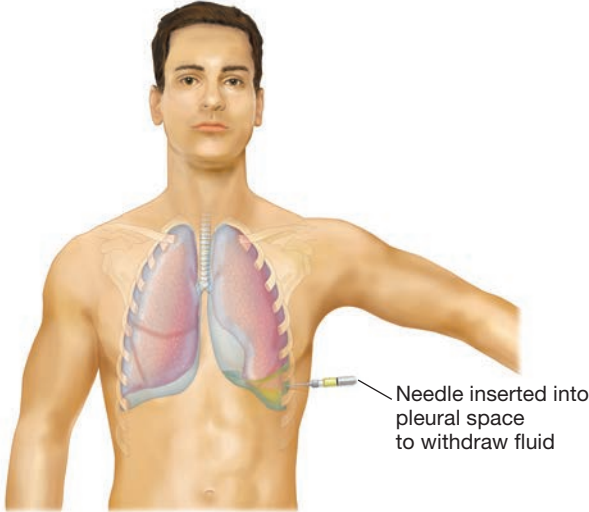
### Additional Diagnostic Procedures

<b>polysomnography</b> (polly-som-NOG-rah-fee)	<b>poly-</b> = many <b>somn/o</b> = sleep <b>-graphy</b> = process of recording	Monitoring a patient while sleeping to identify sleep apnea. Also called <i>sleep apnea study</i> .
<b>sweat test</b>		Test for cystic fibrosis. Patients with this disease have an abnormally large amount of salt in their sweat.
<b>tuberculin skin test (TB test)</b> (too-BER-kyoo-lin)		Procedure in which tuberculin purified protein derivative (PPD) is applied under the surface of the skin to determine if the patient has been exposed to tuberculosis. Also called a <i>Mantoux test</i> .

## Therapeutic Procedures

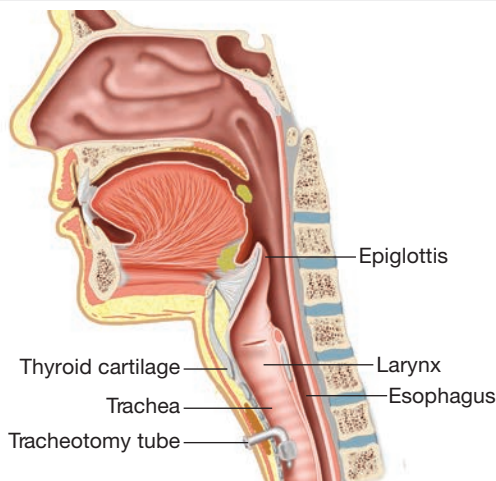
Term	Word Parts	Definition
<b>Respiratory Therapy</b>		
<b>aerosol therapy</b> (AIR-oh-sol)	<b>aer/o</b> = air	Medication suspended in a mist intended for inhalation. Delivered by a <i>nebulizer</i> , which provides the mist for a period of time while the patient breathes, or a <i>metered-dose inhaler</i> (MDI), which delivers a single puff of mist.
<b>endotracheal intubation</b> (en-doh-TRAY-kee-al / in-too-BAY-shun)	<b>endo-</b> = within <b>trache/o</b> = trachea <b>-al</b> = pertaining to	Placing of a tube through the mouth, through the glottis, and into the trachea to create a patent airway.
 <p>Figure 7.12 illustrates the three steps of endotracheal intubation. The first diagram shows a laryngoscope being used to identify the trachea from the esophagus, with labels for the Epiglottis, Trachea, and Esophagus. The second diagram shows the endotracheal tube being inserted into the trachea. The third diagram shows the laryngoscope removed, leaving the tube in place.</p>		
<p>■ <b>Figure 7.12</b> Endotracheal intubation. First, a lighted scope is used to identify the trachea from the esophagus. Next, the tube is placed through the pharynx and into the trachea. Finally, the scope is removed, leaving the tube in place.</p>		
<b>intermittent positive pressure breathing</b> (IPPB)		Method for assisting patients in breathing using a mask connected to a machine that produces an increased positive thoracic pressure.
<b>nasal cannula</b> (CAN-you-lah)	<b>nas/o</b> = nose <b>-al</b> = pertaining to	Two-pronged plastic device for delivering oxygen into the nose; one prong is inserted into each naris.
<b>postural drainage</b>	<b>-al</b> = pertaining to	Drainage of secretions from the bronchi by placing the patient in a position that uses gravity to promote drainage. Used for the treatment of cystic fibrosis and bronchiectasis.
<b>supplemental oxygen therapy</b>	<b>-al</b> = pertaining to	Providing a patient with additional concentration of oxygen to improve oxygen levels in the bloodstream. Oxygen may be provided by a mask or nasal cannula.
<b>ventilator</b> (VENT-ih-later)		Machine that provides artificial ventilation for a patient unable to breathe on his or her own. Also called a <i>respirator</i> .
<b>Surgical Procedures</b>		
<b>bronchoplasty</b> (BRONG-koh-plas-tee)	<b>bronch/o</b> = bronchus <b>-plasty</b> = surgical repair	Surgical repair of a bronchus.
<b>laryngectomy</b> (lair-in-JEK-toh-mee)	<b>laryng/o</b> = larynx <b>-ectomy</b> = surgical removal	Surgical removal of the larynx.
<b>laryngoplasty</b> (lair-RING-goh-plas-tee)	<b>laryng/o</b> = larynx <b>-plasty</b> = surgical repair	Surgical repair of the larynx.

## Therapeutic Procedures (continued)

Term	Word Parts	Definition
<b>lobectomy</b> (loh-BEK-toh-mee)	<b>lob/o</b> = lobe <b>-ectomy</b> = surgical removal	Surgical removal of a lobe of a lung.
<b>pleurectomy</b> (ploor-EK-toh-mee)	<b>pleur/o</b> = pleura <b>-ectomy</b> = surgical removal	Surgical removal of the pleura.
<b>pleurocentesis</b> (ploor-oh-sen-TEE-sis)	<b>pleur/o</b> = pleura <b>-centesis</b> = puncture to withdraw fluid	Procedure involving insertion of a needle into the pleural space to withdraw fluid; may be a treatment for excess fluid accumulating or to obtain fluid for diagnostic examination.
<b>pneumectomy</b> (NOO-moh-NEK-toh-mee)	<b>pneum/o</b> = lung <b>-ectomy</b> = surgical removal	Surgical removal of an entire lung.
<b>rhinoplasty</b> (RYE-noh-plas-tee)	<b>rhin/o</b> = nose <b>-plasty</b> = surgical repair	Surgical repair of the nose.
<b>thoracentesis</b> (thor-ah-sen-TEE-sis)	<b>thorac/o</b> = chest <b>-centesis</b> = puncture to withdraw fluid	Surgical puncture of the chest wall for the removal of fluids. Also called <i>thoracocentesis</i> .
<div>  <p>Needle inserted into pleural space to withdraw fluid</p> </div> <p>■ <b>Figure 7.13</b> Thoracentesis. The needle is inserted between the ribs to withdraw fluid from the pleural sac at the base of the left lung.</p>		
<b>thoracostomy</b> (thor-ah-KOS-toh-mee)	<b>thorac/o</b> = chest <b>-ostomy</b> = surgically create an opening	Insertion of a tube into the chest cavity for the purpose of draining off fluid or air. Also called <i>chest tube</i> .
<b>thoracotomy</b> (thor-ah-KOT-oh-mee)	<b>thorac/o</b> = chest <b>-otomy</b> = cutting into	To cut into the chest cavity.
<b>tracheotomy</b> (tray-kee-OTT-oh-mee)	<b>trache/o</b> = trachea <b>-otomy</b> = cutting into	Surgical procedure often performed in an emergency that creates an opening directly into the trachea to allow the patient to breathe easier; also called <i>tracheostomy</i> (see Figure 7.14 ■).



## Therapeutic Procedures (continued)

Term	Word Parts	Definition
<p>■ <b>Figure 7.14</b> A tracheotomy tube in place, inserted through an opening in the front of the neck and anchored within the trachea.</p> 		
<b>Additional Procedures</b>		
<b>cardiopulmonary resuscitation (CPR)</b> (car-dee-oh-PULL-mon-air-ee / ree-suss-ih-TAY-shun)	<b>cardi/o</b> = heart <b>pulmon/o</b> = lung <b>-ary</b> = pertaining to	Emergency treatment provided by persons trained in CPR and given to patients when their respirations and heart stop. CPR provides oxygen to the brain, heart, and other vital organs until medical treatment can restore normal heart and pulmonary function.
<b>Heimlich maneuver</b> (HYME-lik)		Technique for removing a foreign body from the trachea or pharynx by exerting diaphragmatic pressure. Named for Henry Heimlich, a U.S. thoracic surgeon.
<b>percussion</b> (per-KUH-shun)		Use of the fingertips to tap on a surface to determine the condition beneath the surface. Determined in part by the feel of the surface as it is tapped and the sound generated.

## Practice As You Go

### D. Terminology Matching

Match each term to its definition.

- |  |  |
|--|--|
| 1. _____ sweat test                      | a. polysomnography                     |
| 2. _____ measures oxygen levels in blood | b. Mantoux test                        |
| 3. _____ ventilator                      | c. oximetry                            |
| 4. _____ test to identify sleep apnea    | d. puncture chest wall to remove fluid |
| 5. _____ thoracentesis                   | e. respirator                          |
| 6. _____ tuberculin test                 | f. test for cystic fibrosis            |

## Pharmacology

Classification	Word Parts	Action	Examples
<b>antibiotic</b> (an-tih-bye-AW-tic)	<b>anti-</b> = against <b>bi/o</b> = life <b>-tic</b> = pertaining to	Kills bacteria causing respiratory infections.	ampicillin; amoxicillin, Amoxil; ciprofloxacin, Cipro
<b>antihistamine</b> (an-tih-HIST-ah-meen)	<b>anti-</b> = against	Blocks the effects of histamine that has been released by the body during an allergy attack.	fexofenadine, Allegra; loratadine, Claritin; diphenhydramine, Benadryl
<b>antitussive</b> (an-tih-TUSS-ive)	<b>anti-</b> = without <b>tuss/o</b> = cough	Relieves the urge to cough.	hydrocodon, Hycodan; dextromethorphan, Vicks Formula 44
<b>bronchodilator</b> (BRONG-koh-dye-late-or)	<b>bronch/o</b> = bronchus	Relaxes muscle spasms in bronchial tubes. Used to treat asthma.	albuterol, Proventil, Ventolin; theophyllin, Theo-Dur
<b>corticosteroids</b> (core-tih-koh-STAIR-ryods)	<b>cortic/o</b> = outer layer, cortex	Reduces inflammation and swelling in the respiratory tract.	fluticasone, Flonase; mometasone, Nasonex; triamcinolone, Azmacort
<b>decongestant</b> (dee-kon-JES-tant)	<b>de-</b> = without	Reduces stuffiness and congestion throughout the respiratory system.	oxymetazoline, Afrin, Dristan, Sinex; pseudoephedrine, Drixoral, Sudafed
<b>expectorant</b> (ek-SPEK-toh-rant)		Improves the ability to cough up mucus from the respiratory tract.	guaifenesin, Robitussin, Mucinex
<b>mucolytic</b> (myoo-koh-LIT-ik)	<b>muc/o</b> = mucus <b>-lytic</b> = destruction	Liquefies mucus so it is easier to cough and clear it from the respiratory tract.	N-acetyl-cysteine, Mucomyst

## Abbreviations

<b>ABGs</b>	arterial blood gases	<b>IC</b>	inspiratory capacity
<b>ARDS</b>	adult (or acute) respiratory distress syndrome	<b>IPPB</b>	intermittent positive pressure breathing
<b>Bronch</b>	bronchoscopy	<b>IRDS</b>	infant respiratory distress syndrome
<b>CF</b>	cystic fibrosis	<b>IRV</b>	inspiratory reserve volume
<b>CO<sub>2</sub></b>	carbon dioxide	<b>LLL</b>	left lower lobe
<b>COPD</b>	chronic obstructive pulmonary disease	<b>LUL</b>	left upper lobe
<b>CPR</b>	cardiopulmonary resuscitation	<b>MDI</b>	metered-dose inhaler
<b>C&amp;S</b>	culture and sensitivity	<b>O<sub>2</sub></b>	oxygen
<b>CTA</b>	clear to auscultation	<b>PFT</b>	pulmonary function test
<b>CXR</b>	chest X-ray	<b>PPD</b>	purified protein derivative
<b>DOE</b>	dyspnea on exertion	<b>R</b>	respiration
<b>DPT</b>	diphtheria, pertussis, tetanus injection	<b>RA</b>	room air
<b>ENT</b>	ear, nose, and throat	<b>RDS</b>	respiratory distress syndrome
<b>ERV</b>	expiratory reserve volume	<b>RLL</b>	right lower lobe
<b>flu</b>	influenza	<b>RML</b>	right middle lobe
<b>FRC</b>	functional residual capacity	<b>RRT</b>	registered respiratory therapist
<b>HMD</b>	hyaline membrane disease	<b>RUL</b>	right upper lobe

**Abbreviations** (continued)

<b>RV</b>	reserve volume	<b>TLC</b>	total lung capacity
<b>SARS</b>	severe acute respiratory syndrome	<b>TPR</b>	temperature, pulse, and respiration
<b>SIDS</b>	sudden infant death syndrome	<b>TV</b>	tidal volume
<b>SOB</b>	shortness of breath	<b>URI</b>	upper respiratory infection
<b>TB</b>	tuberculosis	<b>VC</b>	vital capacity

**Practice As You Go****E. What's the Abbreviation?**

1. upper respiratory infection \_\_\_\_\_
2. pulmonary function test \_\_\_\_\_
3. oxygen \_\_\_\_\_
4. carbon dioxide \_\_\_\_\_
5. chronic obstructive pulmonary disease \_\_\_\_\_
6. bronchoscopy \_\_\_\_\_
7. tuberculosis \_\_\_\_\_
8. infant respiratory distress syndrome \_\_\_\_\_



# Chapter Review

## Real-World Applications

### Medical Record Analysis

This Pulmonology Consultation Report contains 12 medical terms. Underline each term and write it in the list below the report. Then define each term.












#### Pulmonology Consultation Report

Reason for Consultation:	Evaluation of increasingly severe asthma.
History of Present Illness:	Patient is a 10-year-old male who first presented to the Emergency Room with dyspnea, coughing, and wheezing at seven years of age. Attacks are increasing in frequency, and there do not appear to be any precipitating factors such as exercise. No other family members are asthmatics.
Results of Physical Examination:	Patient is currently in the ER with marked dyspnea, cyanosis around the lips, prolonged expiration, and a hacking cough producing thick phlegm. Auscultation revealed rhonchi throughout lungs. ABGs indicate hypoxemia. Spirometry reveals moderately severe airway obstruction during expiration. This patient responded to Proventil and he is beginning to cough less and breathe with less effort.
Assessment:	Acute asthma attack with severe airway obstruction. There is no evidence of infection. In view of increasing severity and frequency of attacks, all his medications should be reevaluated for effectiveness and all attempts to identify precipitating factors should be made.
Recommendations:	Patient is to continue to use Proventil for relief of bronchospasms. Instructions for taking medications and controlling severity of asthma attacks were carefully reviewed with the patient and his family.

Term	Definition
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____
7. _____	_____
8. _____	_____
9. _____	_____
10. _____	_____
11. _____	_____
12. _____	_____

### Chart Note Transcription

The chart note below contains 11 phrases that can be reworded with a medical term that you learned in this chapter. Each phrase is identified with an underline. Determine the medical term and write your answers in the space provided.

Pearson General Hospital Emergency Room Record	
Task	Edit View Time Scale Options Help Download Archive Date: 17 May 2015
          	
Current Complaint:	A 43-year-old female was brought to the Emergency Room by her family. She complained of <u>painful and labored breathing</u> , <b>1</b> <u>rapid breathing</u> , <b>2</b> and fever. Symptoms began three days ago, but have become much worse during the past 12 hours.
Past History:	Patient is a mother of three and a business executive. She has had no surgeries or previous serious illnesses.
Signs and Symptoms:	Temperature is 103°F, respiratory rate is 20 breaths/minute, blood pressure is 165/98, and heart rate is 90 bpm. A blood test to measure the levels of oxygen in the blood <b>3</b> indicates a marked low level of oxygen in the blood. <b>4</b> The process of listening to body sounds <b>5</b> of the lungs revealed <u>abnormal crackling sounds</u> <b>6</b> over the left lower chest. She is producing large amounts of <u>pus-filled</u> <b>7</b> <u>mucus coughed up from the respiratory tract</u> <b>8</b> and a <u>chest X-ray</u> <b>9</b> shows a large cloudy patch in the lower lobe of the left lung.
Diagnosis:	Left lower lobe <u>inflammatory condition of the lungs caused by bacterial infection</u> . <b>10</b>
Treatment:	Patient was started on intravenous antibiotics. She also required a <u>tube placed through the mouth to create an airway</u> <b>11</b> for three days.
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____
6.	_____
7.	_____
8.	_____
9.	_____
10.	_____
11.	_____

## Case Study

Below is a case study presentation of a patient with a condition discussed in this chapter. Read the case study and answer the questions below. Some questions will ask for information not included within this chapter. Use your text, a medical dictionary, or any other reference material you choose to answer these questions.



(Ni Qin/Getty Images)

An 88-year-old female was seen in the physician's office complaining of dyspnea, dizziness, orthopnea, elevated temperature, and a cough. Lung auscultation revealed crackles over the right bronchus. CXR revealed fluid in the RUL. The patient was sent to the hospital with an admitting diagnosis of pneumonia. Vital signs upon admission were temperature 102°F, pulse 100 BPM and rapid, respirations 24 breaths/min and labored, blood pressure 180/110. She was treated with IV antibiotics and IPPB. She responded well to treatment and was released home to her family with oral antibiotics on the third day.

## Questions

1. What was this patient's admitting diagnosis? Look this condition up in a reference source and include a short description of it.

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2. List and define each of the patient's presenting symptoms in your own words.

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3. Define auscultation and CXR. Describe what each revealed in your own words.

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4. What does the term "vital signs" mean? Describe this patient's vital signs.

---



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5. Describe the treatments this patient received while in the hospital in your own words.

---



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6. Explain the change in the patient's medication when she was discharged home.

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Practice Exercises

A. Complete the Statement

- 1. The primary function of the respiratory system is \_\_\_\_\_.
- 2. The movement of air in and out of the lungs is called \_\_\_\_\_.
- 3. Define external respiration \_\_\_\_\_.
- 4. Define internal respiration \_\_\_\_\_.

B. Define the Suffix

	Definition	Example from Chapter
1. -ectasis	_____	_____
2. -capnia	_____	_____
3. -phonia	_____	_____
4. -thorax	_____	_____
5. -pnea	_____	_____
6. -ptysis	_____	_____
7. -osmia	_____	_____

C. Word Building Practice

The combining form **rhin/o** refers to the nose. Use it to write a term that means:

- 1. inflammation of the nose \_\_\_\_\_
- 2. discharge from the nose \_\_\_\_\_
- 3. surgical repair of the nose \_\_\_\_\_

The combining form **laryng/o** refers to the larynx or voice box. Use it to write a term that means:

- 4. inflammation of the larynx \_\_\_\_\_
- 5. spasm of the larynx \_\_\_\_\_
- 6. visual examination of the larynx \_\_\_\_\_
- 7. pertaining to the larynx \_\_\_\_\_
- 8. removal of the larynx \_\_\_\_\_
- 9. surgical repair of the larynx \_\_\_\_\_
- 10. paralysis of the larynx \_\_\_\_\_

The combining form **bronch/o** refers to the bronchus. Use it to write a term that means:

11. pertaining to bronchus \_\_\_\_\_
12. inflammation of the bronchus \_\_\_\_\_
13. visually examine the interior of the bronchus \_\_\_\_\_
14. produced by bronchus \_\_\_\_\_
15. spasm of the bronchus \_\_\_\_\_

The combining form **thorac/o** refers to the chest. Use it to write a term that means:

16. cutting into the chest \_\_\_\_\_
17. chest pain \_\_\_\_\_
18. pertaining to chest \_\_\_\_\_

The combining form **trache/o** refers to the trachea. Use it to write a term that means:

19. cutting into the trachea \_\_\_\_\_
20. narrowing of the trachea \_\_\_\_\_
21. pertaining to inside the trachea \_\_\_\_\_

The suffix **-pnea** means breathing. Use this suffix to write a medical term that means:

22. difficult or labored breathing \_\_\_\_\_
23. rapid breathing \_\_\_\_\_
24. can breathe only in an upright position \_\_\_\_\_
25. lack of breathing \_\_\_\_\_

## D. Define the Combining Form

	Definition	Example from Chapter
1. <b>trache/o</b>	_____	_____
2. <b>laryng/o</b>	_____	_____
3. <b>bronch/o</b>	_____	_____
4. <b>spir/o</b>	_____	_____
5. <b>pneum/o</b>	_____	_____
6. <b>rhin/o</b>	_____	_____
7. <b>coni/o</b>	_____	_____
8. <b>pleur/o</b>	_____	_____
9. <b>epiglott/o</b>	_____	_____
10. <b>alveol/o</b>	_____	_____

	Definition	Example from Chapter
11. <b>pulmon/o</b>	_____	_____
12. <b>ox/o</b>	_____	_____
13. <b>sinus/o</b>	_____	_____
14. <b>lob/o</b>	_____	_____
15. <b>nas/o</b>	_____	_____

### E. Name That Term

1. the process of breathing in \_\_\_\_\_
2. spitting up of blood \_\_\_\_\_
3. blood clot in the pulmonary artery \_\_\_\_\_
4. inflammation of a sinus \_\_\_\_\_
5. sore throat \_\_\_\_\_
6. air in the pleural cavity \_\_\_\_\_
7. whooping cough \_\_\_\_\_
8. cutting into the pleura \_\_\_\_\_
9. pain in the pleural region \_\_\_\_\_
10. common cold \_\_\_\_\_

### F. What Does it Stand For?

1. CXR \_\_\_\_\_
2. TV \_\_\_\_\_
3. TPR \_\_\_\_\_
4. ABGs \_\_\_\_\_
5. DOE \_\_\_\_\_
6. RUL \_\_\_\_\_
7. SIDS \_\_\_\_\_
8. TLC \_\_\_\_\_
9. ARDS \_\_\_\_\_
10. MDI \_\_\_\_\_
11. CTA \_\_\_\_\_
12. SARS \_\_\_\_\_

**G. Define the Term**

1. total lung capacity \_\_\_\_\_
2. tidal volume \_\_\_\_\_
3. residual volume \_\_\_\_\_

**H. Fill in the Blank**

anthracosis	sputum cytology	cardiopulmonary resuscitation	patent
thoracentesis	respirator	ventilation-perfusion scan	rhonchi
supplemental oxygen	hyperventilation		

1. When the patient's breathing and heart stopped, the paramedics began \_\_\_\_\_.
2. The physician performed a \_\_\_\_\_ to remove fluid from the chest.
3. A \_\_\_\_\_ is also called a ventilator.
4. The patient received \_\_\_\_\_ through a nasal cannula.
5. An endotracheal intubation was performed to establish a \_\_\_\_\_ airway.
6. A \_\_\_\_\_ is a particularly useful test to identify a pulmonary embolus.
7. The result of the \_\_\_\_\_ was negative for cancer.
8. \_\_\_\_\_ involves tachypnea and hyperpnea.
9. \_\_\_\_\_ are wheezing lung sounds.
10. Miners are at risk of developing \_\_\_\_\_.

**I. Pharmacology Challenge**

Fill in the classification for each drug description, then match the brand name.

Drug Description	Classification	Brand Name
1. _____ Reduces stuffiness and congestion	_____	a. Hycodan
2. _____ Relieves the urge to cough	_____	b. Flonase
3. _____ Kills bacteria	_____	c. Cipro
4. _____ Improves ability to cough up mucus	_____	d. Ventolin
5. _____ Liquefies mucus	_____	e. Allegra
6. _____ Relaxes bronchial muscle spasms	_____	f. Afrin
7. _____ Blocks allergy attack	_____	g. Robitussin
8. _____ Reduces inflammation and swelling	_____	h. Mucomyst

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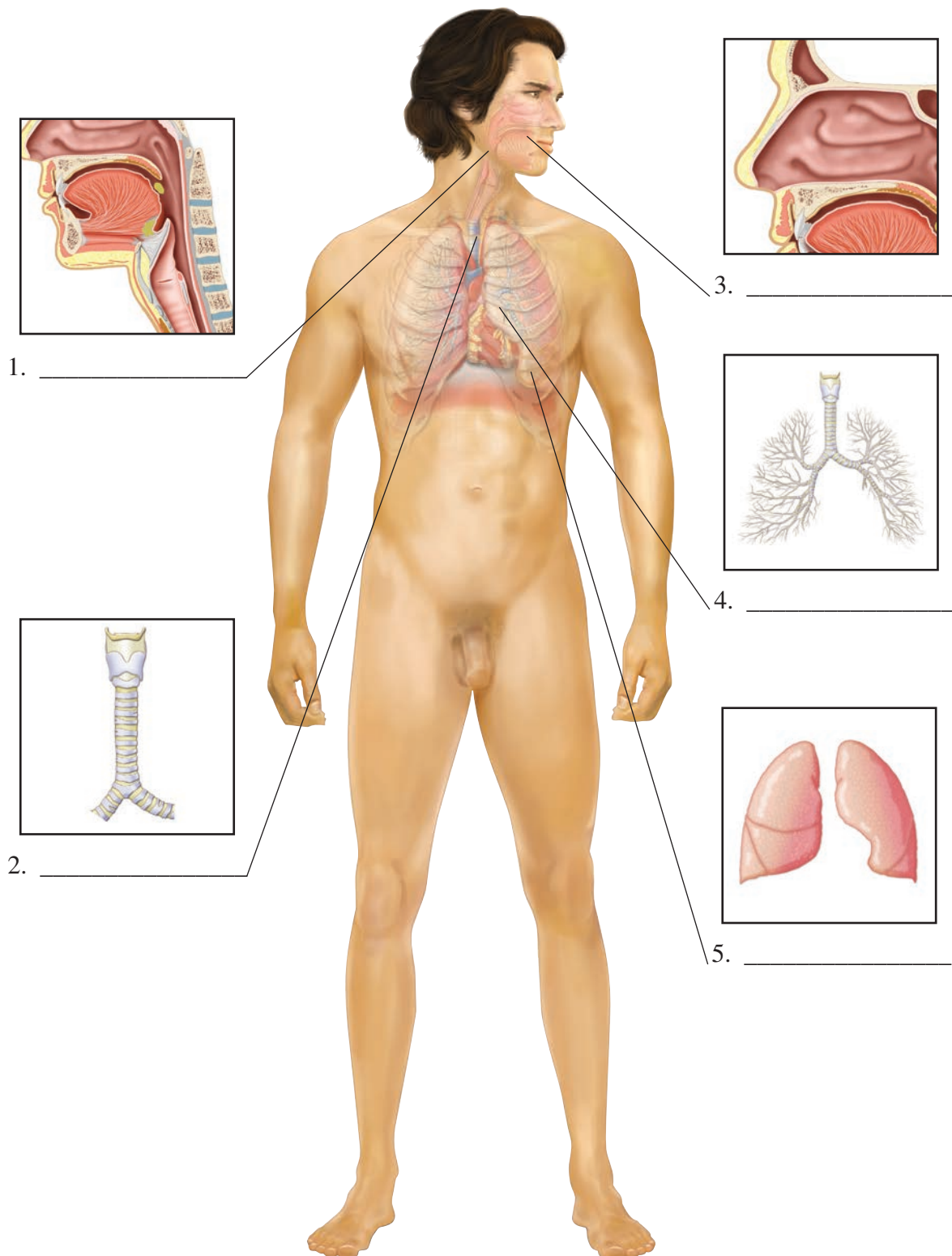
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## Labeling Exercise

### Image A

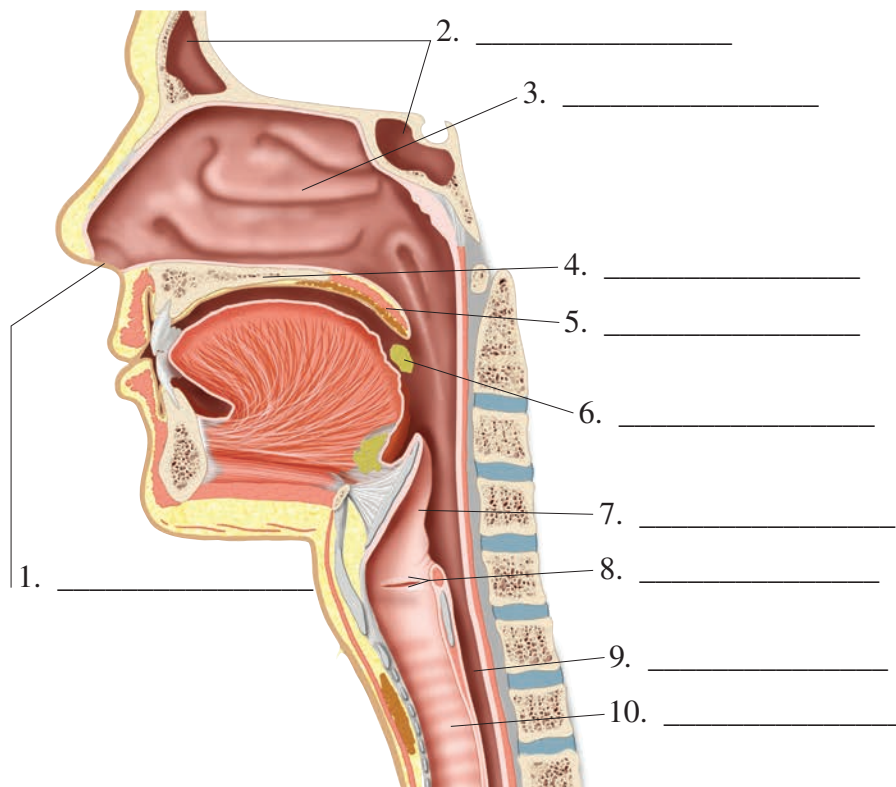
Write the labels for this figure on the numbered lines provided.





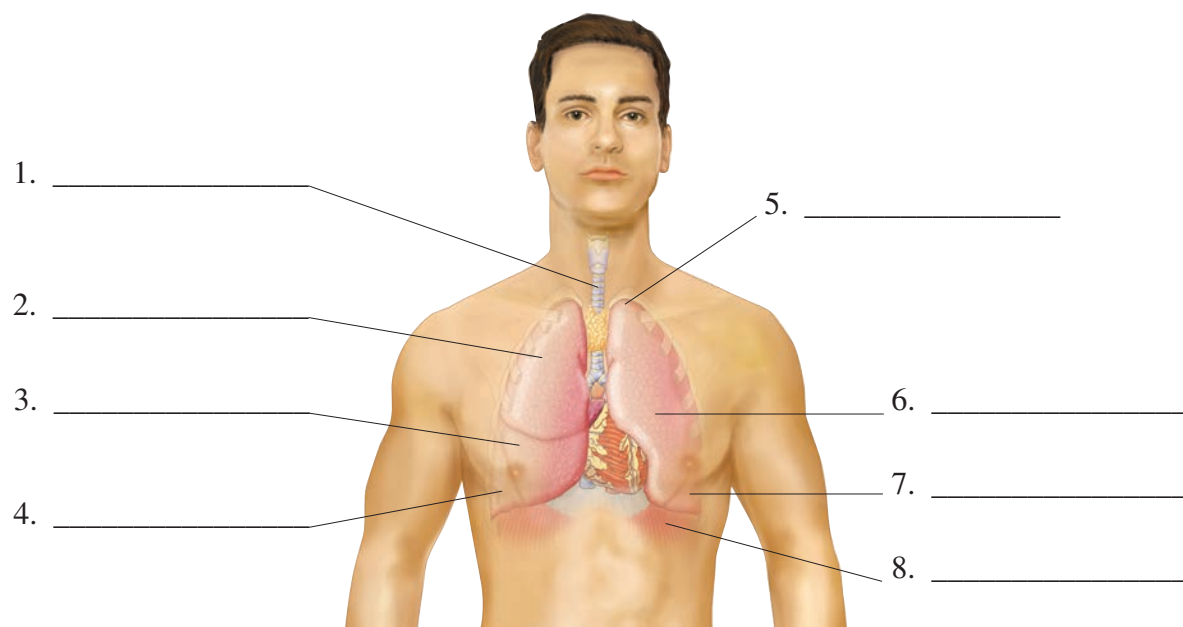
## Image B

Write the labels for this figure on the numbered lines provided.



## Image C

Write the labels for this figure on the numbered lines provided.



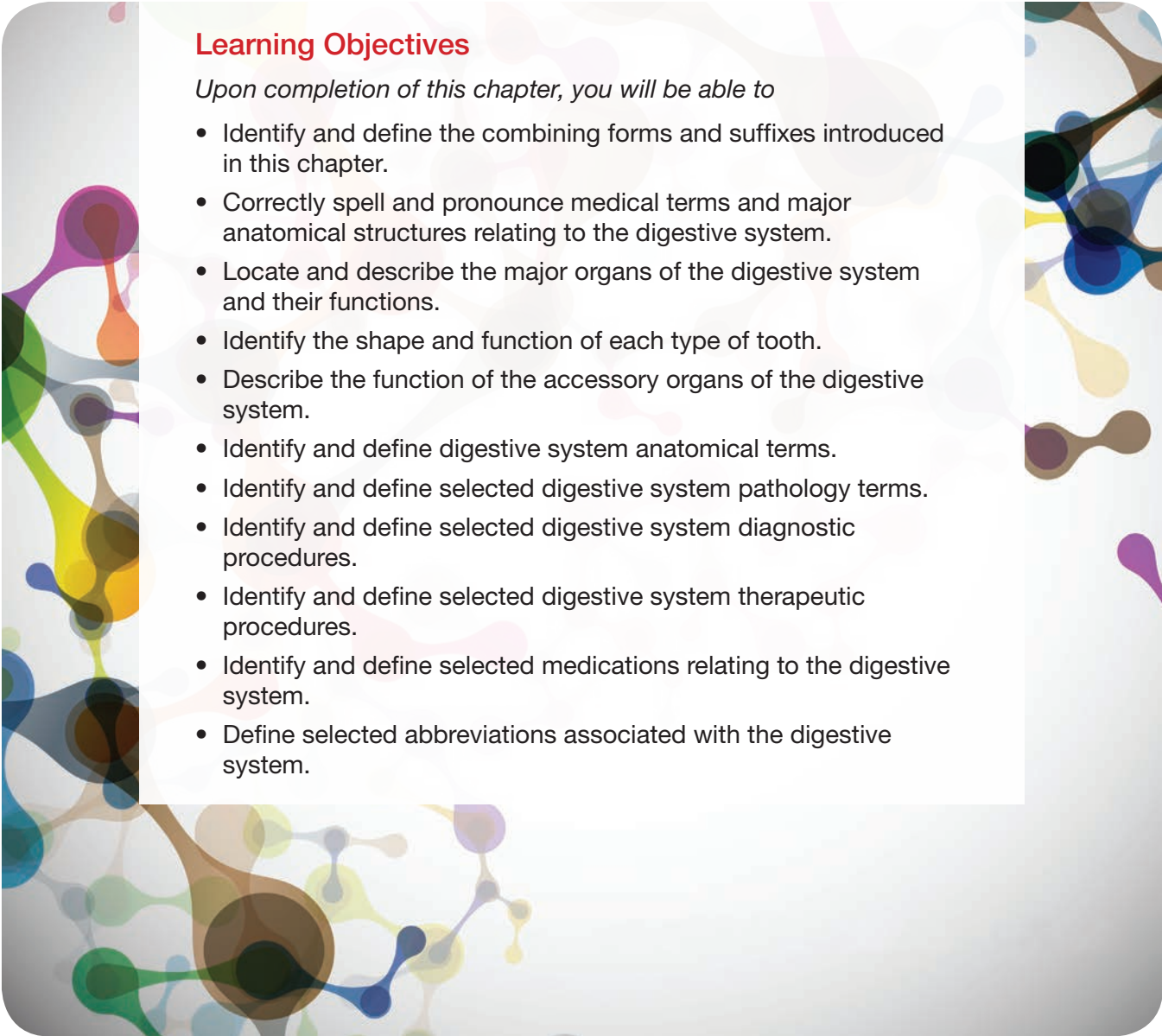


# 8

## Digestive System

### Learning Objectives

*Upon completion of this chapter, you will be able to*

- Identify and define the combining forms and suffixes introduced in this chapter.
  - Correctly spell and pronounce medical terms and major anatomical structures relating to the digestive system.
  - Locate and describe the major organs of the digestive system and their functions.
  - Identify the shape and function of each type of tooth.
  - Describe the function of the accessory organs of the digestive system.
  - Identify and define digestive system anatomical terms.
  - Identify and define selected digestive system pathology terms.
  - Identify and define selected digestive system diagnostic procedures.
  - Identify and define selected digestive system therapeutic procedures.
  - Identify and define selected medications relating to the digestive system.
  - Define selected abbreviations associated with the digestive system.
- 



# Digestive System at a Glance

## Function

The digestive system begins breaking down food through mechanical and chemical digestion. After being digested, nutrient molecules are absorbed into the body and enter the bloodstream; any food not digested or absorbed is eliminated as solid waste.

## Organs

Here are the primary structures that comprise the digestive system:

<b>anus</b>	<b>pancreas</b>
<b>esophagus</b>	<b>pharynx</b>
<b>gallbladder (GB)</b>	<b>salivary glands</b>
<b>large intestine</b>	<b>small intestine</b>
<b>liver</b>	<b>stomach</b>
<b>oral cavity</b>	

## Word Parts

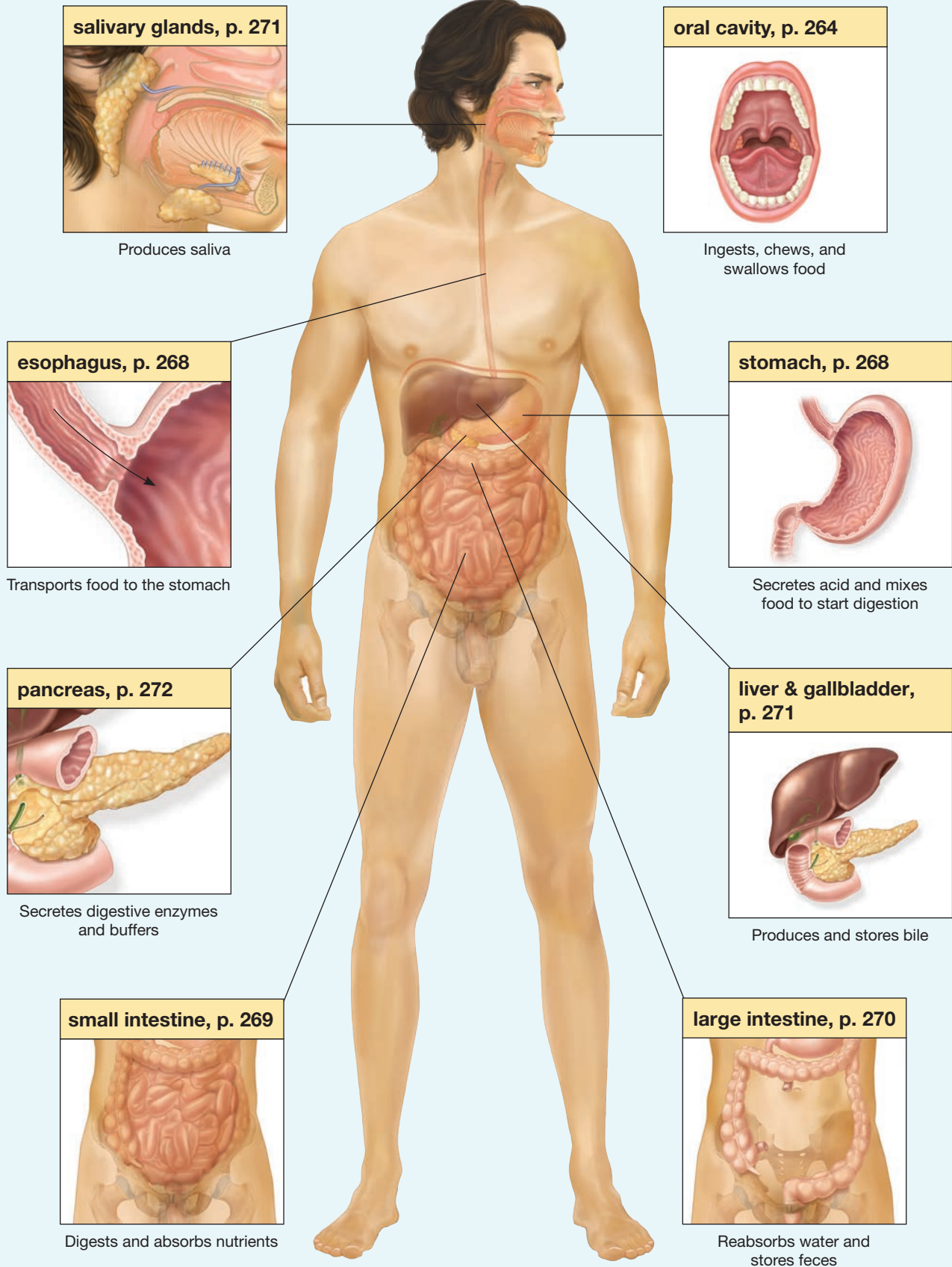
Here are the most common word parts (with their meanings) used to build digestive system terms. For a more comprehensive list, refer to the Terminology section of this chapter.

## Combining Forms

<b>an/o</b>	anus	<b>gloss/o</b>	tongue
<b>append/o</b>	appendix	<b>hepat/o</b>	liver
<b>appendic/o</b>	appendix	<b>ile/o</b>	ileum
<b>bar/o</b>	weight	<b>jejun/o</b>	jejunum
<b>bucc/o</b>	cheek	<b>labi/o</b>	lip
<b>cec/o</b>	cecum	<b>lapar/o</b>	abdomen
<b>cholangi/o</b>	bile duct	<b>lingu/o</b>	tongue
<b>chol/e</b>	bile, gall	<b>lith/o</b>	stone
<b>cholecyst/o</b>	gallbladder	<b>odont/o</b>	tooth
<b>choledoch/o</b>	common bile duct	<b>or/o</b>	mouth
<b>cirrh/o</b>	yellow	<b>palat/o</b>	palate
<b>col/o</b>	colon	<b>pancreat/o</b>	pancreas
<b>colon/o</b>	colon	<b>pharyng/o</b>	pharynx
<b>dent/o</b>	tooth	<b>polyp/o</b>	polyp
<b>diverticul/o</b>	pouch	<b>proct/o</b>	anus and rectum
<b>duoden/o</b>	duodenum	<b>pylor/o</b>	pylorus
<b>enter/o</b>	small intestine	<b>pyr/o</b>	fire
<b>esophag/o</b>	esophagus	<b>rect/o</b>	rectum
<b>gastr/o</b>	stomach	<b>sialaden/o</b>	salivary gland
<b>gingiv/o</b>	gums	<b>sigmoid/o</b>	sigmoid colon

(continued on page 264)

# Digestive System Illustrated



### Suffixes

<b>-emesis</b>	vomit	<b>-orexia</b>	appetite
<b>-emetic</b>	pertaining to vomiting	<b>-pepsia</b>	digestion
<b>-iatic</b>	pertaining to medical treatment	<b>-phagia</b>	eat, swallow
<b>-istry</b>	specialty of	<b>-prandial</b>	pertaining to a meal
<b>-lithiasis</b>	condition of stones	<b>-tripsy</b>	surgical crushing

## Anatomy and Physiology of the Digestive System

accessory organs

alimentary canal (al-ih-MEN-tar-ree)

colon (COH-lon)

esophagus (eh-SOFF-ah-gus)

gallbladder

gastrointestinal system

(gas-troh-in-TESS-tih-nal)

gastrointestinal tract

gut

liver

oral cavity

pancreas (PAN-kree-ass)

pharynx (FAIR-inks)

salivary glands (SAL-ih-vair-ee)

small intestine

stomach (STUM-ak)

### What's In A Name?

Look for these word parts:

-ary = pertaining to

-ory = pertaining to

### Med Term Tip

The term *alimentary* comes from the Latin term *alimentum* meaning "nourishment."

The digestive system, also known as the **gastrointestinal (GI) system**, includes approximately 30 feet of a continuous muscular tube called the **gut**, **alimentary canal**, or **gastrointestinal tract** that stretches between the mouth and the anus. Most of the organs in this system are actually different sections of this tube. In order, beginning at the mouth and continuing to the anus, these organs are the **oral cavity**, **pharynx**, **esophagus**, **stomach**, **small intestine**, **colon**, **rectum**, and **anus**. The **accessory organs** of digestion are those that participate in the digestion process, but are not part of the continuous alimentary canal. These organs, which are connected to the gut by a duct, are the **liver**, **pancreas**, **gallbladder**, and **salivary glands**.

The digestive system has three main functions: digesting food, absorbing nutrients, and eliminating waste. Digestion includes the physical and chemical breakdown of large food particles into simple nutrient molecules like glucose, triglycerides, and amino acids. These simple nutrient molecules are absorbed from the intestines and circulated throughout the body by the cardiovascular system. They are used for growth and repair of organs and tissues. Any food that cannot be digested or absorbed by the body is eliminated from the gastrointestinal system as a solid waste.

## Oral Cavity

cheeks

gingiva (JIN-jih-vah)

gums

lips

palate (PAL-at)

saliva (suh-LYE-vah)

taste buds

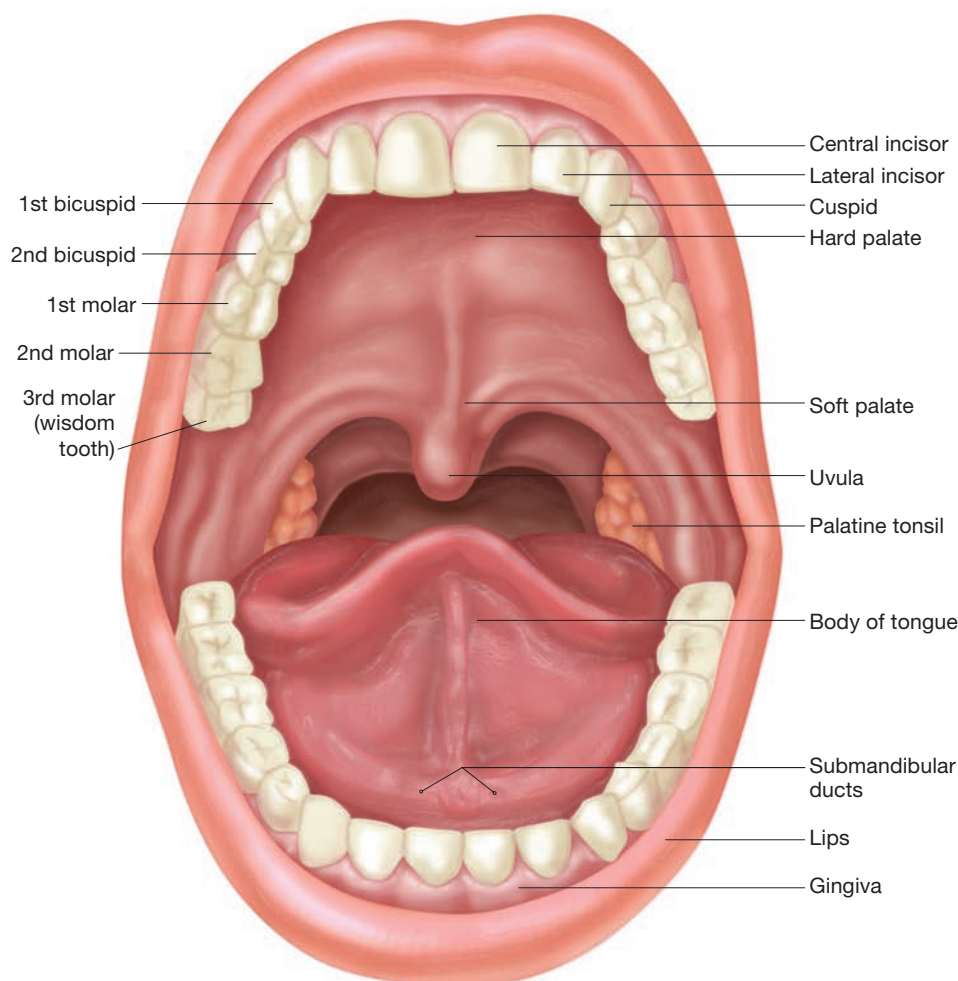
teeth

tongue

uvula (YU-vyu-lah)



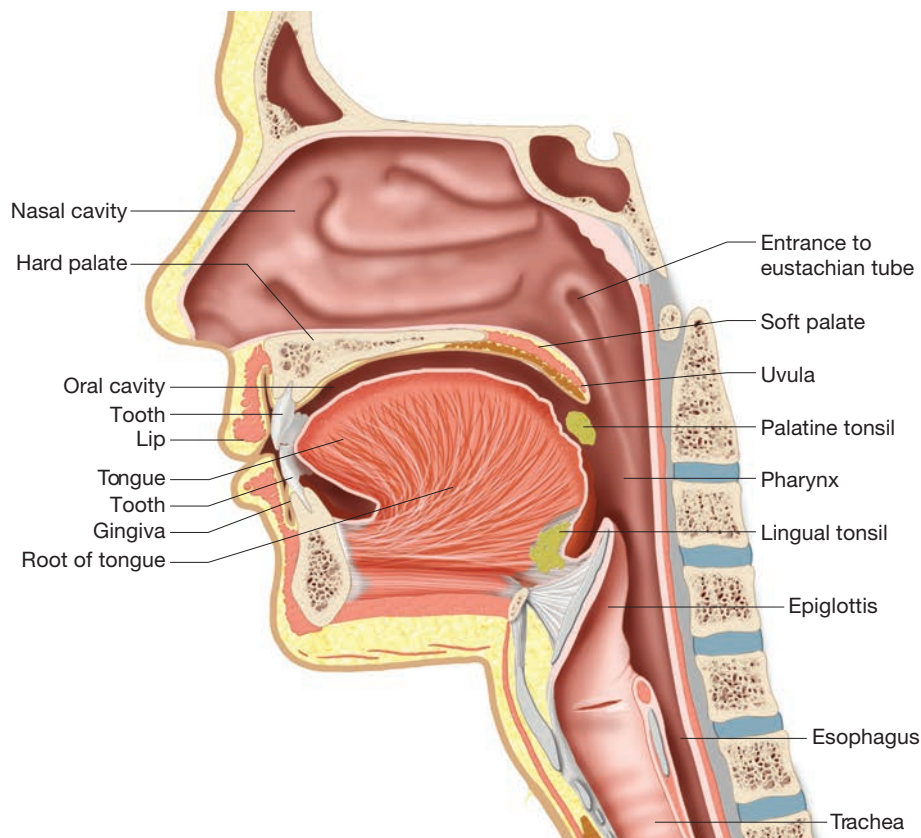
Digestion begins when food enters the mouth and is mechanically broken up by the chewing movements of the **teeth**. The muscular **tongue** moves the food within the mouth and mixes it with **saliva** (see Figure 8.1 ■). Saliva contains digestive enzymes to break down carbohydrates and slippery lubricants to make food easier to swallow. **Taste buds**, found on the surface of the tongue, can distinguish the bitter, sweet, sour, salty, and umami (savory) flavors in our food. The roof of the oral cavity is known as the **palate** and is subdivided into the hard palate (the bony anterior portion) and the soft palate (the flexible posterior portion). Hanging down from the posterior edge of the soft palate is the **uvula**. The uvula serves two important functions. First, it has a role in speech production and, second, it is the location of the gag reflex. This reflex is stimulated when food enters the throat without swallowing (e.g., laughing with food in your mouth). It is important because swallowing also results in the epiglottis covering the larynx to prevent food from entering the lungs (see Figure 8.2 ■). The **cheeks** form the lateral walls of this cavity and the **lips** are the anterior opening. The entire oral cavity is lined with mucous membrane, a portion of which forms the **gums**, or **gingiva**, that combine with connective tissue to cover the jaw bone and seal off the teeth in their bony sockets.



■ **Figure 8.1** Anatomy of structures of the oral cavity.



■ **Figure 8.2** Structures of the oral cavity, and pharynx, and esophagus.



### What's In A Name?

Look for these word parts:

**cis/o** = to cut

**bi-** = two

**in-** = inward

**pre-** = before

### Med Term Tip

There are three different molars, simply referred to as the first, second, or third molars. However, the third molar has a more common name, the wisdom tooth. Not every person forms all four wisdom teeth. Unfortunately, most people do not have enough room in their jaws for the third molars to properly erupt through the gum, a condition requiring surgical removal of the third molar, referred to as an *impacted wisdom tooth*.

### Med Term Tip

The combining form **dent/o** means teeth. Hence we have terms such as dentist and dentistry. The combining form **odont/o** also means teeth and when combined with **orth/o**, which means straight, we have the specialty of *orthodontics*, or straightening teeth.

## Teeth

**bicuspids** (bye-CUSS-pids)

**canines** (KAY-nines)

**cementum** (see-MEN-tum)

**crown**

**cuspid** (CUSS-pids)

**deciduous teeth** (dee-SID-yoo-us)

**dentin** (DEN-tin)

**enamel**

**incisors** (in-SIGH-zors)

**molars** (MOH-lars)

**periodontal ligaments** (pair-ee-on-DON-tal)

**permanent teeth**

**premolars** (pree-MOH-lars)

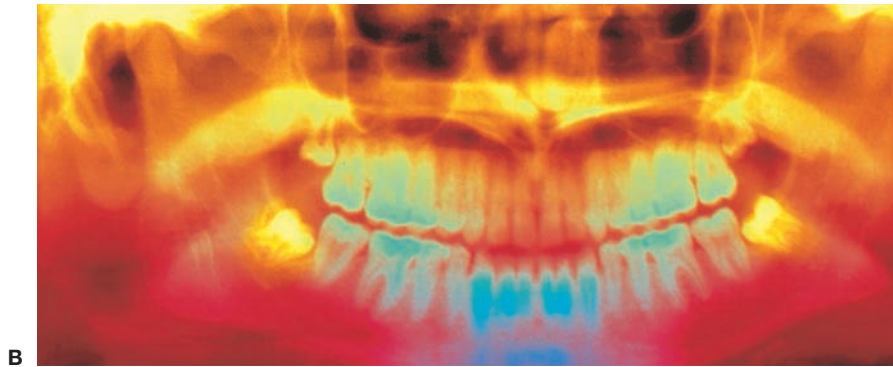
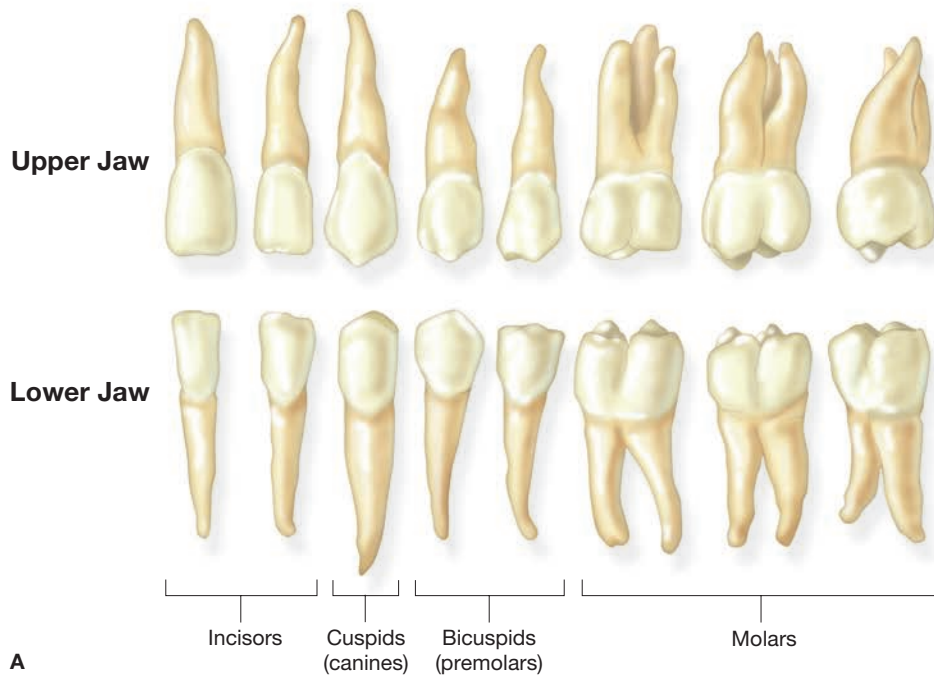
**pulp cavity**

**root**

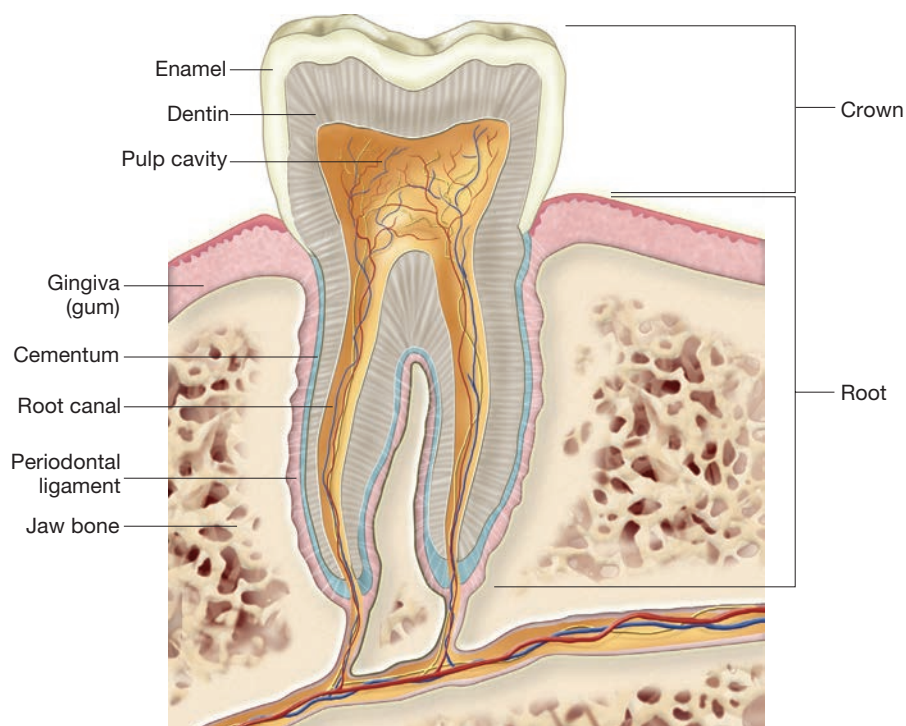
**root canal**

Teeth are an important part of the first stage of digestion. The teeth in the front of the mouth bite, tear, or cut food into small pieces. These cutting teeth include the **cuspid**s (or **canines**) and the **incisors** (see Figure 8.3 ■). The remaining posterior teeth grind and crush food into even finer pieces. These grinding teeth include the **bicuspids** (or **premolars**) and the **molars**. A tooth can be subdivided into the **crown** and the **root**. The crown is that part of the tooth visible above the gum line; the root is below the gum line. The root is anchored in the bony socket of the jaw by **cementum** and tiny **periodontal ligaments**. The crown of the tooth is covered by a layer of **enamel**, the hardest substance in the body. Under the enamel layer is **dentin**, the substance that makes up the main bulk of the tooth. The hollow interior of a tooth is called the **pulp cavity** in the crown and the **root canal** in the root. These cavities contain soft tissue made up of blood vessels, nerves, and lymph vessels (see Figure 8.4 ■).

Humans have two sets of teeth. The first set, often referred to as baby teeth, are **deciduous teeth**. There are 20 teeth in this set that erupt through the gums between the ages of six and 28 months. At approximately six years of age, these teeth begin to fall out and are replaced by the 32 **permanent teeth**. This replacement process continues until about 18–20 years of age.



■ **Figure 8.3** A) The name and shape of the adult teeth. These teeth represent those found in the right side of the mouth. Those of the left side would be a mirror image. The incisors and cuspids are cutting teeth. The bicuspids and molars are grinding teeth. B) Color enhanced X-ray of all teeth. Note the four wisdom teeth (3rd molars) that have not erupted. (Science Source)



■ **Figure 8.4** An adult tooth, longitudinal view showing internal structures of the crown and root.

## Pharynx

**epiglottis** (ep-ih-GLOT-iss)  
**oropharynx**

**laryngopharynx** (lair-ring-goh-FAIR-inks)

### What's In A Name?

Look for these word parts:

**laryng/o** = larynx

**or/o** = mouth

**epi-** = above

When food is swallowed, it enters the **oropharynx** and then the **laryngopharynx** (see again Figure 8.2). Remember from your study of the respiratory system in Chapter 7 that air is also traveling through these portions of the pharynx. The **epiglottis** is a cartilaginous flap that folds down to cover the larynx and trachea so that food is prevented from entering the respiratory tract and instead continues into the esophagus.

## Esophagus

**peristalsis** (pair-ih-STALL-sis)

### Med Term Tip

It takes about 10 seconds for swallowed food to reach the stomach.

The esophagus is a muscular tube about 10 inches long in adults. Food entering the esophagus is carried through the thoracic cavity and diaphragm and into the abdominal cavity where it enters the stomach (see Figure 8.5 ■). Food is propelled along the esophagus by wavelike muscular contractions called **peristalsis**. In fact, peristalsis works to push food through the entire gastrointestinal tract.

## Stomach

**antrum** (AN-trum)

**body**

**cardiac sphincter** (CAR-dee-ak / SFINGK-ter)

**chyme** (KIGHM)

**fundus** (FUN-dus)

**hydrochloric acid**

**lower esophageal sphincter**

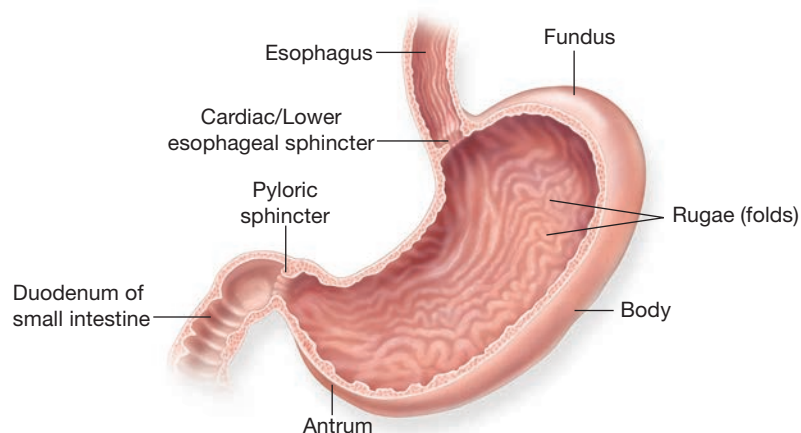
(eh-soff-ah-JEE-al / SFINGK-ter)

**pyloric sphincter** (pigh-LOR-ik / SFINGK-ter)

**rugae** (ROO-gay)

**sphincters** (SFINGK-ters)

The stomach, a J-shaped muscular organ that acts as a bag or sac to collect and churn food with digestive juices, is composed of three parts: the **fundus** or upper region, the **body** or main portion, and the **antrum** or lower region (see again Figure 8.5). The folds in the lining of the stomach are called **rugae**. When the stomach fills with food, the rugae stretch out and disappear. **Hydrochloric acid** (HCl) is secreted by glands in the mucous membrane lining of the stomach. Food



■ **Figure 8.5** The stomach, longitudinal view, showing regions and internal structures.

mixes with hydrochloric acid and other gastric juices to form a liquid mixture called **chyme**, which then passes through the remaining portion of the digestive system.

Entry into and exit from the stomach is controlled by muscular valves called **sphincters**. These valves open and close to ensure that food can only move forward down the gut tube. The **cardiac sphincter**, named for its proximity to the heart, is located between the esophagus and the fundus; also called the **lower esophageal sphincter** (LES), it keeps food from flowing backward into the esophagus.

The antrum tapers off into the **pyloric sphincter**, which regulates the passage of food into the small intestine. Only a small amount of the chyme is allowed to enter the small intestine with each opening of the sphincter for two important reasons. First, the small intestine is much narrower than the stomach and cannot hold as much as the stomach can. Second, the chyme is highly acidic and must be thoroughly neutralized as it leaves the stomach.

## Small Intestine

**duodenum** (doo-oh-DEE-num /  
doo-OD-eh-num)

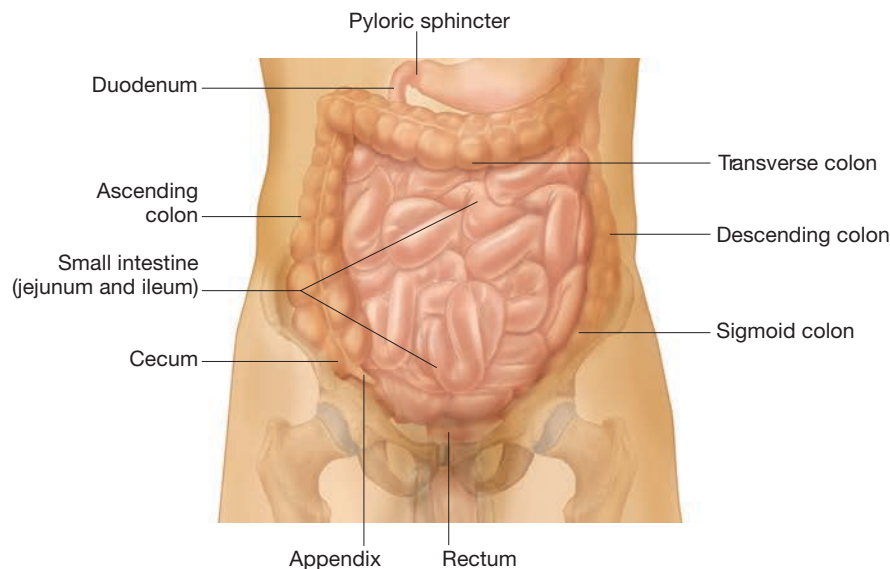
**ileocecal valve** (ill-ee-oh-SEE-kal)

**ileum** (ILL-ee-um)

**jejunum** (jih-JOO-num)

The small intestine, or small bowel, is the major site of digestion and absorption of nutrients from food. It is located between the pyloric sphincter and the colon (see Figure 8.6 ■). Because the small intestine is concerned with absorption of food products, an abnormality in this organ can cause malnutrition. The small intestine, with an average length of 20 feet, is the longest portion of the alimentary canal and has three sections: the **duodenum**, the **jejunum**, and the **ileum**.

- The duodenum extends from the pyloric sphincter to the jejunum, and is about 10–12 inches long. Digestion is completed in the duodenum after the liquid chyme from the stomach is mixed with digestive juices from the pancreas and gallbladder.
- The jejunum, or middle portion, extends from the duodenum to the ileum and is about eight feet long.



### What's In A Name?

Look for these word parts:

**cardi/o** = heart

**hydr/o** = water

**-ac** = pertaining to

**-ic** = pertaining to

### Med Term Tip

It is easier to remember the function of the pyloric sphincter when you note that **pylor/o** means “gatekeeper.” This gatekeeper controls the forward movement of food. Sphincters are rings of muscle that can be opened and closed to control entry and exit from hollow organs like the stomach, colon, and bladder.

### Word Watch

Be careful not to confuse the word root **ile/o** meaning “ileum,” a portion of the small intestine and **ili/o** meaning “ilium,” a pelvic bone.

■ **Figure 8.6** The small intestine. Anterior view of the abdominopelvic cavity illustrating how the three sections of small intestine—duodenum, jejunum, ileum—begin at the pyloric sphincter and end at the colon, but are not arranged in an orderly fashion.



**Med Term Tip**

We can survive without a portion of the small intestine. For example, in cases of cancer, much of the small intestine and/or colon may have to be removed. The surgeon then creates an opening between the remaining intestine and the abdominal wall. The combining form for the section of intestine connected to the abdominal wall and the suffix *-ostomy* are used to describe this procedure. For example, if a person has a *jejunostomy*, the jejunum is connected to the abdominal wall and the ileum (and remainder of the gut tube) has been removed.

**Word Watch**

The term *colon* refers to only a portion of the large intestine. However, you should be aware that many people use it incorrectly as a general term referring to the entire intestinal system, both small and large intestines.

**Med Term Tip**

The term *defecation* comes from the Latin word meaning “to remove the dregs.”

- The ileum is the last portion of the small intestine and extends from the jejunum to the colon. At 12 feet in length, it is the longest portion of the small intestine. The ileum connects to the colon with a sphincter called the **ileocecal valve**.

## Large Intestine

**anal sphincter** (AY-nal / SFINGK-ter)

**anus** (AY-nus)

**ascending colon**

**cecum** (SEE-kum)

**defecation**

**descending colon**

**feces** (FEE-seez)

**rectum** (REK-tum)

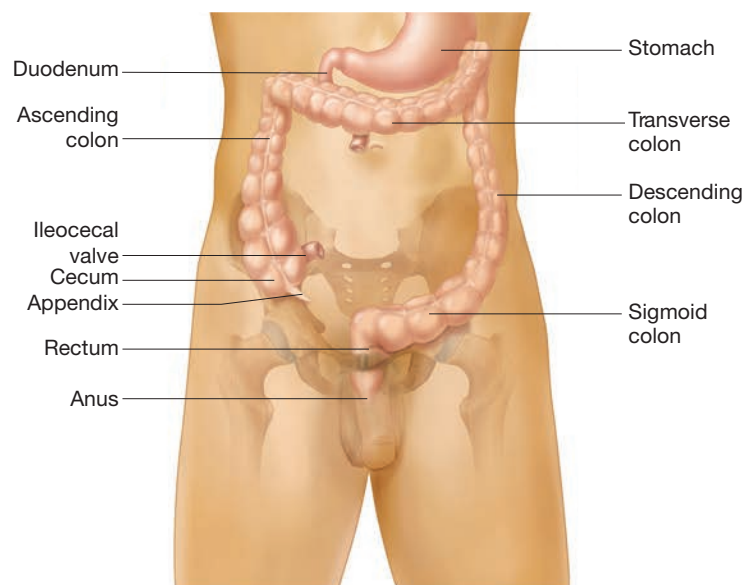
**sigmoid colon** (SIG-moyd)

**transverse colon**

**vermiform appendix** (VER-mih-form / ah-PEN-diks)

Fluid that remains after the complete digestion and absorption of nutrients in the small intestine enters the large intestine (see Figure 8.7 ■). Most of this fluid is water that is reabsorbed into the body. The material that remains after absorption is solid waste called **feces** (or stool). This is the product evacuated in bowel movements (BM).

The large intestine is approximately 5 feet long and extends from the **ileocecal valve** to the **anus**; this includes the cecum, colon, and rectum. The cecum is a pouch or saclike area in the first 2–3 inches at the beginning of the colon. The **vermiform appendix** is a small worm-shaped outgrowth at the end of the cecum. The colon consists of the **ascending colon**, **transverse colon**, **descending colon**, and **sigmoid colon**. The ascending colon on the right side extends from the cecum to the lower border of the liver. The transverse colon moves horizontally across the upper abdomen toward the spleen. The descending colon then travels down the left side of the body to where the sigmoid colon begins. The sigmoid colon curves in an S-shape back to the midline of the body and ends at the **rectum**. The rectum, where feces are stored, leads into the anus, which contains the **anal sphincter**. This sphincter consists of rings of voluntary and involuntary muscles to control the evacuation of feces or **defecation**.



■ **Figure 8.7** The regions of the colon beginning with the cecum and ending at the anus.

## Accessory Organs of the Digestive System

As described earlier, the accessory organs of the digestive system are the salivary glands, the liver, the pancreas, and the gallbladder. In general, these organs function by producing much of the digestive fluids and enzymes necessary for the chemical breakdown of food. Each is attached to the gut tube by a duct.

### Salivary Glands

**amylase** (AM-ill-ace)

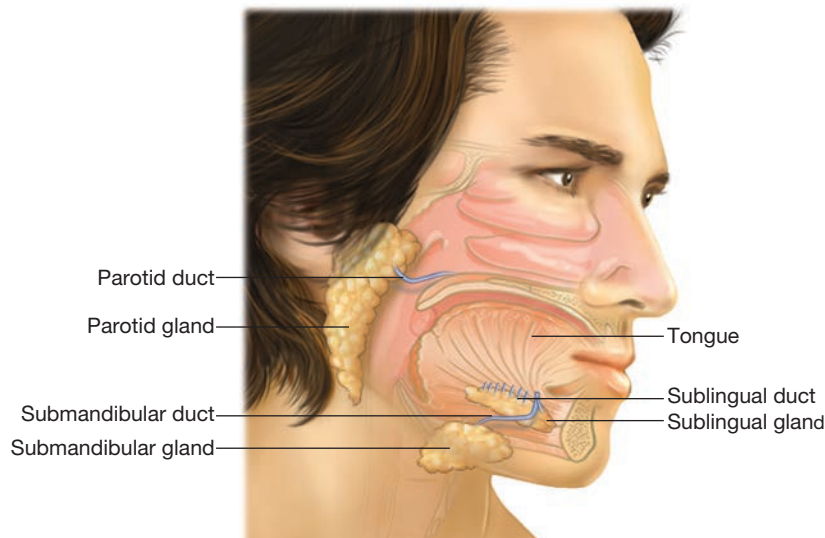
**bolus**

**parotid glands** (pah-ROT-id)

**sublingual glands** (sub-LING-gwal)

**submandibular glands** (sub-man-DIB-yoo-lar)

Salivary glands in the oral cavity produce saliva. This very watery and slick fluid allows food to be swallowed with less danger of choking. Saliva mixed with food in the mouth forms a **bolus**, chewed food that is ready to swallow. Saliva also contains the digestive enzyme **amylase** that begins the digestion of carbohydrates. There are three pairs of salivary glands. The **parotid glands** are in front of the ears, and the **submandibular glands** and **sublingual glands** are in the floor of the mouth (see Figure 8.8 ■).



#### Med Term Tip

In anatomy the term *accessory* generally means that the structure is auxiliary to a more important structure. This is not true for these organs. Digestion would not be possible without the digestive juices produced by these organs.

■ **Figure 8.8** The salivary glands: parotid, sublingual, and submandibular. This image shows the position of each gland and its duct emptying into the oral cavity.

### Liver

**bile** (BYE-al)

**emulsification** (ee-mull-sih-fih-KAY-shun)

The liver, a large organ located in the right upper quadrant of the abdomen, has several functions including processing the nutrients absorbed by the intestines, detoxifying harmful substances in the body, and producing **bile** (see Figure 8.9 ■). Bile is important for the digestion of fats and lipids because it breaks up large fat globules into much smaller droplets, making them easier to digest in the watery environment inside the intestines. The process is called **emulsification**.

#### Med Term Tip

The liver weighs about four pounds and has so many important functions that people cannot live without it. It has become a major transplant organ. The liver is also able to regenerate itself. You can lose more than half of your liver, and it will regrow.

### Gallbladder

**common bile duct**

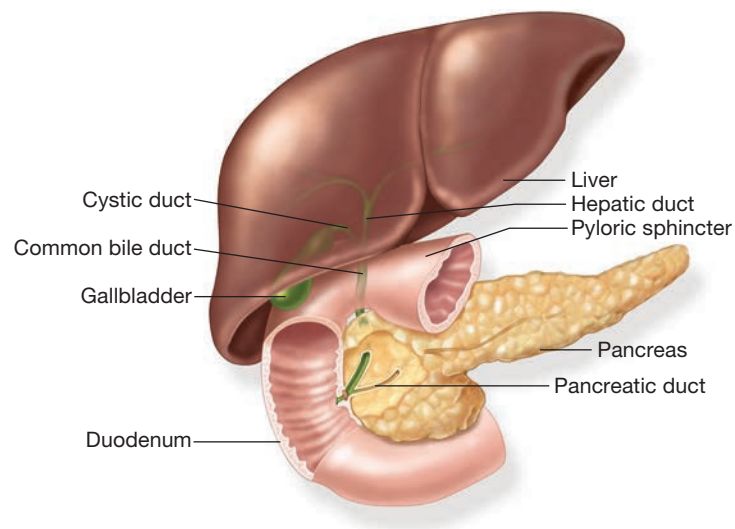
**hepatic duct** (hep-PAT-tik)

**cystic duct** (SIS-tik)

Bile produced by the liver is stored in the gallbladder (GB). As the liver produces bile, it travels down the **hepatic duct** and up the **cystic duct** into the gallbladder.



■ **Figure 8.9** The liver, gallbladder, and pancreas. Image shows the relationship of these three organs and their ducts to the duodenum.



(see again Figure 8.9). In response to the presence of fat in the chyme, the muscular wall of the gallbladder contracts and sends bile back down the cystic duct and into the **common bile duct** (CBD), which carries bile to the duodenum where it is able to emulsify the fat in chyme.

## Pancreas

**buffers**

**pancreatic duct** (pan-kree-AT-ik)

**pancreatic enzymes** (pan-kree-AT-ik / EN-zimes)

The pancreas, connected to the duodenum by the **pancreatic duct**, produces two important secretions for digestion: **buffers** and **pancreatic enzymes** (see again Figure 8.9). Buffers neutralize acidic chyme that has just left the stomach, and pancreatic enzymes chemically digest carbohydrates, fats, and proteins. The pancreas is also an endocrine gland that produces the hormones insulin and glucagon, which play a role in regulating the level of glucose in the blood and are discussed in further detail in Chapter 11.

## Practice As You Go

### A. Complete the Statement

1. The digestive system is also known as the \_\_\_\_\_ system.
2. The continuous muscular tube of the digestive system is called the \_\_\_\_\_ or \_\_\_\_\_ and stretches between the \_\_\_\_\_ and \_\_\_\_\_.
3. The accessory organs of the digestive system are the \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.

4. The three main functions of the digestive system are \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
5. The incisors are examples of \_\_\_\_\_ teeth and the molars are examples of \_\_\_\_\_ teeth.
6. Food is propelled through the gut by wavelike muscular contractions called \_\_\_\_\_.
7. Food in the stomach is mixed with \_\_\_\_\_ and other gastric juices to form a watery mixture called \_\_\_\_\_.
8. The three sections of small intestine in order are the \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
9. The S-shaped section of colon that curves back toward the rectum is called the \_\_\_\_\_ colon.
10. \_\_\_\_\_ produced by the liver is responsible for the \_\_\_\_\_ of fats. It is stored in the \_\_\_\_\_.

## Terminology

### Word Parts Used to Build Digestive System Terms

The following lists contain the combining forms, suffixes, and prefixes used to build terms in the remaining sections of this chapter.

#### Combining Forms

<b>an/o</b>	anus
<b>append/o</b>	appendix
<b>appendic/o</b>	appendix
<b>bar/o</b>	weight
<b>bucc/o</b>	cheek
<b>carcin/o</b>	cancer
<b>cec/o</b>	cecum
<b>chol/e</b>	bile
<b>cholangi/o</b>	bile duct
<b>cholecyst/o</b>	gallbladder
<b>choledoch/o</b>	common bile duct
<b>cirr/o</b>	yellow
<b>col/o</b>	colon
<b>colon/o</b>	colon
<b>cutane/o</b>	skin
<b>cyst/o</b>	sac
<b>dent/o</b>	tooth

<b>diverticul/o</b>	pouch
<b>duoden/o</b>	duodenum
<b>enter/o</b>	small intestine
<b>esophag/o</b>	esophagus
<b>gastr/o</b>	stomach
<b>gingiv/o</b>	gums
<b>gloss/o</b>	tongue
<b>hem/o</b>	blood
<b>hemat/o</b>	blood
<b>hepat/o</b>	liver
<b>ile/o</b>	ileum
<b>inguin/o</b>	groin
<b>jejun/o</b>	jejunum
<b>labi/o</b>	lip
<b>lapar/o</b>	abdomen
<b>lingu/o</b>	tongue
<b>lith/o</b>	stone

<b>nas/o</b>	nose
<b>odont/o</b>	tooth
<b>or/o</b>	mouth
<b>orth/o</b>	straight
<b>palat/o</b>	palate
<b>pancreat/o</b>	pancreas
<b>pharyng/o</b>	pharynx
<b>polyp/o</b>	polyp
<b>proct/o</b>	anus and rectum
<b>pylor/o</b>	pylorus
<b>pyr/o</b>	fire
<b>rect/o</b>	rectum
<b>sialaden/o</b>	salivary gland
<b>sigmoid/o</b>	sigmoid colon
<b>ven/o</b>	vein

## Suffixes

<b>-al</b>	pertaining to
<b>-algia</b>	pain
<b>-centesis</b>	process of removing fluid
<b>-eal</b>	pertaining to
<b>-ectomy</b>	surgical removal
<b>-emesis</b>	vomiting
<b>-emetic</b>	pertaining to vomiting
<b>-gram</b>	record
<b>-graphy</b>	process of recording
<b>-iatic</b>	pertaining to medical treatment

<b>-ic</b>	pertaining to
<b>-istry</b>	specialty of
<b>-itis</b>	inflammation
<b>-lithiasis</b>	condition of stones
<b>-logy</b>	study of
<b>-oma</b>	tumor
<b>-orexia</b>	appetite
<b>-osis</b>	abnormal condition
<b>-ostomy</b>	surgically create an opening
<b>-otomy</b>	cutting into
<b>-ous</b>	pertaining to
<b>-pepsia</b>	digestion

<b>-pexy</b>	surgical fixation
<b>-phagia</b>	eat, swallow
<b>-plasty</b>	surgical repair
<b>-plegia</b>	paralysis
<b>-prandial</b>	pertaining to a meal
<b>-ptosis</b>	drooping
<b>-scope</b>	instrument to view
<b>-scopic</b>	pertaining to visually examining
<b>-scopy</b>	process of viewing
<b>-tic</b>	pertaining to
<b>-tripsy</b>	surgical crushing

## Prefixes

<b>a-</b>	without
<b>an-</b>	without
<b>anti-</b>	against
<b>brady-</b>	slow
<b>dys-</b>	abnormal, painful, difficult
<b>endo-</b>	within
<b>ex-</b>	outward

<b>hyper-</b>	excessive
<b>hypo-</b>	below
<b>in-</b>	inward
<b>intra-</b>	within
<b>per-</b>	through
<b>peri-</b>	around

<b>poly-</b>	many
<b>post-</b>	after
<b>re-</b>	again
<b>retro-</b>	backward
<b>sub-</b>	under
<b>trans-</b>	across

## Adjective Forms of Anatomical Terms

Term	Word Parts	Definition
<b>anal</b>	<b>an/o</b> = anus <b>-al</b> = pertaining to <b>Word Watch</b>       Be careful when using the combining form <b>an/o</b> meaning “anus” and the prefix <b>an-</b> meaning “none.”	Pertaining to the anus.
<b>buccal</b> (BYOO-kal)	<b>bucc/o</b> = cheek <b>-al</b> = pertaining to	Pertaining to the cheeks.
<b>buccolabial</b> (BYOO-koh-labe-ee-all)	<b>bucc/o</b> = cheek <b>labi/o</b> = lip <b>-al</b> = pertaining to	Pertaining to the cheeks and lips.
<b>cecal</b> (SEE-kal)	<b>cec/o</b> = cecum <b>-al</b> = pertaining to	Pertaining to the cecum.
<b>cholecystic</b> (koh-lee-SIS-tik)	<b>cholecyst/o</b> = gallbladder <b>-ic</b> = pertaining to	Pertaining to the gallbladder.

## Adjective Forms of Anatomical Terms (continued)

Term	Word Parts	Definition
<b>colonic</b> (koh-LON-ik)	<b>colon/o</b> = colon <b>-ic</b> = pertaining to	Pertaining to the colon.
<b>colorectal</b> (kohl-oh-REK-tall)	<b>col/o</b> = colon <b>rect/o</b> = rectum <b>-al</b> = pertaining to	Pertaining to the colon and rectum.
<b>cystic</b> (SIS-tik)	<b>cyst/o</b> = sac <b>-ic</b> = pertaining to	Pertaining to the gallbladder. The combining form <b>cyst/o</b> is referring to the sac-like shape of the gallbladder.
<b>dental</b> (DENT-all)	<b>dent/o</b> = tooth <b>-al</b> = pertaining to	Pertaining to the teeth.
<b>duodenal</b> (duo-DEEN-all / do-ODD-in-all)	<b>duoden/o</b> = duodenum <b>-al</b> = pertaining to	Pertaining to the duodenum.
<b>enteric</b> (en-TARE-ik)	<b>enter/o</b> = small intestine <b>-ic</b> = pertaining to	Pertaining to the small intestine.
<b>esophageal</b> (eh-soff-ah-JEE-al)	<b>esophag/o</b> = esophagus <b>-eal</b> = pertaining to	Pertaining to the esophagus.
<b>gastric</b> (GAS-trik)	<b>gastr/o</b> = stomach <b>-ic</b> = pertaining to	Pertaining to the stomach.
<b>gastrointestinal</b> (GI) (gas-troh-in-TESS-tih-nal)	<b>gastr/o</b> = stomach <b>-al</b> = pertaining to	Pertaining to the stomach and intestines.
<b>gingival</b> (JIN-jih-vul)	<b>gingiv/o</b> = gums <b>-al</b> = pertaining to	Pertaining to the gums.
<b>glossal</b> (GLOSS-all)	<b>gloss/o</b> = tongue <b>-al</b> = pertaining to	Pertaining to the tongue.
<b>hepatic</b> (hep-AT-ik)	<b>hepat/o</b> = liver <b>-ic</b> = pertaining to	Pertaining to the liver.
<b>hypoglossal</b> (high-poe-GLOSS-all)	<b>hypo-</b> = under <b>gloss/o</b> = tongue <b>-al</b> = pertaining to	Pertaining to under the tongue.
<b>ileal</b> (ILL-ee-all)	<b>ile/o</b> = ileum <b>-al</b> = pertaining to	Pertaining to the ileum.
<b>ileocecal</b> (ill-ee-oh-SEE-kal)	<b>ile/o</b> = ileum <b>cec/o</b> = cecum <b>-al</b> = pertaining to	Pertaining to the ileum and cecum.
<b>jejunal</b> (jih-JUNE-all)	<b>jejun/o</b> = jejunum <b>-al</b> = pertaining to	Pertaining to the jejunum.
<b>nasogastric</b> (nay-zoh-GAS-trik)	<b>nas/o</b> = nose <b>gastr/o</b> = stomach <b>-ic</b> = pertaining to	Pertaining to the nose and stomach.
<b>oral</b> (OR-ral)	<b>or/o</b> = mouth <b>-al</b> = pertaining to	Pertaining to the mouth.
<b>pancreatic</b> (pan-kree-AT-ik)	<b>pancreat/o</b> = pancreas <b>-ic</b> = pertaining to	Pertaining to the pancreas.

## Adjective Forms of Anatomical Terms (continued)

Term	Word Parts	Definition
<b>periodontal</b> (pair-ee-oh-DON-tal)	<b>peri-</b> = around <b>odont/o</b> = tooth <b>-al</b> = pertaining to	Pertaining to around the teeth.
<b>pharyngeal</b> (fair-in-JEE-all)	<b>pharyng/o</b> = pharynx <b>-eal</b> = pertaining to	Pertaining to the pharynx.
<b>pyloric</b> (pie-LORE-ik)	<b>pylor/o</b> = pylorus <b>-ic</b> = pertaining to	Pertaining to the pylorus.
<b>rectal</b> (RECK-tall)	<b>rect/o</b> = rectum <b>-al</b> = pertaining to	Pertaining to the rectum.
<b>sigmoidal</b> (sig-MOYD-all)	<b>sigmoid/o</b> = sigmoid colon <b>-al</b> = pertaining to	Pertaining to the sigmoid colon.
<b>sublingual</b> (sub-LING-gwal)	<b>sub-</b> = under <b>lingu/o</b> = tongue <b>-al</b> = pertaining to	Pertaining to under the tongue.
<b>submandibular</b> (sub-man-DIB-yoo-lar)	<b>sub-</b> = under <b>mandibul/o</b> = mandible <b>-ar</b> = pertaining to	Pertaining to under the mandible.

## Practice As You Go

### B. Give the adjective form for each anatomical structure

1. The duodenum \_\_\_\_\_
2. Nose and stomach \_\_\_\_\_
3. The liver \_\_\_\_\_
4. The pancreas \_\_\_\_\_
5. The gallbladder \_\_\_\_\_ or \_\_\_\_\_
6. Under the tongue \_\_\_\_\_
7. The esophagus \_\_\_\_\_
8. The sigmoid colon \_\_\_\_\_

Pathology		
Term	Word Parts	Definition
<b>Medical Specialties</b>		
<b>dentistry</b>	<b>dent/o</b> = tooth <b>-istry</b> = specialty of	Branch of healthcare involved with the prevention, diagnosis, and treatment of conditions involving the teeth, jaw, and mouth. Practitioner is a <i>dentist</i> .
<b>gastroenterology</b> (gas-troh-en-ter-ALL-oh-jee)	<b>gastr/o</b> = stomach <b>enter/o</b> = small intestine <b>-logy</b> = study of	Branch of medicine involved in diagnosis and treatment of diseases and disorders of the digestive system. Physician is a <i>gastroenterologist</i> .
<b>oral surgery</b>	<b>or/o</b> = mouth <b>-al</b> = pertaining to	Branch of dentistry that uses surgical means to treat dental conditions. Specialist is an <i>oral surgeon</i> .
<b>orthodontics</b> (or-thoh-DON-tiks)	<b>orth/o</b> = straight <b>odont/o</b> = tooth <b>-ic</b> = pertaining to	Branch of dentistry concerned with correction of problems with tooth alignment. Specialist is an <i>orthodontist</i> .
<b>periodontics</b> (pair-ee-oh-DON-tiks)	<b>peri-</b> = around <b>odont/o</b> = tooth <b>-ic</b> = pertaining to	Branch of dentistry concerned with treating conditions involving the gums and tissues surrounding the teeth. Specialist is a <i>periodontist</i> .
<b>proctology</b> (prok-TOL-oh-jee)	<b>proct/o</b> = anus and rectum <b>-logy</b> = study of	Branch of medicine involved in diagnosis and treatment of diseases and disorders of the anus and rectum. Physician is a <i>proctologist</i> .
<b>Signs and Symptoms</b>		
<b>anorexia</b> (an-oh-REK-see-ah)	<b>an-</b> = without <b>-orexia</b> = appetite	General term meaning loss of appetite that may accompany other conditions. Also used to refer to <i>anorexia nervosa</i> , which is characterized by severe weight loss from excessive dieting.
<b>aphagia</b> (ah-FAY-jee-ah)	<b>a-</b> = without <b>-phagia</b> = eat, swallow	Being unable to swallow or eat.
<b>ascites</b> (ah-SIGH-teez)		Collection or accumulation of fluid in the peritoneal cavity.
<b>bradypepsia</b> (brad-ee-PEP-see-ah)	<b>brady-</b> = slow <b>-pepsia</b> = digestion	Having a slow digestive system.
<b>cachexia</b> (ka-KEK-see-ah)		Loss of weight and generalized wasting that occurs during a chronic disease.
<b>cholecystalgia</b> (koh-lee-sis-TAL-jee-ah)	<b>cholecyst/o</b> = gallbladder <b>-algia</b> = pain	Having gallbladder pain.
<b>constipation</b> (kon-stih-PAY-shun)		Experiencing difficulty in defecation or infrequent defecation.
<b>dentalgia</b> (dent-AL-gee-ah)	<b>dent/o</b> = tooth <b>-algia</b> = pain	Tooth pain.



## Pathology (continued)

Term	Word Parts	Definition
<b>diarrhea</b> (dye-ah-REE-ah)		Passing of frequent, watery, or bloody bowel movements. Usually accompanies gastrointestinal (GI) disorders.
<b>dysorexia</b> (dis-oh-REKS-ee-ah)	<b>dys-</b> = abnormal <b>-orexia</b> = appetite	Abnormal appetite; usually a diminished appetite.
<b>dyspepsia</b> (dis-PEP-see-ah)	<b>dys-</b> = painful <b>-pepsia</b> = digestion	“Upset stomach”; indigestion.
<b>dysphagia</b> (dis-FAY-jee-ah)	<b>dys-</b> = difficult <b>-phagia</b> = eat, swallow	Having difficulty swallowing or eating.
<b>emesis</b> (EM-eh-sis)	<i>Emesis</i> is the Latin term meaning “to vomit”	Vomiting.
<b>gastralgia</b> (gas-TRAL-jee-ah)	<b>gastr/o</b> = stomach <b>-algia</b> = pain	Stomach pain.
<b>hematemesis</b> (hee-mah-TEM-eh-sis)	<b>hemat/o</b> = blood <b>-emesis</b> = vomiting	Vomiting blood.
<b>hematochezia</b> (hee-mat-oh-KEY-zee-ah)	<b>hemat/o</b> = blood	Passing bright red blood in the stool.
<b>hyperemesis</b> (high-per-EM-eh-sis)	<b>hyper-</b> = excessive <b>-emesis</b> = vomiting	Excessive vomiting.
<b>jaundice</b> (JAWN-diss)		Yellow cast to the skin, mucous membranes, and the whites of the eyes caused by the deposit of bile pigment from too much bilirubin in the blood. Bilirubin is a waste product produced when worn-out red blood cells are broken down. May be a symptom of a disorder such as gallstones blocking the common bile duct or carcinoma of the liver. Also called <i>icterus</i> .
<b>melena</b> (me-LEE-nah)		Passage of dark tarry stool. Color is the result of digestive enzymes working on blood in the gastrointestinal tract.
<b>nausea</b> (NAW-see-ah)	<b>Med Term Tip</b> ..... The term <i>nausea</i> comes from the Greek word for “seasickness.”	Urge to vomit.
<b>obesity</b>		Body weight that is above a healthy level. A person whose weight interferes with normal activity and body function has <i>morbid obesity</i> .
<b>polyphagia</b> (pall-ee-FAY-jee-ah)	<b>poly-</b> = many <b>-phagia</b> = eat, swallow	Excessive eating; eating too much.
<b>postprandial</b> (post-PRAN-dee-all)	<b>post-</b> = after <b>-prandial</b> = pertaining to a meal	After a meal.
<b>pyrosis</b> (pie-ROW-sis)	<b>pyr/o</b> = fire <b>-osis</b> = abnormal condition	Pain and burning sensation usually caused by stomach acid splashing up into the esophagus. Commonly called <i>heartburn</i> .

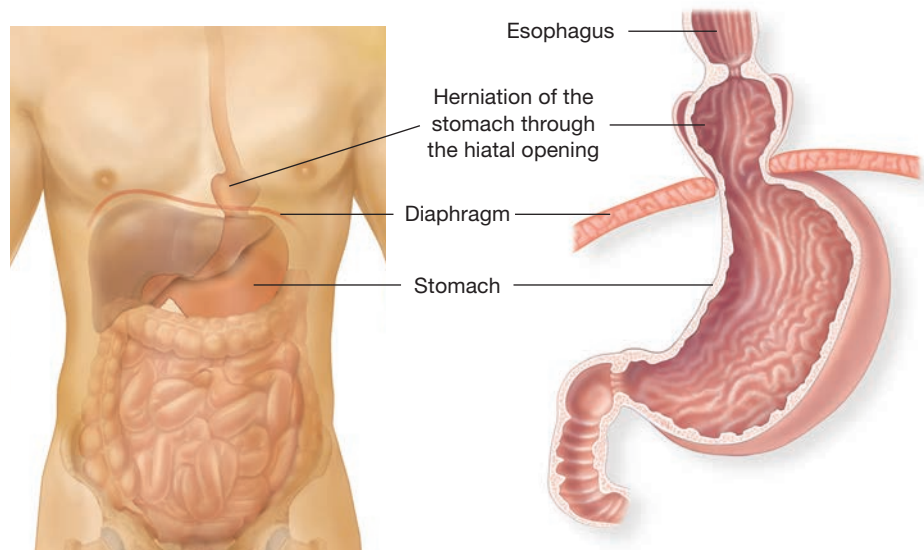
## Pathology (continued)

Term	Word Parts	Definition
<b>regurgitation</b> (ree-gur-jih-TAY-shun)	<b>re-</b> = again	Return of fluids and solids from the stomach into the mouth.
<b>Oral Cavity</b>		
<b>aphthous ulcers</b> (AF-thus)		Painful ulcers in the mouth of unknown cause. Commonly called <i>canker sores</i> .
<b>cleft lip</b> (CLEFT)		Congenital anomaly in which the upper lip and jaw bone fail to fuse in the midline, leaving an open gap. Often seen along with a cleft palate. Corrected with surgery.
<b>cleft palate</b> (CLEFT / PAL-at)		Congenital anomaly in which the roof of the mouth has a split or fissure. Corrected with surgery.
<b>dental caries</b> (KAIR-eez)	<b>dent/o</b> = tooth <b>-al</b> = pertaining to	Gradual decay and disintegration of teeth caused by bacteria; may lead to abscessed teeth. Commonly called a <i>tooth cavity</i> .
<b>gingivitis</b> (jin-jih-VIGH-tis)	<b>gingiv/o</b> = gums <b>-itis</b> = inflammation	Inflammation of the gums.
<b>herpes labialis</b> (HER-pee-z / lay-bee-AL-iz)	<b>labi/o</b> = lip	Infection of the lip by the herpes simplex virus type 1 (HSV-1). Also called <i>fever blisters</i> or <i>cold sores</i> .
<b>periodontal disease</b> (pair-ee-oh-DON-tal)	<b>peri-</b> = around <b>odont/o</b> = tooth <b>-al</b> = pertaining to	Disease of the supporting structures of the teeth, including the gums and bones; the most common cause of tooth loss.
<b>sialadenitis</b> (sigh-al-add-eh-NIGH-tis)	<b>sialaden/o</b> = salivary gland <b>-itis</b> = inflammation	Inflammation of a salivary gland.
<b>Pharynx and Esophagus</b>		
<b>esophageal varices</b> (eh-soff-ah-JEE-al / VAIR-ih-seez)	<b>esophag/o</b> = esophagus <b>-eal</b> = pertaining to	Enlarged and swollen varicose veins in the lower end of the esophagus. If these rupture, serious hemorrhage results; often related to liver disease.
<b>gastroesophageal reflux disease</b> (GERD) (gas-troh-ee-sof-ah-GEE-all / REE-fluks)	<b>gastr/o</b> = stomach <b>esophag/o</b> = esophagus <b>-eal</b> = pertaining to	Acid from the stomach flows backward up into the esophagus causing inflammation and pain.
<b>pharyngoplegia</b> (fair-in-goh-PLIE-jee-ah)	<b>pharyng/o</b> = pharynx <b>-plegia</b> = paralysis	Paralysis of the throat muscles.
<b>Stomach</b>		
<b>gastric carcinoma</b> (GAS-trik / car-si-NOH-mah)	<b>gastr/o</b> = stomach <b>-ic</b> = pertaining to	Cancerous tumor in the stomach.
<b>gastritis</b> (gas-TRY-tis)	<b>gastr/o</b> = stomach <b>-itis</b> = inflammation	Stomach inflammation.
<b>gastroenteritis</b> (gas-troh-en-ter-EYE-tis)	<b>gastr/o</b> = stomach <b>enter/o</b> = small intestine <b>-itis</b> = inflammation	Inflammation of the stomach and small intestine.

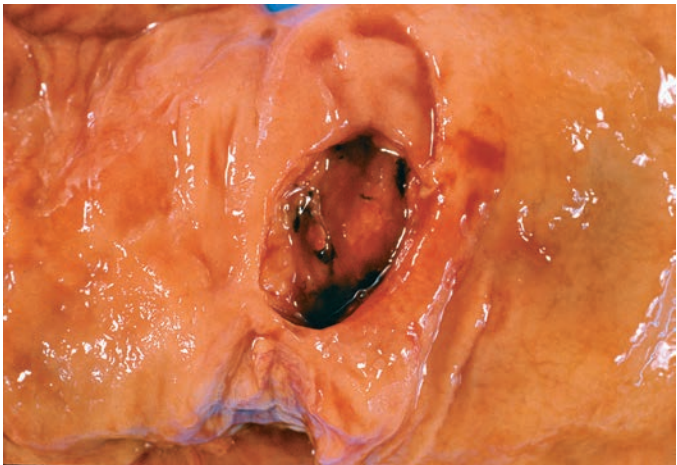
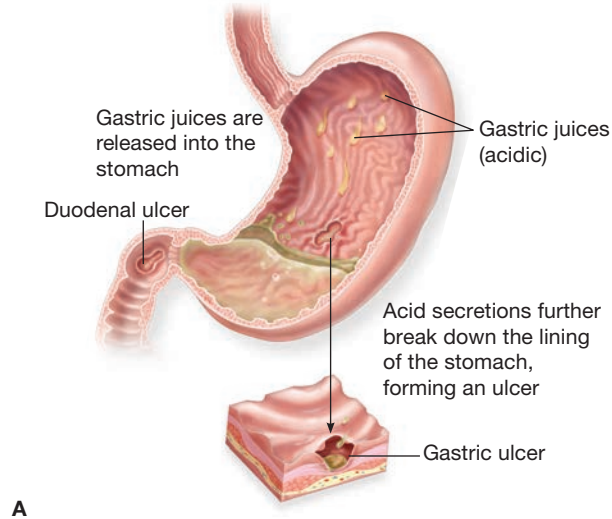
Pathology (continued)

Term	Word Parts	Definition
<b>hiatal hernia</b> (high-AY-tal / HER-nee-ah)	<b>-al</b> = pertaining to	Protrusion of the stomach through the diaphragm (also called a <i>diaphragmatocele</i> ) and extending into the thoracic cavity; gastroesophageal reflux disease is a common symptom.

■ **Figure 8.10** A hiatal hernia or diaphragmatocele. A portion of the stomach protrudes through the diaphragm into the thoracic cavity.

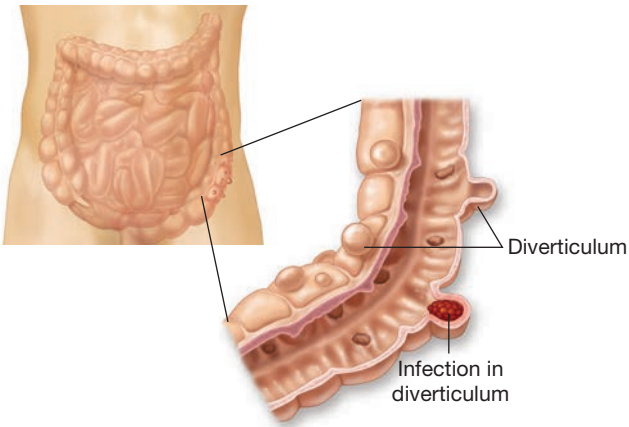


<b>peptic ulcer disease (PUD)</b> (PEP-tik / ULL-sir)	<b>-ic</b> = pertaining to	Ulcer occurring in the lower portion of the esophagus, stomach, and/or duodenum; thought to be caused by the acid of gastric juices. Initial damage to the protective lining of the stomach may be caused by a <i>Helicobacter pylori</i> ( <i>H. pylori</i> ) bacterial infection. If the ulcer extends all the way through the wall of the stomach, it is called a <i>perforated ulcer</i> , which requires immediate surgery to repair.
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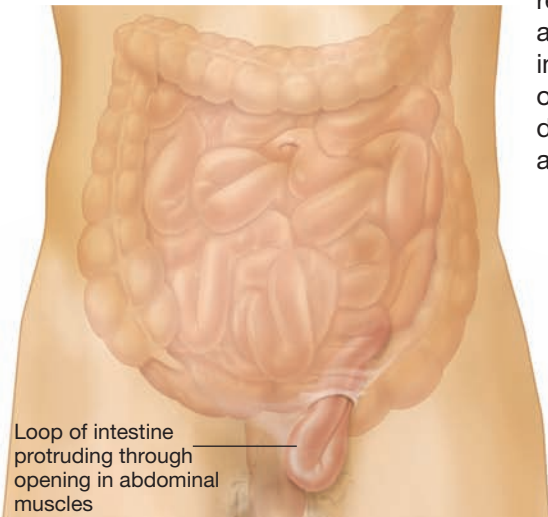
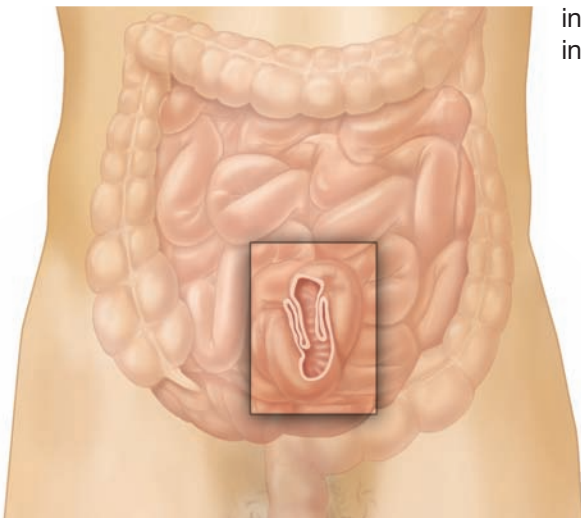


■ **Figure 8.11** A) Figure illustrating the location and appearance of a peptic ulcer in both the stomach and the duodenum. B) Photomicrograph illustrating a gastric ulcer. (Dr. E. Walker/Science Photo Library/Science Source).

## Pathology (continued)

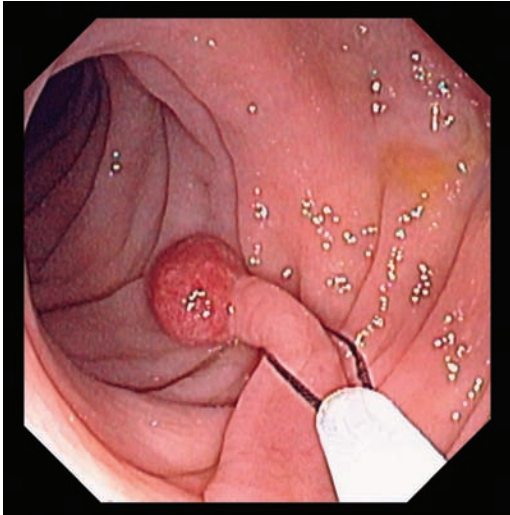
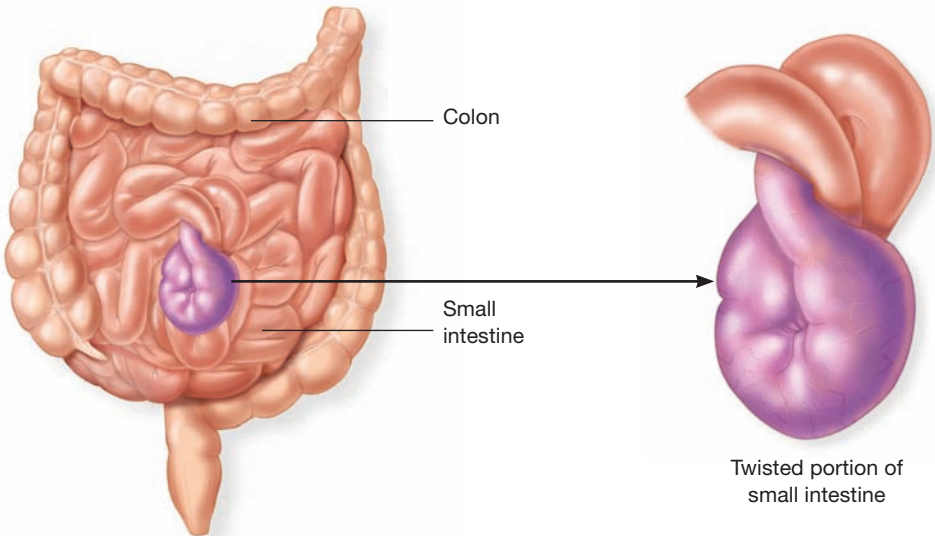
Term	Word Parts	Definition
<b>Small Intestine and Large Intestine</b>		
<b>anal fistula</b> (FIH-styoo-lah)	<b>-al</b> = pertaining to	Abnormal tube-like passage from the surface around the anal opening directly into the rectum.
<b>appendicitis</b> (ah-pen-dih-SIGH-tis)	<b>appendic/o</b> = appendix <b>-itis</b> = inflammation	Inflammation of the appendix; may require an <i>appendectomy</i> .
<b>bowel incontinence</b> (in-CON-tih-nence)		Inability to control defecation.
<b>colorectal carcinoma</b> (kohl-oh-REK-tall / car-si-NOH-mah)	<b>col/o</b> = colon <b>rect/o</b> = rectum <b>-al</b> = pertaining to <b>carcin/o</b> = cancer <b>-oma</b> = tumor	Cancerous tumor originating in the colon or rectum.
<b>Crohn's disease</b> (KROHNZ)		Form of chronic inflammatory bowel disease affecting primarily the ileum and/or colon. Also called <i>regional ileitis</i> . This autoimmune condition affects all the layers of the bowel wall and results in scarring and thickening of the gut wall.
<b>diverticulitis</b> (dye-ver-tik-yoo-LYE-tis)	<b>diverticul/o</b> = pouch <b>-itis</b> = inflammation	Inflammation of a <i>diverticulum</i> (an outpouching off the gut), especially in the colon. Inflammation often results when food becomes trapped within the pouch.
 <p>■ <b>Figure 8.12</b> Diverticulosis. Figure illustrates external and internal appearance of diverticula.</p>		
<b>diverticulosis</b> (dye-ver-tik-yoo-LOW-sis)	<b>diverticul/o</b> = pouch <b>-osis</b> = abnormal condition	Condition of having diverticula (outpouches off the gut). May lead to <i>diverticulitis</i> if one becomes inflamed.
<b>dysentery</b> (dis-in-TARE-ee)		Disease characterized by diarrhea, often with mucus and blood; severe abdominal pain; fever; and dehydration. Caused by ingesting food or water contaminated by chemicals, bacteria, protozoans, or parasites.
<b>enteritis</b> (en-ter-EYE-tis)	<b>enter/o</b> = small intestine <b>-itis</b> = inflammation	Inflammation of the small intestine.
<b>hemorrhoids</b> (HEM-oh-roydz)	<b>hem/o</b> = blood	Varicose veins in the rectum and anus.

## Pathology (continued)

Term	Word Parts	Definition
<b>ileus</b> (ILL-ee-us)		Severe abdominal pain, inability to pass stool, vomiting, and abdominal distension as a result of an intestinal blockage. The blockage can be a physical block such as a tumor or the failure of bowel contents to move forward due to loss of peristalsis (a nonmechanical blockage). May require surgery to reverse the blockage.
<b>inguinal hernia</b> (ING-gwih-nal / HER-nee-ah)	<b>inguin/o</b> = groin <b>-al</b> = pertaining to	Hernia or protrusion of a loop of small intestine into the inguinal (groin) region through a weak spot in the abdominal muscle wall that develops into a hole. May become <i>incarcerated</i> or <i>strangulated</i> if the muscle tightens down around the loop of intestine and cuts off its blood flow.
<p>■ <b>Figure 8.13</b> An inguinal hernia. A portion of the small intestine is protruding through the abdominal muscles into the groin region.</p>	 <p>Loop of intestine protruding through opening in abdominal muscles</p>	
<b>intussusception</b> (in-tuh-suh-SEP-shun)	<b>in-</b> = inward	Result of the intestine slipping or telescoping into another section of intestine just below it. More common in children.
<p>■ <b>Figure 8.14</b> Intussusception. A short length of small intestine has telescoped into itself.</p>		
<b>irritable bowel syndrome (IBS)</b>		Disturbance in the functions of the intestine from unknown causes. Symptoms generally include abdominal discomfort and an alteration in bowel activity. Also called <i>spastic colon</i> or <i>functional bowel syndrome</i> .

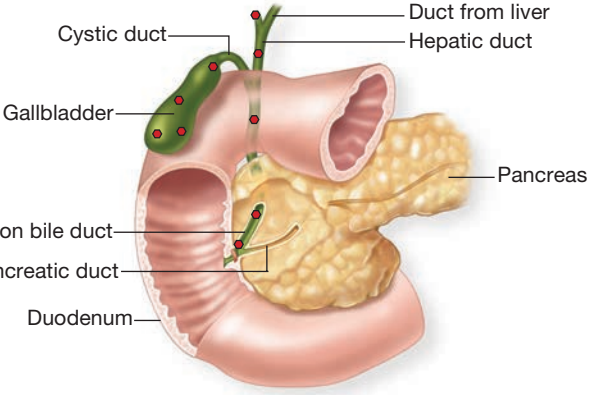



## Pathology (continued)

Term	Word Parts	Definition
<b>polyposis</b> (pall-ee-POH-sis)	<b>polyp/o</b> = polyp <b>-osis</b> = abnormal condition	Presence of small tumors, called <b>polyps</b> , containing a pedicle or stemlike attachment in the mucous membranes of the large intestine (colon); may be precancerous.
<p>■ <b>Figure 8.15</b> Endoscopic view of a polyp in the colon. Note the mushroom-like shape, an enlarged top growing at the end of a stem. It is being removed by means of a wire loop slipped over the polyp and then tightened to cut it off. (David M. Martin, M.D./Science Source)</p> 		
<b>proctoptosis</b> (prok-top-TOH-sis)	<b>proct/o</b> = rectum and anus <b>-ptosis</b> = drooping	proctoptosis definition, so it reads "Prolapsed or drooping rectum and anus."
<b>ulcerative colitis</b> (ULL-sir-ah-tiv / koh-LYE-tis)	<b>col/o</b> = colon <b>-itis</b> = inflammation	Chronic inflammatory condition resulting in numerous ulcers formed on the mucous membrane lining of the colon; the cause is unknown. Also known as <i>inflammatory bowel disease</i> (IBD).
<b>volvulus</b> (VOL-vyoo-lus)		Condition in which the bowel twists upon itself causing an obstruction; painful and requires immediate surgery.
<p>■ <b>Figure 8.16</b> Volvulus. A length of small intestine has twisted around itself, cutting off blood circulation to the twisted loop.</p> 		



## Pathology (continued)

Term	Word Parts	Definition
<b>Accessory Organs</b>		
<b>cholecystitis</b> (koh-lee-sis-TYE-tis)	<b>cholecyst/o</b> = gallbladder <b>-itis</b> = inflammation	Inflammation of the gallbladder; most commonly caused by gallstones in the gallbladder or common bile duct that block the flow of bile.
<b>cholelithiasis</b> (koh-lee-lih-THIGH-ah-sis)	<b>chol/e</b> = bile <b>-lithiasis</b> = condition of stones	Presence of gallstones; may or may not cause symptoms such as <i>cholecystalgia</i> .
<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p><b>A</b></p> </div> <div style="text-align: center;">  <p><b>B</b></p> </div> </div> <p>■ <b>Figure 8.17</b> A) Common sites for cholelithiasis. B) A gallbladder specimen with multiple gallstones. (Biophoto Associates/Science Source)</p>		
<b>cirrhosis</b> (sih-ROH-sis)	<b>cirrh/o</b> = yellow <b>-osis</b> = abnormal condition	Chronic disease of the liver associated with failure of the liver to function properly.
<b>hepatitis</b> (hep-ah-TYE-tis)	<b>hepat/o</b> = liver <b>-itis</b> = inflammation	Inflammation of the liver, usually due to a viral infection. Different viruses are transmitted by different routes, such as sexual contact or from exposure to blood or fecally contaminated water or food.
<b>hepatoma</b> (hep-ah-TOH-mah)	<b>hepat/o</b> = liver <b>-oma</b> = tumor	Liver tumor.
<b>pancreatitis</b> (pan-kree-ah-TYE-tis)	<b>pancreat/o</b> = pancreas <b>-itis</b> = inflammation	Inflammation of the pancreas.

## Practice As You Go

### C. Terminology Matching

Match each term to its definition.

- |                      |                          |
|----------------------|--------------------------|
| 1. _____ anorexia    | a. excess body weight    |
| 2. _____ hematemesis | b. chronic liver disease |
| 3. _____ pyrosis     | c. heartburn             |

- |                              |   |
|------------------------------|---|
| 4. _____ obesity             | d. small colon tumors                     |
| 5. _____ constipation        | e. fluid accumulation in abdominal cavity |
| 6. _____ melena              | f. vomit blood                            |
| 7. _____ ascites             | g. bowel twists on self                   |
| 8. _____ cirrhosis           | h. inflammatory bowel disease             |
| 9. _____ spastic colon       | i. loss of appetite                       |
| 10. _____ polyposis          | j. difficulty having BM                   |
| 11. _____ volvulus           | k. irritable bowel syndrome               |
| 12. _____ hiatal hernia      | l. black tarry stool                      |
| 13. _____ ulcerative colitis | m. yellow skin color                      |
| 14. _____ dysentery          | n. bloody diarrhea                        |
| 15. _____ jaundice           | o. diaphragmatocele                       |

## Diagnostic Procedures

Term	Word Parts	Definition
<b>Clinical Laboratory Tests</b>		
<b>alanine transaminase (ALT)</b> (AL-ah-neen / trans-AM-in-nase)		Enzyme normally present in the blood. Blood levels are increased in persons with liver disease.
<b>aspartate transaminase (AST)</b> (ass-PAR-tate / trans-AM-in-nase)		Enzyme normally present in the blood. Blood levels are increased in persons with liver disease.
<b>fecal occult blood test (FOBT)</b> (uh-CULT)	<b>-al</b> = pertaining to	Laboratory test on the feces to determine if microscopic amounts of blood are present. Also called <i>hemoccult</i> or <i>stool guaiac</i> .
<b>ova and parasites (O&amp;P)</b> (OH-vah / PAR-ah-sights)		Laboratory examination of feces with a microscope for the presence of parasites or their eggs.
<b>serum bilirubin</b> (SEE-rum / BILLY-rubin)		Blood test to determine the amount of the waste product bilirubin in the bloodstream. Elevated levels indicate liver disease.
<b>stool culture</b>		Laboratory test of feces to determine if any pathogenic bacteria are present.
<b>Diagnostic Imaging</b>		
<b>bite-wing X-ray</b>		X-ray taken with a part of the film holder held between the teeth and parallel to the teeth.
<b>cholecystogram</b> (koh-lee-SIS-toh-gram)	<b>cholecyst/o</b> = gallbladder <b>-gram</b> = record	X-ray image of the gallbladder.

## Diagnostic Procedures (continued)

Term	Word Parts	Definition
<b>intravenous cholecystography</b> (in-trah-VEE-nus / koh-lee-sis-TOG-rah-fee)	<b>intra-</b> = within <b>ven/o</b> = vein <b>-ous</b> = pertaining to <b>cholecyst/o</b> = gallbladder <b>-graphy</b> = process of recording	Dye is administered intravenously to the patient allowing for X-ray visualization of the gallbladder and bile ducts.
<b>lower gastrointestinal series</b> (lower GI series)	<b>gastr/o</b> = stomach <b>-al</b> = pertaining to	X-ray image of the colon and rectum is taken after the administration of barium (Ba), a radiopaque dye, by enema. Also called a <i>barium enema</i> (BE).
<div> </div> <div> <p>■ <b>Figure 8.18</b> Color enhanced X-ray of the colon taken during a barium enema. (CNRI/Science Photo Library/Science Source)</p> </div>		
<b>percutaneous transhepatic cholangiography</b> (PTC) (per-kyoo-TAY-nee-us / trans-heh PAT-ik / koh-lan-jee-OG-rah-fee)	<b>per-</b> = through <b>cutane/o</b> = skin <b>-ous</b> = pertaining to <b>trans-</b> = across <b>hepat/o</b> = liver <b>-ic</b> = pertaining to <b>cholangi/o</b> = bile duct <b>-graphy</b> = process of recording	Procedure in which contrast medium is injected directly into the liver to visualize the bile ducts. Used to detect obstructions such as gallstones in the common bile duct.
<b>upper gastrointestinal (UGI) series</b>	<b>gastr/o</b> = stomach <b>-al</b> = pertaining to	Patient is administered a barium (Ba) contrast material orally and then X-rays are taken to visualize the esophagus, stomach, and duodenum. Also called a <i>barium swallow</i> .
<b>Endoscopic Procedures</b>		
<b>colonoscope</b> (koh-LON-oh-scope)	<b>colon/o</b> = colon <b>-scope</b> = instrument to view	Instrument used to view the colon.
<b>colonoscopy</b> (koh-lon-OSS-koh-pee)	<b>colon/o</b> = colon <b>-scopy</b> = process of viewing	Flexible fiberscope called a <i>colonoscope</i> is passed through the anus, rectum, and colon; used to examine the upper portion of the colon. Polyps and small growths can be removed during this procedure (see again Figure 8.15).

## Diagnostic Procedures (continued)

Term	Word Parts	Definition
<b>endoscopic retrograde cholangiopancreatography (ERCP)</b> (en-doh-SKOP-ik / RET-roh-grayd / koh-lan-jee-oh-pan-kree-ah-TOG-rah-fee)	<b>endo-</b> = within <b>-scopic</b> = pertaining to visually examining <b>retro-</b> = backward <b>cholangi/o</b> = bile duct <b>pancreat/o</b> = pancreas <b>-graphy</b> = process of recording	Procedure using an endoscope to visually examine the hepatic duct, common bile duct, and pancreatic duct. First an endoscope is passed through the patient's mouth, esophagus, and stomach until it reaches the duodenum where the pancreatic and common bile ducts empty. Then a thin catheter is passed through the endoscope and into the ducts (in the retrograde direction). Contrast dye is then used to visualize these ducts on an X-ray.
<b>esophagogastroduodenoscopy (EGD)</b> (eh-soff-ah-go-gas-troh-duo-den-OSS-koh-pee)	<b>esophag/o</b> = esophagus <b>gastr/o</b> = stomach <b>duoden/o</b> = duodenum <b>-scopy</b> = process of viewing	Use of a flexible fiberoptic endoscope to visually examine the esophagus, stomach, and beginning of the duodenum.
<b>gastroscope</b> (GAS-troh-scope)	<b>gastr/o</b> = stomach <b>-scope</b> = instrument to view	Instrument used to view inside the stomach.
<b>gastroscopy</b> (gas-TROS-koh-pee)	<b>gastr/o</b> = stomach <b>-scopy</b> = process of viewing	Procedure in which a flexible <i>gastroscope</i> is passed through the mouth and down the esophagus in order to visualize inside the stomach. Used to diagnose peptic ulcers and gastric carcinoma.
<b>laparoscope</b> (LAP-ah-roh-scope)	<b>lapar/o</b> = abdomen <b>-scope</b> = instrument to view	Instrument used to view inside the abdomen.
<b>laparoscopy</b> (lap-ar-OSS-koh-pee)	<b>lapar/o</b> = abdomen <b>-scopy</b> = process of viewing	<i>Laparoscope</i> is passed into the abdominal wall through a small incision. The abdominal cavity is then visually examined for tumors and other conditions with this lighted instrument. Also called <i>peritoneoscopy</i> .
<b>sigmoidoscope</b> (sig-MOYD-oh-scope)	<b>sigmoid/o</b> = sigmoid colon <b>-scope</b> = instrument to view	Instrument used to view inside the sigmoid colon.
<b>sigmoidoscopy</b> (sig-moid-OSS-koh-pee)	<b>sigmoid/o</b> = sigmoid colon <b>-scopy</b> = process of viewing	Procedure using a flexible <i>sigmoidoscope</i> to visually examine the sigmoid colon. Commonly done to diagnose cancer and polyps.
<b>Additional Diagnostic Procedures</b>		
<b>paracentesis</b> (pair-ah-sin-TEE-sis)	<b>-centesis</b> = process of removing fluid	Insertion of a needle into the abdominal cavity to withdraw fluid. Tests to diagnose diseases may be conducted on the fluid.

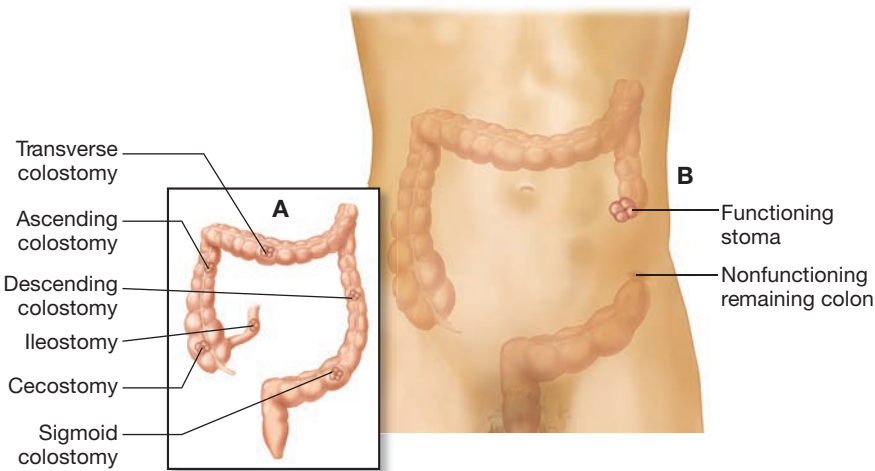
## Therapeutic Procedures

Term	Word Parts	Definition
<b>Dental Procedures</b>		
<b>bridge</b>		Dental appliance to replace missing teeth. It is attached to adjacent teeth for support.
<b>crown</b>		Artificial covering for a tooth that is created to replace the original enamel covering of the tooth.

## Therapeutic Procedures (continued)

Term	Word Parts	Definition
<b>denture</b> (DEN-chur)	<b>dent/o</b> = tooth	Partial or complete set of artificial teeth that are set in plastic materials. Acts as a substitute for the natural teeth and related structures.
<b>extraction</b>	<b>ex-</b> = outward	Removing or “pulling” of teeth.
<b>implant</b> (IM-plant)		Prosthetic device placed in the jaw to which a tooth or denture may be anchored.
<b>root canal</b>	<b>-al</b> = pertaining to	Dental treatment involving the pulp cavity of the root of a tooth. Procedure is used to save a tooth that is badly infected or abscessed.
<b>Medical Procedures</b>		
<b>gavage</b> (guh-VAHZH)		Use of a nasogastric (NG) tube to place liquid nourishment directly into the stomach.
<b>lavage</b> (lah-VAHZH)		Use of a nasogastric (NG) tube to wash out the stomach, for example, after ingestion of dangerous substances.
<b>nasogastric intubation</b> (NG tube) (NAY-zo-gas-trik / in-two-BAY-shun)	<b>nas/o</b> = nose <b>gastr/o</b> = stomach <b>-ic</b> = pertaining to <b>in-</b> = inward	Procedure in which a flexible catheter is inserted into the nose and down the esophagus to the stomach. May be used for feeding or to suction out stomach fluids.
<b>total parenteral nutrition</b> (TPN) (pair-in-TARE-all)	<b>-al</b> = pertaining to	Providing 100% of a patient’s nutrition intravenously. Used when a patient is unable to eat.
<b>Surgical Procedures</b>		
<b>anastomosis</b> (ah-nas-toh-MOH-sis)		To surgically create a connection between two organs or vessels. For example, joining together two cut ends of the intestines after a section is removed.
<b>appendectomy</b> (ap-en-DEK-toh-mee)	<b>append/o</b> = appendix <b>-ectomy</b> = surgical removal	Surgical removal of the appendix.
<b>bariatric surgery</b> (bear-ee-AT-rik)	<b>bar/o</b> = weight <b>-iatric</b> = pertaining to medical treatment	Group of surgical procedures such as stomach stapling and restrictive banding to reduce the size of the stomach. A treatment for morbid (extreme) obesity.
<b>cholecystectomy</b> (koh-lee-sis-TEK-toh-mee)	<b>cholecyst/o</b> = gallbladder <b>-ectomy</b> = surgical removal	Surgical removal of the gallbladder.
<b>choledocholithotripsy</b> (koh-led-oh-koh-LITH-oh-trip-see)	<b>choledoch/o</b> = common bile duct <b>lith/o</b> = stone <b>-tripsy</b> = surgical crushing	Crushing of a gallstone in the common bile duct.
<b>colectomy</b> (koh-LEK-toh-mee)	<b>col/o</b> = colon <b>-ectomy</b> = surgical removal	Surgical removal of the colon.

## Therapeutic Procedures (continued)

Term	Word Parts	Definition
<b>colostomy</b> (koh-LOSS-toh-mee)	<b>col/o</b> = colon <b>-ostomy</b> = surgically create an opening	Surgical creation of an opening of some portion of the colon through the abdominal wall to the outside surface. Fecal material (stool) drains into a bag worn on the abdomen.
<p> <b>Figure 8.19</b> A) The colon illustrating various ostomy sites. B) Colostomy in the descending colon, illustrating functioning stoma and nonfunctioning distal sigmoid colon and rectum.         </p> 		
<b>diverticulectomy</b> (dye-ver-tik-yoo-LEK-toh-mee)	<b>diverticul/o</b> = pouch <b>-ectomy</b> = surgical removal	Surgical removal of a diverticulum.
<b>exploratory laparotomy</b> (ek-SPLOR-ah-tor-ee / lap-ah-ROT-oh-mee)	<b>lapar/o</b> = abdomen <b>-otomy</b> = cutting into	Abdominal operation for the purpose of examining the abdominal organs and tissues for signs of disease or other abnormalities.
<b>fistulectomy</b> (fis-tyoo-LEK-toh-mee)	<b>-ectomy</b> = surgical removal	Removal of an anal fistula.
<b>gastrectomy</b> (gas-TREK-toh-mee)	<b>gastr/o</b> = stomach <b>-ectomy</b> = surgical removal	Surgical removal of the stomach.
<b>gastric stapling</b>	<b>gastr/o</b> = stomach <b>-ic</b> = pertaining to	Procedure that closes off a large section of the stomach with rows of staples. Results in a much smaller stomach to assist very obese patients to lose weight.
<b>gastrostomy</b> (gas-TROSS-toh-mee)	<b>gastr/o</b> = stomach <b>-ostomy</b> = surgically create an opening	Surgical procedure to create an opening in the stomach.
<b>hemorrhoidectomy</b> (hem-oh-royd-EK-toh-mee)	<b>-ectomy</b> = surgical removal	Surgical removal of hemorrhoids from the anorectal area.
<b>hernioplasty</b> (her-nee-oh-PLAS-tee)	<b>-plasty</b> = surgical repair	Surgical repair of a hernia. Also called <i>herniorrhaphy</i> .
<b>ileostomy</b> (ill-ee-OSS-toh-mee)	<b>ile/o</b> = ileum <b>-ostomy</b> = surgically create an opening	Surgical creation of an opening in the ileum.
<b>laparoscopic cholecystectomy</b> (lap-ar-oh-SKOP-ik / koh-lee-sis-TEK-toh-mee)	<b>lapar/o</b> = abdomen <b>-scopic</b> = pertaining to visually examining <b>cholecyst/o</b> = gallbladder <b>-ectomy</b> = surgical removal	Surgical removal of the gallbladder through a very small abdominal incision with the assistance of a laparoscope.



## Therapeutic Procedures (continued)

Term	Word Parts	Definition
<b>laparotomy</b> (lap-ah-ROT-oh-mee)	<b>lapar/o</b> = abdomen <b>-otomy</b> = cutting into	Surgical incision into the abdomen.
<b>liver transplant</b>		Transplant of a liver from a donor.
<b>palatoplasty</b> (pa-LOT-toh-plas-tee)	<b>palat/o</b> = palate <b>-plasty</b> = surgical repair	Surgical repair of the palate.
<b>pharyngoplasty</b> (fair-ING-oh-plas-tee)	<b>pharyng/o</b> = pharynx <b>-plasty</b> = surgical repair	Surgical repair of the throat.
<b>proctopexy</b> (PROK-toh-pek-see)	<b>proct/o</b> = rectum and anus <b>-pexy</b> = surgical fixation	Surgical fixation of the rectum and anus.

## Practice As You Go

### D. Match each procedure term with its definition

- |                                  |   |
|----------------------------------|---|
| 1. _____ serum bilirubin         | a. withdraws fluid from abdominal cavity  |
| 2. _____ lavage                  | b. barium enema                           |
| 3. _____ bariatric surgery       | c. visually examines abdominal cavity     |
| 4. _____ proctopexy              | d. stool guaiac                           |
| 5. _____ lower GI series         | e. treatment for obesity                  |
| 6. _____ paracentesis            | f. elevated levels indicate liver disease |
| 7. _____ fecal occult blood test | g. to wash out the stomach                |
| 8. _____ laparoscopy             | h. surgical fixation of rectum and anus   |

## Pharmacology

Classification	Word Parts	Action	Examples
<b>anorexiant</b> (an-oh-REKS-ee-ant)	<b>an-</b> = without <b>-orexia</b> = appetite	Treats obesity by suppressing appetite.	phendimetrazine, Adipost, Obezine; phentermine, Zantryl, Adipex
<b>antacid</b>	<b>anti-</b> = against	Used to neutralize stomach acids.	calcium carbonate, Tums; aluminum hydroxide and magnesium hydroxide, Maalox, Mylanta
<b>antidiarrheal</b> (an-tee-dye-ah-REE-all)	<b>anti-</b> = against <b>-al</b> = pertaining to	Used to control diarrhea.	loperamide, Imodium; diphenoxylate and atropine, Lomotil; kaolin/pectin, Kaopectate

## Pharmacology (continued)

Classification	Word Parts	Action	Examples
<b>antiemetic</b> (an-tye-ee-MEH-tik)	<b>anti-</b> = against <b>-emetic</b> = pertaining to vomiting	Treats nausea, vomiting, and motion sickness.	prochlorperazine, Compazine; promethazine, Phenergan
<b>antivirals</b>	<b>anti-</b> = against	Treat herpes simplex infection.	valacyclovir, Valtrex; famcyclovir, Famvir; acyclovir, Zovirax
<b>H<sub>2</sub>-receptor antagonist</b>	<b>anti-</b> = against	Used to treat peptic ulcers and gastroesophageal reflux disease. When stimulated, H <sub>2</sub> -receptors increase the production of stomach acid. Using an antagonist to block these receptors results in a low acid level in the stomach.	ranitidine, Zantac; cimetidine, Tagamet; famotidine, Pepcid
<b>laxative</b> <b>Med Term Tip</b> ..... The term <i>laxative</i> comes from the Latin term meaning “to relax.”		Treats constipation by stimulating a bowel movement.	senosides, Senokot; psyllium, Metamucil
<b>proton pump inhibitors</b>		Used to treat peptic ulcers and gastroesophageal reflux disease. Blocks the stomach’s ability to secrete acid.	esomeprazole, Nexium; omeprazole, Prilosec

## Abbreviations

<b>ac</b>	before meals	<b>HDV</b>	hepatitis D virus
<b>ALT</b>	alanine transaminase	<b>HEV</b>	hepatitis E virus
<b>AST</b>	aspartate transaminase	<b>HSV-1</b>	herpes simplex virus type 1
<b>Ba</b>	barium	<b>IBD</b>	inflammatory bowel disease
<b>BE</b>	barium enema	<b>IBS</b>	irritable bowel syndrome
<b>BM</b>	bowel movement	<b>IVC</b>	intravenous cholangiography
<b>BS</b>	bowel sounds	<b>n&amp;v</b>	nausea and vomiting
<b>CBD</b>	common bile duct	<b>NG</b>	nasogastric (tube)
<b>EGD</b>	esophagogastroduodenoscopy	<b>NPO</b>	nothing by mouth
<b>ERCP</b>	endoscopic retrograde cholangiopancreatography	<b>O&amp;P</b>	ova and parasites
<b>FOBT</b>	fecal occult blood test	<b>pc</b>	after meals
<b>GB</b>	gallbladder	<b>PO</b>	by mouth
<b>GERD</b>	gastroesophageal reflux disease	<b>pp</b>	postprandial
<b>GI</b>	gastrointestinal	<b>PTC</b>	percutaneous transhepatic cholangiography
<b>HAV</b>	hepatitis A virus	<b>PUD</b>	peptic ulcer disease
<b>HBV</b>	hepatitis B virus	<b>TPN</b>	total parenteral nutrition
<b>HCl</b>	hydrochloric acid	<b>UGI</b>	upper gastrointestinal series
<b>HCV</b>	hepatitis C virus		

## Practice As You Go

### E. What's the Abbreviation?

1. nasogastric \_\_\_\_\_
2. gastrointestinal \_\_\_\_\_
3. hepatitis B virus \_\_\_\_\_
4. fecal occult blood test \_\_\_\_\_
5. inflammatory bowel disease \_\_\_\_\_
6. herpes simplex virus type 1 \_\_\_\_\_
7. aspartate transaminase \_\_\_\_\_
8. after meals \_\_\_\_\_
9. peptic ulcer disease \_\_\_\_\_
10. gastroesophageal reflux disease \_\_\_\_\_



# Chapter Review

## Real-World Applications

### Medical Record Analysis

This Gastroenterology Consultation Report contains 12 medical terms. Underline each term and write it in the list below the report. Then define each term.

#### Gastroenterology Consultation Report

Reason for Consultation:	Evaluation of recurrent epigastric pain with anemia and melena.
History of Present Illness:	Patient is a 56-year-old male. He reports a long history of mild dyspepsia characterized by burning epigastric pain, especially when his stomach is empty. This pain has been relieved by over-the-counter antacids. Approximately two weeks ago, the pain became significantly worse and he noted that his stool were dark and tarry.
Results of Physical Examination:	CBC indicates anemia, and a fecal occult blood test is positive for blood. A blood test for <i>Helicobacter pylori</i> is positive. Gastrosocopy located an ulcer in the lining of the stomach. This ulcer is 1.5 cm in diameter and deep. There is evidence of active bleeding from the ulcer.
Assessment:	Peptic ulcer disease.
Recommendations:	A gastrectomy to remove the ulcerated portion of the stomach is indicated because the ulcer is already bleeding.

Term	Definition
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____
7. _____	_____
8. _____	_____
9. _____	_____
10. _____	_____
11. _____	_____
12. _____	_____

## Chart Note Transcription

The chart note below contains 12 phrases that can be reworded with a medical term that you learned in this chapter. Each phrase is identified with an underline. Determine the medical term and write your answers in the space provided.

Pearson General Hospital Consultation Report	
Task	Edit View Time Scale Options Help Download Archive Date: 17 May 2015
Current Complaint:	Patient is a 74-year-old female seen by a <u>physician who specializes in the treatment of the gastrointestinal tract</u> <b>1</b> with complaints of severe lower abdominal pain and extreme <u>difficulty with having a bowel movement</u> . <b>2</b>
Past History:	Patient has a history of the <u>presence of gallstones</u> <b>3</b> requiring surgical removal of the <u>gallbladder</u> <b>4</b> 10 years ago and chronic <u>acid backing up from the stomach into the esophagus</u> . <b>5</b>
Signs and Symptoms:	The patient's abdomen is distended with <u>fluid collecting in the abdominal cavity</u> . <b>6</b> <u>X-ray of the colon after inserting barium dye with an enema</u> <b>7</b> revealed the <u>presence of multiple small tumors growing on a stalk</u> <b>8</b> throughout the colon. <u>Visual examination of the colon by a scope inserted through the rectum</u> <b>9</b> was performed, and biopsies taken for microscopic examination located a tumor.
Diagnosis:	Carcinoma of the section of colon between <u>the descending colon and the rectum</u> . <b>10</b>
Treatment:	<u>Surgical removal of the colon</u> <b>11</b> between the descending colon and the rectum with <u>the surgical creation of an opening of the colon through the abdominal wall</u> . <b>12</b>
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____
6.	_____
7.	_____
8.	_____
9.	_____
10.	_____
11.	_____
12.	_____

## Case Study

Below is a case study presentation of a patient with a condition discussed in this chapter. Read the case study and answer the questions below. Some questions will ask for information not included within this chapter. Use your text, a medical dictionary, or any other reference material you choose to answer these questions.



(Rob Marmion/Shutterstock)

A 60-year-old obese female has come into the ER due to severe RUQ pain for the past two hours. Patient also reports increasing nausea but denies emesis. Patient states she has been told she has cholelithiasis by her family physician following a milder episode of this pain two years ago. In addition to severe pain, patient displays a moderate degree of scleral jaundice. Abdominal ultrasound identified acute cholecystitis and a large number of gallstones. Because of the jaundice a PTC was performed and confirmed choledocholithiasis. Patient was sent to surgery for laparoscopic cholecystectomy to remove the gallbladder and all gallstones. She recovered without incident.

## Questions

1. Define each of the patient's symptoms.

---



---

2. The patient has severe RUQ pain. What organs are located in the RUQ?

---



---

3. After reading the definition of jaundice, what is most likely causing this patient to have it?

---



---

4. Describe the diagnostic imaging procedures this patient received.

---



---

5. What is the difference between cholelithiasis and cholecystitis?

---



---

6. The patient's gallbladder was removed laparoscopically. What does that mean?

---



---



## Practice Exercises

### A. Word Building Practice

The combining form **gastr/o** refers to the stomach. Use it to write a term that means:

1. inflammation of the stomach \_\_\_\_\_
2. study of the stomach and small intestines \_\_\_\_\_
3. removal of the stomach \_\_\_\_\_
4. visual exam of the stomach \_\_\_\_\_
5. stomach pain \_\_\_\_\_
6. enlargement of the stomach \_\_\_\_\_
7. cutting into the stomach \_\_\_\_\_

The combining form **esophag/o** refers to the esophagus. Use it to write a term that means:

8. inflammation of the esophagus \_\_\_\_\_
9. visual examination of the esophagus \_\_\_\_\_
10. surgical repair of the esophagus \_\_\_\_\_
11. pertaining to the esophagus \_\_\_\_\_
12. stretched-out esophagus \_\_\_\_\_

The combining form **proct/o** refers to the rectum and anus. Use it to write a term that means:

13. surgical fixation of the rectum and anus \_\_\_\_\_
14. drooping of the rectum and anus \_\_\_\_\_
15. inflammation of the rectum and anus \_\_\_\_\_
16. specialist in the study of the rectum and anus \_\_\_\_\_

The combining form **cholecyst/o** refers to the gallbladder. Use it to write a term that means:

17. removal of the gallbladder \_\_\_\_\_
18. condition of having gallbladder stones \_\_\_\_\_
19. gallbladder stone surgical crushing \_\_\_\_\_
20. gallbladder inflammation \_\_\_\_\_

The combining form **lapar/o** refers to the abdomen. Use it to write a term that means:

21. instrument to view inside the abdomen \_\_\_\_\_
22. cutting into the abdomen \_\_\_\_\_
23. visual examination of the abdomen \_\_\_\_\_

The combining form **hepat/o** refers to the liver. Use it to write a term that means:

24. liver tumor \_\_\_\_\_
25. enlargement of the liver \_\_\_\_\_
26. pertaining to the liver \_\_\_\_\_
27. inflammation of the liver \_\_\_\_\_

The combining form **pancreat/o** refers to the pancreas. Use it to write a term that means:

28. inflammation of the pancreas \_\_\_\_\_
29. pertaining to the pancreas \_\_\_\_\_

The combining form **col/o** refers to the colon. Use it to write a term that means:

30. surgically create an opening in the colon \_\_\_\_\_
31. inflammation of the colon \_\_\_\_\_

## B. Define the Combining Form

	Definition	Example from Chapter
1. <b>esophag/o</b>	_____	_____
2. <b>hepat/o</b>	_____	_____
3. <b>ile/o</b>	_____	_____
4. <b>proct/o</b>	_____	_____
5. <b>gloss/o</b>	_____	_____
6. <b>labi/o</b>	_____	_____
7. <b>jejun/o</b>	_____	_____
8. <b>sigmoid/o</b>	_____	_____
9. <b>rect/o</b>	_____	_____
10. <b>gingiv/o</b>	_____	_____
11. <b>cholecyst/o</b>	_____	_____
12. <b>duoden/o</b>	_____	_____
13. <b>an/o</b>	_____	_____
14. <b>enter/o</b>	_____	_____
15. <b>dent/o</b>	_____	_____

### C. Suffix Practice

Use the following suffixes to create a medical term for the following definitions.

**-orexia**

**-phagia**

**-pepsia**

**-emesis**

**-lithiasis**

**-prandial**

1. after meals \_\_\_\_\_
2. condition of having gallstones \_\_\_\_\_
3. no appetite \_\_\_\_\_
4. difficulty swallowing \_\_\_\_\_
5. vomiting blood \_\_\_\_\_
6. slow digestion \_\_\_\_\_

### D. What Does it Stand For?

1. BM \_\_\_\_\_
2. UGI \_\_\_\_\_
3. BE \_\_\_\_\_
4. BS \_\_\_\_\_
5. n & v \_\_\_\_\_
6. O & P \_\_\_\_\_
7. PO \_\_\_\_\_
8. CBD \_\_\_\_\_
9. NPO \_\_\_\_\_
10. pp \_\_\_\_\_

### E. Define the Term

1. colonoscopy \_\_\_\_\_
2. bite wing X-ray \_\_\_\_\_
3. hematochezia \_\_\_\_\_
4. serum bilirubin \_\_\_\_\_
5. cachexia \_\_\_\_\_
6. lavage \_\_\_\_\_
7. hernioplasty \_\_\_\_\_
8. extraction \_\_\_\_\_
9. choledocholithotripsy \_\_\_\_\_
10. anastomosis \_\_\_\_\_

**F. Fill in the Blank**

colonoscopy	barium swallow	lower GI series
gastric stapling	colostomy	colectomy
total parenteral nutrition	choledocholithotripsy	liver biopsy
ileostomy	fecal occult blood test	intravenous cholecystography

- Excising a small piece of hepatic tissue for microscopic examination is called a(n) \_\_\_\_\_.
- When a surgeon performs a total or partial colectomy for cancer, she may have to create an opening on the surface of the skin for fecal matter to leave the body. This procedure is called a(n) \_\_\_\_\_.
- Another name for an upper GI series is a(n) \_\_\_\_\_.
- Mr. White has had a radiopaque material placed into his large bowel by means of an enema for the purpose of viewing his colon. This procedure is called a(n) \_\_\_\_\_.
- A(n) \_\_\_\_\_ is the surgical removal of the colon.
- Jessica has been on a red meat-free diet in preparation for a test of her feces for the presence of hidden blood. This test is called a(n) \_\_\_\_\_.
- Dr. Mendez uses equipment to crush gallstones in the common bile duct. This procedure is called a(n) \_\_\_\_\_.
- Mrs. Alcazar required \_\_\_\_\_ because she could not eat following her intestinal surgery.
- Mr. Bright had a(n) \_\_\_\_\_ to treat his morbid obesity.
- Visualizing the gallbladder and bile ducts by injecting a dye into the patient's arm is called a(n) \_\_\_\_\_.
- Passing an instrument into the anus and rectum in order to see the colon is called a(n) \_\_\_\_\_.
- Ms. Fayne suffers from Crohn's disease, which has necessitated the removal of much of her small intestine. She has had a surgical passage created for the external disposal of waste material from the ileum. This is called a(n) \_\_\_\_\_.

**G. Terminology Matching**

Match each term to its definition.

- |                        |   |
|------------------------|---|
| 1. _____ dentures      | a. tooth decay                              |
| 2. _____ cementum      | b. prosthetic device used to anchor a tooth |
| 3. _____ root canal    | c. inflammation of the gums                 |
| 4. _____ crown         | d. full set of artificial teeth             |
| 5. _____ bridge        | e. portion of the tooth covered by enamel   |
| 6. _____ implant       | f. replacement for missing teeth            |
| 7. _____ gingivitis    | g. anchors root in bony socket of jaw       |
| 8. _____ dental caries | h. surgery on the tooth pulp                |

## H. Pharmacology Challenge

Fill in the classification for each drug description, then match the brand name.

Drug Description	Classification	Brand Name
1. _____ Controls diarrhea	_____	a. Pepcid
2. _____ Blocks stomach's ability to secrete acid	_____	b. Obezine
3. _____ Treats motion sickness	_____	c. Metamucil
4. _____ Blocks acid-producing receptors	_____	d. Compazine
5. _____ Suppresses appetite	_____	e. Maalox
6. _____ Stimulates a bowel movement	_____	f. Imodium
7. _____ Neutralizes stomach acid	_____	g. Valtrex
8. _____ Treats herpes simplex infection	_____	h. Nexium

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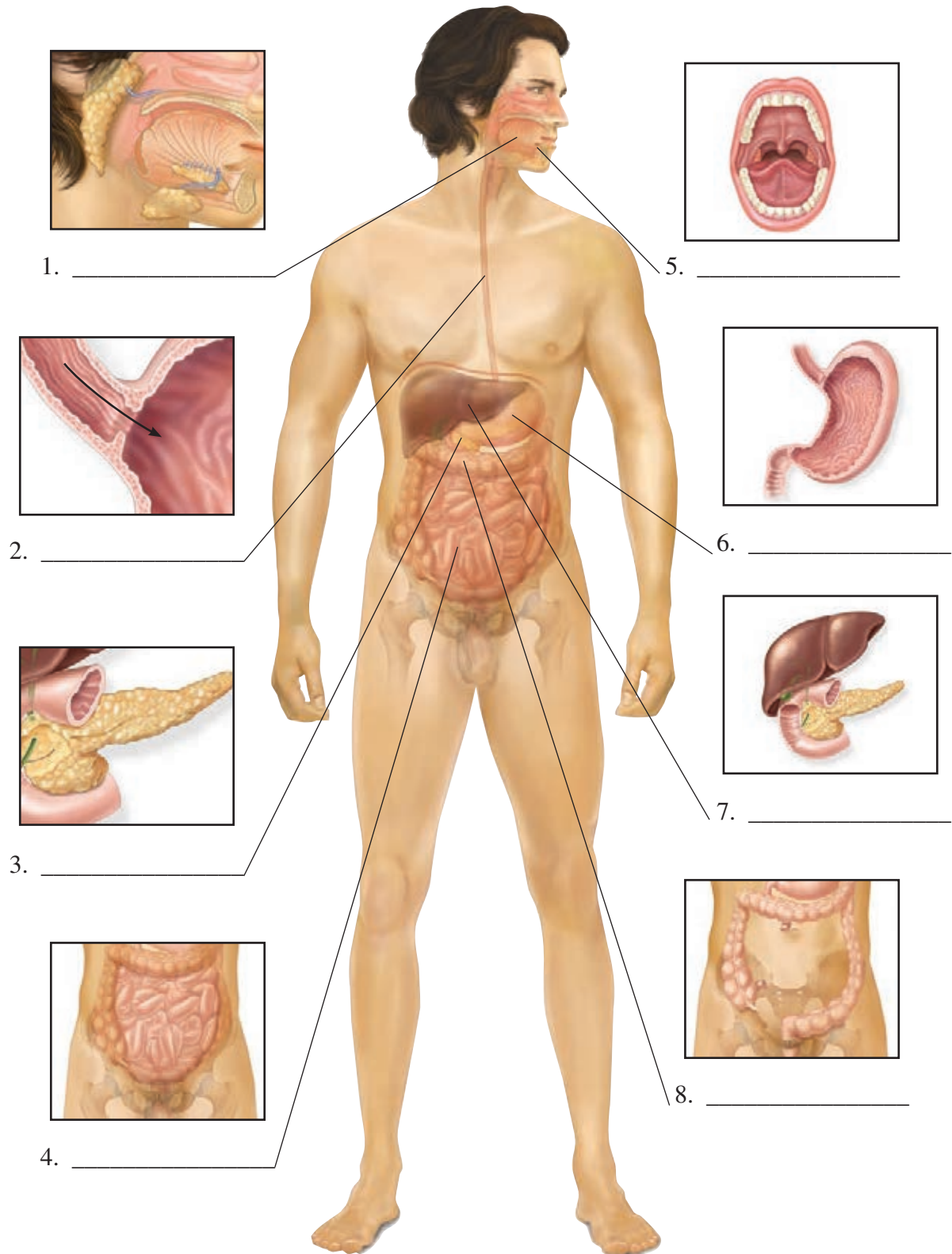
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## Labeling Exercise

### Image A

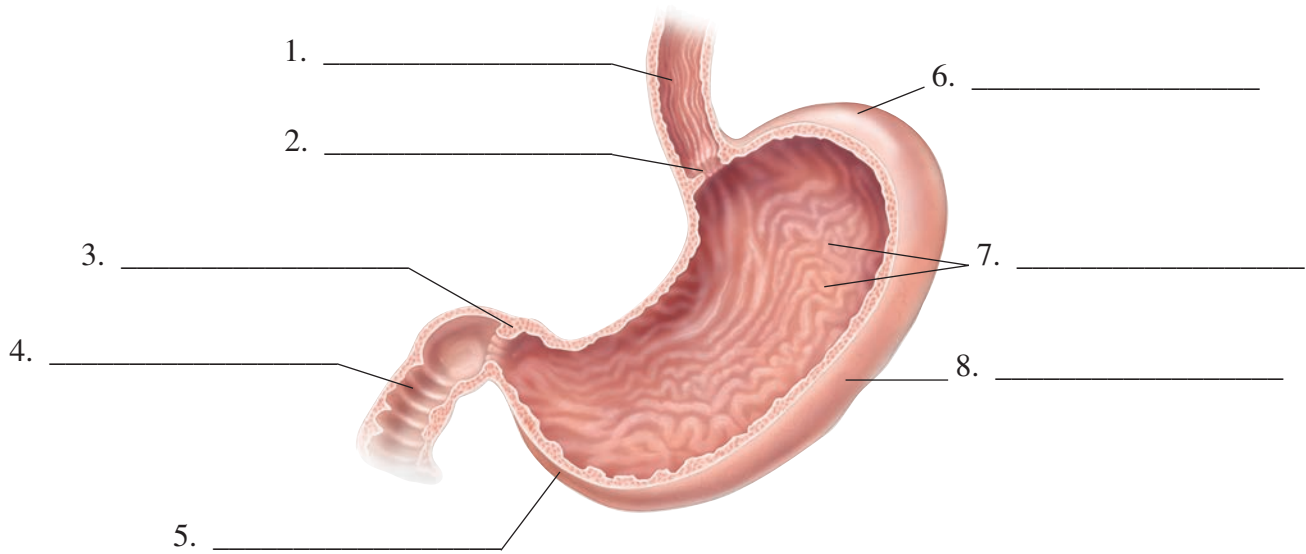
Write the labels for this figure on the numbered lines provided.





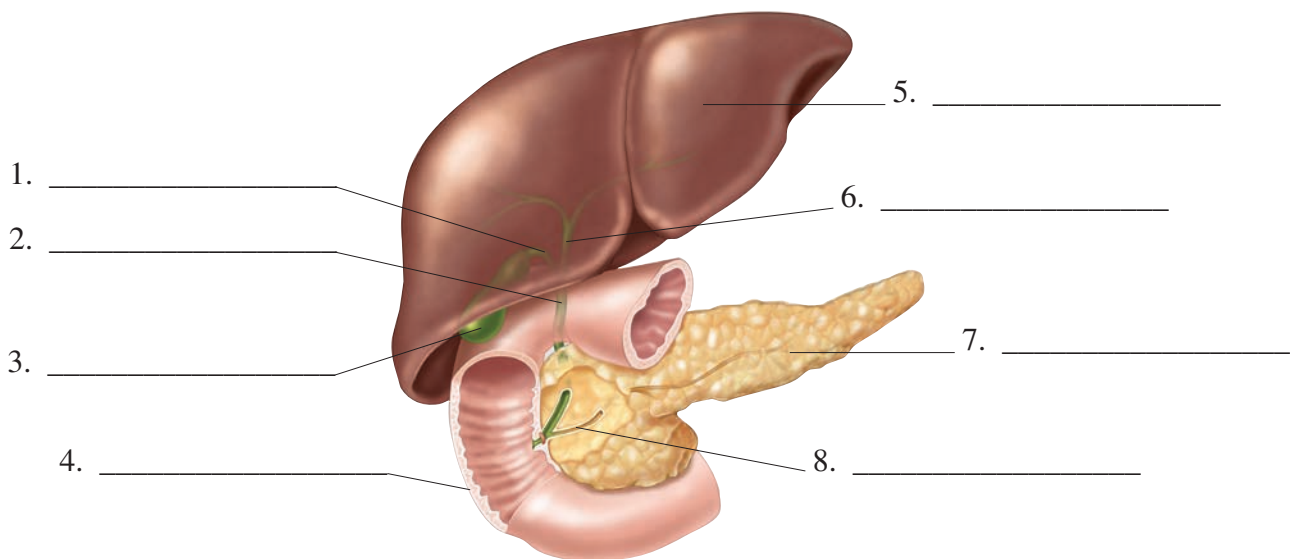
### Image B

Write the labels for this figure on the numbered lines provided.



### Image C

Write the labels for this figure on the numbered lines provided.



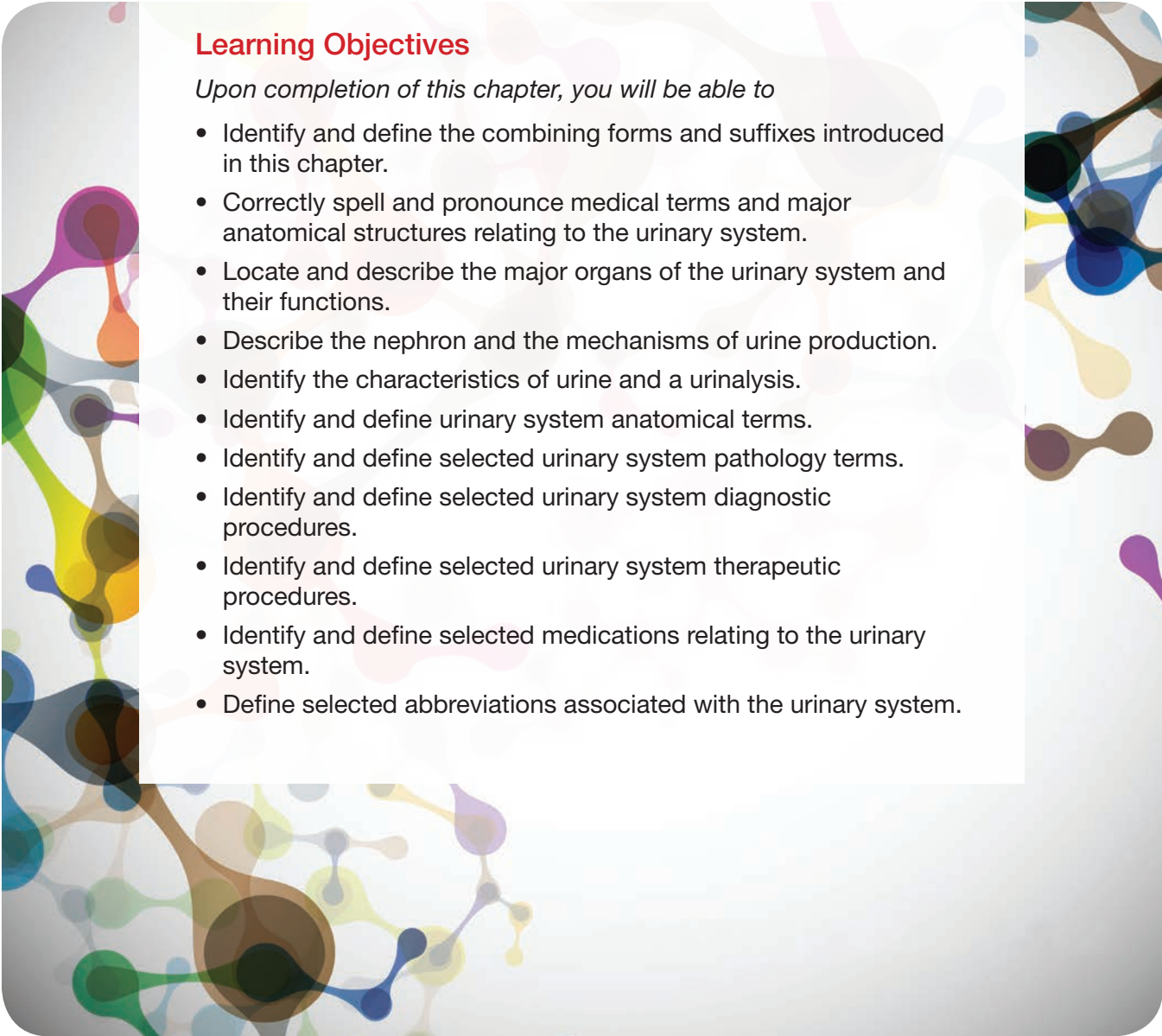


# 9

## Urinary System

### Learning Objectives

*Upon completion of this chapter, you will be able to*

- Identify and define the combining forms and suffixes introduced in this chapter.
  - Correctly spell and pronounce medical terms and major anatomical structures relating to the urinary system.
  - Locate and describe the major organs of the urinary system and their functions.
  - Describe the nephron and the mechanisms of urine production.
  - Identify the characteristics of urine and a urinalysis.
  - Identify and define urinary system anatomical terms.
  - Identify and define selected urinary system pathology terms.
  - Identify and define selected urinary system diagnostic procedures.
  - Identify and define selected urinary system therapeutic procedures.
  - Identify and define selected medications relating to the urinary system.
  - Define selected abbreviations associated with the urinary system.
- 



# Urinary System at a Glance

## Function

The urinary system is responsible for maintaining a stable internal environment for the body. In order to achieve this state, the urinary system removes waste products, adjusts water and electrolyte levels, and maintains the correct pH.

## Organs

Here are the primary structures that comprise the urinary system:

**kidneys**  
**urethra**

**ureters**  
**urinary bladder**

## Word Parts

Here are the most common word parts (with their meanings) used to build urinary system terms. For a more comprehensive list, refer to the Terminology section of this chapter.

### Combining Forms

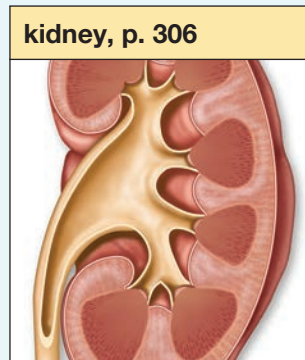
<b>azot/o</b>	nitrogenous waste
<b>bacteri/o</b>	bacteria
<b>cyst/o</b>	urinary bladder
<b>glomerul/o</b>	glomerulus
<b>glycos/o</b>	sugar, glucose
<b>home/o</b>	sameness
<b>hydr/o</b>	water
<b>keton/o</b>	ketones
<b>meat/o</b>	meatus
<b>nephr/o</b>	kidney

<b>noct/i</b>	night
<b>olig/o</b>	scanty
<b>protein/o</b>	protein
<b>pyel/o</b>	renal pelvis
<b>ren/o</b>	kidney
<b>ureter/o</b>	ureter
<b>urethr/o</b>	urethra
<b>urin/o</b>	urine
<b>ur/o</b>	urine

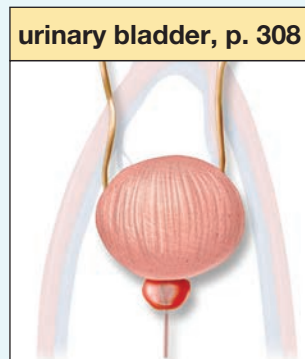
### Suffixes

<b>-lith</b>	stone	<b>-ptosis</b>	drooping
<b>-lysis</b>	to destroy	<b>-uria</b>	urine condition

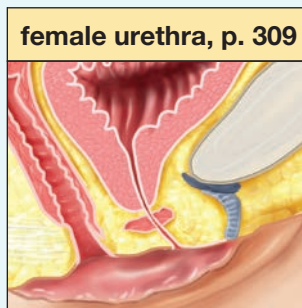
# Urinary System Illustrated



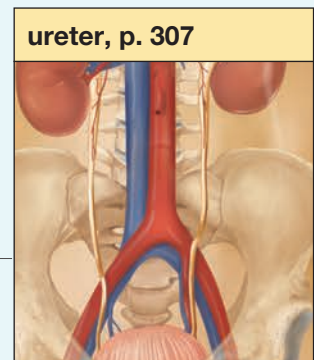
Filters blood and produces urine



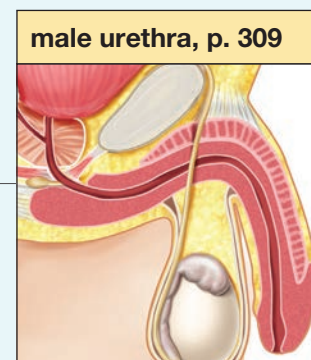
Stores urine



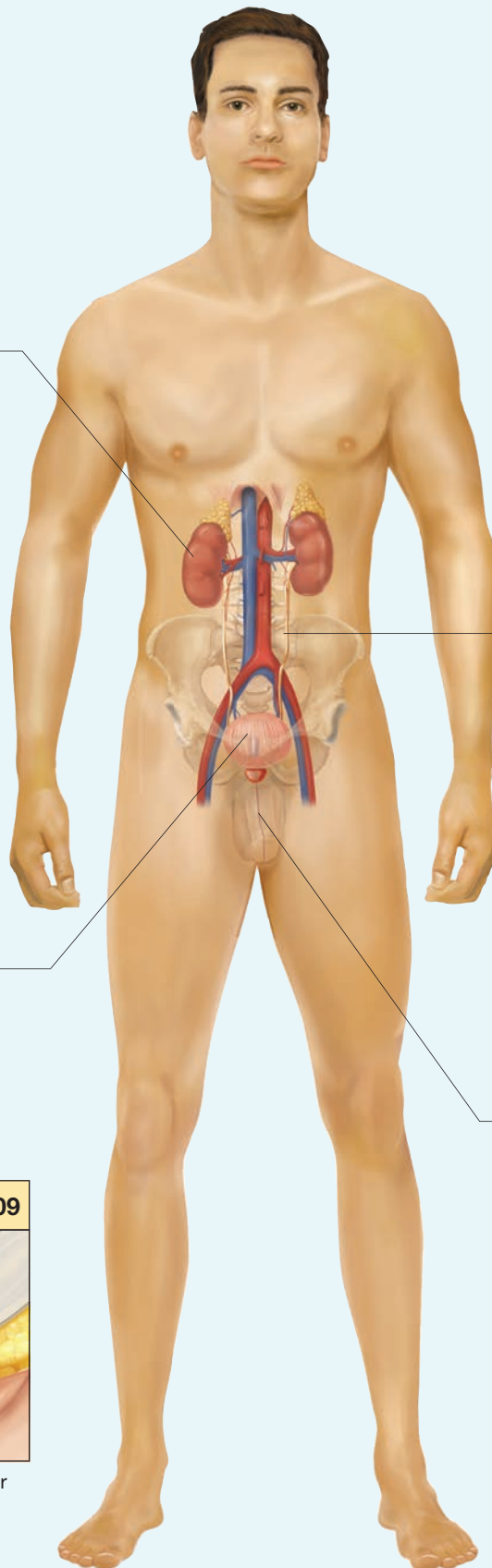
Transports urine to exterior



Transports urine to the bladder



Transports urine to exterior



**What's In A Name?**

Look for these word parts:

**genit/o** = genitals

**urin/o** = urine

**-ary** = pertaining to

## Anatomy and Physiology of the Urinary System

### genitourinary system

(jen-ih-toh-YOO-rih-nair-ee)

### kidneys

**nephrons** (NEF-ronz)

**uremia** (yoo-REE-mee-ah)

**ureters** (YOO-reh-ters)

**urethra** (yoo-REE-thrah)

**urinary bladder** (YOO-rih-nair-ee)

**urine** (YOO-rin)

Think of the urinary system, sometimes referred to as the **genitourinary** (GU) **system**, as similar to a water filtration plant. Its main function is to filter and remove waste products from the blood. These waste materials result in the production and excretion of **urine** from the body.

The urinary system is one of the hardest working systems of the body. All the body's metabolic processes result in the production of waste products. These waste products are a natural part of life but quickly become toxic if they are allowed to build up in the blood, resulting in a condition called **uremia**. Waste products in the body are removed through a very complicated system of blood vessels and kidney tubules. The actual filtration of wastes from the blood takes place in millions of **nephrons**, which make up each of the **kidneys**. As urine drains from each kidney, the **ureters** transport it to the **urinary bladder**. We are constantly producing urine, and our bladders can hold about one quart of this liquid. When the urinary bladder empties, urine moves from the bladder down the **urethra** to the outside of the body.

**Med Term Tip**

The urinary system and the male reproductive system share some of the same organs, particularly the urethra. Hence, the term *genitourinary* (GU) is sometimes used to describe the urinary system. The reproductive system is discussed in Chapter 10.

**What's In A Name?**

Look for these word parts:

**peritone/o** = peritoneum

**-al** = pertaining to

**retro-** = behind

## Kidneys

**calyx** (KAY-likz)

**cortex** (KOR-teks)

**hilum** (HIGH-lum)

**medulla** (meh-DULL-ah)

**renal artery**

**renal papilla** (pah-PILL-ah)

**renal pelvis**

**renal pyramids**

**renal vein**

**retroperitoneal** (ret-roh-pair-ih-toh-NEE-al)

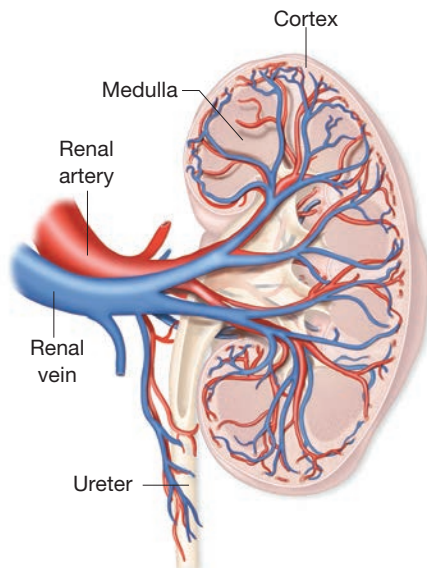
**Med Term Tip**

From the time of early man, there has been an interest in urine. Drawings on cave walls and hieroglyphics in Egyptian pyramids reveal interest in urine as a means of determining the physical state of the body. Some of the first doctors, called *pisse prophets*, believed that examining the urine would help treat a patient. Now urologists treat disorders of the urinary tract in both men and women, as well as disorders of the male reproductive tract.

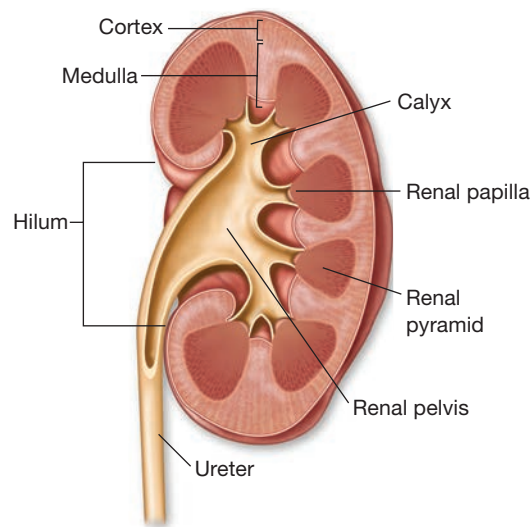
The two kidneys are located in the lumbar region of the back above the waist on either side of the vertebral column. They are not inside the peritoneal sac, a location referred to as **retroperitoneal**. Each kidney has a concave or indented area on the edge toward the center that gives the kidney its bean shape. The center of this concave area is called the **hilum**. The hilum is where the **renal artery** enters and the **renal vein** leaves the kidney (see Figure 9.1 ■). The renal artery delivers the blood that is full of waste products to the kidney and the renal vein returns the now cleansed blood to the general circulation. The ureters also leave the kidneys at the hilum. The ureters are narrow tubes that lead from the kidneys to the bladder.

When a surgeon cuts into a kidney, several structures or areas are visible. The outer portion, called the **cortex**, is much like a shell for the kidney. The inner area is called the **medulla**. Within the medulla are a dozen or so triangular-shaped areas, the **renal pyramids**, which resemble their namesake, the Egyptian pyramids. The tip of each pyramid points inward toward the hilum. At its tip, called the **renal papilla**, each pyramid opens into a **calyx** (plural is *calyces*), which is continuous with the **renal pelvis**. The calyces and ultimately the renal pelvis collect urine as it is formed. The ureter for each kidney arises from the renal pelvis (see Figure 9.2 ■).





■ **Figure 9.1** Kidney structure. Longitudinal section showing the renal artery entering and the renal vein and ureter exiting at the hilum of the kidney.



■ **Figure 9.2** Longitudinal section of a kidney illustrating the internal structures.

## Nephrons

**afferent arteriole** (AFF-er-ent)

**Bowman's capsule**

**collecting tubule**

**distal convoluted tubule**

(DISS-tall / con-voh-LOOT-ed)

**efferent arteriole** (EF-er-ent)

**glomerular capsule** (glom-AIR-yoo-lar)

**glomerulus** (glom-AIR-yoo-lus)

**loop of Henle**

**nephron** (NEF-ron)

**nephron loop**

**proximal convoluted tubule**

(PROK-sim-al / con-voh-LOOT-ed)

**renal corpuscle** (KOR-pus-ehl)

**renal tubule**

The functional or working unit of the kidney is the **nephron**. There are more than one million of these microscopic structures in each human kidney. Each nephron consists of the **renal corpuscle** and the **renal tubule** (see Figure 9.3 ■). The renal corpuscle is the blood-filtering portion of the nephron. It has a double-walled cuplike structure called the **glomerular capsule** (also known as **Bowman's capsule**) that encases a ball of capillaries called the **glomerulus**. An **afferent arteriole** carries blood to the glomerulus, and an **efferent arteriole** carries blood away from the glomerulus.

Water and substances that were removed from the bloodstream in the renal corpuscle flow into the renal tubules to finish the urine production process. This continuous tubule is divided into four sections: the **proximal convoluted tubule**, followed by the narrow **nephron loop** (also known as the **loop of Henle**), then the **distal convoluted tubule**, and finally the **collecting tubule**.

## Ureters

As urine drains out of the renal pelvis it enters the ureter, which carries it down to the urinary bladder (see Figure 9.4 ■). Ureters are very narrow tubes measuring less than ¼-inch wide and 10–12 inches long that extend from the renal pelvis to the urinary bladder. Mucous membrane lines the ureters just as it lines most passages that open to the external environment.

### Med Term Tip

The kidney bean is so named because it resembles a kidney in shape. Each organ weighs four to six ounces, is two to three inches wide and approximately one inch thick, and is about the size of your fist. In most people the left kidney is slightly higher and larger than the right kidney. Functioning kidneys are necessary for life, but it is possible to live with only one functioning kidney.

### What's In A Name?

Look for these word parts:

**dist/o** = away from

**proxim/o** = near to

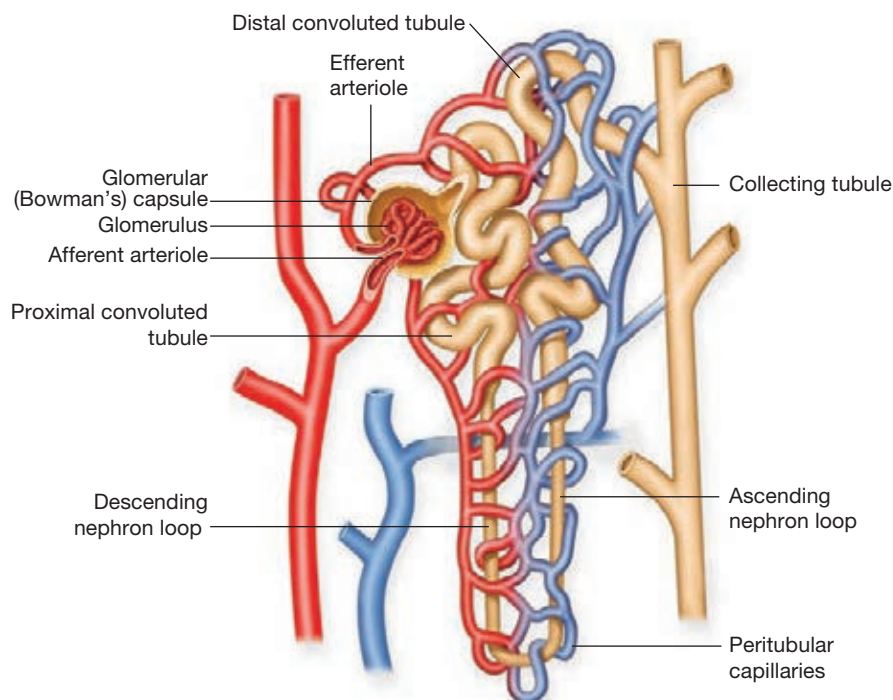
**-al** = pertaining to

### Med Term Tip

*Afferent*, meaning "moving toward," and *efferent*, meaning "moving away from," are terms used when discussing moving either toward or away from the central point in many systems. For example, there are afferent and efferent nerves in the nervous system.



■ **Figure 9.3** The structure of a nephron, illustrating the nephron structure in relation to the circulatory system.



#### What's In A Name?

Look for these word parts:

**ex-** = outward

**in-** = inward

**-al** = pertaining to

## Urinary Bladder

**external sphincter** (SFINGK-ter)

**internal sphincter**

**rugae** (ROO-gay)

**urination**

#### Word Watch

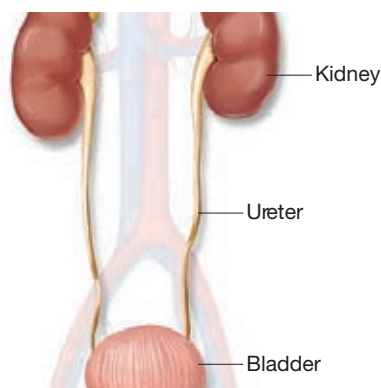
The terms *ureter* and *urethra* are frequently confused. Remember that there are two ureters carrying urine from the kidneys into the bladder. There is only one urethra, and it carries urine from the bladder to the outside of the body.

#### Med Term Tip

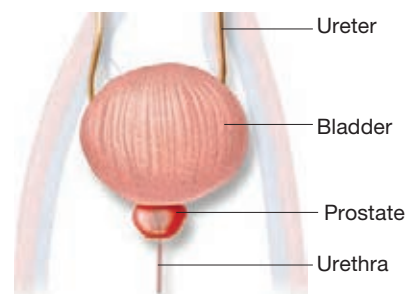
Terms such as *micturition*, *voiding*, and *urination* all mean basically the same thing—the process of releasing urine from the body.

The urinary bladder is an elastic muscular sac that lies in the base of the pelvis just behind the pubic symphysis (see Figure 9.5 ■). It is composed of three layers of smooth muscle tissue lined with mucous membrane containing **rugae** or folds that allow it to stretch. The bladder receives the urine directly from the ureters, stores it, and excretes it by **urination** through the urethra.

Generally, an adult bladder will hold 250 mL of urine. This amount then creates an urge to void or empty the bladder. Involuntary muscle action causes the bladder to contract and the **internal sphincter** to relax. The internal sphincter protects us from having our bladder empty at the wrong time. Voluntary action



■ **Figure 9.4** The ureters extend from the kidneys to the urinary bladder.



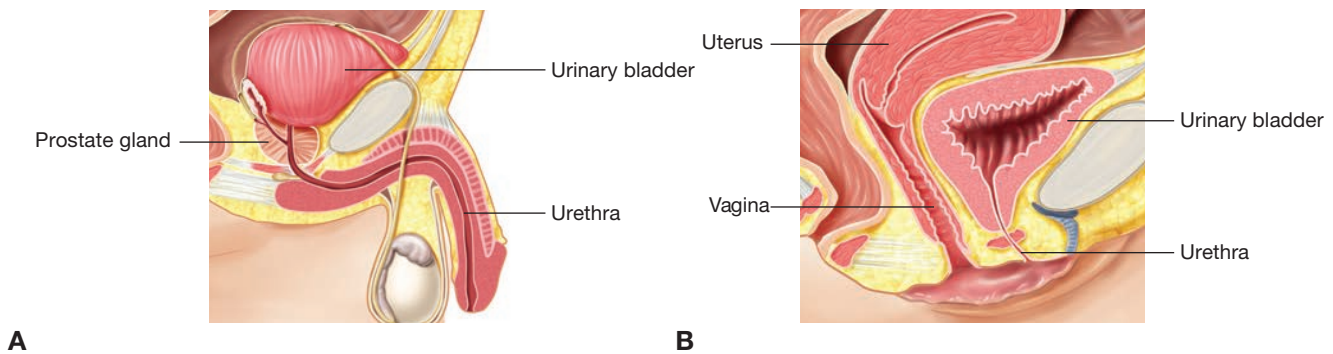
■ **Figure 9.5** The structure of the urinary bladder. (Note the prostate gland.)

controls the **external sphincter**, which opens on demand to allow the intentional emptying of the bladder. The act of controlling the emptying of urine is developed sometime after a child is two years of age.

## Urethra

**urinary meatus** (mee-AY-tus)

The urethra is a tubular canal that carries the flow of urine from the bladder to the outside of the body (see Figure 9.6 ■). The external opening through which urine passes out of the body is called the **urinary meatus**. Mucous membrane also lines the urethra as it does other structures of the urinary system. This is one of the reasons that infection spreads up the urinary tract. The urethra is one to two inches long in the female and eight inches long in the male. In a woman it functions only as the outlet for urine and is in front of the vagina. In the male, however, it has two functions: an outlet for urine and the passageway for semen to leave the body.



■ **Figure 9.6** A) The male urethra extends from the urinary bladder in the floor of the pelvis through the penis to the urinary meatus. B) The much shorter female urethra extends from the urinary bladder to the floor of the pelvis and exits just in front of the vaginal opening.

## Role of Kidneys in Homeostasis

**electrolytes** (ee-LEK-troh-lites)

**homeostasis** (hoh-mee-oh-STAY-sis)

The kidneys are responsible for **homeostasis** or balance in the body. They continually adjust the chemical conditions in the body, allowing us to survive. Because of its interaction with the bloodstream and its ability to excrete substances from the body, the urinary system maintains the body's proper balance of water ( $H_2O$ ) and chemicals. If the body is low on water, the kidneys conserve it, or in the opposite case, if there is excess water in the body, the kidneys excrete the excess. In addition to water, the kidneys regulate the level of **electrolytes**—small biologically important molecules such as sodium ( $Na^+$ ), potassium ( $K^+$ ), chloride ( $Cl^-$ ), and bicarbonate ( $HCO_3^-$ ). Finally, the kidneys play an important role in maintaining the correct pH range within the body, making sure we do not become too acidic or too alkaline. The kidneys accomplish these important tasks through the production of urine.

### Med Term Tip

Mucous membranes will carry infections up the urinary tract from the urinary meatus and urethra into the bladder and eventually up the ureters and the kidneys if not stopped. It is never wise to ignore a simple bladder infection or what is called *cystitis*.

### What's In A Name?

Look for these word parts:  
**home/o** = sameness  
**-stasis** = standing still

**What's In A Name?**

Look for these word parts:

-ar = pertaining to

peri- = around

re- = again

**Med Term Tip**

At any one time, about 20% of your blood is being filtered by your kidneys. In this way, all your blood is cleansed every few minutes.

**Med Term Tip**

The amount of water and other fluids processed by the kidneys each day is astonishing. Approximately 190 quarts of fluid are filtered out of the glomerular blood every day. Most of this fluid returns to the body through the reabsorption process. About 99% of the water that leaves the blood each day through the filtration process returns to the blood by proximal tubule reabsorption.

## Stages of Urine Production

**filtration**

**glomerular filtrate** (glom-AIR-yoo-lar)

**peritubular capillaries** (pair-ih-TOO-byoo-lar)

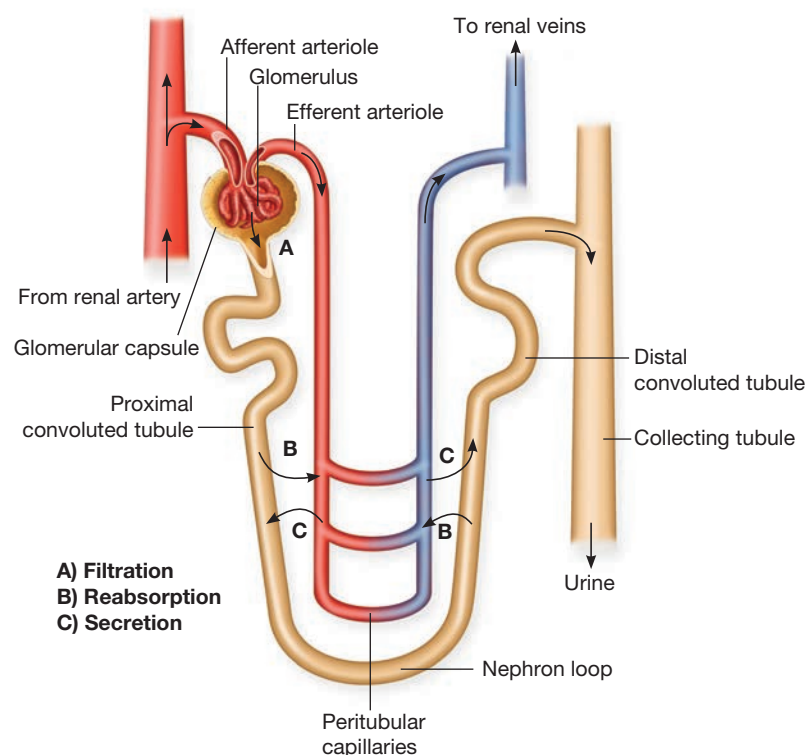
**reabsorption**

**secretion**

As wastes and unnecessary substances are removed from the bloodstream by the nephrons, many desirable molecules are also removed initially. Waste products are eliminated from the body, but other substances such as water, electrolytes, and nutrients must be returned to the bloodstream. Urine, in its final form ready for elimination from the body, is the ultimate product of this entire process.

Urine production occurs in three stages: **filtration**, **reabsorption**, and **secretion**. Each of these steps is performed by a different section of the nephrons (see Figure 9.7 ■).

1. **Filtration.** The first stage is the filtering of particles, which occurs in the renal corpuscle. The pressure of blood flowing through the glomerulus forces material out of the bloodstream, through the wall of the glomerular capsule, and into the renal tubules. This fluid in the tubules is called the **glomerular filtrate** and consists of water, electrolytes, nutrients such as glucose and amino acids, wastes, and toxins.
2. **Reabsorption.** After filtration, the filtrate passes through the four sections of the tubule. As the filtrate moves along its twisted journey, most of the water and much of the electrolytes and nutrients are reabsorbed into the **peritubular capillaries**, a capillary bed that surrounds the renal tubules. They can then reenter the circulating blood.
3. **Secretion.** The final stage of urine production occurs when the special cells of the renal tubules secrete ammonia, uric acid, and other waste substances directly into the renal tubule. Urine formation is now finished; it passes into the collecting tubules, renal papilla, calyx, renal pelvis, and ultimately into the ureter.



■ **Figure 9.7** The three stages of urine production: filtration, reabsorption, and secretion.

## Urine

**albumin** (al-BEW-min)

**nitrogenous wastes** (nigh-TROJ-eh-nus)

**specific gravity**

**urinalysis** (yoo-rih-NAL-ih-sis)

Urine is normally straw-colored to clear, depending on how dilute it is. As it is being produced and collecting in the bladder, it is sterile. However, as it passes through the urethra to the outside, it may become contaminated by bacteria. Although it is 95% water, it also contains many dissolved substances, such as electrolytes, toxins, and **nitrogenous wastes**, the by-products of muscle metabolism. At times the urine also contains substances that should not be there, such as glucose, blood, or **albumin**, a protein that should remain in the blood. This is the reason for performing a **urinalysis**, a physical and chemical analysis of urine, which gives medical personnel important information regarding disease processes occurring in a patient. Normally, during a 24-hour period the output of urine will be 1,000–2,000 mL, depending on the amount of fluid consumed and the general health of the person. Normal urine is acidic because this is one way our bodies dispose of excess acids. **Specific gravity** indicates the amount of dissolved substances in urine. The specific gravity of pure water is 1.000. The specific gravity of urine varies from 1.001 to 1.030. Highly concentrated urine has a higher specific gravity, while the specific gravity of very dilute urine is close to that of water. See Table 9.1 ■ for the normal values for urine testing and Table 9.2 ■ for abnormal findings.

### What's In A Name?

Look for these word parts:

**urin/o** = urine

**-lysis** = to destroy

**-ous** = pertaining to

### Med Term Tip

The color, odor, volume, and sugar content of urine have been examined for centuries. Color charts for urine were developed by 1140, and “taste testing” was common in the late 17th century. By the 19th century, urinalysis was a routine part of a physical examination.

**Table 9.1 Values for Urinalysis Testing**

Element	Normal Findings
Color	Straw-colored, pale yellow to deep gold
Odor	Aromatic
Appearance	Clear
Specific gravity	1.001–1.030
pH	5.0–8.0
Protein	Negative to trace
Glucose	None
Ketones	None
Blood	Negative

**Table 9.2 Abnormal Urinalysis Findings**

Element	Implications
Color	Color varies depending on the patient's fluid intake and output or medication. Brown or black urine color indicates a serious disease process.
Odor	A fetid or foul odor may indicate infection, while a fruity odor may be found in diabetes mellitus, dehydration, or starvation. Other odors may be due to medication or foods.
Appearance	Cloudiness may mean that an infection is present.
Specific gravity	Concentrated urine has a higher specific gravity. Dilute urine, such as can be found with diabetes insipidus, acute tubular necrosis, or salt-restricted diets, has a lower specific gravity.
pH	A pH value below 7.0 (acidic) is common in urinary tract infections, metabolic or respiratory acidosis, diets high in fruits or vegetables, or administration of some drugs. A pH higher than 7.0 (basic or alkaline) is common in metabolic or respiratory alkalosis, fever, high-protein diets, and taking ascorbic acid.
Protein	Protein may indicate glomerulonephritis or preeclampsia in a pregnant woman.
Glucose	Small amounts of glucose may be present as the result of eating a high-carbohydrate meal, stress, pregnancy, and taking some medications, such as aspirin or corticosteroids. Higher levels may indicate poorly controlled diabetes, Cushing's syndrome, or infection.
Ketones	The presence of ketones may indicate poorly controlled diabetes, dehydration, starvation, or ingestion of large amounts of aspirin.
Blood	Blood may indicate glomerulonephritis, cancer of the urinary tract, some types of anemia, taking of some medications (such as blood thinners), arsenic poisoning, reactions to transfusion, trauma, burns, and convulsions.

## Practice As You Go

### A. Complete the Statement

1. The functional or working units of the kidneys are the \_\_\_\_\_.
2. The three stages of urine production are \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
3.  $\text{Na}^+$ ,  $\text{K}^+$ , and  $\text{Cl}^-$  are collectively known as \_\_\_\_\_.
4. The term that describes the location of the kidneys is \_\_\_\_\_.
5. The glomerular capsule surrounds the \_\_\_\_\_.
6. The tip of each renal pyramid opens into a(n) \_\_\_\_\_.
7. There are \_\_\_\_\_ ureters and \_\_\_\_\_ urethra.
8. Urination can also be referred to as \_\_\_\_\_ or \_\_\_\_\_.

## Terminology

### Word Parts Used to Build Urinary System Terms

The following lists contain the combining forms, suffixes, and prefixes used to build terms in the remaining sections of this chapter.

#### Combining Forms

<b>azot/o</b>	nitrogenous waste
<b>bacteri/o</b>	bacteria
<b>bi/o</b>	life
<b>carcin/o</b>	cancer
<b>corpor/o</b>	body
<b>cyst/o</b>	bladder, pouch
<b>glomerul/o</b>	glomerulus
<b>glycos/o</b>	sugar
<b>hem/o</b>	blood
<b>hemat/o</b>	blood

<b>hydr/o</b>	water
<b>keton/o</b>	ketones
<b>lith/o</b>	stone
<b>meat/o</b>	meatus
<b>necr/o</b>	death
<b>nephr/o</b>	kidney
<b>neur/o</b>	nerve
<b>noct/i</b>	night
<b>olig/o</b>	scanty
<b>peritone/o</b>	peritoneum

<b>protein/o</b>	protein
<b>py/o</b>	pus
<b>pyel/o</b>	renal pelvis
<b>ren/o</b>	kidney
<b>ur/o</b>	urine
<b>ureter/o</b>	ureter
<b>urethr/o</b>	urethra
<b>urin/o</b>	urine
<b>ven/o</b>	vein

#### Suffixes

<b>-al</b>	pertaining to
<b>-algia</b>	pain
<b>-ar</b>	pertaining to
<b>-ary</b>	pertaining to

<b>-cele</b>	protrusion
<b>-eal</b>	pertaining to
<b>-ectasis</b>	dilated
<b>-ectomy</b>	surgical removal

<b>-emia</b>	blood condition
<b>-genic</b>	producing
<b>-gram</b>	record

## Suffixes (continued)

<b>-graphy</b>	process of recording
<b>-ic</b>	pertaining to
<b>-itis</b>	inflammation
<b>-lith</b>	stone
<b>-lithiasis</b>	condition of stones
<b>-logy</b>	study of
<b>-lysis</b>	to destroy (to break down)
<b>-malacia</b>	abnormal softening
<b>-megaly</b>	enlarged
<b>-meter</b>	instrument to measure

<b>-oma</b>	tumor
<b>-ory</b>	pertaining to
<b>-osis</b>	abnormal condition
<b>-ostomy</b>	surgically create an opening
<b>-otomy</b>	cutting into
<b>-ous</b>	pertaining to
<b>-pathy</b>	disease
<b>-pexy</b>	surgical fixation
<b>-plasty</b>	surgical repair
<b>-ptosis</b>	drooping
<b>-rrhagia</b>	abnormal flow condition

<b>-sclerosis</b>	hardening
<b>-scope</b>	instrument to visually examine
<b>-scopy</b>	process of visually examining
<b>-stenosis</b>	narrowing
<b>-tic</b>	pertaining to
<b>-tripsy</b>	surgical crushing
<b>-uria</b>	urine condition

## Prefixes

<b>an-</b>	without
<b>anti-</b>	against
<b>dys-</b>	painful, difficult

<b>extra-</b>	outside of
<b>intra-</b>	within
<b>poly-</b>	many

<b>retro-</b>	backward
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## Adjective Forms of Anatomical Terms

Term	Word Parts	Definition
<b>cystic</b> (SIS-tik)	<b>cyst/o</b> = bladder <b>-ic</b> = pertaining to	Pertaining to the bladder.
<b>glomerular</b> (glom-AIR-yoo-lar)	<b>glomerul/o</b> = glomerulus <b>-ar</b> = pertaining to	Pertaining to a glomerulus.
<b>meatal</b> (mee-AY-tal)	<b>meat/o</b> = meatus <b>-al</b> = pertaining to	Pertaining to the meatus.
<b>pyelitic</b> (pye-eh-LIT-ik)	<b>pyel/o</b> = renal pelvis <b>-tic</b> = pertaining to	Pertaining to the renal pelvis.
<b>renal</b> (REE-nal)	<b>ren/o</b> = kidney <b>-al</b> = pertaining to	Pertaining to the kidney.
<b>ureteral</b> (yoo-REE-ter-all)	<b>ureter/o</b> = ureter <b>-al</b> = pertaining to  <b>Word Watch</b>       Be particularly careful when using the three very similar combining forms: <b>uter/o</b> meaning "uterus," <b>ureter/o</b> meaning "ureter," and <b>urethr/o</b> meaning "urethra."	Pertaining to the ureter.
<b>urethral</b> (yoo-REE-thral)	<b>urethr/o</b> = urethra <b>-al</b> = pertaining to	Pertaining to the urethra.
<b>urinary</b> (yoo-rih-NAIR-ee)	<b>urin/o</b> = urine <b>-ary</b> = pertaining to	Pertaining to urine.




## Practice As You Go

### B. Give the adjective form for each anatomical structure

1. The ureter \_\_\_\_\_
2. The kidney \_\_\_\_\_
3. A glomerulus \_\_\_\_\_
4. Urine \_\_\_\_\_
5. The urethra \_\_\_\_\_

## Pathology

Term	Word Parts	Definition
<b>Medical Specialties</b>		
<b>nephrology</b> (neh-FROL-oh-jee)	<b>nephr/o</b> = kidney <b>-logy</b> = study of	Branch of medicine involved in diagnosis and treatment of diseases and disorders of the kidney. Physician is a <i>nephrologist</i> .
<b>urology</b> (yoo-RAL-oh-jee)	<b>ur/o</b> = urine <b>-logy</b> = study of	Branch of medicine involved in diagnosis and treatment of diseases and disorders of the urinary system (and male reproductive system). Physician is a <i>urologist</i> .
<b>Signs and Symptoms</b>		
<b>anuria</b> (an-YOO-ree-ah)	<b>an-</b> = without <b>-uria</b> = urine condition	Complete suppression of urine formed by the kidneys and a complete lack of urine excretion.
<b>azotemia</b> (a-zo-TEE-mee-ah)	<b>azot/o</b> = nitrogenous waste <b>-emia</b> = blood condition	Accumulation of nitrogenous waste in the bloodstream. Occurs when the kidney fails to filter these wastes from the blood.
<b>bacteriuria</b> (back-teer-ree-YOO-ree-ah)	<b>bacteri/o</b> = bacteria <b>-uria</b> = urine condition	Presence of bacteria in the urine.
<b>calculus</b> (KAL-kew-lus)		Stone formed within an organ by an accumulation of mineral salts. Found in the kidney, renal pelvis, ureters, bladder, or urethra. Plural is <i>calculi</i> .

■ **Figure 9.8** Photograph of sectioned kidney specimen illustrating extensive renal calculi. (Science Source)

## Pathology (continued)

Term	Word Parts	Definition
<b>cystalgia</b> (sis-TAL-jee-ah)	<b>cyst/o</b> = bladder <b>-algia</b> = pain <b>Word Watch</b>       Be careful using the combining forms <b>cyst/o</b> meaning “bladder” and <b>cyt/o</b> meaning “cell.”	Urinary bladder pain.
<b>cystolith</b> (SIS-toh-lith)	<b>cyst/o</b> = bladder <b>-lith</b> = stone	Bladder stone.
<b>cystorrhagia</b> (sis-toh-RAH-jee-ah)	<b>cyst/o</b> = bladder <b>-rrhagia</b> = abnormal flow condition	Profuse bleeding from the urinary bladder.
<b>diuresis</b> (dye-yoo-REE-sis)		Increased formation and excretion of urine.
<b>dysuria</b> (dis-YOO-ree-ah)	<b>dys-</b> = painful, difficult <b>-uria</b> = urine condition	Difficult or painful urination.
<b>enuresis</b> (en-yoo-REE-sis)		Involuntary discharge of urine after the age by which bladder control should have been established. This usually occurs by the age of five. <i>Nocturnal enuresis</i> refers to bed-wetting at night.
<b>frequency</b>		Greater-than-normal occurrence in the urge to urinate, without an increase in the total daily volume of urine. Frequency is an indication of inflammation of the bladder or urethra.
<b>glycosuria</b> (glye-kohs-YOO-ree-ah)	<b>glycos/o</b> = sugar <b>-uria</b> = urine condition	Presence of sugar in the urine.
<b>hematuria</b> (hee-mah-TOO-ree-ah)	<b>hemat/o</b> = blood <b>-uria</b> = urine condition	Presence of blood in the urine.
<b>hesitancy</b>		Decrease in the force of the urine stream, often with difficulty initiating the flow. It is often a symptom of a blockage along the urethra, such as an enlarged prostate gland.
<b>ketonuria</b> (key-tone-YOO-ree-ah)	<b>keton/o</b> = ketones <b>-uria</b> = urine condition	Presence of ketones in the urine. This occurs when the body burns fat instead of glucose for energy, such as in uncontrolled diabetes mellitus.
<b>nephrolith</b> (NEF-roh-lith)	<b>nephr/o</b> = kidney <b>-lith</b> = stone	Kidney stone.
<b>nephromalacia</b> (nef-roh-mah-LAY-she-ah)	<b>nephr/o</b> = kidney <b>-malacia</b> = abnormal softening	Kidney is abnormally soft.
<b>nephromegaly</b> (nef-roh-MEG-ah-lee)	<b>nephr/o</b> = kidney <b>-megaly</b> = enlarged	Kidney is enlarged.
<b>nephrosclerosis</b> (nef-roh-skleh-ROH-sis)	<b>nephr/o</b> = kidney <b>-sclerosis</b> = hardening	Kidney tissue has become hardened.
<b>nocturia</b> (nok-TOO-ree-ah)	<b>noct/i</b> = night <b>-uria</b> = urine condition	Having to urinate frequently during the night.

## Pathology (continued)

Term	Word Parts	Definition
<b>oliguria</b> (ol-ig-YOO-ree-ah)	<b>olig/o</b> = scanty <b>-uria</b> = urine condition	Producing too little urine.
<b>polyuria</b> (pol-ee-YOO-ree-ah)	<b>poly-</b> = many <b>-uria</b> = urine condition	Producing an unusually large volume of urine.
<b>proteinuria</b> (pro-teen-YOO-ree-ah)	<b>protein/o</b> = protein <b>-uria</b> = urine condition	Presence of protein in the urine.
<b>pyuria</b> (pye-YOO-ree-ah)	<b>py/o</b> = pus <b>-uria</b> = urine condition	Presence of pus in the urine.
<b>renal colic</b> (KOL-ik)	<b>ren/o</b> = kidney <b>-al</b> = pertaining to <b>-ic</b> = pertaining to	Pain caused by a kidney stone. Can be an excruciating pain and generally requires medical treatment.
<b>stricture</b> (STRIK-chur)		Narrowing of a passageway in the urinary system.
<b>uremia</b> (yoo-REE-mee-ah)	<b>ur/o</b> = urine <b>-emia</b> = blood condition	Accumulation of waste products (especially nitrogenous wastes) in the bloodstream. Associated with renal failure.
<b>ureterectasis</b> (yoo-ree-ter-EK-tah-sis)	<b>ureter/o</b> = ureter <b>-ectasis</b> = dilated	Ureter is stretched out or dilated.
<b>ureterolith</b> (yoo-REE-teh-roh-lith)	<b>ureter/o</b> = ureter <b>-lith</b> = stone	Stone in the ureter.
<b>ureterostenosis</b> (yoo-ree-ter-oh-sten-OH-sis)	<b>ureter/o</b> = ureter <b>-stenosis</b> = narrowing	Ureter has become narrow.
<b>urethralgia</b> (yoo-ree-THRAL-jee-ah)	<b>urethr/o</b> = urethra <b>-algia</b> = pain	Urethral pain.
<b>urethrorrhagia</b> (yoo-ree-throh-RAH-jee-ah)	<b>urethr/o</b> = urethra <b>-rrhagia</b> = abnormal flow condition	Profuse bleeding from the urethra.
<b>urethrostenosis</b> (yoo-ree-throh-steh-NOH-sis)	<b>urethr/o</b> = urethra <b>-stenosis</b> = narrowing	Urethra has become narrow.
<b>urgency</b> (ER-jen-see)		Feeling the need to urinate immediately.
<b>urinary incontinence</b> (in-CON-tin-ens)	<b>urin/o</b> = urine <b>-ary</b> = pertaining to	Involuntary release of urine. In some patients an indwelling catheter is inserted into the bladder for continuous urine drainage.



■ **Figure 9.9** Healthcare worker draining urine from a bladder catheter bag. (Michal Heron, Pearson Education)

## Pathology (continued)

Term	Word Parts	Definition
<b>urinary retention</b>	<b>urin/o</b> = urine <b>-ary</b> = pertaining to	Inability to fully empty the bladder, often indicates a blockage in the urethra.
<b>Kidney</b>		
<b>acute tubular necrosis (ATN)</b> (ne-KROH-sis)	<b>-ar</b> = pertaining to <b>necr/o</b> = death <b>-osis</b> = abnormal condition	Damage to the renal tubules due to presence of toxins in the urine or to ischemia. Results in oliguria.
<b>diabetic nephropathy</b> (ne-FROH-path-ee)	<b>-ic</b> = pertaining to <b>nephr/o</b> = kidney <b>-pathy</b> = disease	Accumulation of damage to the glomerulus capillaries due to the chronic high blood sugars of diabetes mellitus.
<b>glomerulonephritis</b> (gloh-mair-yoo-loh-neh-FRYE-tis)	<b>glomerul/o</b> = glomerulus <b>nephr/o</b> = kidney <b>-itis</b> = inflammation	Inflammation of the kidney (primarily of the glomerulus). Since the glomerular membrane is inflamed, it becomes more permeable and will allow protein and blood cells to enter the filtrate. Results in protein in the urine (proteinuria) and hematuria.
<b>hydronephrosis</b> (high-droh-neh-FROH-sis)	<b>hydr/o</b> = water <b>nephr/o</b> = kidney <b>-osis</b> = abnormal condition	Distention of the renal pelvis due to urine collecting in the kidney; often a result of the obstruction of a ureter.
<b>nephritis</b> (neh-FRYE-tis)	<b>nephr/o</b> = kidney <b>-itis</b> = inflammation	Kidney inflammation.
<b>nephrolithiasis</b> (nef-roh-lith-EYE-a-sis)	<b>nephr/o</b> = kidney <b>-lithiasis</b> = condition of stones	Presence of calculi in the kidney. Usually begins with the solidification of salts present in the urine.
<b>nephroma</b> (neh-FROH-ma)	<b>nephr/o</b> = kidney <b>-oma</b> = tumor	Kidney tumor.
<b>nephropathy</b> (neh-FROP-ah-thee)	<b>nephr/o</b> = kidney <b>-pathy</b> = disease	General term describing the presence of kidney disease.
<b>nephroptosis</b> (nef-rop-TOH-sis)	<b>nephr/o</b> = kidney <b>-ptosis</b> = drooping	Downward displacement of the kidney out of its normal location; commonly called a <i>floating kidney</i> .
<b>nephrotic syndrome (NS)</b>	<b>nephr/o</b> = kidney <b>-tic</b> = pertaining to	Damage to the glomerulus resulting in protein appearing in the urine, proteinuria, and the corresponding decrease in protein in the bloodstream. Also called <i>nephrosis</i> .
<b>polycystic kidneys</b> (POL-ee-sis-tik)	<b>poly-</b> = many <b>cyst/o</b> = pouch <b>-tic</b> = pertaining to	Formation of multiple cysts within the kidney tissue. Results in the destruction of normal kidney tissue and uremia.



■ **Figure 9.10** Photograph of a polycystic kidney on the left compared to a normal kidney on the right. (Simon Fraser/Royal Victoria Infirmary, Newcastle/Science Photo Library/Science Source)

## Pathology (continued)

Term	Word Parts	Definition
<b>pyelitis</b> (pye-eh-LYE-tis)	<b>pyel/o</b> = renal pelvis <b>-itis</b> = inflammation	Renal pelvis inflammation.
<b>pyelonephritis</b> (pye-eh-loh-neh-FRYE-tis)	<b>pyel/o</b> = renal pelvis <b>nephr/o</b> = kidney <b>-itis</b> = inflammation	Inflammation of the renal pelvis and the kidney. One of the most common types of kidney disease; may be the result of a lower urinary tract infection that moved up to the kidney by way of the ureters. Large quantities of white blood cells and bacteria in the urine are possible. Blood (hematuria) may even be present in the urine in this condition. Can occur with any untreated or persistent case of cystitis.
<b>renal cell carcinoma</b>	<b>ren/o</b> = kidney <b>-al</b> = pertaining to <b>carcin/o</b> = cancer <b>-oma</b> = tumor	Cancerous tumor that arises from kidney tubule cells.
<b>renal failure</b>	<b>ren/o</b> = kidney <b>-al</b> = pertaining to	Inability of the kidneys to filter wastes from the blood resulting in uremia. May be acute or chronic. Major reason for a patient being placed on dialysis.
<b>Wilms' tumor</b> (VILMZ)		Malignant kidney tumor found most often in children.
<b>Urinary Bladder</b>		
<b>bladder cancer</b>		Cancerous tumor that arises from the cells lining the bladder; major sign is hematuria.
<b>bladder neck obstruction</b> (BNO)		Blockage of the bladder outlet. Often caused by an enlarged prostate gland in males.
<b>cystitis</b> (sis-TYE-tis)	<b>cyst/o</b> = bladder <b>-itis</b> = inflammation	Urinary bladder inflammation.
<b>cystocele</b> (SIS-toh-seel)	<b>cyst/o</b> = bladder <b>-cele</b> = protrusion	Protrusion (or herniation) of the urinary bladder into the wall of the vagina.
<b>interstitial cystitis</b> (in-ter-STISH-al / sis-TYE-tis)	<b>-al</b> = pertaining to <b>cyst/o</b> = bladder <b>-itis</b> = inflammation	Disease of unknown cause in which there is inflammation and irritation of the bladder. Most commonly seen in middle-aged women.
<b>neurogenic bladder</b> (noo-roh-JEN-ik)	<b>neur/o</b> = nerve <b>-genic</b> = producing	Loss of nervous control that leads to retention; may be caused by spinal cord injury or multiple sclerosis.
<b>urinary tract infection</b> (UTI)	<b>urin/o</b> = urine <b>-ary</b> = pertaining to	Infection, usually from bacteria, of any organ of the urinary system. Most often begins with cystitis and may ascend into the ureters and kidneys. Most common in women because of their shorter urethra.

## Practice As You Go

### C. Terminology Matching

Match each term to its definition.


- |                                     |   |
|-------------------------------------|---|
| 1. _____ Wilms' tumor               | a. kidney stones  |
| 2. _____ azotemia                   | b. feeling the need to urinate immediately                            |
| 3. _____ urinary retention          | c. childhood malignant kidney tumor                                   |
| 4. _____ nephroptosis               | d. swelling of the kidney due to urine collecting in the renal pelvis |
| 5. _____ nocturia                   | e. involuntary release of urine                                       |
| 6. _____ incontinence               | f. frequent urination at night  |
| 7. _____ hydronephrosis             | g. excess nitrogenous waste in bloodstream                            |
| 8. _____ urgency                    | h. inability to fully empty bladder                                   |
| 9. _____ nephrolithiasis            | i. a floating kidney  |
| 10. _____ polycystic kidney disease | j. multiple cysts in the kidneys                                      |

## Diagnostic Procedures

Term	Word Parts	Definition
<b>Clinical Laboratory Tests</b>		
<b>blood urea nitrogen (BUN)</b> (yoo-REE-ah / NIGH-troh-jen)		Blood test to measure kidney function by the level of nitrogenous waste (urea) that is in the blood.
<b>clean catch specimen (CC)</b>		Urine sample obtained after cleaning off the urinary opening and catching or collecting a urine sample in midstream (halfway through the urination process) to minimize contamination from the genitalia.
<b>creatinine clearance</b> (kree-AT-tih-neen)		Test of kidney function. Creatinine is a waste product cleared from the bloodstream by the kidneys. For this test, urine is collected for 24 hours, and the amount of creatinine in the urine is compared to the amount of creatinine that remains in the bloodstream.
<b>urinalysis (U/A, UA)</b> (yoo-rih-NAL-ih-sis)	<b>urin/o</b> = urine <b>-lysis</b> = to destroy (to break down)	Laboratory test consisting of the physical, chemical, and microscopic examination of urine.
<b>urine culture and sensitivity (C&amp;S)</b>		Laboratory test of urine for bacterial infection. Attempt to grow bacteria on a culture medium in order to identify it and determine which antibiotics it is sensitive to.
<b>urinometer</b> (yoo-rin-OH-meter)	<b>urin/o</b> = urine <b>-meter</b> = instrument to measure	Instrument to measure the specific gravity of urine; part of a urinalysis.



## Diagnostic Procedures (continued)

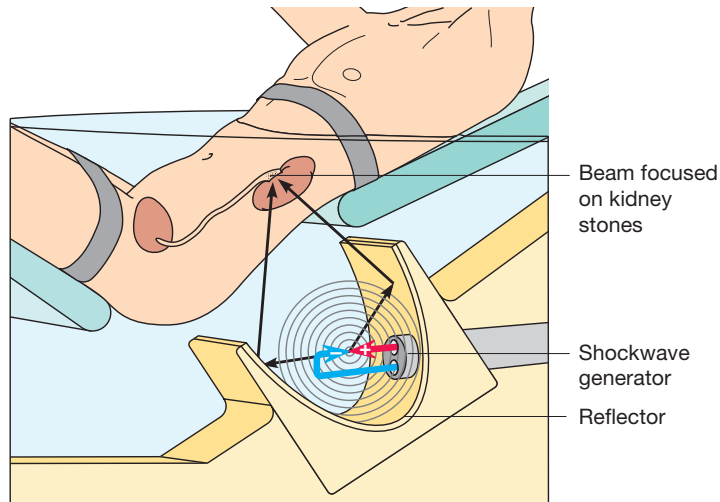
Term	Word Parts	Definition
<b>Diagnostic Imaging</b>		
<b>cystogram</b> (SIS-toh-gram)	<b>cyst/o</b> = bladder <b>-gram</b> = record	X-ray record of the urinary bladder.
<b>cystography</b> (sis-TOG-rah-fee)	<b>cyst/o</b> = bladder <b>-graphy</b> = process of recording	Process of instilling a contrast material or dye into the bladder by catheter to visualize the urinary bladder on X-ray.
<b>excretory urography</b> (EU) (EKS-kreh-tor-ee / yoo-ROG-rah-fee)	<b>-ory</b> = pertaining to <b>ur/o</b> = urine <b>-graphy</b> = process of recording	Injecting dye into the bloodstream and then taking an X-ray to trace the action of the kidney as it excretes the dye.
<b>intravenous pyelography</b> (IVP) (in-trah-VEE-nus / pye-eh-LOG-rah-fee)	<b>intra-</b> = within <b>ven/o</b> = vein <b>-ous</b> = pertaining to <b>pyel/o</b> = renal pelvis <b>-graphy</b> = process of recording	Diagnostic X-ray procedure in which a dye is injected into a vein and then X-rays are taken to visualize the renal pelvis as the dye is removed by the kidneys.
<b>kidneys, ureters, bladder</b> (KUB)		X-ray taken of the abdomen demonstrating the kidneys, ureters, and bladder without using any contrast dye. Also called a <i>flat-plate abdomen</i> .
<b>nephrogram</b> (NEH-fro-gram)	<b>nephr/o</b> = kidney <b>-gram</b> = record	X-ray record of the kidney.
<b>pyelogram</b> (PYE-eh-loh-gram)	<b>pyel/o</b> = renal pelvis <b>-gram</b> = record	X-ray record of the renal pelvis.
<b>retrograde pyelography</b> (RP) (RET-roh-grayd/ pye-eh-LOG-rah-fee)	<b>retro-</b> = backward <b>pyel/o</b> = renal pelvis <b>-graphy</b> = process of recording	Diagnostic X-ray procedure in which dye is inserted through the urethra to outline the bladder, ureters, and renal pelvis.
<p>■ <b>Figure 9.11</b> Color enhanced retrograde pyelogram X-ray. Radiopaque dye outlines urinary bladder, ureters, and renal pelvis. (Clinique Ste. Catherine/CNRI/ Science Photo Library/Science Source)</p> 		
<b>voiding cystourethrography</b> (VCUG) (sis-toh-yoo-ree-THROG-rah-fee)	<b>cyst/o</b> = bladder <b>urethr/o</b> = urethra <b>-graphy</b> = process of recording	X-ray taken to visualize the urethra while the patient is voiding after a contrast dye has been placed in the bladder.

## Diagnostic Procedures (continued)

Term	Word Parts	Definition
<b>Endoscopic Procedure</b>		
<b>cystoscope</b> (SIS-toh-scope)	<b>cyst/o</b> = bladder <b>-scope</b> = instrument to visually examine	Instrument used to visually examine the inside of the urinary bladder.
<b>cystoscopy</b> (cysto) (sis-TOSS-koh-pee)	<b>cyst/o</b> = bladder <b>-scopy</b> = process of visually examining	Visual examination of the urinary bladder using an instrument called a <i>cystoscope</i> .
<b>urethroscope</b> (yoo-REE-throh-scope)	<b>urethr/o</b> = urethra <b>-scope</b> = instrument to visually examine	Instrument to visually examine the inside of the urethra.

## Therapeutic Procedures

Term	Word Parts	Definition
<b>Medical Treatments</b>		
<b>catheter</b> (KATH-eh-ter)		Flexible tube inserted into the body for the purpose of moving fluids into or out of the body. Most commonly used to refer to a tube threaded through the urethra into the bladder to withdraw urine (see again Figure 9.9).
<b>catheterization</b> (cath) (kath-eh-ter-ih-ZAY-shun)		Insertion of a tube through the urethra and into the urinary bladder for the purpose of withdrawing urine or inserting dye.
<b>extracorporeal shockwave lithotripsy</b> (ESWL) (eks-trah-cor-POR-ee-al / shockwave / LITH-oh-trip-see)	<b>extra-</b> = outside of <b>corpor/o</b> = body <b>-eal</b> = pertaining to <b>lith/o</b> = stone <b>-tripsy</b> = surgical crushing	Use of ultrasound waves to break up stones. Process does not require invasive surgery.



■ **Figure 9.12** Extracorporeal shockwave lithotripsy, a non-invasive procedure using high-frequency sound waves to shatter kidney stones.

## Therapeutic Procedures (continued)

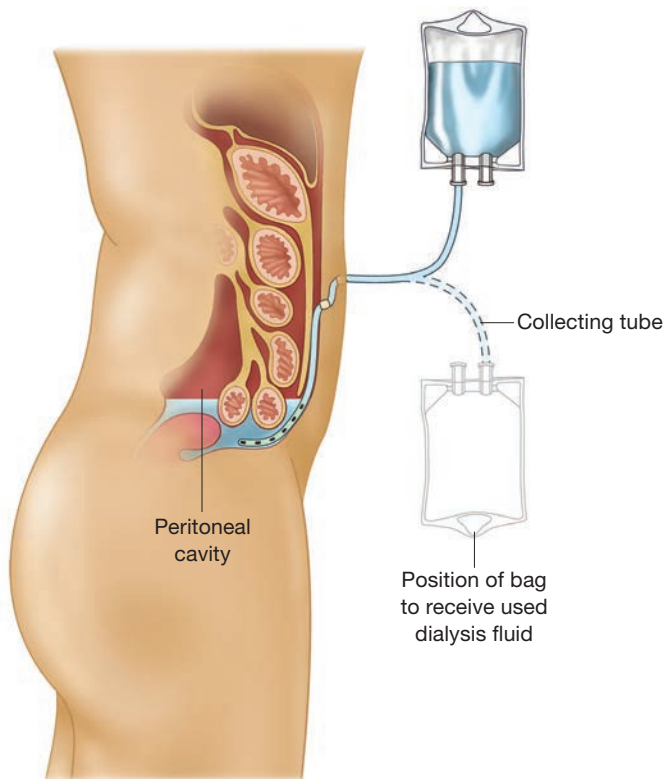
Term	Word Parts	Definition
<b>hemodialysis (HD)</b> (hee-moh-dye-AL-ih-sis)	<b>hem/o</b> = blood	Use of an artificial kidney machine that filters the blood of a person to remove waste products. Use of this technique in patients who have defective kidneys is lifesaving.



■ **Figure 9.13** Patient undergoing hemodialysis. Patient's blood passes through hemodialysis machine for cleansing and is then returned to the body. (gopixa/Shutterstock)

<b>peritoneal dialysis</b> (pair-ih-TOH-nee-al / dye-AL-ih-sis)	<b>peritone/o</b> = peritoneum <b>-eal</b> = pertaining to
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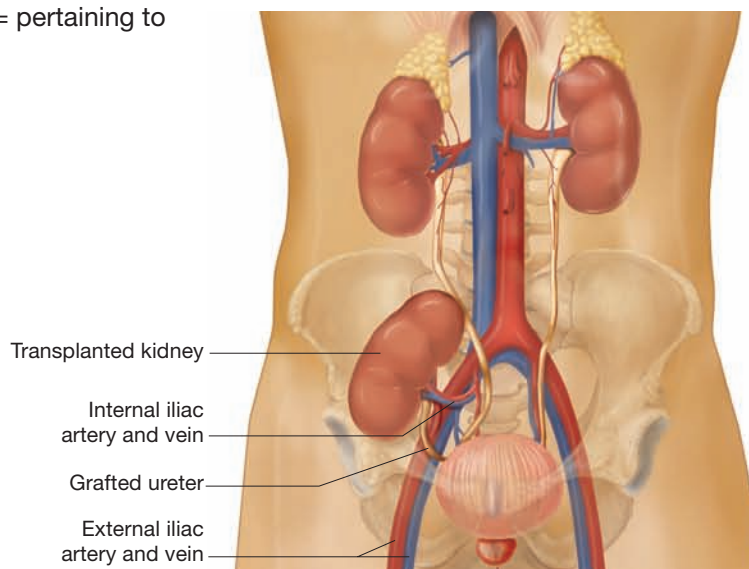
Removal of toxic waste substances from the body by placing warm chemically balanced solutions into the peritoneal cavity. Wastes are filtered out of the blood across the peritoneum. Used in treating renal failure and certain poisonings.



■ **Figure 9.14** Peritoneal dialysis. Chemically balanced solution is placed into the abdominal cavity to draw impurities out of the bloodstream. It is removed after several hours.

## Therapeutic Procedures (continued)

Term	Word Parts	Definition
<b>Surgical Treatments</b>		
<b>cystectomy</b> (sis-TEK-toh-mee)	<b>cyst/o</b> = bladder <b>-ectomy</b> = surgical removal	Surgical removal of the urinary bladder.
<b>cystopexy</b> (SIS-toh-pek-see)	<b>cyst/o</b> = bladder <b>-pexy</b> = surgical fixation	Surgical fixation of the urinary bladder. Performed to correct a cystocele.
<b>cystoplasty</b> (SIS-toh-plas-tee)	<b>cyst/o</b> = bladder <b>-plasty</b> = surgical repair	To repair a defect in the urinary bladder by surgical means.
<b>cystostomy</b> (sis-TOSS-toh-mee)	<b>cyst/o</b> = bladder <b>-ostomy</b> = surgically create an opening	To surgically create an opening into the urinary bladder through the abdominal wall.
<b>cystotomy</b> (sis-TOT-oh-mee)	<b>cyst/o</b> = bladder <b>-otomy</b> = cutting into	To cut into the urinary bladder.
<b>lithotomy</b> (lith-OT-oh-mee)	<b>lith/o</b> = stone <b>-otomy</b> = cutting into	To cut into an organ for the purpose of removing a stone.
<b>lithotripsy</b> (LITH-oh-trip-see)	<b>lith/o</b> = stone <b>-tripsy</b> = surgical crushing	Destroying or crushing stones in the bladder or urethra.
<b>meatotomy</b> (mee-ah-TOT-oh-mee)	<b>meat/o</b> = meatus <b>-otomy</b> = cutting into	To cut into the meatus in order to enlarge the opening of the urethra.
<b>nephrectomy</b> (ne-FREK-toh-mee)	<b>nephr/o</b> = kidney <b>-ectomy</b> = surgical removal	Surgical removal of a kidney.
<b>nephrolithotomy</b> (nef-roh-lith-OT-oh-mee)	<b>nephr/o</b> = kidney <b>lith/o</b> = stone <b>-otomy</b> = cutting into	To cut into the kidney in order to remove stones.
<b>nephropexy</b> (NEF-roh-pek-see)	<b>nephr/o</b> = kidney <b>-pexy</b> = surgical fixation	Surgical fixation of a kidney; to anchor it in its normal anatomical position.
<b>nephrostomy</b> (neh-FROS-toh-mee)	<b>nephr/o</b> = kidney <b>-ostomy</b> = surgically create an opening	To surgically create an opening into the kidney through the abdominal wall.
<b>nephrotomy</b> (neh-FROT-oh-mee)	<b>nephr/o</b> = kidney <b>-otomy</b> = cutting into	To cut into the kidney.
<b>pyeloplasty</b> (PIE-ah-loh-plas-tee)	<b>pyel/o</b> = renal pelvis <b>-plasty</b> = surgical repair	To repair the renal pelvis by surgical means.
<b>renal transplant</b>	<b>ren/o</b> = kidney <b>-al</b> = pertaining to	Surgical placement of a donor kidney.



■ **Figure 9.15** Figure illustrates location utilized for implantation of donor kidney.

## Practice As You Go

### D. Match each procedure term with its definition

- |                                    |   |
|------------------------------------|---|
| 1. _____ clean catch specimen      | a. measures specific gravity              |
| 2. _____ hemodialysis              | b. abdominal X-ray                        |
| 3. _____ pyeloplasty               | c. visual examination of the bladder      |
| 4. _____ urinometer                | d. a flexible tube inserted into the body |
| 5. _____ lithotripsy               | e. removes waste products from blood      |
| 6. _____ cystoscopy                | f. method of obtaining urine sample       |
| 7. _____ catheter                  | g. crushing of a stone                    |
| 8. _____ kidneys, ureters, bladder | h. surgical repair of the renal pelvis    |

## Pharmacology

Classification	Word Parts	Action	Examples
<b>antibiotic</b>	<b>anti-</b> = against <b>bi/o</b> = life <b>-tic</b> = pertaining to	Used to treat bacterial infections of the urinary tract.	ciprofloxacin, Cipro; nitrofurantoin, Macrobid
<b>antispasmodic</b> (an-tye-spaz-MAH-dik)	<b>anti-</b> = against <b>-ic</b> = pertaining to	Used to prevent or reduce bladder muscle spasms.	oxybutynin, Ditropan; neostigmine, Prostigmine
<b>diuretic</b> (dye-yoo-REH-tik)	<b>-tic</b> = pertaining to	Increases the volume of urine produced by the kidneys. Useful in the treatment of edema, kidney failure, heart failure, and hypertension.	furosemide, Lasix; spironolactone, Aldactone

## Abbreviations

<b>AGN</b>	acute glomerulonephritis	<b>cysto</b>	cystoscopy
<b>ARF</b>	acute renal failure	<b>ESRD</b>	end-stage renal disease
<b>ATN</b>	acute tubular necrosis	<b>ESWL</b>	extracorporeal shockwave lithotripsy
<b>BNO</b>	bladder neck obstruction	<b>EU</b>	excretory urography
<b>BUN</b>	blood urea nitrogen	<b>GU</b>	genitourinary
<b>CAPD</b>	continuous ambulatory peritoneal dialysis	<b>HCO<sub>3</sub><sup>-</sup></b>	bicarbonate
<b>cath</b>	catheterization	<b>HD</b>	hemodialysis
<b>CC</b>	clean catch urine specimen	<b>H<sub>2</sub>O</b>	water
<b>Cl<sup>-</sup></b>	chloride	<b>I&amp;O</b>	intake and output
<b>CRF</b>	chronic renal failure	<b>IPD</b>	intermittent peritoneal dialysis
<b>C&amp;S</b>	culture and sensitivity	<b>IVP</b>	intravenous pyelogram

**Abbreviations** (continued)

<b>K<sup>+</sup></b>	potassium	<b>RP</b>	retrograde pyelogram
<b>KUB</b>	kidneys, ureters, bladder	<b>SG, sp. gr.</b>	specific gravity
<b>mL</b>	milliliter	<b>U/A, UA</b>	urinalysis
<b>Na<sup>+</sup></b>	sodium	<b>UC</b>	urine culture
<b>NS</b>	nephrotic syndrome	<b>UTI</b>	urinary tract infection
<b>pH</b>	acidity or alkalinity of urine	<b>VCUG</b>	voiding cystourethrography

**Practice As You Go****E. What Does it Stand For?**

1. KUB \_\_\_\_\_
2. cath \_\_\_\_\_
3. cysto \_\_\_\_\_
4. GU \_\_\_\_\_
5. ESWL \_\_\_\_\_
6. UTI \_\_\_\_\_
7. UC \_\_\_\_\_
8. RP \_\_\_\_\_
9. ARF \_\_\_\_\_
10. BUN \_\_\_\_\_
11. CRF \_\_\_\_\_
12. H<sub>2</sub>O \_\_\_\_\_





# Chapter Review

## Real-World Applications

### Medical Record Analysis

This Discharge Summary contains 13 medical terms. Underline each term and write it in the list below the report. Then define each term.

#### Discharge Summary

Admitting Diagnosis:	Severe right side pain and hematuria.
Final Diagnosis:	Pyelonephritis right kidney, complicated by chronic cystitis.
History of Present Illness:	Patient has long history of frequent bladder infections, but denies any recent lower pelvic pain or dysuria. Earlier today he had rapid onset of severe right side pain and is unable to stand fully erect. His temperature was 101°F, and his skin was sweaty and flushed. He was admitted from the ER for further testing and diagnosis.
Summary of Hospital Course:	Clean catch urinalysis revealed gross hematuria and pyuria, but no albuminuria. A culture and sensitivity was ordered to identify the pathogen and an antibiotic was started. Cystoscopy showed evidence of chronic cystitis, bladder irritation, and a bladder neck obstruction. The obstruction appears to be congenital and the probable cause of the chronic cystitis. The patient was catheterized to ensure complete emptying of the bladder, and fluids were encouraged. Patient responded well to the antibiotic therapy and fluids, and his symptoms improved.
Discharge Plans:	Patient was discharged home after three days in the hospital. He was switched to an oral antibiotic for the pyelonephritis and chronic cystitis. A repeat urinalysis is scheduled for next week. After all inflammation is corrected, will repeat cystoscopy to reevaluate bladder neck obstruction.

Term	Definition
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____
7. _____	_____
8. _____	_____
9. _____	_____
10. _____	_____
11. _____	_____
12. _____	_____
13. _____	_____

## Chart Note Transcription

The chart note below contains 11 phrases that can be reworded with a medical term that you learned in this chapter. Each phrase is identified with an underline. Determine the medical term and write your answers in the space provided.

Pearson General Hospital Consultation Report	
Task	Edit View Time Scale Options Help Download Archive Date: 17 May 2015
Current Complaint:	A 36-year-old male was seen by the <u>specialist in the treatment of diseases of the urinary system</u> <b>1</b> because of right flank pain and <u>blood in the urine</u> . <b>2</b>
Past History:	Patient has a history <u>of bladder infection</u> ; <b>3</b> denies experiencing any symptoms for two years.
Signs and Symptoms:	<u>A technique used to obtain an uncontaminated urine sample</u> <b>4</b> obtained for <u>laboratory analysis of the urine</u> <b>5</b> revealed blood in the urine, but no <u>pus in the urine</u> . <b>6</b> A <u>kidney X-ray made after inserting dye into the bladder</u> <b>7</b> was normal on the left, but dye was seen filling the right <u>tube between the kidney and bladder</u> <b>8</b> only halfway to the kidney.
Diagnosis:	<u>Stone in the tube between the kidney and the bladder</u> <b>9</b> on the right.
Treatment:	Patient underwent <u>the use of ultrasound waves to break up stones</u> . <b>10</b> Pieces of dissolved <u>kidney stones</u> <b>11</b> were flushed out, after which symptoms resolved.
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____
6.	_____
7.	_____
8.	_____
9.	_____
10.	_____
11.	_____

## Case Study

Below is a case study presentation of a patient with a condition discussed in this chapter. Read the case study and answer the questions below. Some questions will ask for information not included within this chapter. Use your text, a medical dictionary, or any other reference material you choose to answer these questions.



(Gina Smith/Shutterstock)

A 32-year-old female is seen in the urologist's office because of a fever, chills, and generalized fatigue. She also reported urgency, frequency, dysuria, and hematuria. In addition, she noticed that her urine was cloudy with a fishy odor. The physician ordered the following tests: a clean catch specimen for a U/A, a urine C&S, and a KUB. The U/A revealed pyuria, bacteriuria, and a slightly acidic pH. A common type of bacteria was grown in the culture. X-rays reveal acute pyelonephritis resulting from cystitis, which has spread up to the kidney from the bladder. The patient was placed on an antibiotic and encouraged to "push fluids" by drinking two liters of water a day.

## Questions

1. This patient has two urinary system infections in different locations; name them. Which one caused the other and how?  

---

---
2. List and define each of the patient's presenting symptoms in your own words.  

---

---
3. What diagnostic tests did the urologist order? Describe them in your own words.  

---

---
4. Explain the results of each diagnostic test in your own words.  

---

---
5. What were the physician's treatment instructions for this patient? Explain the purpose of each treatment.  

---

---
6. Describe the normal appearance of urine.  

---

---

## Practice Exercises

### A. Word Building Practice

The combining form **nephro** refers to the kidney. Use it to write a term that means:

1. surgical fixation of the kidney \_\_\_\_\_
2. X-ray record of the kidney \_\_\_\_\_
3. condition of kidney stones \_\_\_\_\_
4. removal of a kidney \_\_\_\_\_
5. inflammation of the kidney \_\_\_\_\_
6. kidney disease \_\_\_\_\_
7. hardening of the kidney \_\_\_\_\_

The combining form **cysto** refers to the urinary bladder. Use it to write a term that means:

8. inflammation of the bladder \_\_\_\_\_
9. abnormal flow condition from the bladder \_\_\_\_\_
10. surgical repair of the bladder \_\_\_\_\_
11. instrument to view inside the bladder \_\_\_\_\_
12. bladder pain \_\_\_\_\_

The combining form **pyelo** refers to the renal pelvis. Use it to write a term that means:

13. surgical repair of the renal pelvis \_\_\_\_\_
14. inflammation of the renal pelvis \_\_\_\_\_
15. X-ray record of the renal pelvis \_\_\_\_\_

The combining form **uretero** refers to one or both of the ureters. Use it to write a term that means:

16. a ureteral stone \_\_\_\_\_
17. ureter dilation \_\_\_\_\_
18. ureter narrowing \_\_\_\_\_

The combining form **urethr** refers to the urethra. Use it to write a term that means:

19. urethra inflammation \_\_\_\_\_
20. instrument to view inside the urethra \_\_\_\_\_

### B. Define the Combining Form

Definition	Example from Chapter
1. <b>ur/o</b> _____	_____
2. <b>meat/o</b> _____	_____

Definition	Example from Chapter
3. <b>cyst/o</b> _____	_____
4. <b>ren/o</b> _____	_____
5. <b>pyel/o</b> _____	_____
6. <b>glycos/o</b> _____	_____
7. <b>noct/i</b> _____	_____
8. <b>olig/o</b> _____	_____
9. <b>ureter/o</b> _____	_____
10. <b>glomerul/o</b> _____	_____

### C. Pharmacology Challenge

Fill in the classification for each drug description, then match the brand name.

Drug Description	Classification	Brand Name
1. _____ Reduces bladder muscle spasms	_____	a. Lasix
2. _____ Treats bacterial infections	_____	b. Ditropan
3. _____ Increases volume of urine produced	_____	c. Cipro

### D. Define the Term

- micturition \_\_\_\_\_
- diuretic \_\_\_\_\_
- renal colic \_\_\_\_\_
- catheterization \_\_\_\_\_
- pyelitis \_\_\_\_\_
- glomerulonephritis \_\_\_\_\_
- lithotomy \_\_\_\_\_
- enuresis \_\_\_\_\_
- meatotomy \_\_\_\_\_
- diabetic nephropathy \_\_\_\_\_
- urinalysis \_\_\_\_\_
- hesitancy \_\_\_\_\_

**E. Name That Term**

1. absence of urine \_\_\_\_\_
2. blood in the urine \_\_\_\_\_
3. kidney stone \_\_\_\_\_
4. crushing a stone \_\_\_\_\_
5. inflammation of the urethra \_\_\_\_\_
6. pus in the urine \_\_\_\_\_
7. bacteria in the urine \_\_\_\_\_
8. painful urination \_\_\_\_\_
9. ketones in the urine \_\_\_\_\_
10. protein in the urine \_\_\_\_\_
11. (too) much urine \_\_\_\_\_

**F. What's the Abbreviation?**

1. potassium \_\_\_\_\_
2. sodium \_\_\_\_\_
3. urinalysis \_\_\_\_\_
4. blood urea nitrogen \_\_\_\_\_
5. specific gravity \_\_\_\_\_
6. intravenous pyelogram \_\_\_\_\_
7. bladder neck obstruction \_\_\_\_\_
8. intake and output \_\_\_\_\_
9. acute tubular necrosis \_\_\_\_\_
10. end-stage renal disease \_\_\_\_\_

**G. Define the Suffix**

	Definition	Example from Chapter
1. -ptosis	_____	_____
2. -uria	_____	_____
3. -lith	_____	_____
4. -tripsy	_____	_____
5. -lithiasis	_____	_____



**H. Fill in the Blank**

renal transplant	ureterectomy	intravenous pyelogram (IVP)
cystostomy	pyelolithectomy	nephropexy
renal biopsy	cystoscopy	urinary tract infection

1. Juan suffered from chronic renal failure. His sister, Maria, donated one of her normal kidneys to him, and he had a(n)\_\_\_\_\_.
2. Anesha's floating kidney needed surgical fixation. Her physician performed a surgical procedure known as \_\_\_\_\_.
3. Kenya's physician stated that she had a general infection that he referred to as a UTI. The full name for this infection is \_\_\_\_\_.
4. Surgeons operated on Robert to remove calculi from his renal pelvis. The name of this surgery is \_\_\_\_\_.
5. Charles had to have a small piece of his kidney tissue removed so that the physician could perform a microscopic evaluation. This procedure is called a(n) \_\_\_\_\_.
6. Naomi had to have one of her ureters removed due to a stricture. This procedure is called \_\_\_\_\_.
7. The physician had to create a temporary opening between Eric's bladder and his abdominal wall. This procedure is called \_\_\_\_\_.
8. Sally's bladder was visually examined using a special instrument. This procedure is called a(n) \_\_\_\_\_.
9. The doctors believe that Jacob has a tumor of the right kidney. They are going to do a test called a(n) \_\_\_\_\_ that requires them to inject a radiopaque contrast medium intravenously so that they can see the kidney on X-ray.

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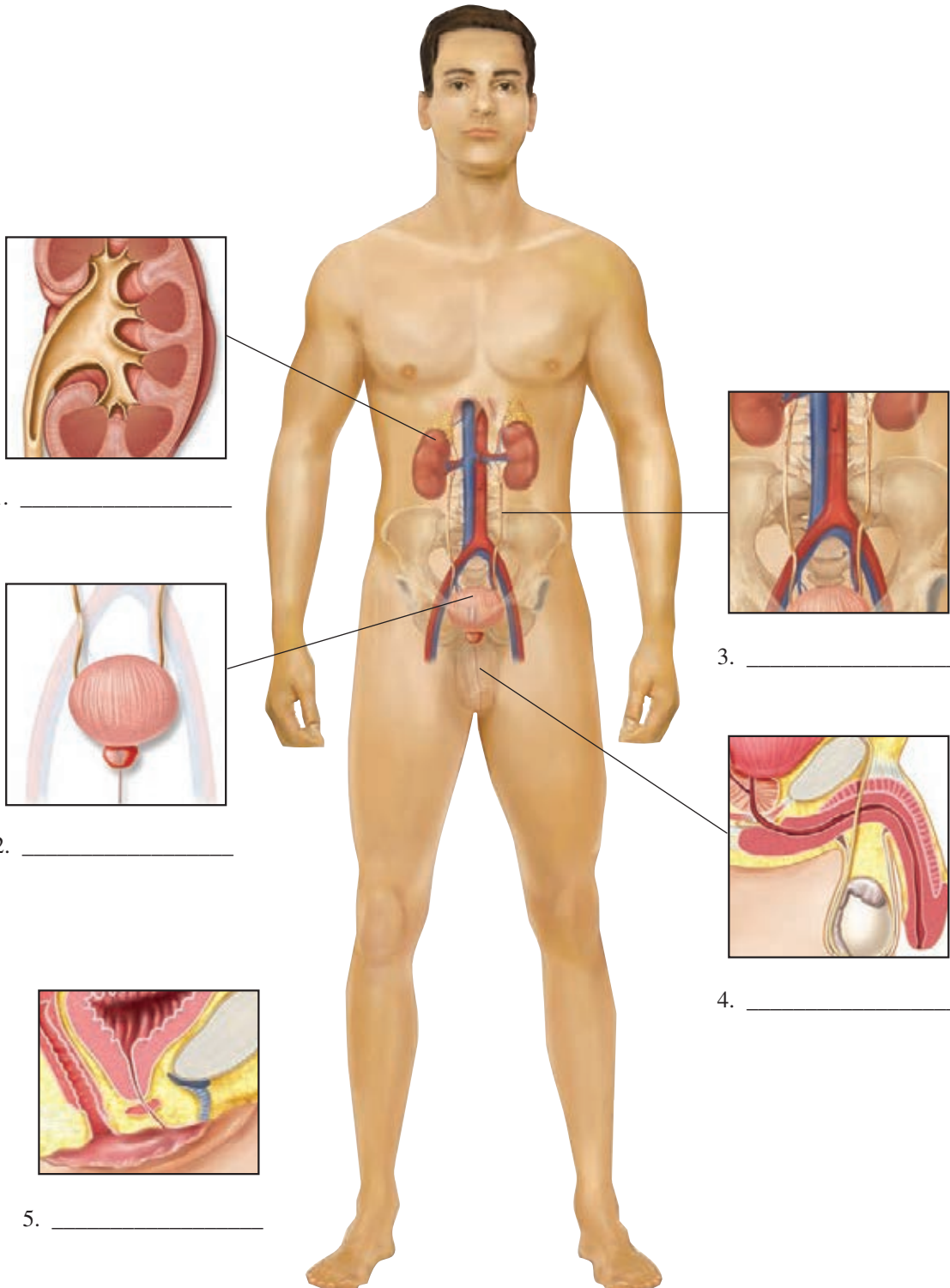
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## Labeling Exercise

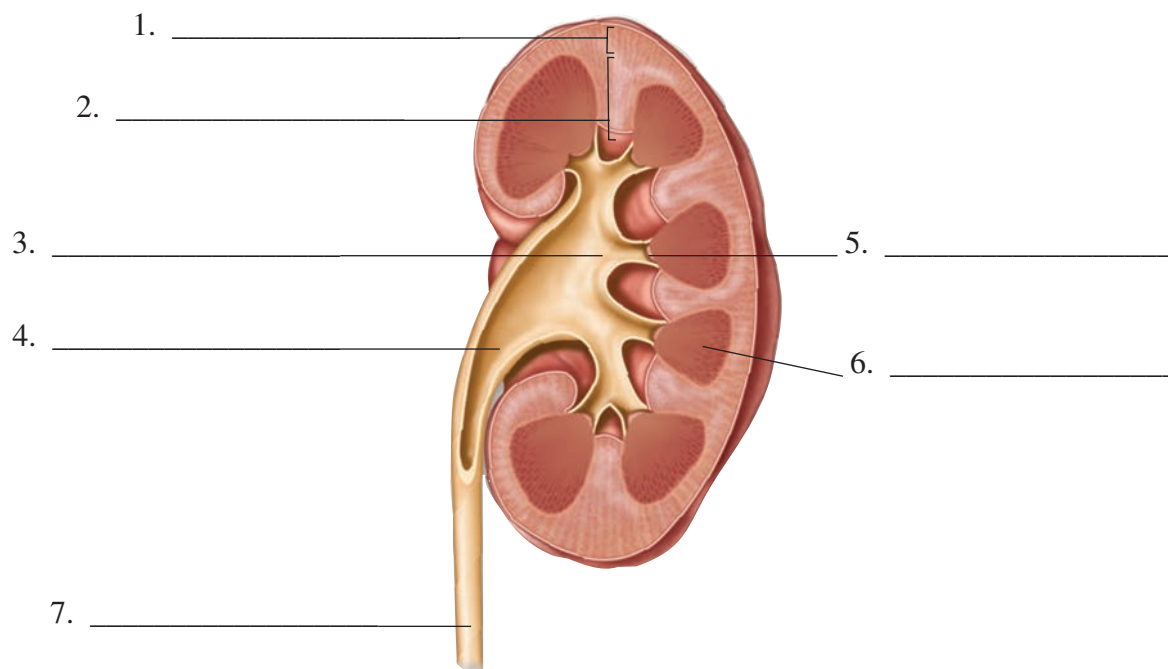
### Image A

Write the labels for this figure on the numbered lines provided.



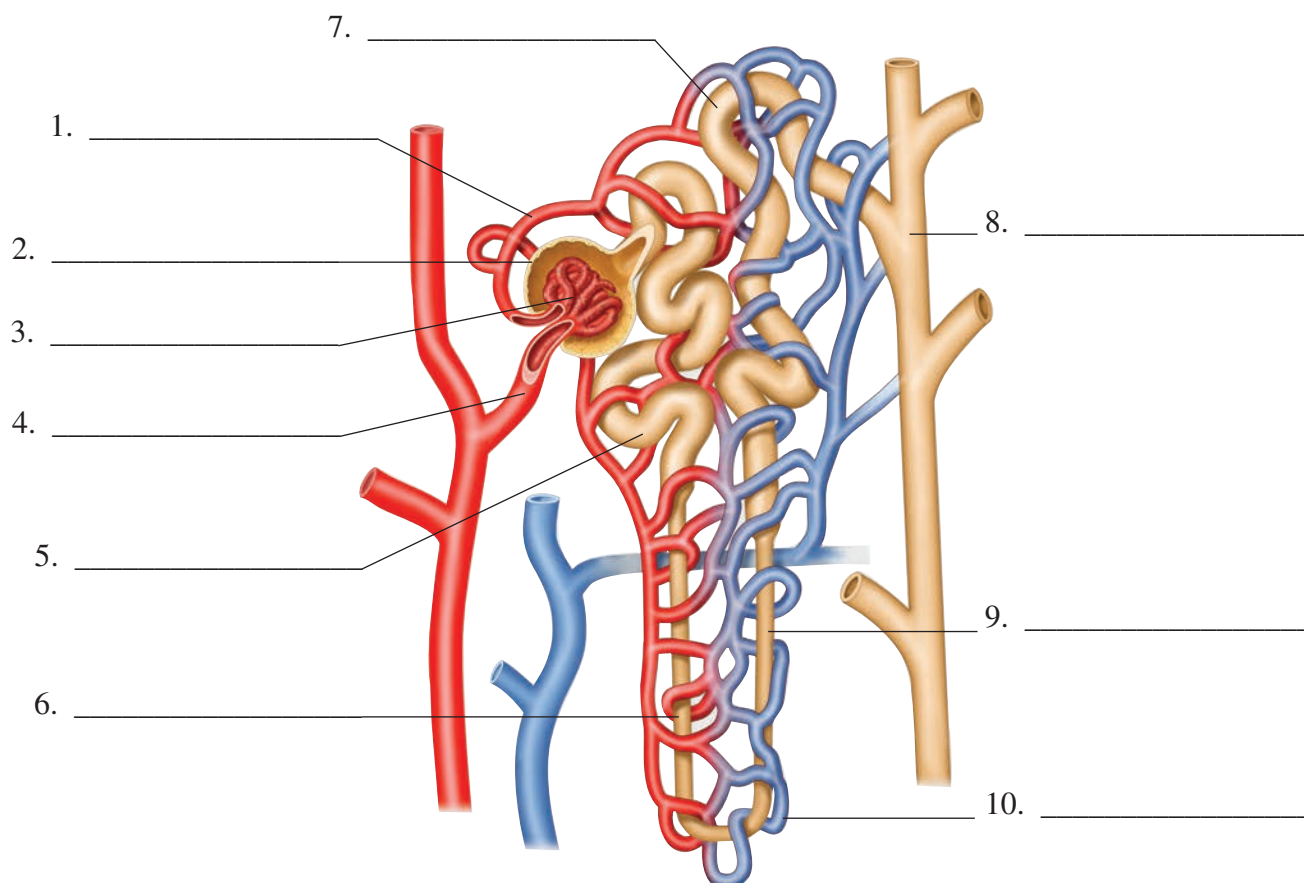
## Image B

Write the labels for this figure on the numbered lines provided.



## Image C

Write the labels for this figure on the numbered lines provided.



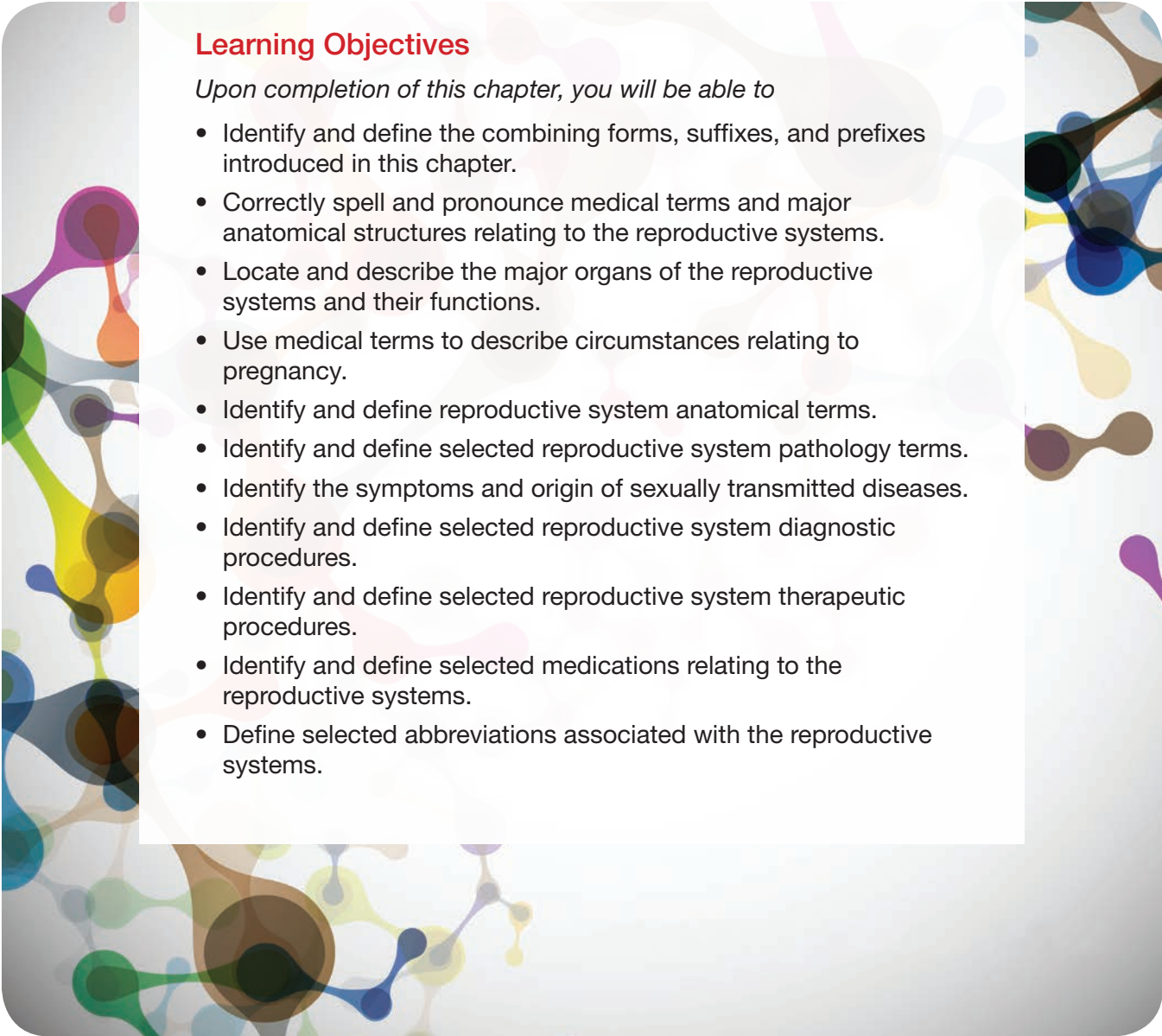


# 10

## Reproductive System

### Learning Objectives

*Upon completion of this chapter, you will be able to*

- Identify and define the combining forms, suffixes, and prefixes introduced in this chapter.
  - Correctly spell and pronounce medical terms and major anatomical structures relating to the reproductive systems.
  - Locate and describe the major organs of the reproductive systems and their functions.
  - Use medical terms to describe circumstances relating to pregnancy.
  - Identify and define reproductive system anatomical terms.
  - Identify and define selected reproductive system pathology terms.
  - Identify the symptoms and origin of sexually transmitted diseases.
  - Identify and define selected reproductive system diagnostic procedures.
  - Identify and define selected reproductive system therapeutic procedures.
  - Identify and define selected medications relating to the reproductive systems.
  - Define selected abbreviations associated with the reproductive systems.
- 



# Section I: Female Reproductive System at a Glance

## Function

The female reproductive system produces ova (the female reproductive cells), provides a location for fertilization and growth of a baby, and secretes female sex hormones. In addition, the breasts produce milk to nourish the newborn.

## Organs

Here are the primary structures that comprise the female reproductive system:

<b>breasts</b>	<b>uterus</b>
<b>uterine tubes</b>	<b>vagina</b>
<b>ovaries</b>	<b>vulva</b>

## Word Parts

Here are the most common word parts (with their meanings) used to build female reproductive system terms. For a more comprehensive list, refer to the Terminology section of this chapter.

### Combining Forms

<b>amni/o</b>	amnion	<b>mast/o</b>	breast
<b>cervic/o</b>	neck, cervix	<b>men/o</b>	menses, menstruation
<b>chori/o</b>	chorion	<b>metr/o</b>	uterus
<b>colp/o</b>	vagina	<b>nat/o</b>	birth
<b>culd/o</b>	cul-de-sac	<b>o/o</b>	egg
<b>dilat/o</b>	to widen	<b>oophor/o</b>	ovary
<b>embry/o</b>	embryo	<b>ov/o, ov/i</b>	ovum
<b>episi/o</b>	vulva	<b>ovari/o</b>	ovary
<b>estr/o</b>	female	<b>perine/o</b>	perineum
<b>fet/o</b>	fetus	<b>radic/o</b>	root
<b>gynec/o</b>	woman, female	<b>salping/o</b>	uterine (fallopian) tubes
<b>hymen/o</b>	hymen	<b>tox/o</b>	poison
<b>hyster/o</b>	uterus	<b>uter/o</b>	uterus
<b>lact/o</b>	milk	<b>vagin/o</b>	vagina
<b>mamm/o</b>	breast	<b>vulv/o</b>	vulva

### Suffixes

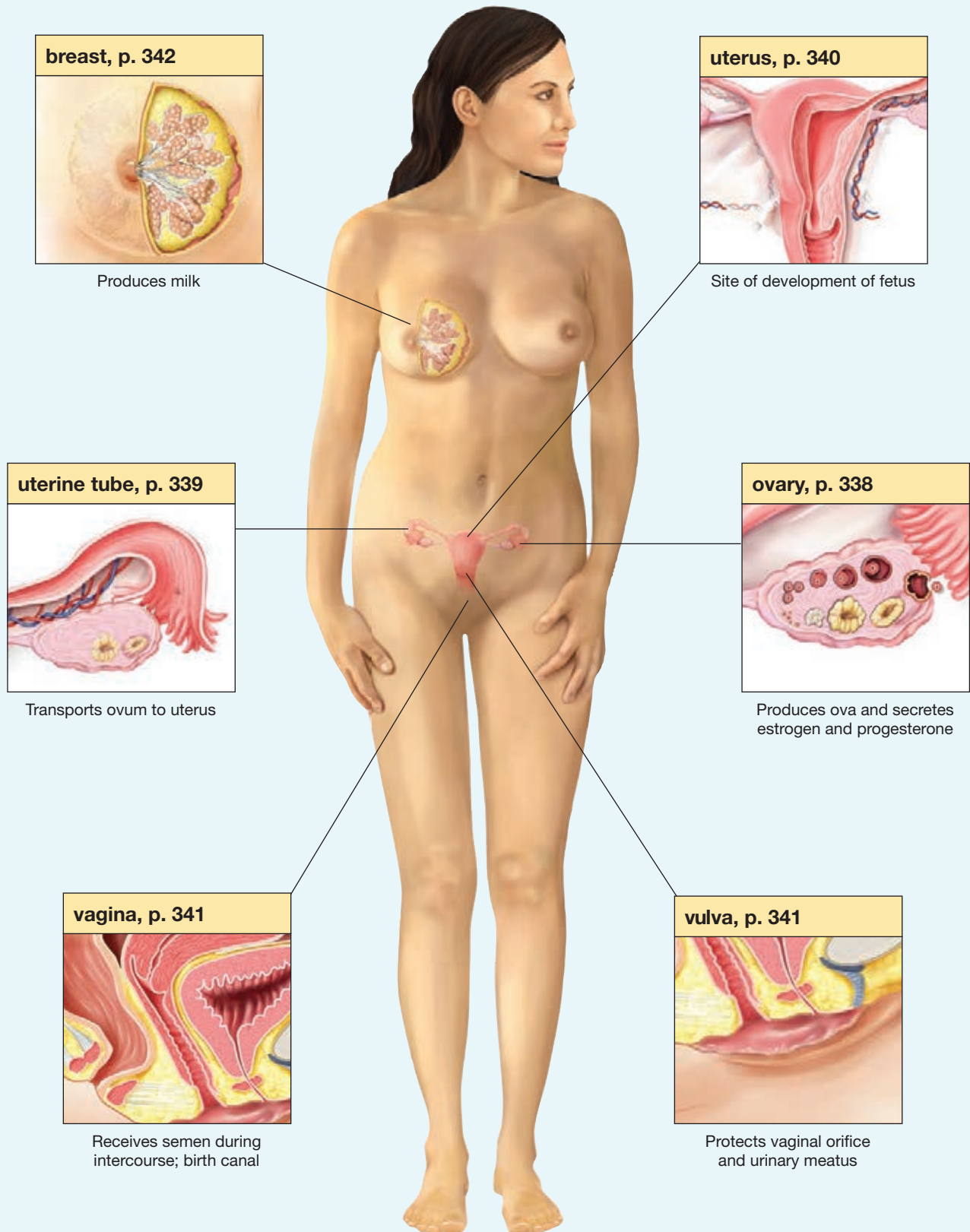
<b>-arche</b>	beginning	<b>-para</b>	to bear (offspring)
<b>-cyesis</b>	state of pregnancy	<b>-partum</b>	childbirth
<b>-genesis</b>	produces	<b>-salpinx</b>	uterine tube
<b>-gravida</b>	pregnancy	<b>-tocia</b>	labor, childbirth
<b>-oid</b>	resembling		

### Prefixes

<b>ante-</b>	before, in front of	<b>primi-</b>	first
<b>contra-</b>	against		



# Female Reproductive System Illustrated





# Anatomy and Physiology of the Female Reproductive System

**breasts**

**fertilization**

**genitalia** (jen-ih-TAY-lee-ah)

**ova** (OH-vah)

**ovaries** (OH-vah-reez)

**pregnancy**

**sex hormones**

**uterine tubes** (YOO-ter-in)

**uterus** (YOO-ter-us)

**vagina** (vah-JIGH-nah)

**vulva** (VULL-vah)

The female reproductive system plays many vital functions that ensure the continuation of the human race. First, it produces **ova**, the female reproductive cells. It then provides a place for **fertilization** to occur and for a baby to grow during **pregnancy**. The **breasts** provide nourishment for the newborn. Finally, this system secretes the female **sex hormones**.

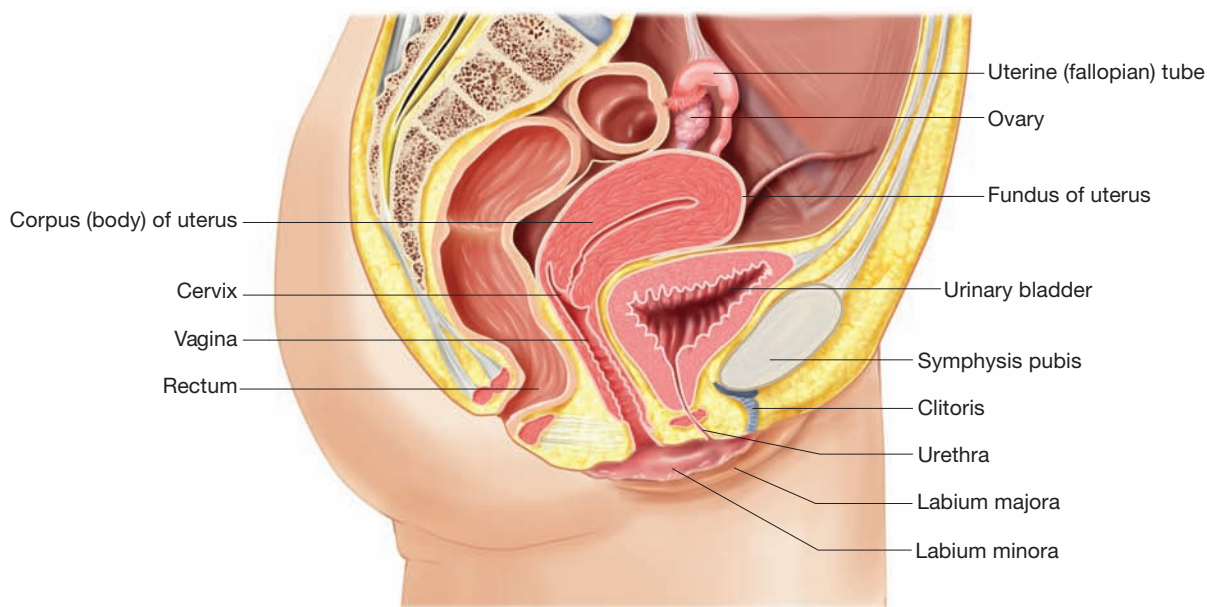
This system consists of both internal and external **genitalia**, or reproductive organs (see Figure 10.1 ■). The internal genitalia are located in the pelvic cavity and consist of the **uterus**, two **ovaries**, two **uterine tubes**, and the **vagina**, which extends to the external surface of the body. The external genitalia are collectively referred to as the **vulva**.

## What's In A Name?

Look for these word parts:

**genit/o** = genitals

**-al** = pertaining to



■ **Figure 10.1** The female reproductive system, sagittal view showing organs of the system in relation to the urinary bladder and rectum.

## Med Term Tip

The singular for egg is *ovum*. The plural term for many eggs is *ova*. The term *ova* is not used exclusively when discussing the human reproductive system. For instance, testing the stool for ova and parasites is used to detect the presence of parasites or their ova in the digestive tract, a common cause for severe diarrhea. Ova are produced in the ovary by a process called *oogenesis* (*o/o* = egg and *-genesis* = produce).

## Internal Genitalia

### Ovaries

**estrogen** (ESS-troh-jen)

**follicle-stimulating hormone** (FOLL-ih-kl)

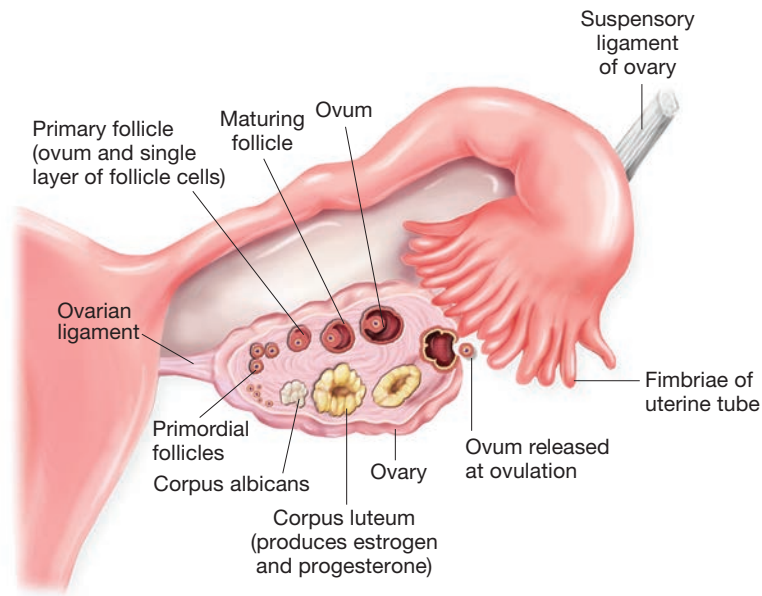
**luteinizing hormone** (loo-teh-NIGH-zing)

**oocyte** (oh-oh-site)

**ovulation** (ov-yoo-LAY-shun)

**progesterone** (proh-JES-ter-ohn)

There are two ovaries, one located on each side of the uterus within the pelvic cavity (see again Figure 10.1). These are small almond-shaped glands that produce ova (singular is *ovum*) and the female sex hormones (see Figure 10.2 ■).



■ **Figure 10.2** Structure of the ovary and fallopian (uterine) tube. Figure illustrates stages of ovum development and the relationship of the ovary to the uterine tube.

In humans approximately every 28 days hormones from the anterior pituitary, **follicle-stimulating hormone** (FSH) and **luteinizing hormone** (LH), stimulate maturation of ovum and trigger **ovulation**, the process by which one ovary releases an ovum (or **oocyte**) (see Figure 10.3 ■). The principal female sex hormones produced by the ovaries, **estrogen** and **progesterone**, stimulate the lining of the uterus to be prepared to receive a fertilized ovum. These hormones are also responsible for the female secondary sexual characteristics.

## Uterine Tubes

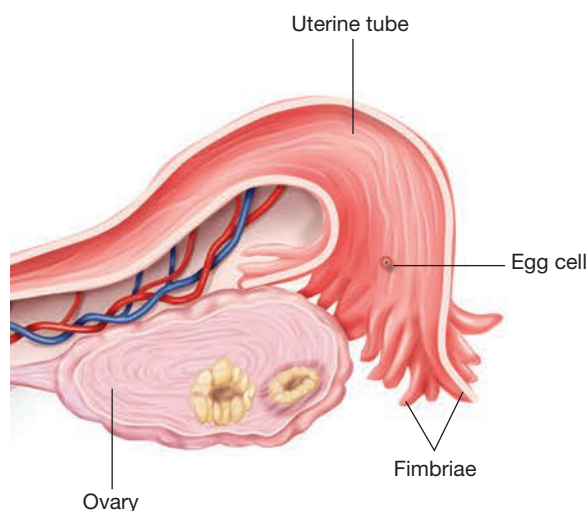
**conception** (con-SEP-shun)

**fallopian tubes** (fah-LOH-pee-an)

**fimbriae** (FIM-bree-ay)

**oviducts** (OH-vih-ducts)

The uterine tubes, also called the **fallopian tubes** or **oviducts**, are approximately 5½ inches long and run from the area around each ovary to either side of the upper portion of the uterus (see Figure 10.4 ■ and Figure 10.5 ■). As they near the



■ **Figure 10.3** Color-enhanced scanning electron micrograph showing an ovum (pink) released by the ovary at ovulation surrounded by follicle (white) tissue. The external surface of the ovary is brown in this photo. (P.M. Motta and J. Van Blekrom/Science Photo Library/ Science Source)

### What's In A Name?

Look for these word parts:  
 estr/o = female  
 o/o = egg  
 ov/o = ovum  
 -cyte = cell  
 -gen = that which produces  
 pro- = before

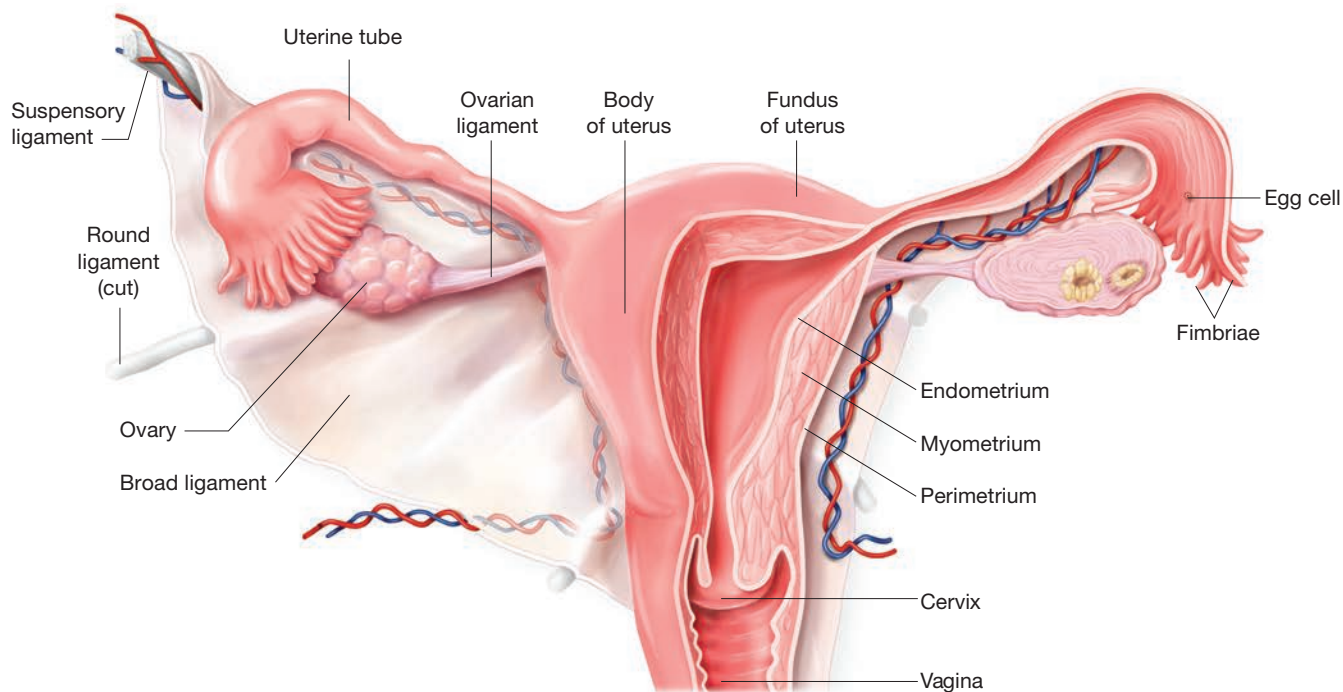
### What's In A Name?

Look for these word parts:  
 ov/i = ovum

### Med Term Tip

When the fertilized egg adheres or implants to the uterine tube instead of moving into the uterus, a condition called *tubal pregnancy* exists. There is not enough room in the uterine tube for the fetus to grow normally. Implantation of the fertilized egg in any location other than the uterus is called an *ectopic pregnancy*. *Ectopic* is a general term meaning "in the wrong place."

■ **Figure 10.4** Uterine (fallopian) tube, showing released ovum within the uterine tube.



■ **Figure 10.5** The uterus. Cutaway view shows regions of the uterus and cervix and its relationship to the uterine (fallopian) tubes and vagina.

ovaries, the unattached ends of these two tubes expand into finger-like projections called **fimbriae**. The fimbriae catch an ovum after ovulation and direct it into the uterine tube. The uterine tube can then propel the ovum from the ovary to the uterus so that it can implant. The meeting of the egg and sperm, called fertilization or **conception**, normally takes place within the upper one-half of the uterine tubes.

#### What's In A Name?

Look for these word parts:

**flex/o** = to bend  
**men/o** = menses  
**metr/o** = uterus  
**my/o** = muscle  
**-al** = pertaining to  
**-arche** = beginning  
**-ion** = action  
**ante-** = in front of  
**endo-** = inner  
**peri-** = around

#### Med Term Tip

During pregnancy, the height of the fundus is an important measurement for estimating the stage of pregnancy and the size of the fetus. Following birth, massaging the fundus with pressure applied in a circular pattern stimulates the uterine muscle to contract to help stop bleeding. Patients may be more familiar with a common term for uterus, *womb*. However, the correct medical term is *uterus*.

### Uterus

**anteflexion** (an-tee-FLEK-shun)  
**cervix** (SER-viks)  
**corpus** (KOR-pus)  
**endometrium** (en-doh-MEE-tre-um)  
**fundus** (FUN-dus)  
**menarche** (men-AR-kee)

**menopause** (MEN-oh-pawz)  
**menstrual period** (MEN-stroo-all)  
**menstruation** (men-stroo-AY-shun)  
**myometrium** (my-oh-MEE-tre-um)  
**perimetrium** (pear-ee-MEE-tre-um)  
**puberty** (PEW-ber-tee)

The uterus is a hollow, pear-shaped organ that contains a thick muscular wall, a mucous membrane lining, and a rich supply of blood (see again Figure 10.5). It lies in the center of the pelvic cavity between the bladder and the rectum. It is normally bent slightly forward, which is called **anteflexion**, and is held in position by strong fibrous ligaments anchored in the outer layer of the uterus, called the **perimetrium** (see again Figure 10.1). The uterus has three sections: the **fundus** or upper portion, between where the uterine tubes connect to the uterus; **corpus** or body, which is the central portion; and **cervix** (Cx), or lower portion, also called the neck of the uterus, which opens into the vagina.

The inner layer, or **endometrium**, of the uterine wall contains a rich blood supply. The endometrium reacts to hormonal changes every month that prepare it to receive a fertilized ovum. In a normal pregnancy the fertilized ovum implants in the endometrium, which can then provide nourishment and protection for the developing fetus. Contractions of the thick muscular walls of the uterus, called the **myometrium**, assist in propelling the fetus through the birth canal at delivery.



If a pregnancy is not established, most of the endometrium is sloughed off, resulting in **menstruation** or the **menstrual period**. During a pregnancy, the lining of the uterus does not leave the body but remains to nourish the fetus. A girl's first menstrual period occurs during **puberty** (the sequence of events by which a child becomes a young adult capable of reproduction) and is called **menarche**. In the United States, the average age for menarche is 12½ years. The ending of menstrual activity and childbearing years is called **menopause**. This generally occurs between the ages of 40 and 55.

## Vagina

**Bartholin's glands** (BAR-toh-linz)

**hymen** (HIGH-men)

**vaginal orifice** (VAJ-ih-nal / OR-ih-fis)

The vagina is a muscular tube lined with mucous membrane that extends from the cervix of the uterus to the outside of the body (see Figure 10.6 ■). The vagina allows for the passage of the menstrual flow. In addition, during intercourse, it receives the male's penis and semen, which is the fluid containing sperm. The vagina also serves as the birth canal through which the baby passes during a normal vaginal birth.

The **hymen** is a thin membranous tissue that partially covers the external vaginal opening or **vaginal orifice**. This membrane may be broken by the use of tampons, during physical activity, or during sexual intercourse. A pair of glands (called **Bartholin's glands**) are located on either side of the vaginal orifice and secrete mucus for lubrication during intercourse.

## Vulva

**clitoris** (KLIT-oh-ris)

**erectile tissue** (ee-REK-tile)

**labia majora** (LAY-bee-ah / mah-JOR-ah)

**labia minora** (LAY-bee-ah / min-NOR-ah)

**perineum** (pair-ih-NEE-um)

**urinary meatus** (YOO-rih-nair-ee / mee-AY-tus)

The vulva is a general term that refers to the group of structures that make up the female external genitalia. The **labia majora** and **labia minora** are folds of skin that serve as protection for the genitalia, the vaginal orifice, and the **urinary meatus** (see Figure 10.7 ■). Since the urinary tract and the reproductive organs are located in proximity to one another and each contains mucous membranes that can transport infection, there is a danger of infection entering the urinary tract. The **clitoris** is a small organ containing sensitive **erectile tissue** that is aroused during sexual stimulation and corresponds to the glans penis in the male. The region between the vaginal orifice and the anus is referred to as the **perineum**.

### Word Watch

Be careful using the combining forms **uter/o** meaning "uterus" and **ureter/o** meaning "ureter."

### Word Watch

Be careful using the combining forms **colp/o** meaning "vagina" and **culd/o** meaning "cul-de-sac (rectouterine pouch)."

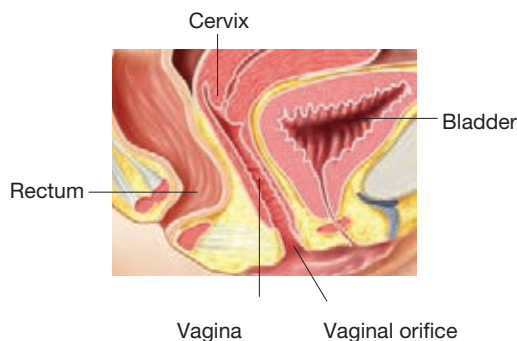
### What's In A Name?

Look for these word parts:

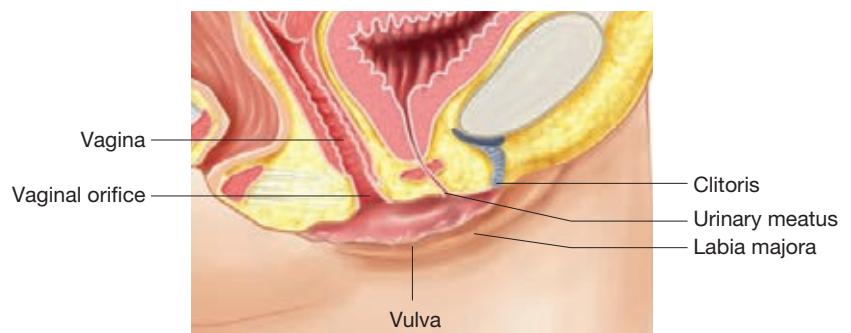
**labi/o** = lip

**urin/o** = urine

**-ary** = pertaining to



■ **Figure 10.6** The vagina, sagittal section showing the location of the vagina and its relationship to the cervix, uterus, rectum, and bladder.



■ **Figure 10.7** The vulva, sagittal section illustrating how the labia major and labia minora cover and protect the vaginal orifice, clitoris, and urinary meatus.

## Breast

**areola** (ah-REE-oh-la)

**lactation** (lak-TAY-shun)

**lactiferous ducts** (lak-TIF-er-us)

**lactiferous glands** (lak-TIF-er-us)

**mammary glands** (MAM-ah-ree)

**nipple**

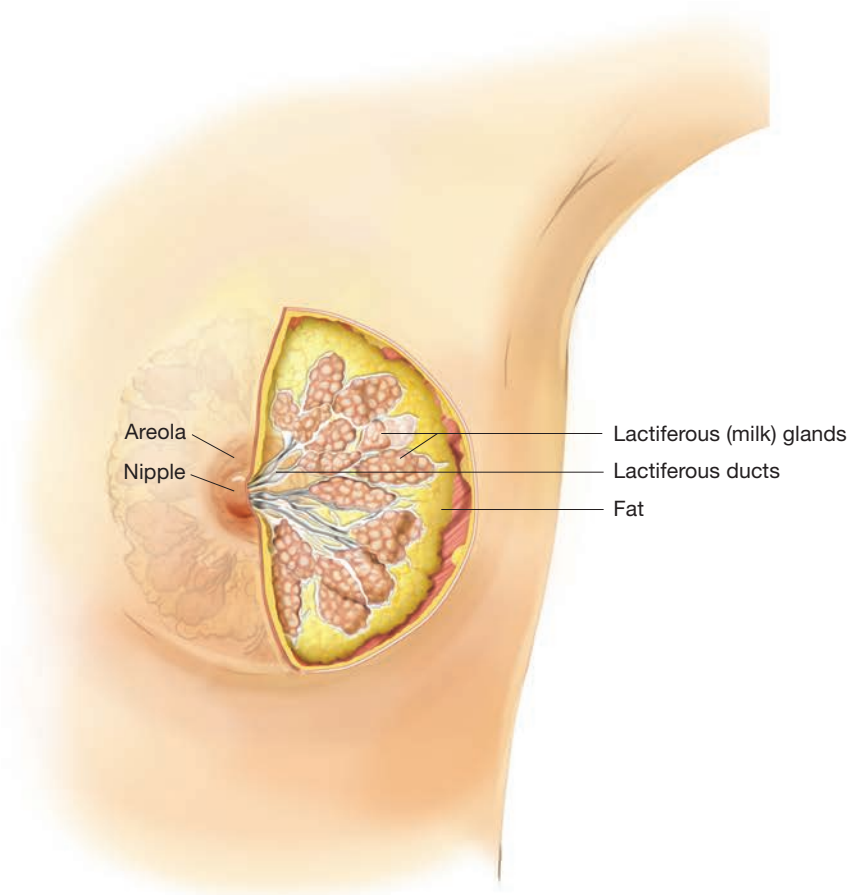
**nurse**

### What's In A Name?

Look for these word parts:

**lact/o** = milk

The breasts, or **mammary glands**, play a vital role in the reproductive process because they produce milk, a process called **lactation**, to nourish the newborn. The size of the breasts, which varies greatly from woman to woman, has no bearing on the ability to **nurse** or feed a baby. Milk is produced by the **lactiferous glands** and is carried to the **nipple** by the **lactiferous ducts** (see Figure 10.8 ■). The **areola** is the pigmented area around the nipple. As long as the breast is stimulated by the nursing infant, the breast will continue to secrete milk.



■ **Figure 10.8** The breast, cutaway view showing both internal and external features.

## Pregnancy

**amnion** (AM-nee-on)

**amniotic fluid** (am-nee-OT-ik)

**chorion** (KOR-ree-on)

**embryo** (EM-bree-oh)

**fetus** (FEE-tus)

**gestation** (jess-TAY-shun)

**placenta** (plah-SEN-tah)

**premature**

**umbilical cord** (um-BILL-ih-kal)

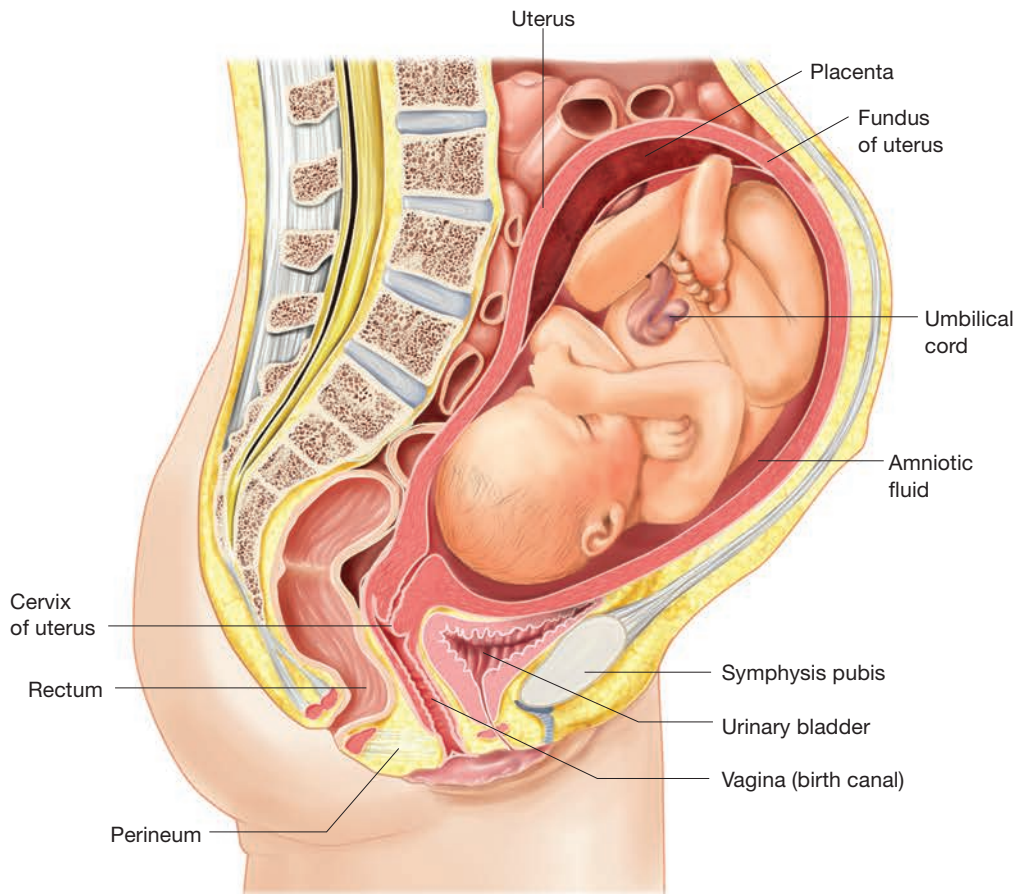
### What's In A Name?

Look for these word parts:

**-al** = pertaining to

**pre-** = before

Pregnancy refers to the period of time during which a fetus grows and develops in its mother's uterus (see Figure 10.9 ■). The normal length of time for a pregnancy (**gestation**) is 40 weeks. If a baby is born before completing at least 37 weeks of gestation, it is considered **premature**.



■ **Figure 10.9** A full-term pregnancy. Image illustrates position of the fetus and the structures associated with pregnancy.

During pregnancy the female body undergoes many changes. In fact, all of the body systems become involved in the development of a healthy infant. From the time the fertilized egg implants in the uterus until approximately the end of the eighth week, the infant is referred to as an **embryo** (see Figure 10.10 ■). During this period all the major organs and body systems are formed. Following the embryo stage and lasting until birth, the infant is called a **fetus** (see Figure 10.11 ■). During this time, the longest period of gestation, the organs mature and begin to function.

The fetus receives nourishment from its mother by way of the **placenta**, which is a spongy, blood-filled organ that forms in the uterus next to the fetus. The placenta is commonly referred to as the afterbirth because it is delivered through the birth canal after the birth of a baby. The fetus is attached to the placenta by

#### Med Term Tip

During the embryo stage of gestation, the organs and organ systems of the body are formed. Therefore, this is a very common time for *congenital anomalies*, or birth defects, to occur. This may happen before the woman is even aware of being pregnant.



■ **Figure 10.10** Photograph illustrating the development of an embryo. (Science Source)



■ **Figure 10.11** Photograph illustrating the development of a fetus. (Petit Format/Science Source)



**Med Term Tip**

The term *placenta* comes from the Latin word meaning “a flat cake.” This refers to the appearance of the placenta, which is a solid mass, flattened along the inner wall of the uterus.

**What's In A Name?**

Look for these word parts:

**dilat/o** = to widen

**-al** = pertaining to

**ex-** = outward

way of the **umbilical cord** and is surrounded by two membranous sacs, the **amnion** and the **chorion**. The amnion is the innermost sac, and it holds the **amniotic fluid** in which the fetus floats. The chorion is an outer, protective sac and also forms part of the placenta.

**Labor and Delivery**

**breech presentation**

**crowning**

**delivery**

**dilation stage** (dye-LAY-shun)

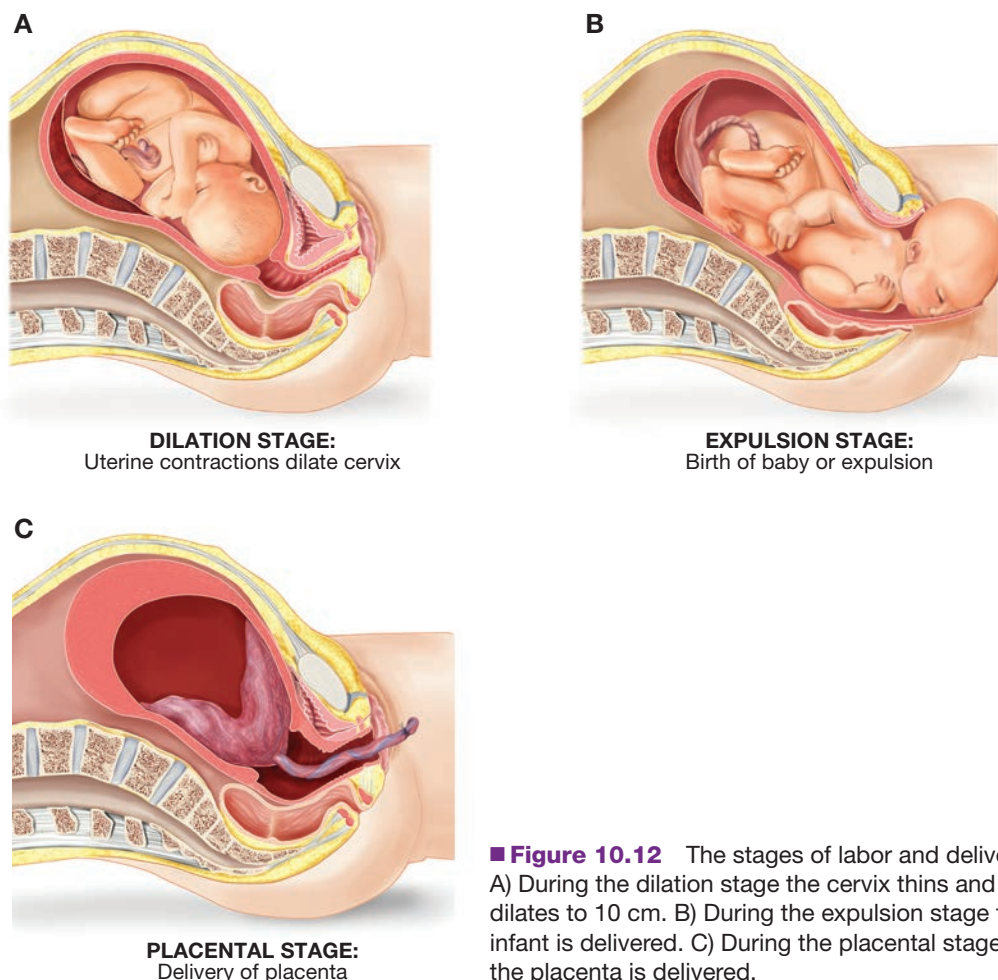
**effacement** (eh-FACE-ment)

**expulsion stage** (ex-PULL-shun)

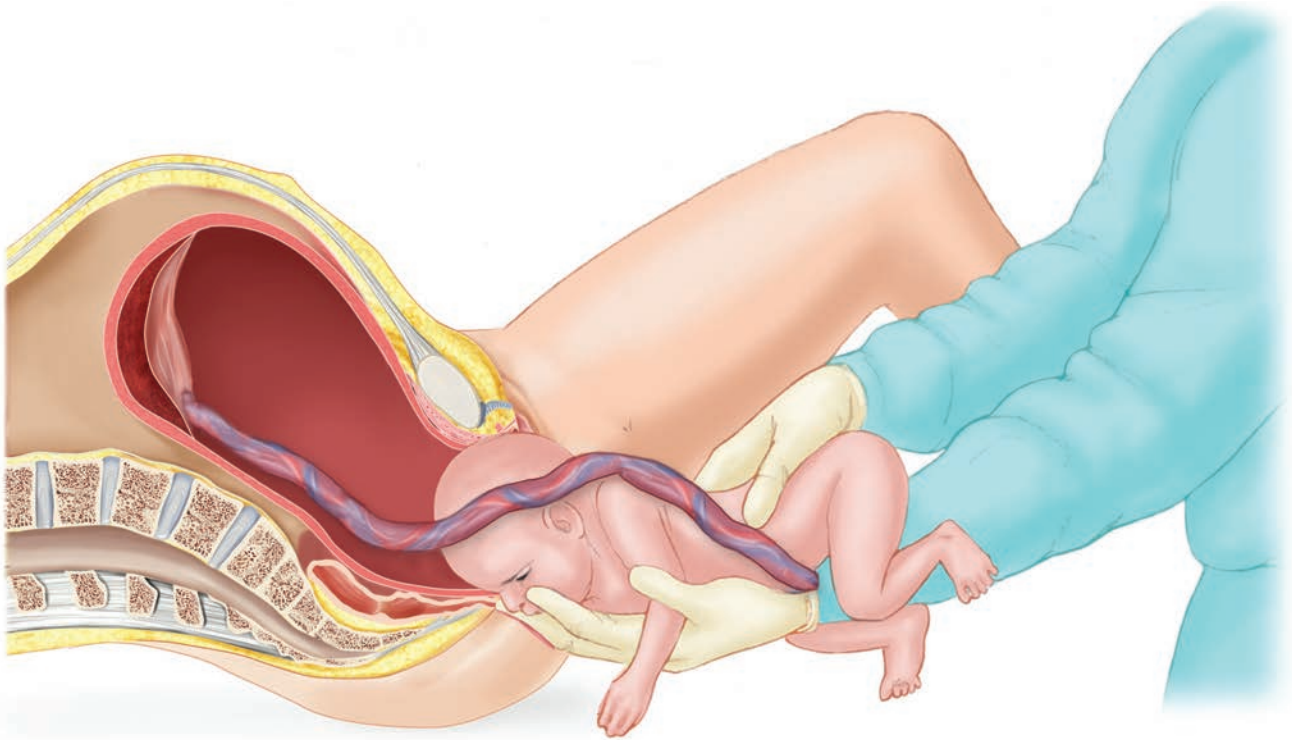
**labor**

**placental stage** (plah-SEN-tal)

**Labor** is the actual process of expelling the fetus from the uterus and through the vagina. The first stage is referred to as the **dilation stage**, in which the uterine muscle contracts strongly to expel the fetus (see Figure 10.12A ■). During this process the fetus presses on the cervix and causes it to dilate or expand. As the cervix dilates, it also becomes thinner, referred to as **effacement**. When the cervix is completely dilated to 10 centimeters, the second stage of labor begins (see Figure 10.12B ■). This is the **expulsion stage** and ends with **delivery** of the baby. Generally, the head of the baby appears first, which is referred to as **crowning**. In some cases the baby's buttocks will appear first, and this is referred to as a **breech presentation** (see Figure 10.13 ■). The last stage of labor is the **placental stage** (see Figure 10.12C ■). Immediately after childbirth, the uterus continues to contract, causing the placenta to be expelled through the vagina.



■ **Figure 10.12** The stages of labor and delivery. A) During the dilation stage the cervix thins and dilates to 10 cm. B) During the expulsion stage the infant is delivered. C) During the placental stage the placenta is delivered.



■ **Figure 10.13** A breech birth. This image illustrates a newborn that has been delivered buttocks first.

## Practice As You Go

### A. Complete the Statement

1. The tubes that extend from the outer edges of the uterus and assist in transporting the ova and sperm are called \_\_\_\_\_.
2. The time required for the development of a fetus is called \_\_\_\_\_.
3. The three stages of labor and delivery are the \_\_\_\_\_ stage, the \_\_\_\_\_ stage, and the \_\_\_\_\_ stage.
4. The cessation of menstruation is called \_\_\_\_\_.
5. The female sex cell is a(n) \_\_\_\_\_.
6. The inner lining of the uterus is called the \_\_\_\_\_.
7. The organ in which the developing fetus resides is called the \_\_\_\_\_.

# Terminology

## Word Parts Used to Build Female Reproductive System Terms

The following lists contain the combining forms, suffixes, and prefixes used to build terms in the remaining sections of this chapter.

### Combining Forms

<b>abdomin/o</b>	abdomen
<b>amni/o</b>	amnion
<b>bi/o</b>	life
<b>carcin/o</b>	cancer
<b>cervic/o</b>	cervix
<b>chori/o</b>	chorion
<b>colp/o</b>	vagina
<b>culd/o</b>	cul-de-sac
<b>cyst/o</b>	urinary bladder
<b>dilat/o</b>	to widen
<b>embryo/o</b>	embryo
<b>episi/o</b>	vulva
<b>fet/o</b>	fetus
<b>fibr/o</b>	fibers
<b>gynec/o</b>	woman

<b>hem/o</b>	blood
<b>hemat/o</b>	blood
<b>hymen/o</b>	hymen
<b>hyster/o</b>	uterus
<b>lact/o</b>	milk
<b>lapar/o</b>	abdomen
<b>later/o</b>	side
<b>leuk/o</b>	white
<b>mamm/o</b>	breast
<b>mast/o</b>	breast
<b>men/o</b>	menstruation
<b>metr/o</b>	uterus
<b>nat/o</b>	birth
<b>olig/o</b>	scanty
<b>oophor/o</b>	ovary

<b>or/o</b>	mouth
<b>ovari/o</b>	ovary
<b>pelv/o</b>	pelvis
<b>perine/o</b>	perineum
<b>py/o</b>	pus
<b>radic/o</b>	root
<b>rect/o</b>	rectum
<b>salping/o</b>	uterine tube
<b>son/o</b>	sound
<b>tox/o</b>	poison
<b>uter/o</b>	uterus
<b>vagin/o</b>	vagina
<b>vulv/o</b>	vulva

### Suffixes

<b>-al</b>	pertaining to
<b>-algia</b>	pain
<b>-an</b>	pertaining to
<b>-ar</b>	pertaining to
<b>-ary</b>	pertaining to
<b>-cele</b>	protrusion
<b>-centesis</b>	puncture to withdraw fluid
<b>-cyesis</b>	pregnancy
<b>-ectomy</b>	surgical removal
<b>-gram</b>	record
<b>-graphy</b>	process of recording
<b>-gravida</b>	pregnancy
<b>-ia</b>	condition

<b>-iasis</b>	abnormal condition
<b>-ic</b>	pertaining to
<b>-ine</b>	pertaining to
<b>-itis</b>	inflammation
<b>-logy</b>	study of
<b>-lytic</b>	destruction
<b>-nic</b>	pertaining to
<b>-oid</b>	resembling
<b>-oma</b>	tumor
<b>-opsy</b>	view of
<b>-osis</b>	abnormal condition
<b>-otomy</b>	cutting into
<b>-para</b>	to bear

<b>-partum</b>	childbirth
<b>-pexy</b>	surgical fixation
<b>-plasty</b>	surgical repair
<b>-rrhagia</b>	abnormal flow condition
<b>-rrhaphy</b>	suture
<b>-rrhea</b>	discharge
<b>-rrhexis</b>	rupture
<b>-salpinx</b>	uterine tube
<b>-scope</b>	instrument for viewing
<b>-scopy</b>	process of viewing
<b>-tic</b>	pertaining to
<b>-tocia</b>	labor and childbirth

## Prefixes

<b>a-</b>	without
<b>ante-</b>	before
<b>bi-</b>	two
<b>contra-</b>	against
<b>dys-</b>	painful
<b>endo-</b>	inner, within

<b>in-</b>	not
<b>intra-</b>	within
<b>multi-</b>	many
<b>neo-</b>	new
<b>nulli-</b>	none
<b>peri-</b>	around

<b>post-</b>	after
<b>pre-</b>	before
<b>primi-</b>	first
<b>pseudo-</b>	false
<b>ultra-</b>	beyond

## Adjective Forms of Anatomical Terms

Term	Word Parts	Definition
<b>amniotic</b> (am-nee-OT-ik)	<b>amni/o</b> = amnion <b>-tic</b> = pertaining to	Pertaining to the amnion.
<b>cervical</b> (SER-vih-kal)	<b>cervic/o</b> = cervix <b>-al</b> = pertaining to	Pertaining to the cervix.
<b>chorionic</b> (koh-ree-ON-ik)	<b>chori/o</b> = chorion <b>-nic</b> = pertaining to	Pertaining to the chorion.
<b>embryonic</b> (em-bree-ON-ik)	<b>embry/o</b> = embryo <b>-nic</b> = pertaining to	Pertaining to the embryo.
<b>endometrial</b> (en-doh-MEE-tree-al)	<b>endo-</b> = inner <b>metr/o</b> = uterus <b>-al</b> = pertaining to	Pertaining to the inner lining of the uterus.
<b>fetal</b> (FEE-tal)	<b>fet/o</b> = fetus <b>-al</b> = pertaining to	Pertaining to the fetus.
<b>lactic</b> (LAK-tik)	<b>lact/o</b> = milk <b>-ic</b> = pertaining to	Pertaining to milk.
<b>mammary</b> (MAM-mah-ree)	<b>mamm/o</b> = breast <b>-ary</b> = pertaining to	Pertaining to the breast.
<b>ovarian</b> (oh-VAIR-ee-an)	<b>ovari/o</b> = ovary <b>-an</b> = pertaining to	Pertaining to the ovary.
<b>perineal</b> (per-ih-NEE-al)	<b>perine/o</b> = perineum <b>-al</b> = pertaining to	Pertaining to the perineum.
<b>uterine</b> (YOO-ter-in)	<b>uter/o</b> = uterus <b>-ine</b> = pertaining to	Pertaining to the uterus.
<b>vaginal</b> (VAJ-ih-nal)	<b>vagin/o</b> = vagina <b>-al</b> = pertaining to	Pertaining to the vagina.
<b>vulvar</b> (VUL-var)	<b>vulv/o</b> = vulva <b>-ar</b> = pertaining to	Pertaining to the vulva.

## Practice As You Go

### B. Give the adjective form for each anatomical structure

1. The embryo \_\_\_\_\_
2. The fetus \_\_\_\_\_
3. The uterus \_\_\_\_\_
4. An ovary \_\_\_\_\_
5. A breast \_\_\_\_\_
6. The vagina \_\_\_\_\_

## Pregnancy Terms

Term	Word Parts	Definition
<b>antepartum</b> (an-tee-PAR-tum)	<b>ante-</b> = before <b>-partum</b> = childbirth	Period of time before birth.
<b>colostrum</b> (kuh-LOS-trum)		Thin fluid first secreted by the breast after delivery. It does not contain much protein, but is rich in antibodies.
<b>fraternal twins</b>	<b>-al</b> = pertaining to	Twins that develop from two different ova fertilized by two different sperm. Although twins, these siblings do not have identical DNA.
<b>identical twins</b>	<b>-al</b> = pertaining to	Twins that develop from the splitting of one fertilized ovum. These siblings have identical DNA.
<b>meconium</b> (meh-KOH-nee-um)		First bowel movement of a newborn. It is greenish-black in color and consists of mucus and bile.
<b>multigravida</b> (mull-tih-GRAV-ih-dah)	<b>multi-</b> = many <b>-gravida</b> = pregnancy	A woman who has been pregnant two or more times.
<b>multipara</b> (mull-TIP-ah-rah)	<b>multi-</b> = many <b>-para</b> = to bear	A woman who has given birth to a live infant two or more times.
<b>neonate</b> (NEE-oh-nayt)	<b>neo-</b> = new <b>nat/o</b> = birth	Term for a newborn baby.
<b>nulligravida</b> (null-ih-GRAV-ih-dah)	<b>nulli-</b> = none <b>-gravida</b> = pregnancy	A woman who has not been pregnant.
<b>nullipara</b> (null-IP-ah-rah)	<b>nulli-</b> = none <b>-para</b> = to bear	A woman who has not given birth to a live infant.
<b>postpartum</b> (post-PAR-tum)	<b>post-</b> = after <b>-partum</b> = childbirth	Period of time shortly after birth.
<b>primigravida</b> (GI, grav I) (pry-mih-GRAV-ih-dah)	<b>primi-</b> = first <b>-gravida</b> = pregnancy	A woman who is pregnant for the first time.
<b>primipara</b> (PI, para I) (pry-MIP-ah-rah)	<b>primi-</b> = first <b>-para</b> = to bear	A woman who has given birth to a live infant once.

## Pathology

Term	Word Parts	Definition
<b>Medical Specialties</b>		
<b>gynecology</b> (GYN, gyn) (gigh-neh-KOL-oh-jee)	<b>gynec/o</b> = woman <b>-logy</b> = study of	Branch of medicine specializing in the diagnosis and treatment of conditions of the female reproductive system. Physician is called a <i>gynecologist</i> .
<b>neonatology</b> (nee-oh-nay-TALL-oh-jee)	<b>neo-</b> = new <b>nat/o</b> = birth <b>-logy</b> = study of	Branch of medicine specializing in the diagnosis and treatment of conditions involving newborns. Physician is called a <i>neonatologist</i> .
<b>obstetrics</b> (OB) (ob-STET-riks)		Branch of medicine specializing in the diagnosis and treatment of women during pregnancy and childbirth, and immediately after childbirth. Physician is called an <i>obstetrician</i> .
<b>Signs and Symptoms</b>		
<b>amenorrhea</b> (ah-men-oh-REE-ah)	<b>a-</b> = without <b>men/o</b> = menstruation <b>-rrhea</b> = flow	Condition of having no menstrual flow.
<b>amniorrhea</b> (am-nee-oh-REE-ah)	<b>amni/o</b> = amnion <b>-rrhea</b> = flow	Flow of amniotic fluid when the amnion ruptures.
<b>dysmenorrhea</b> (dis-men-oh-REE-ah)	<b>dys-</b> = painful <b>men/o</b> = menstruation <b>-rrhea</b> = flow	Condition of having painful menstrual flow.
<b>dystocia</b> (dis-TOH-she-ah)	<b>dys-</b> = abnormal, difficult <b>-tocia</b> = labor and childbirth	Difficult labor and childbirth.
<b>hematosalpinx</b> (hee-mah-toh-SAL-pinks)	<b>hemat/o</b> = blood <b>-salpinx</b> = uterine tube	Presence of blood in a uterine tube.
<b>leukorrhea</b> (loo-koh-REE-ah)	<b>leuk/o</b> = white <b>-rrhea</b> = discharge	Whitish or yellowish vaginal discharge; may be caused by vaginal infection.
<b>mastalgia</b> (mas-TAL-jee-ah)	<b>mast/o</b> = breast <b>-algia</b> = pain	Breast pain.
<b>menorrhagia</b> (men-oh-RAY-jee-ah)	<b>men/o</b> = menstruation <b>-rrhagia</b> = abnormal flow condition	Condition of having abnormally heavy menstrual flow during normal menstruation time.
<b>metrorrhagia</b> (mee-troh-RAY-jee-ah)	<b>metr/o</b> = uterus <b>-rrhagia</b> = abnormal flow condition	Term is used to describe uterine bleeding between menstrual periods.
<b>metrorrhea</b> (mee-troh-REE-ah)	<b>metr/o</b> = uterus <b>-rrhea</b> = discharge	Having a discharge (such as mucus or pus) from the uterus that is not the menstrual flow.
<b>oligomenorrhea</b> (ol-lih-goh-men-oh-REE-ah)	<b>olig/o</b> = scanty <b>men/o</b> = menstruation <b>-rrhea</b> = flow	Condition of having light menstrual flow.
<b>Ovary</b>		
<b>oophoritis</b> (oh-off-oh-RIGH-tis)	<b>oophor/o</b> = ovary <b>-itis</b> = inflammation	Inflammation of the ovary.



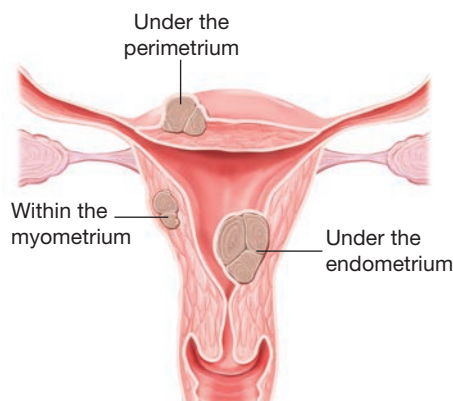
## Pathology (continued)

Term	Word Parts	Definition
<b>ovarian carcinoma</b> (oh-VAY-ree-an / kar-sih-NOH-mah)	<b>ovari/o</b> = ovary <b>-an</b> = pertaining to <b>carcin/o</b> = cancer <b>-oma</b> = tumor	Cancer of the ovary.
<b>ovarian cyst</b> (oh-VAY-ree-an / SIST)	<b>ovari/o</b> = ovary <b>-an</b> = pertaining to	Cyst that develops within the ovary. These may be multiple cysts and may rupture, causing pain and bleeding.
<b>Uterine Tubes</b>		
<b>pyosalpinx</b> (pie-oh-SAL-pinks)	<b>py/o</b> = pus <b>-salpinx</b> = uterine tube	Presence of pus in a uterine tube.
<b>salpingitis</b> (sal-ping-JIGH-tis)	<b>salping/o</b> = uterine tube <b>-itis</b> = inflammation	Inflammation of the uterine tube.
<b>Uterus</b>		
<b>cervical cancer</b> (SER-vih-kal)	<b>cervic/o</b> = cervix <b>-al</b> = pertaining to	Malignant growth in the cervix. Some cases are caused by the <i>human papilloma virus</i> (HPV), a sexually transmitted virus for which there is now a vaccine. An especially difficult type of cancer to treat that causes 5% of the cancer deaths in women. Pap smear tests have helped to detect early cervical cancer.
<b>endocervicitis</b> (en-doh-ser-vih-SIGH-tis)	<b>endo-</b> = within <b>cervic/o</b> = cervix <b>-itis</b> = inflammation	Inflammation that occurs within the cervix.
<b>endometrial cancer</b> (en-doh-MEE-tree-al)	<b>endo-</b> = inner <b>metr/o</b> = uterus <b>-al</b> = pertaining to	Cancer of the endometrial lining of the uterus.
<b>endometritis</b> (en-doh-meh-TRY-tis)	<b>endo-</b> = inner <b>metr/o</b> = uterus <b>-itis</b> = inflammation	Inflammation of the endometrium (inner layer of the uterine wall)
<b>Word Watch</b>       Be careful when using the combining form <b>metr/o</b> meaning “uterus” and the suffix <b>-metry</b> meaning “process of measuring.”		

**fibroid tumor**  
(FIGH-broyd / TOO-mor)

**fibr/o** = fibers  
**-oid** = resembling

Benign tumor or growth that contains fiberlike tissue. Uterine fibroid tumors are the most common tumors in women.

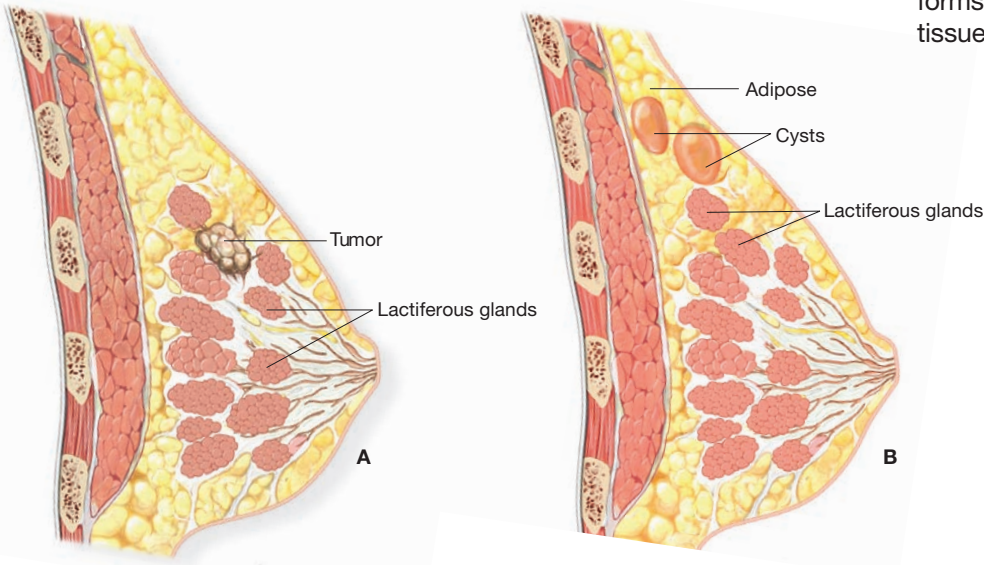


■ **Figure 10.14** Common sites for the development of fibroid tumors.

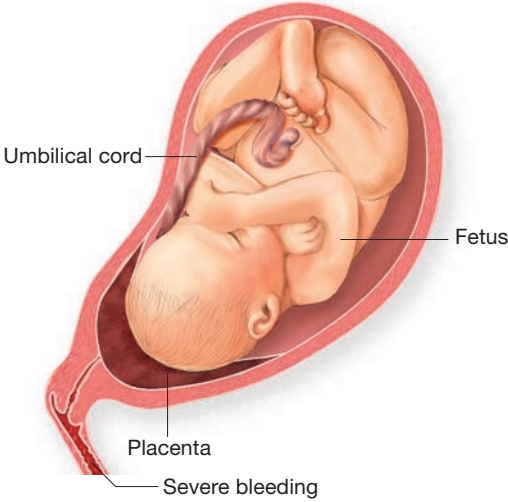
## Pathology (continued)

Term	Word Parts	Definition
<b>hysterorrhexis</b> (hiss-ter-oh-REK-sis)	<b>hyster/o</b> = uterus <b>-rrhexis</b> = rupture	Rupture of the uterus; may occur during labor.
<b>menometrorrhagia</b> (men-oh-mee-troh-RAY-jee-ah)	<b>men/o</b> = menstruation <b>metr/o</b> = uterus <b>-rrhagia</b> = abnormal flow condition	Excessive bleeding during the menstrual period and at intervals between menstrual periods.
<b>premenstrual syndrome (PMS)</b> (pre-MEN-stroo-al / SIN-drohm)	<b>pre-</b> = before <b>men/o</b> = menstruation <b>-al</b> = pertaining to	Symptoms that develop just prior to the onset of a menstrual period, which can include irritability, headache, tender breasts, and anxiety.
<b>prolapsed uterus</b> (pro-LAPS'D / YOO-ter-us)		Fallen uterus that can cause the cervix to protrude through the vaginal opening. Generally caused by weakened muscles from vaginal delivery or as the result of pelvic tumors pressing down.
<b>Vagina</b>		
<b>candidiasis</b> (kan-dih-DYE-ah-sis)	<b>-iasis</b> = abnormal condition	Yeast infection of the skin and mucous membranes that can result in white plaques on the tongue and vagina.
<b>Med Term Tip</b> The term <i>candida</i> comes from a Latin term meaning “dazzling white.” Candida is the scientific name for yeast and refers to the very white discharge that is the hallmark of a yeast infection.		
<b>cystocele</b> (SIS-toh-seel)	<b>cyst/o</b> = urinary bladder <b>-cele</b> = protrusion	Hernia or outpouching of the bladder that protrudes into the vagina. This may cause urinary frequency and urgency.
<b>rectocele</b> (REK-toh-seel)	<b>rect/o</b> = rectum <b>-cele</b> = protrusion	Protrusion or herniation of the rectum into the vagina.
<b>toxic shock syndrome (TSS)</b>	<b>tox/o</b> = poison <b>-ic</b> = pertaining to	Rare and sometimes fatal staphylococcus infection that generally occurs in menstruating women. Initial infection of the vagina is associated with prolonged wearing of a super-absorbent tampon.
<b>vaginitis</b> (vaj-ih-NIGH-tis)	<b>vagin/o</b> = vagina <b>-itis</b> = inflammation	Inflammation of the vagina.
<b>Pelvic Cavity</b>		
<b>endometriosis</b> (en-doh-mee-tree-OH-sis)	<b>endo-</b> = within <b>metr/o</b> = uterus <b>-osis</b> = abnormal condition	Abnormal condition of endometrium tissue appearing throughout the pelvis or on the abdominal wall. This tissue is normally found within the uterus.
<b>pelvic inflammatory disease (PID)</b> (PELL-vik / in-FLAM-mah-toh-ree)	<b>pelv/o</b> = pelvis <b>-ic</b> = pertaining to	Chronic or acute infection, usually bacterial, that has ascended through the female reproductive organs and out into the pelvic cavity. May result in scarring that interferes with fertility.
<b>perimetritis</b> (pair-ih-meh-TRY-tis)	<b>peri-</b> = around <b>metr/o</b> = uterus <b>-itis</b> = inflammation	Inflammation in the pelvic cavity around the outside of the uterus.

## Pathology (continued)

Term	Word Parts	Definition
<b>Breast</b>		
<b>breast cancer</b>		Malignant tumor of the breast. Usually forms in the milk-producing gland tissue or the lining of the milk ducts.
 <p>■ <b>Figure 10.15</b> Comparison of breast cancer and fibrocystic disease. A) Breast with a malignant tumor growing in the lactiferous gland and duct. B) The location of a fibrocystic lump in the adipose tissue covering the breast.</p>		
<b>fibrocystic breast disease</b> (figh-bro-SIS-tik)	<b>fibr/o</b> = fibers <b>cyst/o</b> = pouch <b>-ic</b> = pertaining to	Benign cysts forming in the breast (see Figure 10.15B ■).
<b>lactorrhea</b> (lak-toh-REE-ah)	<b>lact/o</b> = milk <b>-rrhea</b> = flow	Discharge of milk from the breast other than normal lactation. Any white discharge from a nipple.
<b>mastitis</b> (mas-TYE-tis)	<b>mast/o</b> = breast <b>-itis</b> = inflammation	Inflammation of the breast.
<b>Pregnancy</b>		
<b>abruptio placentae</b> (ah-BRUP-tee-oh / plah-SEN-tee)		Emergency condition in which the placenta tears away from the uterine wall prior to delivery of the infant. Requires immediate delivery of the baby.
<b>eclampsia</b> (eh-KLAMP-see-ah)	<b>-ia</b> = condition	Further worsening of preeclampsia symptoms with the addition of seizures and coma; may occur between the 20th week of pregnancy and up to six weeks postpartum.
<b>hemolytic disease of the newborn</b> (HDN) (hee-moh-LIT-ik)	<b>hem/o</b> = blood <b>-lytic</b> = destruction	Condition developing in the baby when the mother's blood type is Rh-negative and the baby's blood is Rh-positive. Antibodies in the mother's blood enter the fetus's bloodstream through the placenta and destroy the fetus's red blood cells, causing anemia, jaundice, and enlargement of liver and spleen. Treatment is early diagnosis and blood transfusion. Also called <i>erythroblastosis fetalis</i> .

## Pathology (continued)

Term	Word Parts	Definition
<b>infertility</b>	<b>in-</b> = not	Inability to produce children. Generally defined as no pregnancy after properly timed intercourse for one year.
<b>placenta previa</b> (plah-SEN-tah / PREE-vee-ah)		A placenta that is implanted in the lower portion of the uterus and, in turn, blocks the birth canal.
<div>  <p>Umbilical cord</p> <p>Fetus</p> <p>Placenta</p> <p>Severe bleeding</p> </div> <p>■ <b>Figure 10.16</b> Placenta previa, longitudinal section showing the placenta growing over the opening into the cervix.</p>		
<b>preeclampsia</b> (pre-eh-KLAMP-see-ah)	<b>pre-</b> = before	Metabolic disease of pregnancy. If untreated, it may progress to eclampsia. Symptoms include hypertension, headaches, albumin in the urine, and edema. May occur between the 20th week of pregnancy and up to six weeks postpartum. Also called <i>toxemia</i> or <i>pregnancy-induced hypertension</i> (PIH).
<b>prolapsed umbilical cord</b> (pro-LAPSD / um-BILL-ih-kal)		When the umbilical cord of the baby is expelled first during delivery and is squeezed between the baby's head and the vaginal wall. This presents an emergency situation since the baby's circulation is compromised.
<b>pseudocyesis</b> (soo-doh-sigh-EE-sis)	<b>pseudo-</b> = false <b>-cyesis</b> = pregnancy	Condition in which the body reacts as if there is a pregnancy (especially hormonal changes), but there is no pregnancy.
<b>salpingocyesis</b> (sal-ping-goh-sigh-EE-sis)	<b>salping/o</b> = uterine tube <b>-cyesis</b> = pregnancy	Pregnancy that occurs in the uterine tube instead of in the uterus.
<b>spontaneous abortion</b> <b>Med Term Tip</b> The term <i>abortion</i> (AB) has different meanings for medical professionals and the general population. The general population equates the term <i>abortion</i> specifically with the planned termination of a pregnancy. However, to the medical community, <i>abortion</i> is a broader medical term meaning that a pregnancy has ended before a fetus is <i>viable</i> , meaning before it can live on its own.		Unplanned loss of a pregnancy due to the death of the embryo or fetus before the time it is viable, commonly referred to as a <i>miscarriage</i> .
<b>stillbirth</b>		Birth in which a viable-aged fetus dies shortly before or at the time of delivery.

## Practice As You Go

### C. Terminology Matching

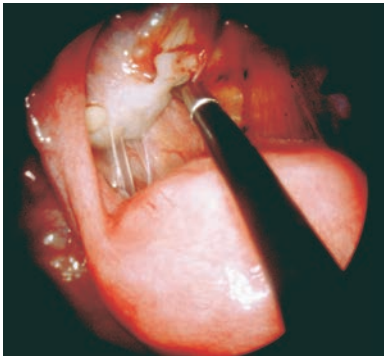
Match each term to its definition.

- |   |  |
|---|--|
| 1. _____ hemolytic disease of the newborn | a. seizures and coma during pregnancy      |
| 2. _____ dysmenorrhea                     | b. erythroblastosis fetalis                |
| 3. _____ breech presentation              | c. detached placenta                       |
| 4. _____ abruptio placentae               | d. yeast infection                         |
| 5. _____ eclampsia                        | e. abnormal discharge from breast          |
| 6. _____ pyosalpinx                       | f. newborn                                 |
| 7. _____ fibroid                          | g. buttocks first to appear in birth canal |
| 8. _____ candidiasis                      | h. painful menstruation                    |
| 9. _____ lactorrhea                       | i. pus in the uterine tube                 |
| 10. _____ neonate                         | j. benign tumor                            |

## Diagnostic Procedures

Term	Word Parts	Definition
<b>Clinical Laboratory Tests</b>		
<b>Pap</b> (Papanicolaou) <b>smear</b> (pap-ah-NIK-oh-low)		Test for the early detection of cancer of the cervix named after the developer of the test, George Papanicolaou, a Greek physician. A scraping of cells is removed from the cervix for examination under a microscope.
<b>pregnancy test</b> (PREG-nan-see)		Chemical test that can determine a pregnancy during the first few weeks. Can be performed in a physician's office or with a home-testing kit.
<b>Diagnostic Imaging</b>		
<b>hysterosalpingography</b> (HSG) (hiss-ter-oh-sal-pin-GOG-rah-fee)	<b>hyster/o</b> = uterus <b>salping/o</b> = uterine tube <b>-graphy</b> = process of recording	Taking of an X-ray after injecting radiopaque material into the uterus and uterine tubes.
<b>mammogram</b> (MAM-moh-gram)	<b>mamm/o</b> = breast <b>-gram</b> = record	X-ray record of the breast.
<b>mammography</b> (mam-OG-rah-fee)	<b>mamm/o</b> = breast <b>-graphy</b> = process of recording	X-ray to diagnose breast disease, especially breast cancer.

## Diagnostic Procedures (continued)

Term	Word Parts	Definition
<b>pelvic ultrasonography</b> (PELL-vik / ull-trah-son-OG-rah-fee)	<b>pelv/o</b> = pelvis <b>-ic</b> = pertaining to <b>ultra-</b> = beyond <b>son/o</b> = sound <b>-graphy</b> = process of recording	Use of high-frequency sound waves to produce an image or photograph of an organ, such as the uterus, ovaries, or fetus.
<b>Endoscopic Procedures</b>		
<b>colposcope</b> (KOL-poh-scope)	<b>colp/o</b> = vagina <b>-scope</b> = instrument for viewing	Instrument used to view inside the vagina.
<b>colposcopy</b> (kol-POS-koh-pee)	<b>colp/o</b> = vagina <b>-scopy</b> = process of viewing	Examination of vagina using an instrument called a <i>colposcope</i> .
<b>culdoscopy</b> (kul-DOS-koh-pee)	<b>culd/o</b> = cul-de-sac <b>-scopy</b> = process of viewing	Examination of the female pelvic cavity, particularly behind the uterus, by introducing an endoscope through the wall of the vagina.
<b>laparoscope</b> (LAP-ah-row-scope)	<b>lapar/o</b> = abdomen <b>-scope</b> = instrument for viewing	Instrument used to view inside the abdomen.
<b>laparoscopy</b> (lap-ar-OS-koh-pee)	<b>lapar/o</b> = abdomen <b>-scopy</b> = process of viewing	Examination of the peritoneal cavity using an instrument called a <i>laparoscope</i> . The instrument is passed through a small incision made by the surgeon into the abdominopelvic cavity.
<p>■ <b>Figure 10.17</b> Photograph taken during a laparoscopic procedure. The fundus of the uterus is visible below the probe, the ovary is at the tip of the probe, and the uterine tube extends along the left side of the photo. (Southern Illinois University/Photo Researchers, Inc.)</p> 		
<b>Obstetrical Diagnostic Procedures</b>		
<b>amniocentesis</b> (am-nee-oh-sen-TEE-sis)	<b>amni/o</b> = amnion <b>-centesis</b> = puncture to withdraw fluid	Puncturing of the amniotic sac using a needle and syringe for the purpose of withdrawing amniotic fluid for testing. Can assist in determining fetal maturity, development, and genetic disorders.
<b>Apgar score</b> (AP-gar)		Evaluation of a neonate's adjustment to the outside world. Observes color, heart rate, muscle tone, respiratory rate, and response to stimulus at one minute and five minutes after birth.
<b>chorionic villus sampling (CVS)</b> (kor-ree-ON-ik / vill-us)	<b>chori/o</b> = chorion <b>-nic</b> = pertaining to	Removal of a small piece of the chorion for genetic analysis. May be done at an earlier stage of pregnancy than amniocentesis.



## Diagnostic Procedures (continued)

Term	Word Parts	Definition
<b>fetal monitoring</b> (FEE-tal)	<b>fet/o</b> = fetus <b>-al</b> = pertaining to	Using electronic equipment placed on the mother's abdomen or the fetus' scalp to check the fetal heart rate (FHR) (also called fetal heart tone [FHT]) during labor. The normal heart rate of the fetus is rapid, ranging from 120 to 160 beats per minute. A drop in the fetal heart rate indicates the fetus is in distress.

### Additional Diagnostic Procedures

<b>cervical biopsy</b> (SER-vih-kal / BYE-op-see)	<b>cervic/o</b> = cervix <b>-al</b> = pertaining to <b>bi/o</b> = life <b>-opsy</b> = view of	Taking a sample of tissue from the cervix to test for the presence of cancer cells.
<b>endometrial biopsy (EMB)</b> (en-doh-MEE-tre-al BYE-op-see)	<b>endo-</b> = inner <b>metr/o</b> = uterus <b>-al</b> = pertaining to <b>bi/o</b> = life <b>-opsy</b> = view of	Taking a sample of tissue from the lining of the uterus to test for abnormalities.
<b>pelvic examination</b> (PELL-vik)	<b>pelv/o</b> = pelvis <b>-ic</b> = pertaining to	Physical examination of the vagina and adjacent organs performed by a physician placing the fingers of one hand into the vagina. An instrument called a <i>speculum</i> is used to open the vagina.



■ **Figure 10.18** A speculum used to hold the vagina open in order to visualize the cervix. (Patrick Watson, Pearson Education)

## Therapeutic Procedures

Term	Word Parts	Definition
<b>Medical Procedures</b>		
<b>barrier contraception</b> (kon-trah-SEP-shun)	<b>contra-</b> = against	Prevention of a pregnancy using a device to prevent sperm from meeting an ovum. Examples include condoms, diaphragms, and cervical caps.
<b>hormonal contraception</b>	<b>-al</b> = pertaining to <b>contra-</b> = against	Use of hormones to block ovulation and prevent conception. May be in the form of a pill, a patch, an implant under the skin, or an injection.
<b>intrauterine device (IUD)</b> (in-trah-YOO-ter-in)	<b>intra-</b> = within <b>uter/o</b> = uterus <b>-ine</b> = pertaining to	Device inserted into the uterus by a physician for the purpose of contraception (see Figure 10.19 ■).

## Therapeutic Procedures (continued)

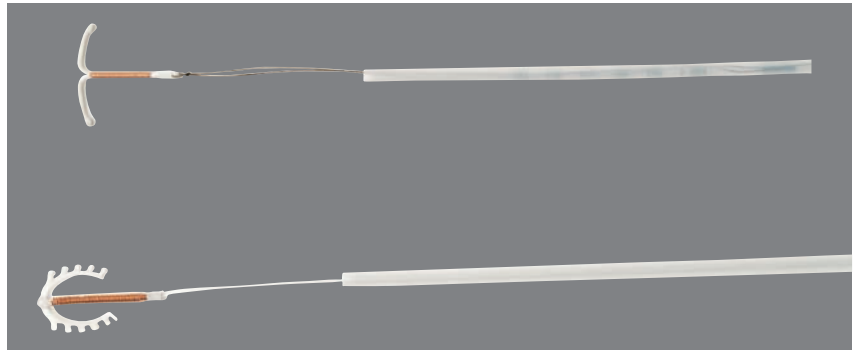
### Term

### Word Parts

### Definition

■ **Figure 10.19** Photograph illustrating the shape of two different Intrauterine devices (IUDs). The intrauterine portion is approximately 1-1/4 inches long. The thin thread attached to the end of the device extends through the cervix into the vagina. This allows a woman to check that the IUD remains properly in place.

(Jules Selmes and Debi Treloar/Dorling Kindersley Media Library)



### Surgical Procedures

<b>amniotomy</b> (am-nee-OT-oh-mee)	<b>amni/o</b> = amnion <b>-otomy</b> = cutting into	Surgically cutting open the amnion; commonly referred to as “breaking the water.”
<b>cervicectomy</b> (ser-vih-SEK-toh-mee)	<b>cervic/o</b> = cervix <b>-ectomy</b> = surgical removal	Surgical removal of the cervix.
<b>cesarean section (CS, C-section)</b> (see-SAYR-ee-an)		Surgical delivery of a baby through an incision into the abdominal and uterine walls. Legend has it that the Roman emperor, Julius Caesar, was the first person born by this method.
<b>conization</b> (kon-ih-ZAY-shun)		Surgical removal of a core of cervical tissue. Also refers to partial removal of the cervix.
<b>dilation and curettage</b> (D & C) (dye-LAY-shun / koo-reh-TAZH)	<b>dilat/o</b> = to widen	Surgical procedure in which the opening of the cervix is dilated and the uterus is scraped or suctioned of its lining or tissue. Often performed after a spontaneous abortion and to stop excessive bleeding from other causes.
<b>elective abortion</b>		Legal termination of a pregnancy for nonmedical reasons.
<b>episiorrhaphy</b> (eh-pee-z-ee-OR-ah-fee)	<b>episi/o</b> = vulva <b>-rrhaphy</b> = suture	To suture the perineum; postpartum procedure to repair an episiotomy or any tearing of the perineum that occurred during birth. Note that the combining form <b>episi/o</b> is used even though the perineum is not part of the vulva.
<b>episiotomy</b> (eh-pee-z-ee-OT-oh-mee)	<b>episi/o</b> = vulva <b>-otomy</b> = cutting into	Surgical incision of the perineum to facilitate the delivery process. Can prevent an irregular tearing of tissue during birth. Note that the combining form <b>episi/o</b> is used even though the perineum is not part of the vulva.
<b>hymenectomy</b> (high-men-EK-toh-mee)	<b>hymen/o</b> = hymen <b>-ectomy</b> = surgical removal	Surgical removal of the hymen.
<b>hysterectomy</b> (hiss-ter-EK-toh-mee)	<b>hyster/o</b> = uterus <b>-ectomy</b> = surgical removal	Surgical removal of the uterus.
<b>hysteropexy</b> (HISS-ter-oh-pek-see)	<b>hyster/o</b> = uterus <b>-pexy</b> = surgical fixation	To surgically anchor the uterus to its proper location in the pelvic cavity; a treatment for a prolapsed uterus.

## Therapeutic Procedures (continued)

Term	Word Parts	Definition
<b>laparotomy</b> (lap-ah-ROT-oh-mee)	<b>lapar/o</b> = abdomen <b>-otomy</b> = cutting into	To cut open the abdomen; performed in order to complete other surgical procedures inside the abdomen or performed during a C-section.
<b>lumpectomy</b> (lump-EK-toh-mee)	<b>-ectomy</b> = surgical removal	Removal of only a breast tumor and the tissue immediately surrounding it.
<b>mammoplasty</b> (MAM-moh-plas-tee)	<b>mamm/o</b> = breast <b>-plasty</b> = surgical repair	Surgical repair or reconstruction of the breast.
<b>mastectomy</b> (mass-TEK-toh-mee)	<b>mast/o</b> = breast <b>-ectomy</b> = surgical removal	Surgical removal of the breast.
<b>oophorectomy</b> (oh-off-oh-REK-toh-mee)	<b>oophor/o</b> = ovary <b>-ectomy</b> = surgical removal	Surgical removal of the ovary.
<b>radical mastectomy</b> (mast-EK-toh-mee)	<b>radic/o</b> = root <b>-al</b> = pertaining to <b>mast/o</b> = breast <b>-ectomy</b> = surgical removal	Surgical removal of the breast tissue plus chest muscles and axillary lymph nodes.
<b>salpingectomy</b> (sal-ping-JECK-toh-mee)	<b>salping/o</b> = uterine tube <b>-ectomy</b> = surgical removal	Surgical removal of the uterine tube.
<b>simple mastectomy</b> (mast-EK-toh-mee)	<b>mast/o</b> = breast <b>-ectomy</b> = surgical removal	Surgical removal of only breast tissue; all underlying tissue is left intact.
<b>therapeutic abortion</b>		Termination of a pregnancy for the health of the mother or another medical reason.
<b>total abdominal hysterectomy—bilateral salpingo-oophorectomy</b> (TAH-BSO) (hiss-ter-EK-toh-me / sal-ping-goh / oh-oh-foe-REK-toh-mee)	<b>abdomin/o</b> = abdomen <b>-al</b> = pertaining to <b>hyster/o</b> = uterus <b>-ectomy</b> = surgical removal <b>bi-</b> = two <b>later/o</b> = side <b>-al</b> = pertaining to <b>salping/o</b> = uterine tube <b>oophor/o</b> = ovary <b>-ectomy</b> = surgical removal	Removal of the entire uterus, cervix, both ovaries, and both uterine tubes.
<b>tubal ligation</b> (TOO-bal / lye-GAY-shun)	<b>-al</b> = pertaining to	Surgical tying-off of the uterine tubes to prevent conception from taking place. Results in sterilization of the female.
<b>vaginal hysterectomy</b> (VAJ-ih-nal / hiss-ter-EK-toh-me)	<b>vagin/o</b> = vagina <b>-al</b> = pertaining to <b>hyster/o</b> = uterus <b>-ectomy</b> = surgical removal	Removal of the uterus through the vagina rather than through an abdominal incision.

## Practice As You Go

### D. Terminology Matching

Match each term to its definition.

- |                                    |   |
|------------------------------------|---|
| 1. _____ Pap smear                 | a. measures newborn's adjustment to outside world |
| 2. _____ intrauterine device       | b. widens birth canal; facilitates delivery       |
| 3. _____ colposcopy                | c. removes only tumor and tissue around it        |
| 4. _____ Apgar                     | d. visually examines vagina                       |
| 5. _____ chorionic villus sampling | e. test for cervical cancer                       |
| 6. _____ lumpectomy                | f. sterilization procedure                        |
| 7. _____ episiotomy                | g. birth control method                           |
| 8. _____ tubal ligation            | h. obtains cells for genetic testing              |

## Pharmacology

Classification	Word Parts	Action	Examples
<b>abortifacient</b> (ah-bore-tih-FAY-shee-ent)		Terminates a pregnancy.	mifepristone, Mifeprex; dinoprostone, Prostin E2
<b>fertility drug</b>		Triggers ovulation. Also called <i>ovulation stimulant</i> .	clomiphene, Clomid; follitropin alfa, Gonal-F
<b>hormone replacement therapy (HRT)</b>		Replaces hormones missing from menopause or lost ovaries, which can result in the lack of estrogen production. Replacing this hormone may prevent some of the consequences of menopause, especially in younger women who have surgically lost their ovaries.	conjugated estrogens, Cenestin, Premarin
<b>oral contraceptive pills (OCPs)</b> (kon-trah-SEP-tive)	<b>or/o</b> = mouth <b>-al</b> = pertaining to <b>contra-</b> = against	Form of birth control that uses low doses of female hormones to prevent conception by blocking ovulation.	desogestrel/ethinyl estradiol, Ortho-Cept; ethinyl estradiol/norgestrel, Lo/Ovral
<b>oxytocin</b> (ox-ee-TOH-sin)		A natural hormone that begins or improves uterine contractions during labor and delivery.	oxytocin, Pitocin, Syntocinon

## Abbreviations

<b>AB</b>	abortion	<b>HPV</b>	human papilloma virus
<b>AI</b>	artificial insemination	<b>HRT</b>	hormone replacement therapy
<b>BSE</b>	breast self-examination	<b>HSG</b>	hysterosalpingography
<b>CS, C-section</b>	cesarean section	<b>IUD</b>	intrauterine device
<b>CVS</b>	chorionic villus sampling	<b>IVF</b>	<i>in vitro</i> fertilization
<b>Cx</b>	cervix	<b>LBW</b>	low birth weight
<b>D &amp; C</b>	dilation and curettage	<b>LH</b>	luteinizing hormone
<b>EDC</b>	estimated date of confinement	<b>LMP</b>	last menstrual period
<b>EMB</b>	endometrial biopsy	<b>NB</b>	newborn
<b>ERT</b>	estrogen replacement therapy	<b>OB</b>	obstetrics
<b>FEKG</b>	fetal electrocardiogram	<b>OCPs</b>	oral contraceptive pills
<b>FHR</b>	fetal heart rate	<b>Pap</b>	Papanicolaou test
<b>FHT</b>	fetal heart tone	<b>PI, para I</b>	first delivery
<b>FSH</b>	follicle-stimulating hormone	<b>PID</b>	pelvic inflammatory disease
<b>FTND</b>	full-term normal delivery	<b>PIH</b>	pregnancy-induced hypertension
<b>GI, grav I</b>	first pregnancy	<b>PMS</b>	premenstrual syndrome
<b>GYN, gyn</b>	gynecology	<b>TAH-BSO</b>	total abdominal hysterectomy–bilateral salpingo-oophorectomy
<b>HCG, hCG</b>	human chorionic gonadotropin	<b>TSS</b>	toxic shock syndrome
<b>HDN</b>	hemolytic disease of the newborn	<b>UC</b>	uterine contractions

## Practice As You Go

### E. What's the Abbreviation?

1. first pregnancy \_\_\_\_\_
2. artificial insemination \_\_\_\_\_
3. uterine contractions \_\_\_\_\_
4. full-term normal delivery \_\_\_\_\_
5. intrauterine device \_\_\_\_\_
6. dilation and curettage \_\_\_\_\_
7. hormone replacement therapy \_\_\_\_\_
8. gynecology \_\_\_\_\_
9. abortion \_\_\_\_\_
10. oral contraceptive pills \_\_\_\_\_



## Section II: Male Reproductive System at a Glance

### Function

Similar to the female reproductive system, the male reproductive system is responsible for producing sperm, the male reproductive cell, secreting the male sex hormones, and delivering sperm to the female reproductive tract.

### Organs

Here are the primary structures that comprise the male reproductive system:

**bulbourethral glands**  
**epididymis**  
**penis**  
**prostate gland**

**seminal vesicles**  
**testes**  
**vas deferens**

### Word Parts

Here are the most common word parts (with their meanings) used to build male reproductive system terms. For a more comprehensive list, refer to the Terminology section of this chapter.

### Combining Forms

<b>andr/o</b>	male
<b>balan/o</b>	glans penis
<b>crypt/o</b>	hidden
<b>epididym/o</b>	epididymis
<b>orch/o</b>	testes
<b>orchi/o</b>	testes
<b>orchid/o</b>	testes

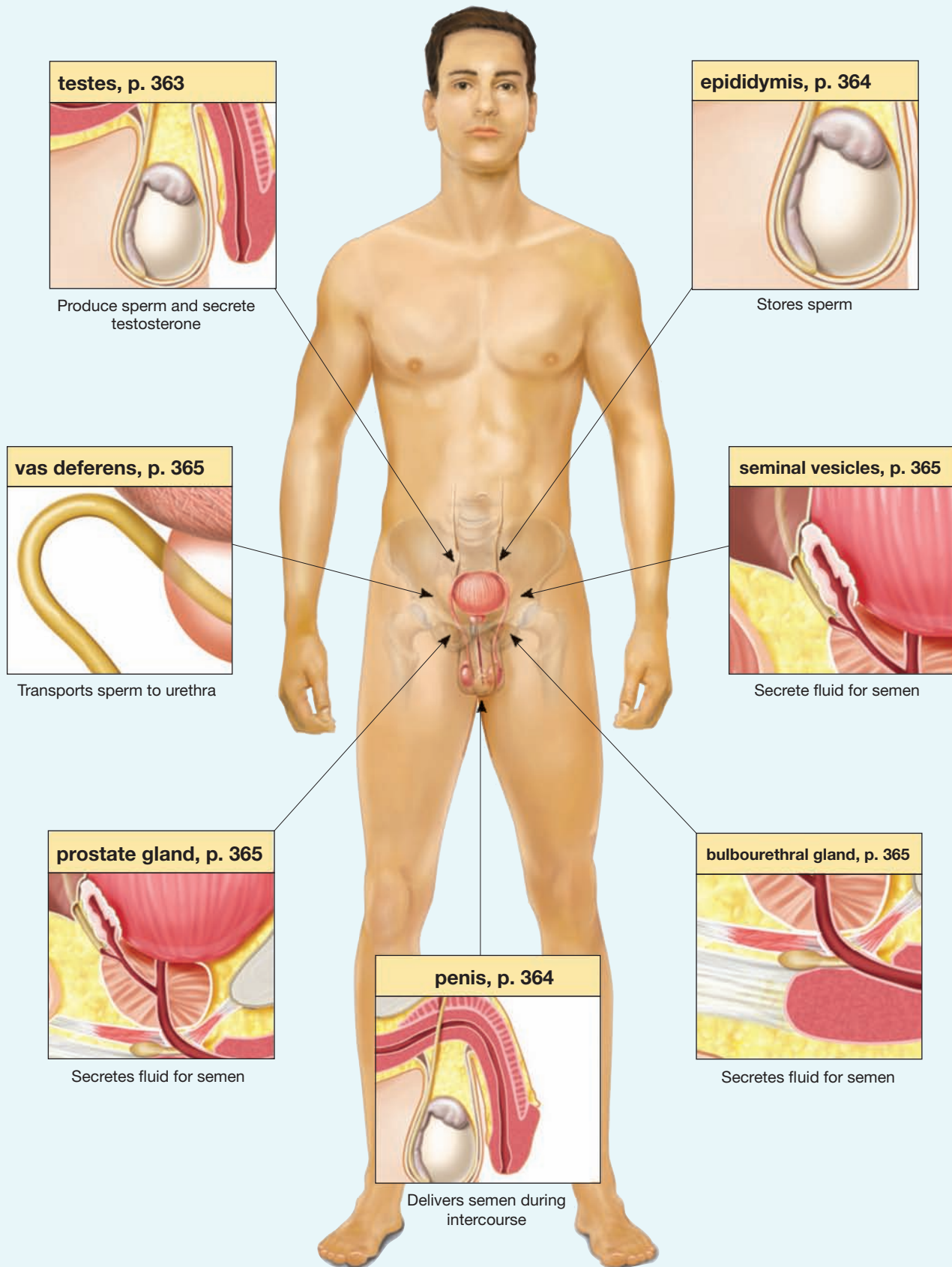
<b>pen/o</b>	penis
<b>prostat/o</b>	prostate
<b>spermat/o</b>	sperm
<b>testicul/o</b>	testes
<b>vas/o</b>	vas deferens
<b>vesicul/o</b>	seminal vesicle

### Suffixes

<b>-cide</b>	to kill
<b>-plasia</b>	formation of cells
<b>-spermia</b>	condition of sperm



# Male Reproductive System Illustrated



# Anatomy and Physiology of the Male Reproductive System

## bulbourethral glands

(buhl-boh-yoo-REE-thral)

## epididymis (ep-ih-DID-ih-mis)

## genitourinary system

(jen-ih-toh-YOO-rih-nair-ee)

## penis (PEE-nis)

## prostate gland (PROSS-tayt)

## semen (SEE-men)

## seminal vesicles (SEM-ih-nal / VESS-ih-klz)

## sex hormones

## sperm

## testes (TESS-teez)

## vas deferens (VAS / DEF-er-enz)

The male reproductive system has two main functions. The first is to produce **sperm**, the male reproductive cell; the second is to secrete the male **sex hormones**. In the male, the major organs of reproduction are located outside the body: the **penis**, and the two **testes**, each with an **epididymis** (see Figure 10.20 ■). The penis contains the urethra, which carries both urine and **semen** to the outside of the body. For this reason, this system is sometimes referred to as the **genitourinary system** (GU).

The internal organs of reproduction include two **seminal vesicles**, two **vas deferens**, the **prostate gland**, and two **bulbourethral glands**.

### What's In A Name?

Look for these word parts:

**genit/o** = genitals

**urethr/o** = urethra

**urin/o** = urine

**-al** = pertaining to

**-ary** = pertaining to

## External Organs of Reproduction

### Testes

#### androgen (AN-droh-jen)

#### perineum

#### scrotum (SKROH-tum)

#### seminiferous tubules

(sem-ih-NIF-er-us / TOO-byools)

#### spermatogenesis (sper-mat-oh-JEN-eh-sis)

#### testicles (test-IH-kles)

#### testosterone (tess-TAHS-ter-own)

### What's In A Name?

Look for these word parts:

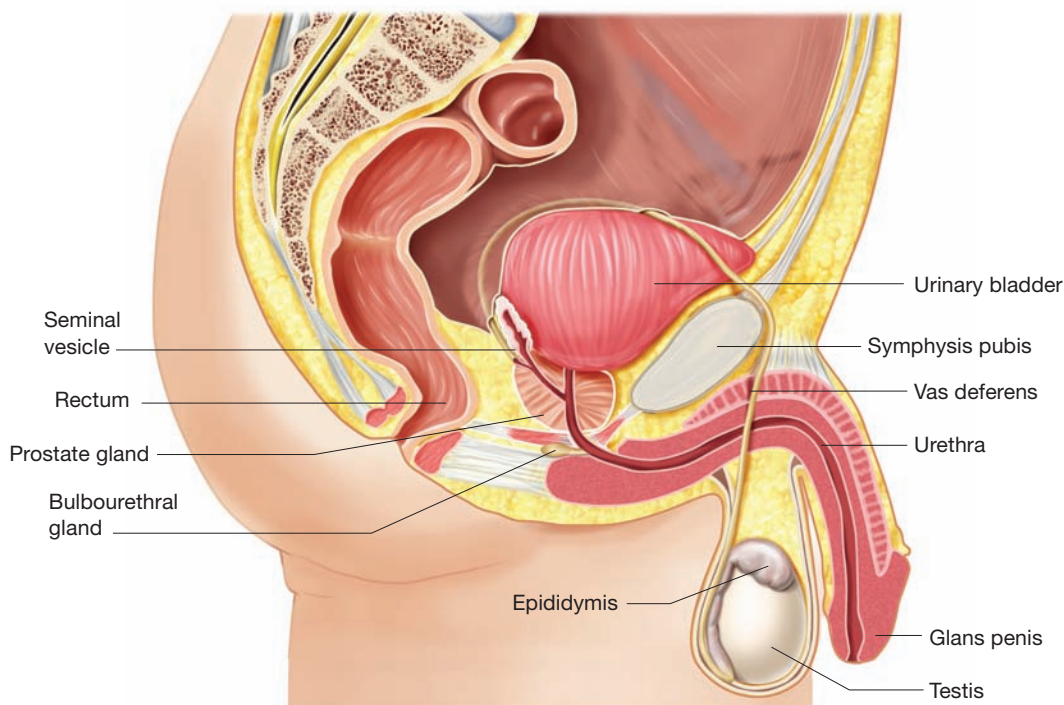
**andr/o** = male

**spermat/o** = sperm

**-gen** = that which produces

**-genesis** = produces

**-ous** = pertaining to



■ **Figure 10.20** The male reproductive system, sagittal section showing the organs of the system and their relation to the urinary bladder and rectum.

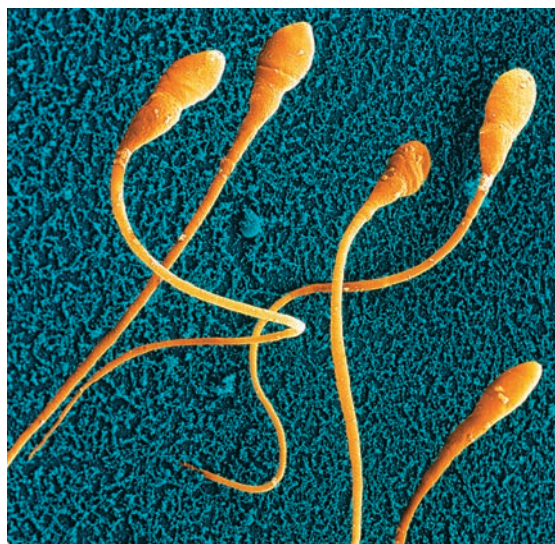
**Med Term Tip**

*Spermatozoon* and its plural form, *spermatozoa*, are other terms that mean “sperm.” You have no doubt realized that there can be several terms with the same meaning in medical terminology. You must continue to remain flexible when working with these terms in your career. In some cases, one term will be more commonly used, depending on the type of medical specialty or even what part of the country you are in.

■ **Figure 10.21** Electron-micrograph of human sperm.

(Juergen Berger, Max-Planck Institute/ Science Photo Library/Science Source)

The testes (singular is *testis*) or **testicles** are oval in shape and are responsible for the production of sperm (see again Figure 10.20). This process, called **spermatogenesis**, takes place within the **seminiferous tubules** that make up the insides of the testes (see Figure 10.21 ■). The testes must be maintained at the proper temperature for the sperm to survive. This lower temperature level is achieved by the placement of the testes suspended in the **scrotum**, a sac outside the body. The **perineum** of the male is similar to that in the female and is the area between the scrotum and the anus. The chief **androgen** (male sex hormone) is **testosterone**, which is responsible for the development of the male reproductive organs, sperm, and secondary sex characteristics, and is also produced by the testes.



## Epididymis

Each epididymis is a coiled tubule that lies on top of the testes within the scrotum (see again Figure 10.20). This elongated structure serves as the location for sperm maturation and storage until they are ready to be released into the vas deferens.

## Penis

### What's In A Name?

Look for these word parts:

**urin/o** = urine  
**-ary** = pertaining to  
**-ile** = pertaining to  
**circum-** = around

**circumcision** (ser-kum-SIH-zhun)  
**ejaculation** (ee-jak-yoo-LAY-shun)  
**erectile tissue** (ee-REK-tile)  
**glans penis** (GLANS / PEE-nis)

**prepuce** (PREE-pyoos)  
**sphincter** (SFINGK-ter)  
**urinary meatus**  
 (YOO-rih-nair-ee / me-AY-tus)

**Med Term Tip**

During sexual intercourse, which is also referred to as *coitus*, the male can eject up to 100 million sperm cells. The adult male produces nearly 200 million sperm daily.

The penis is the male sex organ containing **erectile tissue** that is encased in skin (see again Figure 10.20). This organ delivers semen into the female vagina. The soft tip of the penis is referred to as the **glans penis**. It is protected by a covering called the **prepuce** or foreskin. It is this covering of skin that is removed during the procedure known as **circumcision**. The penis becomes erect during sexual stimulation, which allows it to be placed within the female for the **ejaculation** of semen. The male urethra extends from the urinary bladder to the external opening in the penis, the **urinary meatus**, and serves a dual function: the elimination of urine and the ejaculation of semen. During the ejaculation process, a **sphincter** closes to keep urine from escaping.

## Internal Organs of Reproduction

### Vas Deferens

**spermatic cord** (sper-MAT-ik)

Each vas deferens carries sperm from the epididymis up into the pelvic cavity. They travel up in front of the urinary bladder, over the top, and then back down the posterior side of the bladder to empty into the urethra (see again Figure 10.20). They, along with nerves, arteries, veins, and lymphatic vessels running between the pelvic cavity and the testes, form the **spermatic cord**.

### Seminal Vesicles

The two seminal vesicles are small glands located at the base of the urinary bladder (see again Figure 10.20). These vesicles are connected to the vas deferens just before it empties into the urethra. The seminal vesicles secrete a glucose-rich fluid that nourishes the sperm. This liquid, along with the sperm and secretions from other male reproductive glands, constitutes semen, the fluid that is eventually ejaculated during sexual intercourse.

### Prostate Gland

The single prostate gland is located just below the urinary bladder (see again Figure 10.20). It surrounds the urethra and when enlarged can cause difficulty in urination. The prostate is important for the reproductive process since it secretes an alkaline fluid that assists in keeping the sperm alive by neutralizing the pH of the urethra and vagina.

### Bulbourethral Glands

**Cowper's glands** (KOW-perz)

The bulbourethral glands, also known as **Cowper's glands**, are two small glands located on either side of the urethra just below the prostate (see again Figure 10.20). They produce a mucuslike lubricating fluid that joins with semen to become a part of the ejaculate.

## Practice As You Go

### F. Complete the Statement

1. The male reproductive system is a combination of the \_\_\_\_\_ and \_\_\_\_\_ systems.
2. The male's external organs of reproduction consist of the \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
3. Another term for the prepuce is the \_\_\_\_\_.
4. The organs responsible for developing the sperm cells are the \_\_\_\_\_.
5. The glands of lubrication and fluid production at each side of the male urethra are the \_\_\_\_\_.
6. The male sex hormone is \_\_\_\_\_.
7. The area between the scrotum and the anus is called the \_\_\_\_\_.



# Terminology

## Word Parts Used to Build Male Reproductive System Terms

The following lists contain the combining forms, suffixes, and prefixes used to build terms in the remaining sections of this chapter.

### Combining Forms

<b>andr/o</b>	male
<b>balan/o</b>	glans penis
<b>carcin/o</b>	cancer
<b>crypt/o</b>	hidden
<b>epididym/o</b>	epididymis
<b>genit/o</b>	genital
<b>hydr/o</b>	water
<b>immun/o</b>	protection

<b>olig/o</b>	scanty
<b>orch/o</b>	testes
<b>orchi/o</b>	testes
<b>orchid/o</b>	testes
<b>pen/o</b>	penis
<b>prostat/o</b>	prostate gland
<b>rect/o</b>	rectum

<b>spermat/o</b>	sperm
<b>testicul/o</b>	testicle
<b>ur/o</b>	urine
<b>urethr/o</b>	urethra
<b>varic/o</b>	dilated vein
<b>vas/o</b>	vas deferens
<b>vesicul/o</b>	seminal vesicle

### Suffixes

<b>-al</b>	pertaining to
<b>-ar</b>	pertaining to
<b>-cele</b>	protrusion
<b>-cide</b>	to kill
<b>-ectomy</b>	surgical removal
<b>-gen</b>	that which produces
<b>-iasis</b>	abnormal condition
<b>-ic</b>	pertaining to

<b>-ile</b>	pertaining to
<b>-ism</b>	state of
<b>-itis</b>	inflammation
<b>-logy</b>	study of
<b>-lysis</b>	to destroy
<b>-oid</b>	resembling
<b>-oma</b>	tumor
<b>-osis</b>	abnormal condition

<b>-ostomy</b>	surgically create an opening
<b>-otomy</b>	cutting into
<b>-pexy</b>	surgical fixation
<b>-plasia</b>	formation of cells
<b>-plasty</b>	surgical repair
<b>-rrhea</b>	discharge
<b>-spermia</b>	sperm condition

### Prefixes

<b>a-</b>	without
<b>an-</b>	without
<b>anti-</b>	against

<b>dys-</b>	abnormal
<b>epi-</b>	above
<b>hyper-</b>	excessive

<b>hypo-</b>	below
<b>trans-</b>	across

## Adjective Forms of Anatomical Terms

Term	Word Parts	Definition
<b>balanic</b> (buh-LAN-ik)	<b>balan/o</b> = glans penis <b>-ic</b> = pertaining to	Pertaining to the glans penis.
<b>epididymal</b> (ep-ih-DID-ih-mal)	<b>epididym/o</b> = epididymis <b>-al</b> = pertaining to	Pertaining to the epididymis.
<b>penile</b> (PEE-nile)	<b>pen/o</b> = penis <b>-ile</b> = pertaining to	Pertaining to the penis.
<b>prostatic</b> (pross-TAT-ik)	<b>prostat/o</b> = prostate gland <b>-ic</b> = pertaining to	Pertaining to the prostate gland.

## Adjective Forms of Anatomical Terms (continued)

Term	Word Parts	Definition
<b>spermatic</b> (sper-MAT-ik)	<b>spermat/o</b> = sperm <b>-ic</b> = pertaining to	Pertaining to sperm.
<b>testicular</b> (tes-TIK-yoo-lar)	<b>testicul/o</b> = testes <b>-ar</b> = pertaining to	Pertaining to the testes.
<b>vasal</b> (VAY-sal)	<b>vas/o</b> = vas deferens <b>-al</b> = pertaining to	Pertaining to the vas deferens.
<b>vesicular</b> (veh-SIC-yoo-lar)	<b>vesicul/o</b> = seminal vesicle <b>-ar</b> = pertaining to  <b>Word Watch</b>       Be careful using the combining forms <i>vesic/o</i> meaning “bladder” and <i>vesicul/o</i> meaning “seminal vesicle.”	Pertaining to the seminal vesicle.

## Practice As You Go

### G. Give the adjective form for each anatomical structure

1. A testis \_\_\_\_\_
2. Sperm \_\_\_\_\_
3. A seminal vesicle \_\_\_\_\_
4. The penis \_\_\_\_\_
5. The prostate gland \_\_\_\_\_

## Pathology


Term	Word Parts	Definition
<b>Medical Specialties</b>		
<b>urology</b> (yoo-RAL-oh-jee)	<b>ur/o</b> = urine <b>-logy</b> = study of	Branch of medicine involved in diagnosis and treatment of diseases and disorders of the urinary system and male reproductive system. Physician is a <i>urologist</i> .
<b>Signs and Symptoms</b>		
<b>aspermia</b> (ah-SPER-mee-ah)	<b>a-</b> = without <b>-spermia</b> = sperm condition	Condition of having no sperm.
<b>balanorrhea</b> (bah-lah-noh-REE-ah)	<b>balan/o</b> = glans penis <b>-rrhea</b> = discharge	Discharge from the glans penis.
<b>oligospermia</b> (ol-ih-goh-SPER-mee-ah)	<b>olig/o</b> = scanty <b>-spermia</b> = sperm condition	Condition of having too few sperm, making the chances of fertilization very low.
<b>spermatolysis</b> (sper-mah-TOL-ih-sis)	<b>spermat/o</b> = sperm <b>-lysis</b> = to destroy	Term that refers to anything that destroys sperm.



## Pathology (continued)

Term	Word Parts	Definition
<b>Testes</b>		
<b>anorchism</b> (an-OR-kizm)	<b>an-</b> = without <b>orch/o</b> = testes <b>-ism</b> = state of	The absence of testes; may be congenital or as the result of an accident or surgery.
<b>cryptorchidism</b> (kript-OR-kid-izm)	<b>crypt/o</b> = hidden <b>orchid/o</b> = testes <b>-ism</b> = state of	Failure of the testes to descend into the scrotal sac before birth. Usually, the testes will descend before birth. A surgical procedure called <i>orchidopexy</i> may be required to bring the testes down into the scrotum permanently. Failure of the testes to descend could result in sterility in the male or an increased risk of testicular cancer.
<b>hydrocele</b> (HIGH-droh-seel)	<b>hydr/o</b> = water <b>-cele</b> = protrusion	Accumulation of fluid around the testes or along the spermatic cord. Common in infants.
<b>orchitis</b> (or-KIGH-tis)	<b>orch/o</b> = testes <b>-itis</b> = inflammation	Inflammation of one or both testes.
<b>sterility</b>		Inability to father children due to a problem with spermatogenesis.
<b>testicular carcinoma</b> (kar-sih-NOH-mah)	<b>testicul/o</b> = testicle <b>-ar</b> = pertaining to <b>carcin/o</b> = cancer <b>-oma</b> = tumor	Cancer of one or both testicles; most common cancer in men under age 40.
<b>testicular torsion</b>	<b>testicul/o</b> = testicle <b>-ar</b> = pertaining to	Twisting of the spermatic cord.
<b>varicocele</b> (VAIR-ih-koh-seel)	<b>varic/o</b> = dilated vein <b>-cele</b> = protrusion	Enlargement of the veins of the spermatic cord that commonly occurs on the left side of adolescent males.
<b>Epididymis</b>		
<b>epididymitis</b> (ep-ih-did-ih-MYE-tis)	<b>epididym/o</b> = epididymis <b>-itis</b> = inflammation	Inflammation of the epididymis.
<b>Prostate Gland</b>		
<b>benign prostatic hyperplasia (BPH)</b> (bee-NINE / pross-TAT-ik / high-per-PLAY-zhee-ah)	<b>prostat/o</b> = prostate gland <b>-ic</b> = pertaining to <b>hyper-</b> = excessive <b>-plasia</b> = formation of cells	Noncancerous enlargement of the prostate gland commonly seen in males over age 50. Formerly called <i>benign prostatic hypertrophy</i> .
<b>prostate cancer</b> (PROSS-tayt)		Slow-growing cancer that affects a large number of males after age 50. The prostate-specific antigen (PSA) test is used to assist in early detection of this disease.
<b>prostatitis</b> (pross-tah-TYE-tis)	<b>prostat/o</b> = prostate gland <b>-itis</b> = inflammation	Inflammation of the prostate gland.
<b>Penis</b>		
<b>balanitis</b> (bal-ah-NYE-tis)	<b>balan/o</b> = glans penis <b>-itis</b> = inflammation	Inflammation of the glans penis.

## Pathology (continued)

Term	Word Parts	Definition
<b>epispadias</b> (ep-ih-SPAY-dee-as)	<b>epi-</b> = above	Congenital opening of the urethra on the dorsal surface of the penis.
<b>erectile dysfunction (ED)</b> (ee-REK-tile)	<b>-ile</b> = pertaining to <b>dys-</b> = abnormal, difficult	Inability to engage in sexual intercourse due to inability to maintain an erection. Also called <i>impotence</i> .
<b>hypospadias</b> (high-poh-SPAY-dee-as)	<b>hypo-</b> = below	Congenital opening of the male urethra on the underside of the penis.
<b>phimosis</b> (fih-MOH-sis)	<b>-osis</b> = abnormal condition	Narrowing of the foreskin over the glans penis resulting in difficulty with hygiene. This condition can lead to infection or difficulty with urination. The condition is treated with circumcision, the surgical removal of the foreskin.
<b>priapism</b> (pri-ah-pizm)	<b>-ism</b> = state of	A persistent and painful erection due to pathological causes, not sexual arousal.
<b>Sexually Transmitted Diseases</b>		
<b>chancroid</b> (SHANG-kroyd)	<b>-oid</b> = resembling	Highly infectious nonsyphilitic venereal ulcer.
<p>■ <b>Figure 10.22</b> Photograph showing a chancroid on the glans penis. (Joe Miller/Centers for Disease Control and Prevention [CDC])</p> 		
<b>chlamydia</b> (klah-MID-ee-ah)		Bacterial infection causing genital inflammation in males and females. Can lead to pelvic inflammatory disease in females and eventual infertility.
<b>genital herpes</b> (JEN-ih-tal / HER-pee-z)	<b>genit/o</b> = genital <b>-al</b> = pertaining to	Spreading skin disease that can appear like a blister or vesicle on the genital region of males and females; may spread to other areas of the body. Caused by a sexually transmitted virus.

## Pathology (continued)

Term	Word Parts	Definition
<b>genital warts</b> (JEN-ih-tal)	<b>genit/o</b> = genital <b>-al</b> = pertaining to	Growth of warts on the genitalia of both males and females that can lead to cancer of the cervix in females. Caused by the sexual transmission of the human papilloma virus (HPV).
<b>gonorrhea</b> (GC) (gon-oh-REE-ah)	<b>-rrhea</b> = discharge	Sexually transmitted bacterial infection of the mucous membranes of either sex. Can be passed on to an infant during the birth process.
<b>human immunodeficiency virus</b> (HIV)	<b>immun/o</b> = protection	Sexually transmitted virus that attacks the immune system.
<b>sexually transmitted disease</b> (STD)		Disease usually acquired as the result of sexual intercourse. Also called <i>sexually transmitted infections</i> (STI). Formerly referred to as <i>venereal disease</i> (VD).
<b>syphilis</b> (SIF-ih-lis)		Infectious, chronic, bacterial venereal disease that can involve any organ. May exist for years without symptoms, but is fatal if untreated. Treated with the antibiotic penicillin.
<b>trichomoniasis</b> (trik-oh-moh-NYE-ah-sis)	<b>-iasis</b> = abnormal condition	Genitourinary infection caused by a single-cell protist that is usually without symptoms (asymptomatic) in both males and females. In women the disease can produce itching and/or burning, a foul-smelling discharge, and result in vaginitis.

## Practice As You Go

### H. Terminology Matching

Match each term to its definition.

- |                       |                                  |
|-----------------------|----------------------------------|
| 1. _____ aspermia     | a. inflammation of glans penis   |
| 2. _____ phimosis     | b. having no sperm               |
| 3. _____ balanitis    | c. venereal ulcer                |
| 4. _____ chancroid    | d. having too few sperm          |
| 5. _____ varicocele   | e. narrowing of foreskin         |
| 6. _____ oligospermia | f. enlarged spermatic cord veins |

## Diagnostic Procedures

Term	Word Parts	Definition
<b>Clinical Laboratory Tests</b>		
<b>prostate-specific antigen (PSA)</b> (PROSS-tayt-specific / AN-tih-jen)	<b>anti-</b> = against <b>-gen</b> = that which produces	Blood test to screen for prostate cancer. Elevated blood levels of PSA are associated with prostate cancer.
<b>semen analysis</b> (SEE-men / ah-NAL-ih-sis)		Procedure used when performing a fertility workup to determine if the male is able to produce sperm. Semen is collected by the patient after abstaining from sexual intercourse for a period of three to five days. The sperm in the semen are analyzed for number, swimming strength, and shape. Also used to determine if a vasectomy has been successful. After a period of six weeks, no further sperm should be present in a sample from the patient.
<b>Additional Diagnostic Procedures</b>		
<b>digital rectal exam (DRE)</b> (DIJ-ih-tal / REK-tal)	<b>rect/o</b> = rectum <b>-al</b> = pertaining to	Manual examination for an enlarged prostate gland performed by palpating (feeling) the prostate gland through the wall of the rectum.

## Therapeutic Procedures

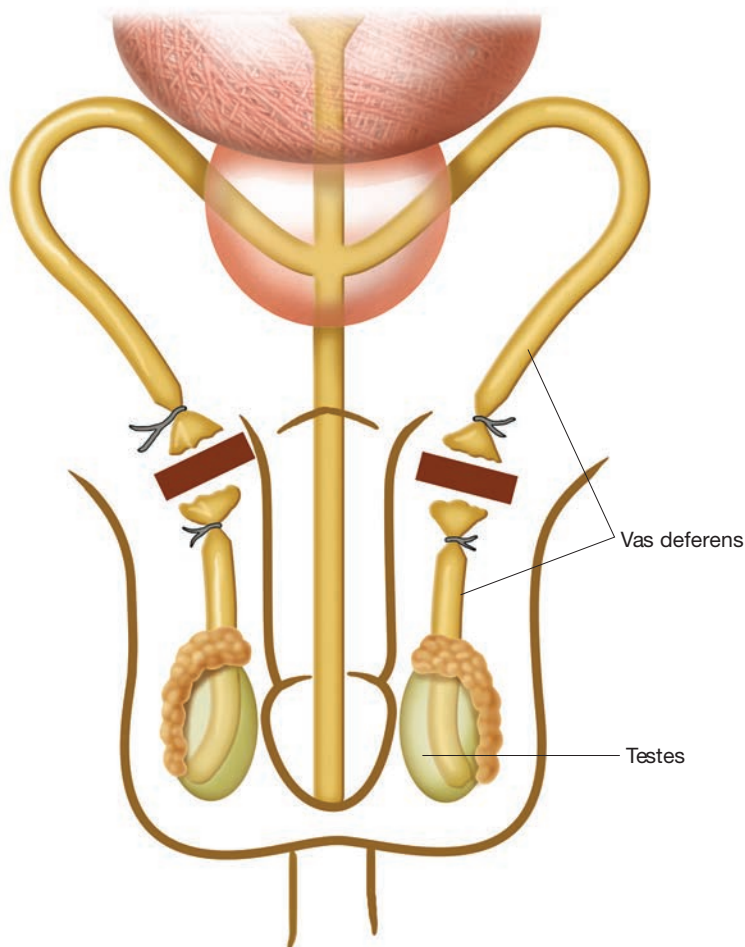
Term	Word Parts	Definition
<b>Surgical Procedures</b>		
<b>balanoplasty</b> (BAL-ah-noh-plas-tee)	<b>balan/o</b> = glans penis <b>-plasty</b> = surgical repair	Surgical repair of the glans penis.
<b>castration</b> (kass-TRAY-shun)		Removal of the testicles in the male or the ovaries in the female.
<b>circumcision</b> (ser-kum-SIH-zhun)		Surgical removal of the prepuce, or foreskin, of the penis. Generally performed on the newborn male at the request of the parents. The primary reason is for ease of hygiene. Circumcision is also a ritual practice in some religions.
<b>epididymectomy</b> (ep-ih-did-ih-MEK-toh-mee)	<b>epididym/o</b> = epididymis <b>-ectomy</b> = surgical removal	Surgical removal of the epididymis.
<b>orchidectomy</b> (or-kid-EK-toh-mee)	<b>orchid/o</b> = testes <b>-ectomy</b> = surgical removal	Surgical removal of one or both testes.
<b>orchidopexy</b> (OR-kid-oh-peck-see)	<b>orchid/o</b> = testes <b>-pexy</b> = surgical fixation	Surgical fixation to move undescended testes into the scrotum and to attach them to prevent retraction. Used to treat cryptorchidism.
<b>orchiectomy</b> (or-kee-EK-toh-mee)	<b>orchi/o</b> = testes <b>-ectomy</b> = surgical removal	Surgical removal of one or both testes.
<b>orchiotomy</b> (or-kee-OT-oh-mee)	<b>orchi/o</b> = testes <b>-otomy</b> = cutting into	To cut into the testes.
<b>orchioplasty</b> (OR-kee-oh-plas-tee)	<b>orchi/o</b> = testes <b>-plasty</b> = surgical repair	Surgical repair of the testes.

## Therapeutic Procedures (continued)

Term	Word Parts	Definition
<b>prostatectomy</b> (pross-tah-TEK-toh-mee)	<b>prostat/o</b> = prostate gland <b>-ectomy</b> = surgical removal	Surgical removal of the prostate gland.
<b>sterilization</b> (ster-ih-lih-ZAY-shun)		Process of rendering a male or female sterile or unable to conceive children.
<b>transurethral resection of the prostate (TUR, TURP)</b> (trans-yoo-REE-thrall / REE-sek-shun / PROSS-tayt)	<b>trans-</b> = across <b>urethr/o</b> = urethra <b>-al</b> = pertaining to	Surgical removal of the part of the prostate gland that is blocking urine flow by inserting a device through the urethra and removing prostate tissue.
<b>vasectomy</b> (vas-EK-toh-mee)	<b>vas/o</b> = vas deferens <b>-ectomy</b> = surgical removal	Removal of a segment or all of the vas deferens to prevent sperm from leaving the male body. Used for contraception purposes.

### Med Term Tip

The vas deferens is the tubing that is severed during a procedure called a *vasectomy*. A vasectomy results in the sterilization of the male since the sperm are no longer able to travel into the urethra and out of the penis during sexual intercourse. The surgical procedure to reverse a vasectomy is a *vasovasostomy*. A new opening is created in order to reconnect one section of the vas deferens to another section of the vas deferens, thereby reestablishing an open tube for sperm to travel through.



■ **Figure 10.23** A vasectomy, showing how each vas deferens is tied off in two places and then a section is removed from the middle. This prevents sperm from traveling through the vas deferens during ejaculation.

<b>vasovasostomy</b> (vas-oh-vay-ZOS-toh-mee)	<b>vas/o</b> = vas deferens <b>-ostomy</b> = surgically create an opening	Surgical procedure to reconnect the vas deferens to reverse a vasectomy.
--	--	--

## Practice As You Go

### I. Terminology Matching

Match each term to its definition.

- |                              |                                      |
|------------------------------|--------------------------------------|
| 1. _____ digital rectal exam | a. removes prepuce                   |
| 2. _____ circumcision        | b. surgical fixation of testis       |
| 3. _____ vasectomy           | c. examination for enlarged prostate |
| 4. _____ orchidopexy         | d. sterilization procedure           |
| 5. _____ semen analysis      | e. part of a fertility workup        |

## Pharmacology

Classification	Word Parts	Action	Examples
<b>androgen therapy</b> (AN-droh-jen)	<b>andr/o</b> = male <b>-gen</b> = that which produces	Replaces male hormones to treat patients who produce insufficient hormone naturally.	testosterone cypionate, Andronate, depAndro
<b>antiprostatic agents</b> (an-tye-pross-TAT-ik)	<b>anti-</b> = against <b>prostat/o</b> = prostate gland <b>-ic</b> = pertaining to	Treat early cases of benign prostatic hyperplasia. May prevent surgery for mild cases.	finasteride, Proscar; dutasteride, Avodart
<b>erectile dysfunction agents</b> (ee-REK-tile)	<b>-ile</b> = pertaining to <b>dys-</b> = abnormal	Temporarily produce an erection in patients with erectile dysfunction.	sildenafil citrate, Viagra; tadalafil, Cialis
<b>spermatocide</b> (SPER-mah-toh-side)	<b>spermat/o</b> = sperm <b>-cide</b> = to kill	Destroys sperm. One form of birth control is the use of spermatolytic creams.	octoxynol 9, Semicid, Ortho-Gynol

## Abbreviations

<b>BPH</b>	benign prostatic hyperplasia	<b>SPP</b>	suprapubic prostatectomy
<b>DRE</b>	digital rectal exam	<b>STD</b>	sexually transmitted disease
<b>ED</b>	erectile dysfunction	<b>STI</b>	sexually transmitted infection
<b>GC</b>	gonorrhea	<b>TUR</b>	transurethral resection
<b>GU</b>	genitourinary	<b>TURP</b>	transurethral resection of the prostate
<b>PSA</b>	prostate-specific antigen	<b>VD</b>	venereal disease
<b>RPR</b>	rapid plasma reagin (test for syphilis)		



## Practice As You Go

### J. What's the Abbreviation?

1. erectile dysfunction \_\_\_\_\_
2. gonorrhea \_\_\_\_\_
3. digital rectal exam \_\_\_\_\_
4. transurethral resection of the prostate \_\_\_\_\_
5. sexually transmitted infection \_\_\_\_\_



# Chapter Review

## Real-World Applications

### Medical Record Analysis

This High-Risk Obstetrics Consultation Report contains 12 medical terms. Underline each term and write it in the list below the report. Then define each term.

#### High-Risk Obstetrics Consultation Report

Reason for Consultation:	High-risk pregnancy with late-term bleeding
History of Present Illness:	Patient is 23 years old. She is currently estimated to be at 175 days' gestation. Amniocentesis at 20 weeks shows a normally developing male fetus. She noticed a moderate degree of bleeding this morning but denies any cramping or pelvic pain. She immediately saw her obstetrician who referred her for high-risk evaluation.
Past Medical History:	This patient is multigravida but nullipara with three early miscarriages without obvious cause.
Results of Physical Examination:	Patient appears well nourished and abdominal girth appears consistent with length of gestation. Pelvic ultrasound indicates placenta previa with placenta almost completely overlying cervix. However, there is no evidence of abruptio placentae at this time. Fetal size estimate is consistent with 25 weeks' gestation. The fetal heartbeat is strong with a rate of 130 beats/minute.
Recommendations:	Fetus appears to be developing well and in no distress at this time. The placenta appears to be well attached on ultrasound, but the bleeding is cause for concern. With the extremely low position of the placenta, this patient is at very high risk for abruptio placentae. She will require C-section at onset of labor.

Term	Definition
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____
7. _____	_____
8. _____	_____
9. _____	_____
10. _____	_____
11. _____	_____
12. _____	_____

## Chart Note Transcription

The chart note below contains 10 phrases that can be reworded with a medical term that you learned in this chapter. Each phrase is identified with an underline. Determine the medical term and write your answers in the space provided.

Pearson General Hospital Consultation Report	
Task	Edit View Time Scale Options Help Download Archive Date: 17 May 2015
Current Complaint:	Patient is a 77-year-old male seen by the urologist with complaints of nocturia and difficulty with <u>the release of semen from the urethra</u> . <b>1</b>
Past History:	Medical history revealed that the patient had <u>failure of the testes to descend into the scrotum</u> <b>2</b> at birth, which was repaired by <u>surgical fixation of the testes</u> . <b>3</b> He had also undergone elective sterilization <u>by removal of a segment of the vas deferens</u> <b>4</b> at the age of 41.
Signs and Symptoms:	Patient states he first noted these symptoms about five years ago. They have become increasingly severe and now he is not able to sleep without waking to urinate up to 20 times a night. He has difficulty with <u>release of semen</u> . <b>5</b> <u>Palpation of the prostate gland through the rectum</u> <b>6</b> revealed multiple round, firm nodules in prostate gland. A needle biopsy was negative for <u>slow-growing cancer that frequently affects males over age 50</u> <b>7</b> and a <u>blood test for prostate cancer</u> <b>8</b> was normal.
Diagnosis:	<u>Noncancerous enlargement of the prostate gland</u> . <b>9</b>
Treatment:	Patient was scheduled for a <u>surgical removal of prostate tissue through the urethra</u> . <b>10</b>
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____
6.	_____
7.	_____
8.	_____
9.	_____
10.	_____

## Case Study

Below is a case study presentation of a patient with a condition covered by this chapter. Read the case study and answer the questions below. Some questions will ask for information not included within this chapter. Use your text, a medical dictionary, or any other reference material you choose to answer these questions.



(Jason Stitt/Shutterstock)

A 22-year-old female has come into the gynecologist's office complaining of fever, malaise, dysuria, and vaginal leukorrhea. Upon examination the physician observes fluid-filled vesicles on her cervix, vulva, and perineum. Several have ruptured into ulcers with marked erythema and edema. Palpation revealed painful and enlarged inguinal lymph nodes. She also has an extragenital lesion on her mouth. Her diagnosis is genital herpes.

## Questions

1. What pathological condition does this patient have? Look this condition up in a reference source and include a short description of it.  

---

---
2. List and define each of the patient's presenting symptoms in your own words.  

---

---
3. Describe the results of the physician's examination in your own words.  

---

---
4. Explain what extragenital lesion means.  

---

---
5. Explain what palpation means.  

---

---
6. What is the potential effect of having this virus present in open genital lesions on the patient's future pregnancy and childbirth?  

---

---

## Practice Exercises

### A. What Does it Stand For?

1. SPP \_\_\_\_\_
2. TUR \_\_\_\_\_
3. GU \_\_\_\_\_
4. BPH \_\_\_\_\_
5. PSA \_\_\_\_\_
6. Cx \_\_\_\_\_
7. LMP \_\_\_\_\_
8. FHR \_\_\_\_\_
9. PID \_\_\_\_\_
10. GYN \_\_\_\_\_
11. CS \_\_\_\_\_
12. NB \_\_\_\_\_
13. PMS \_\_\_\_\_
14. TSS \_\_\_\_\_
15. LBW \_\_\_\_\_

### B. Define the Term

1. spermatogenesis \_\_\_\_\_
2. hydrocele \_\_\_\_\_
3. transurethral resection of the prostate (TURP) \_\_\_\_\_
4. sterility \_\_\_\_\_
5. orchiectomy \_\_\_\_\_
6. vasectomy \_\_\_\_\_
7. castration \_\_\_\_\_
8. gestation \_\_\_\_\_
9. meconium \_\_\_\_\_
10. nulligravida \_\_\_\_\_
11. dystocia \_\_\_\_\_
12. metrorrhea \_\_\_\_\_

13. fibroid tumor \_\_\_\_\_

14. fibrocystic disease \_\_\_\_\_

15. placenta previa \_\_\_\_\_

### C. Word Building Practice

The combining form **colp/o** refers to the vagina. Use it to write a term that means:

1. visual examination of the vagina \_\_\_\_\_

2. instrument used to examine the vagina \_\_\_\_\_

The combining form **cervic/o** refers to the cervix. Use it to write a term that means:

3. removal of the cervix \_\_\_\_\_

4. inflammation of the cervix \_\_\_\_\_

The combining form **hyster/o** also refers to the uterus. Use it to write a term that means:

5. surgical fixation of the uterus \_\_\_\_\_

6. removal of the uterus \_\_\_\_\_

7. rupture of the uterus \_\_\_\_\_

The combining form **oophor/o** refers to the ovaries. Use it to write a term that means:

8. inflammation of an ovary \_\_\_\_\_

9. removal of an ovary \_\_\_\_\_

The combining form **mamm/o** refers to the breasts. Use it to write a term that means:

10. record of breast \_\_\_\_\_

11. surgical repair of breast \_\_\_\_\_

The combining form **amni/o** refers to the amnion. Use it to write a term that means:

12. cutting into amnion \_\_\_\_\_

13. flow from amnion \_\_\_\_\_

The combining form **prostat/o** refers to the prostate. Use this to write a term that means:

14. removal of prostate \_\_\_\_\_

15. inflammation of the prostate \_\_\_\_\_

The combining form **orchi/o** refers to the testes. Use this to write a term that means:

16. removal of the testes \_\_\_\_\_

17. surgical repair of the testes \_\_\_\_\_

18. incision into the testes \_\_\_\_\_



The suffix **-spermia** refers to a sperm condition. Use this to write a term that means:

19. condition of being without sperm \_\_\_\_\_

20. condition of having too few (scanty) sperm \_\_\_\_\_

The combining form **spermat/o** refers to sperm. Use this to write a term that means:

21. sperm forming \_\_\_\_\_

22. to destroy sperm \_\_\_\_\_

#### D. Define the Combining Form

	Definition	Example from Chapter
1. <b>metr/o</b>	_____	_____
2. <b>hyster/o</b>	_____	_____
3. <b>gynec/o</b>	_____	_____
4. <b>episi/o</b>	_____	_____
5. <b>oophor/o</b>	_____	_____
6. <b>ovari/o</b>	_____	_____
7. <b>salping/o</b>	_____	_____
8. <b>men/o</b>	_____	_____
9. <b>vagin/o</b>	_____	_____
10. <b>mast/o</b>	_____	_____
11. <b>spermat/o</b>	_____	_____
12. <b>orchi/o</b>	_____	_____
13. <b>andr/o</b>	_____	_____
14. <b>pen/o</b>	_____	_____
15. <b>prostat/o</b>	_____	_____

**E. Define the Suffix**

	Definition	Example from Chapter
1. <b>-tocia</b>	_____	_____
2. <b>-gravida</b>	_____	_____
3. <b>-arche</b>	_____	_____
4. <b>-cyesis</b>	_____	_____
5. <b>-partum</b>	_____	_____
6. <b>-para</b>	_____	_____
7. <b>-salpinx</b>	_____	_____
8. <b>-spermia</b>	_____	_____

**F. Fill in the Blank**

premenstrual syndrome	stillbirth	conization	laparoscopy
D & C	puberty	endometriosis	eclampsia
fibroid tumor	cesarean section		

- Kesha had a core of tissue from her cervix removed for testing. This is called \_\_\_\_\_.
- Joan delivered a baby that had died while still in the uterus. She had a(n) \_\_\_\_\_.
- Ashley has just started her first menstrual cycle. She is said to have entered \_\_\_\_\_.
- Kimberly is experiencing tender breasts, headaches, and some irritability just prior to her monthly menstrual cycle. This may be \_\_\_\_\_.
- Ana has been scheduled for an examination in which her physician will use an instrument to observe her abdominal cavity to rule out the diagnosis of severe endometriosis. The physician will insert the instrument through a small incision. This procedure is called a(n) \_\_\_\_\_.
- Lenora is scheduled to have a hysterectomy as a result of a long history of large benign growths in her uterus that have caused pain and bleeding. Lenora has a(n) \_\_\_\_\_.
- Tiffany's physician has recommended that she have a uterine scraping to stop excessive bleeding after a miscarriage. She will be scheduled for a(n) \_\_\_\_\_.
- Stacey is having frequent prenatal checkups to prevent the serious condition of pregnancy called \_\_\_\_\_.
- Marion has experienced painful menstrual periods as a result of the lining of her uterus being displaced into her pelvic cavity. This is called \_\_\_\_\_.
- Because her cervix was not dilating, Shataundra was informed that she will probably require a(n) \_\_\_\_\_ for her baby's delivery.

### G. Terminology Matching

Match each term to its definition.

- |                                       |                                      |
|---------------------------------------|--------------------------------------|
| 1. _____ gonorrhea                    | a. also called STD                   |
| 2. _____ genital herpes               | b. caused by parasitic microorganism |
| 3. _____ human immunodeficiency virus | c. treated with penicillin           |
| 4. _____ syphilis                     | d. caused by human papilloma virus   |
| 5. _____ venereal disease             | e. can pass to infant during birth   |
| 6. _____ genital warts                | f. genitourinary infection           |
| 7. _____ chancroid                    | g. venereal ulcer                    |
| 8. _____ chlamydia                    | h. attacks the immune system         |
| 9. _____ trichomoniasis               | i. skin disease with vesicles        |

### H. Pharmacology Challenge

Fill in the classification for each drug description, then match the brand name.

Drug Description	Classification	Brand Name
1. _____ replacement male hormone	_____	a. Pitocin
2. _____ improves uterine contractions	_____	b. Avodart
3. _____ treats early BPH	_____	c. Clomid
4. _____ blocks ovulation	_____	d. Semicid
5. _____ kills sperm	_____	e. Mifeprex
6. _____ produces an erection	_____	f. Andronate
7. _____ replaces estrogen	_____	g. Ortho-Cept
8. _____ terminates a pregnancy	_____	h. Viagra
9. _____ triggers ovulation	_____	i. Premarin

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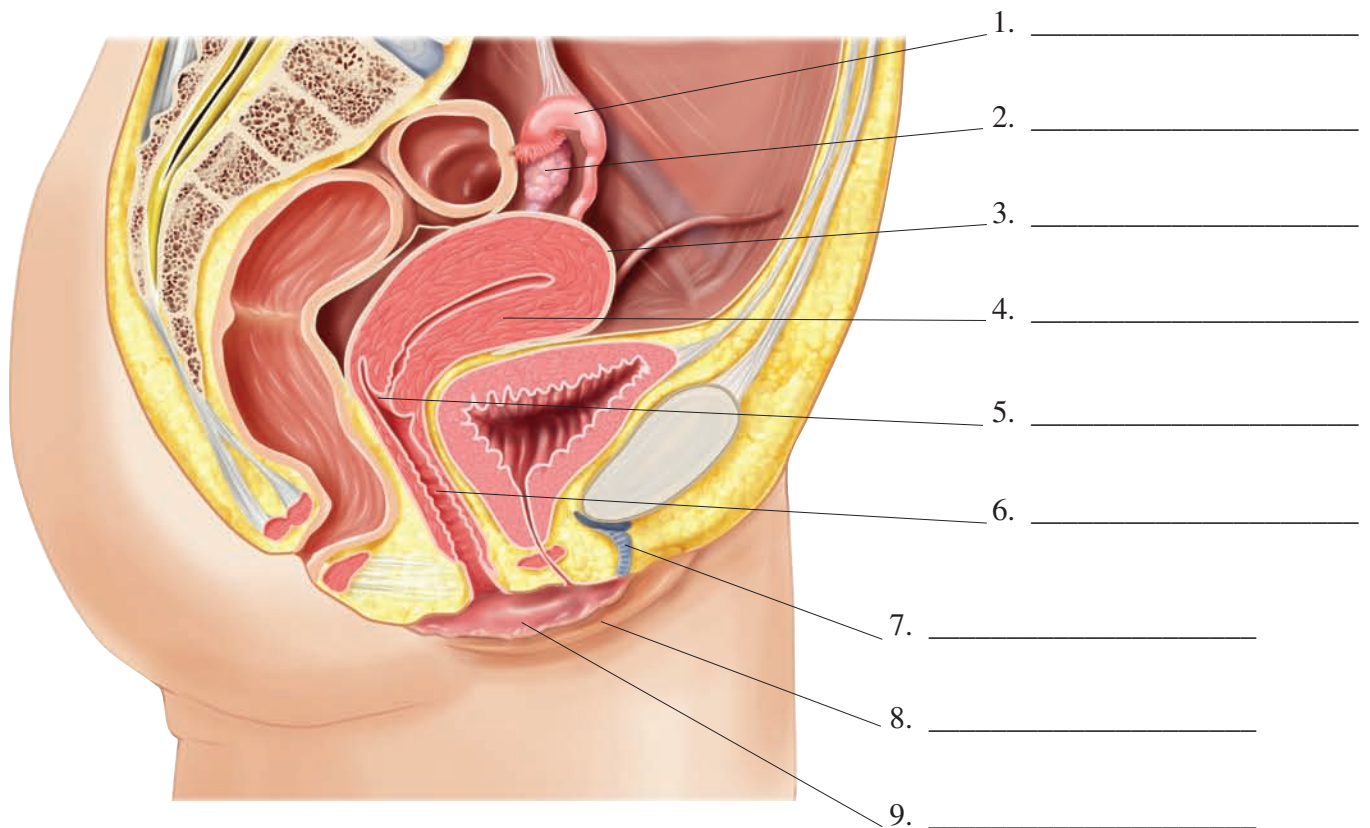
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## Labeling Exercise

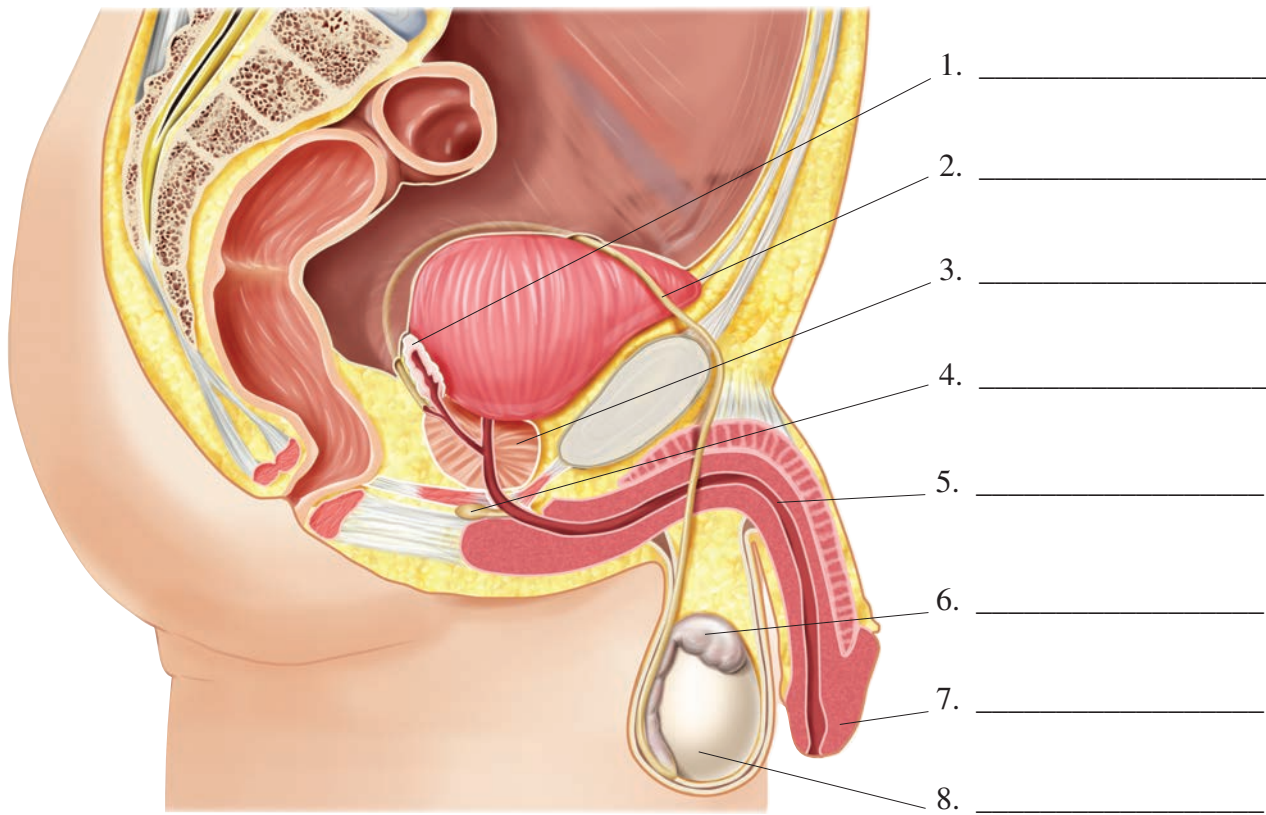
### Image A

Write the labels for this figure on the numbered lines provided.



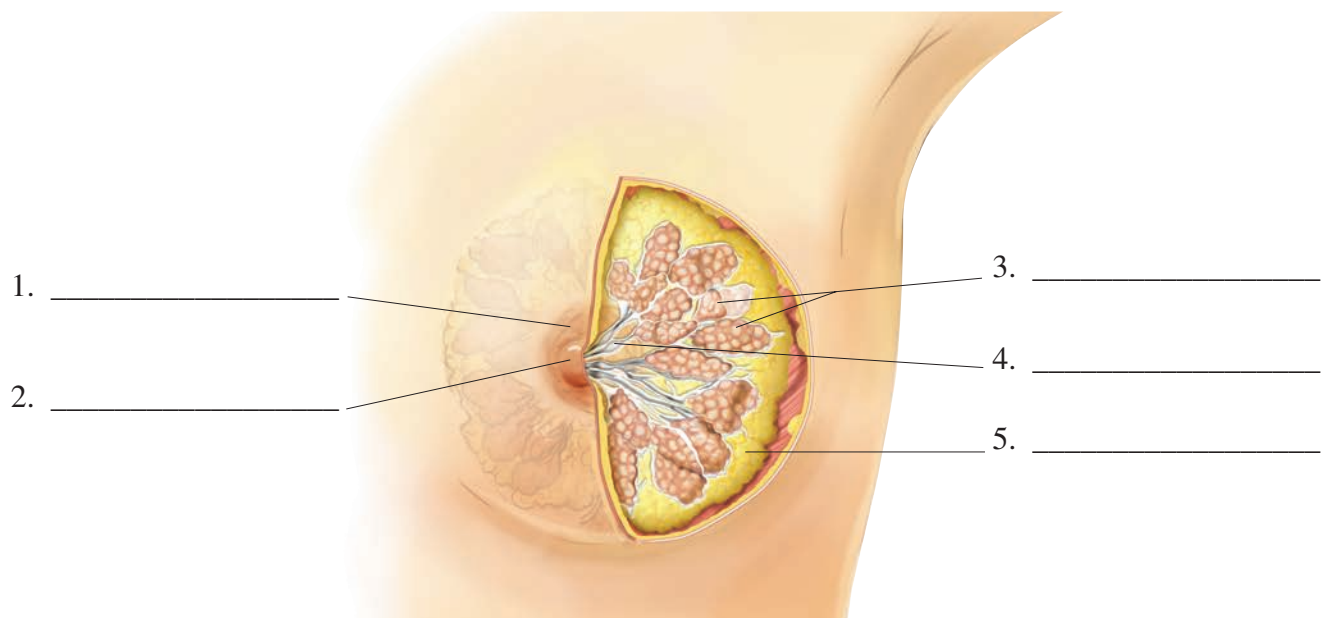
## Image B

Write the labels for this figure on the numbered lines provided.



## Image C

Write the labels for this figure on the numbered lines provided.



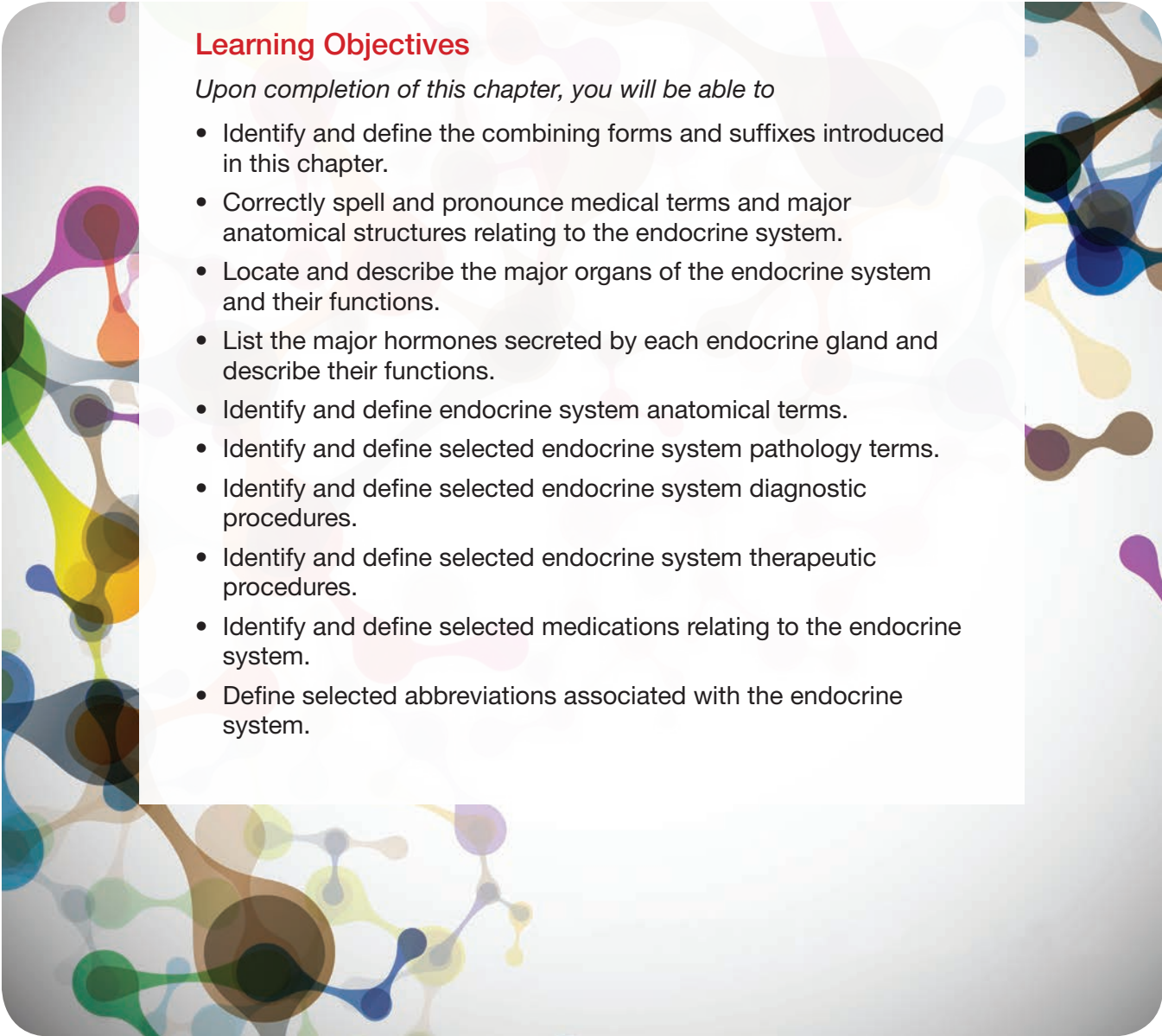


# 11

## Endocrine System

### Learning Objectives

*Upon completion of this chapter, you will be able to*

- Identify and define the combining forms and suffixes introduced in this chapter.
  - Correctly spell and pronounce medical terms and major anatomical structures relating to the endocrine system.
  - Locate and describe the major organs of the endocrine system and their functions.
  - List the major hormones secreted by each endocrine gland and describe their functions.
  - Identify and define endocrine system anatomical terms.
  - Identify and define selected endocrine system pathology terms.
  - Identify and define selected endocrine system diagnostic procedures.
  - Identify and define selected endocrine system therapeutic procedures.
  - Identify and define selected medications relating to the endocrine system.
  - Define selected abbreviations associated with the endocrine system.
- 





# Endocrine System at a Glance

## Function

Endocrine glands secrete hormones that regulate many body activities such as metabolic rate, water and mineral balance, immune system reactions, and sexual functioning.

## Organs

Here are the primary structures that comprise the endocrine system:

<b>adrenal glands</b>	<b>pituitary gland</b>
<b>ovaries</b>	<b>testes</b>
<b>pancreas (islets of Langerhans)</b>	<b>thymus gland</b>
<b>parathyroid glands</b>	<b>thyroid gland</b>
<b>pineal gland</b>	

## Word Parts

Here are the most common word parts used to build endocrine system terms. For a more comprehensive list, refer to the Terminology section of this chapter.

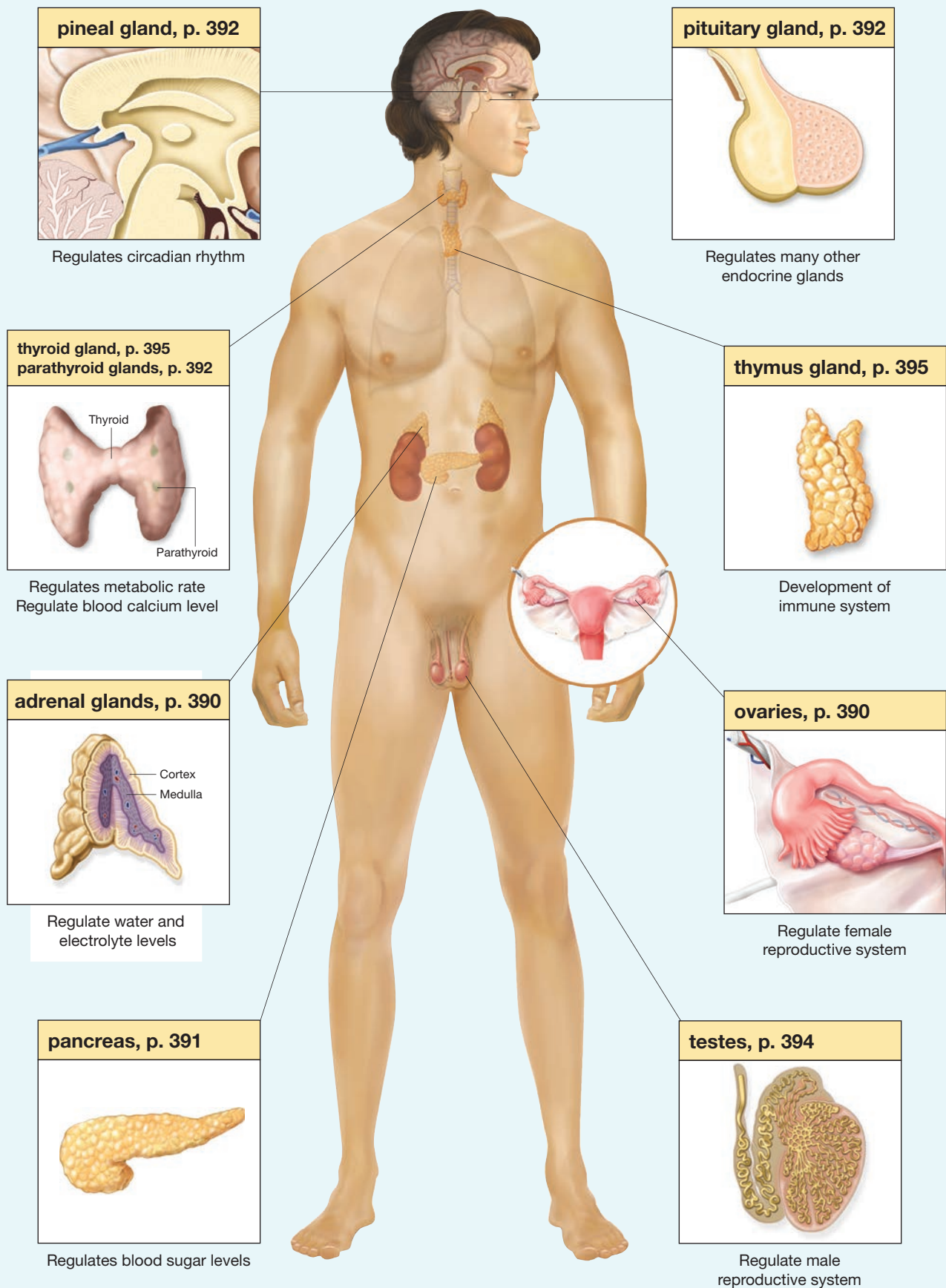
### Combining Forms

<b>acr/o</b>	extremities	<b>mineral/o</b>	minerals, electrolytes
<b>aden/o</b>	gland	<b>natr/o</b>	sodium
<b>adren/o</b>	adrenal glands	<b>ovari/o</b>	ovary
<b>adrenal/o</b>	adrenal glands	<b>pancreat/o</b>	pancreas
<b>andr/o</b>	male	<b>parathyroid/o</b>	parathyroid gland
<b>calc/o</b>	calcium	<b>pineal/o</b>	pineal gland
<b>crin/o</b>	to secrete	<b>pituitar/o</b>	pituitary gland
<b>estr/o</b>	female	<b>radi/o</b>	radiation
<b>gluc/o</b>	glucose	<b>somat/o</b>	body
<b>glyc/o</b>	sugar	<b>testicul/o</b>	testes
<b>gonad/o</b>	sex glands	<b>thym/o</b>	thymus gland
<b>iod/o</b>	iodine	<b>thyr/o</b>	thyroid gland
<b>kal/i</b>	potassium	<b>thyroid/o</b>	thyroid gland
<b>ket/o</b>	ketones	<b>toxic/o</b>	poison

### Suffixes

<b>-dipsia</b>	thirst	<b>-tropic</b>	pertaining to stimulating
<b>-emic</b>	pertaining to a blood condition	<b>-tropin</b>	to stimulate
<b>-pressin</b>	to press down		

# Endocrine System Illustrated



# Anatomy and Physiology of the Endocrine System

- adrenal glands (ad-REE-nal)

endocrine glands (EN-doh-krin)

endocrine system

exocrine glands (EKS-oh-krin)

glands

homeostasis (hoe-me-oh-STAY-sis)

hormones (HOR-mohnz)

ovaries (OH-vah-reez)
- pancreas (PAN-kree-ass)

parathyroid glands (pair-ah-THIGH-royd)

pineal gland (pih-NEAL)

pituitary gland (pih-TOO-ih-tair-ee)

target organs

testes (TESS-teez)

thymus gland (THIGH-mus)

thyroid gland (THIGH-royd)

**What's In A Name?**

Look for these word parts:  
home/o = sameness  
-stasis = standing still

**Med Term Tip**

The terms *endocrine* and *exocrine* were constructed to reflect the function of each type of gland. As glands, they both secrete, indicated by the combining form *crin/o*. The prefix *exo-*, meaning “external” or “outward,” tells us that exocrine gland secretions are carried to the outside of the body or to a passageway connected to the outside of the body. However, the prefix *endo-*, meaning “within” or “internal,” indicates that endocrine gland secretions are carried to other internal body structures by the bloodstream.

The **endocrine system** is a collection of **glands** that secrete **hormones** directly into the bloodstream. Hormones are chemicals that act on their **target organs** to either increase or decrease the target’s activity level. In this way the endocrine system is instrumental in maintaining **homeostasis** (*home/o* = sameness; *-stasis* = standing still)—that is, adjusting the activity level of most of the tissues and organs of the body to maintain a stable internal environment.

The body actually has two distinct types of glands: **exocrine glands** and **endocrine glands**. Exocrine glands release their secretions into a duct that carries them to the outside of the body or to a passageway connected to the outside of the body. For example, sweat glands release sweat into a sweat duct that travels to the surface of the body. Endocrine glands, however, release hormones directly into the bloodstream. For example, the thyroid gland secretes its hormones directly into the bloodstream. Because endocrine glands have no ducts, they are also referred to as *ductless glands*.

The endocrine system consists of the following glands: two **adrenal glands**, two **ovaries** in the female, four **parathyroid glands**, the **pancreas**, the **pineal gland**, the **pituitary gland**, two **testes** in the male, the **thymus gland**, and the **thyroid gland**. The endocrine glands as a whole affect the functions of the entire body. Table 11.1 ■ presents a description of the endocrine glands, their hormones, and their functions.

Table 11.1 Endocrine Glands and Their Hormones		
Gland and Hormone	Word Parts	Function
<b>Adrenal cortex</b>	<b>adren/o</b> = adrenal gland <b>-al</b> = pertaining to	
Glucocorticoids such as cortisol	<b>gluc/o</b> = glucose <b>cortic/o</b> = outer layer	Regulates carbohydrate levels in the body.
Mineralocorticoids such as aldosterone	<b>mineral/o</b> = minerals, electrolytes <b>cortic/o</b> = outer layer	Regulates electrolytes and fluid volume in the body.
Steroid sex hormones such as androgen	<b>andr/o</b> = male <b>-gen</b> = that which produces	Male sex hormones from adrenal cortex may be converted to estrogens in the bloodstream. Responsible for reproduction and secondary sexual characteristics.
<b>Adrenal medulla</b>	<b>adren/o</b> = adrenal gland <b>-al</b> = pertaining to	
Epinephrine (adrenaline)	<b>epi-</b> = above <b>nephro/o</b> = kidney <b>-ine</b> = pertaining to	Intensifies response during stress; “fight-or-flight” response.
Norepinephrine	<b>epi-</b> = above <b>nephro/o</b> = kidney <b>-ine</b> = pertaining to	Chiefly a vasoconstrictor.

**Table 11.1 Endocrine Glands and Their Hormones (continued)**

Gland and Hormone	Word Parts	Function
<b>Ovaries</b>		
Estrogen	<b>estr/o</b> = female <b>-gen</b> = that which produces	Stimulates development of secondary sex characteristics in females; regulates menstrual cycle.
Progesterone	<b>pro-</b> = before <b>estr/o</b> = female	Prepares for conditions of pregnancy.
<b>Pancreas</b>		
Glucagon		Stimulates liver to release glucose into the blood.
Insulin		Regulates and promotes entry of glucose into cells.
<b>Parathyroid glands</b>		
Parathyroid hormone (PTH)	<b>para-</b> = beside	Stimulates bone breakdown; regulates calcium level in the blood.
<b>Pineal gland</b>		
Melatonin	<b>pineal/o</b> = pineal gland <b>-al</b> = pertaining to	Regulates circadian rhythm.
<b>Pituitary anterior lobe</b>		
Adrenocorticotrophic hormone (ACTH)	<b>-ary</b> = pertaining to <b>anter/o</b> = front <b>-ior</b> = pertaining to <b>adren/o</b> = adrenal gland <b>cortic/o</b> = outer layer <b>-tropic</b> = pertaining to stimulating	Regulates secretion of some adrenal cortex hormones.
Gonadotropins	<b>gonad/o</b> = gonads <b>-tropin</b> = to stimulate	Consists of two hormones, follicle-stimulating hormone and luteinizing hormone.
Follicle-stimulating hormone (FSH)		Stimulates growth of eggs in female and sperm in males.
Luteinizing hormone (LH)		Regulates function of male and female gonads and plays a role in releasing ova in females.
Growth hormone (GH)		Stimulates growth of the body.
Melanocyte-stimulating hormone (MSH)	<b>melan/o</b> = black <b>-cyte</b> = cell	Stimulates pigment in skin.
Prolactin	<b>pro-</b> = before <b>lact/o</b> = milk	Stimulates milk production.
Thyroid-stimulating hormone (TSH)		Regulates function of thyroid gland.
<b>Pituitary posterior lobe</b>		
Antidiuretic hormone (ADH)	<b>-ary</b> = pertaining to <b>poster/o</b> = back <b>-ior</b> = pertaining to <b>anti-</b> = against <b>-tic</b> = pertaining to	Stimulates reabsorption of water by the kidneys.
Oxytocin		Stimulates uterine contractions and releases milk into ducts.
<b>Testes</b>		
Testosterone		Promotes sperm production and development of secondary sex characteristics in males.
<b>Thymus</b>		
Thymosin	<b>thym/o</b> = thymus gland	Promotes development of cells in immune system.
<b>Thyroid gland</b>		
Calcitonin (CT)		Stimulates deposition of calcium into bone.
Thyroxine (T <sub>4</sub> )	<b>thyr/o</b> = thyroid gland <b>-ine</b> = pertaining to	Stimulates metabolism in cells.
Triiodothyronine (T <sub>3</sub> )	<b>tri-</b> = three <b>iod/o</b> = iodine <b>thyr/o</b> = thyroid gland <b>-ine</b> = pertaining to	Stimulates metabolism in cells.

**What's In A Name?**

Look for these word parts:  
**adrenal/o** = adrenal gland  
**-ine** = pertaining to

**Med Term Tip**

The term *adrenal* contains the word part **ren/o**, meaning “kidney.” Likewise, the term *epinephrine* contains another word part meaning “kidney,” **nephro**. But neither the adrenal gland nor epinephrine have anything to do with the kidney. Both received their names because the adrenal glands sit on top of the kidney, but have no connection to it.

**Med Term Tip**

The term *cortex* is frequently used in anatomy to indicate the outer layer of an organ such as the adrenal gland or the kidney. The term *cortex* means “bark,” as in the bark of a tree. The term *medulla* means “marrow.” Because marrow is found in the inner cavity of bones, the term came to stand for the middle of an organ.

## Adrenal Glands

**adrenal cortex** (KOR-tex)

**adrenal medulla** (meh-DOOL-lah)

**adrenaline** (ah-DREN-ah-lin)

**aldosterone** (al-DOSS-ter-ohn)

**androgens** (AN-druh-jenz)

**corticosteroids** (kor-tih-koh-STAIR-oydz)

**cortisol** (KOR-tih-sal)

**epinephrine** (ep-ih-NEF-rin)

**estrogen** (ESS-troh-jen)

**glucocorticoids** (gloo-koh-KOR-tih-koydz)

**mineralocorticoids**

(min-er-al-oh-KOR-tih-koydz)

**norepinephrine** (nor-ep-ih-NEF-rin)

**progesterone** (proh-JESS-ter-ohn)

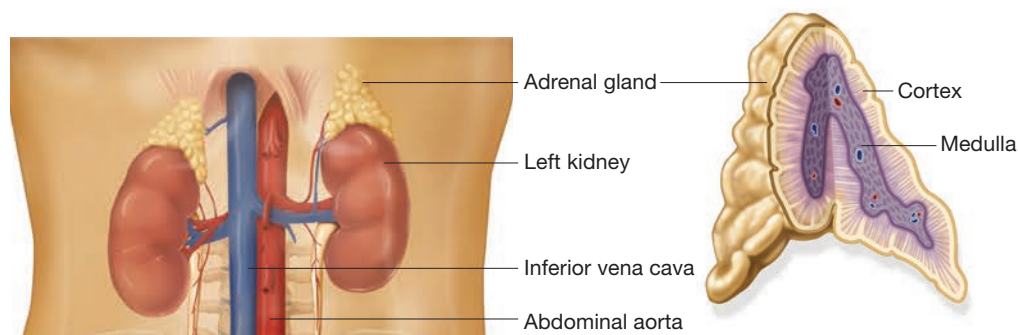
**steroid sex hormones** (STAIR-oyd)

The two adrenal glands are located above each of the kidneys (see Figure 11.1 ■). Each gland is composed of two sections: **adrenal cortex** and **adrenal medulla**.

The outer adrenal cortex manufactures several different families of hormones: **mineralocorticoids**, **glucocorticoids**, and **steroid sex hormones** (see again Table 11.1). However, because they are all produced by the cortex, they are collectively referred to as **corticosteroids**. The mineralocorticoid hormone, **aldosterone**, regulates sodium ( $\text{Na}^+$ ) and potassium ( $\text{K}^+$ ) levels in the body. The glucocorticoid hormone, **cortisol**, regulates carbohydrates in the body. The adrenal cortex of both men and women secretes steroid sex hormones, **androgens** (which may be converted to **estrogen** once released into the bloodstream). These hormones regulate secondary sexual characteristics. All hormones secreted by the adrenal cortex are steroid hormones.

The inner adrenal medulla is responsible for secreting the hormones **epinephrine**, also called **adrenaline**, and **norepinephrine**. These hormones are critical during emergency situations because they increase blood pressure, heart rate, and respiration levels. This helps the body perform better during emergencies or otherwise stressful times.

■ **Figure 11.1** The adrenal glands. These glands sit on top of each kidney. Each adrenal is subdivided into an outer cortex and an inner medulla. Each region secretes different hormones.



## Ovaries

**estrogen**

**gametes** (GAM-eats)

**gonads** (GOH-nadz)

**menstrual cycle** (MEN-stroo-al)

**ova**

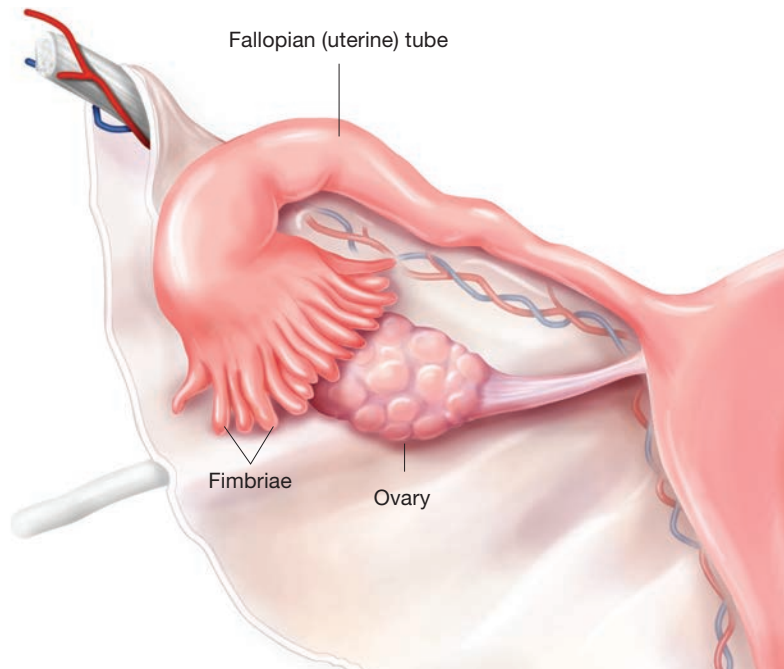
**progesterone**

The two ovaries are located in the lower abdominopelvic cavity of the female (see Figure 11.2 ■). They are the female **gonads**. Gonads are organs that produce **gametes** or the reproductive sex cells. In the case of females, the gametes are the **ova**. Of importance to the endocrine system, the ovaries produce the female sex hormones, **estrogen** and **progesterone** (see again Table 11.1). Estrogen is responsible for the appearance of the female sexual characteristics and regulation of the **menstrual cycle**. Progesterone helps to maintain a suitable uterine environment for pregnancy.

**What's In A Name?**

Look for these word parts:  
**men/o** = menses, menstruation  
**-al** = pertaining to





■ **Figure 11.2**

The ovaries. In addition to producing ova, the ovaries secrete the female sex hormones, estrogen and progesterone.

## Pancreas

**glucagon** (GLOO-koh-gon)

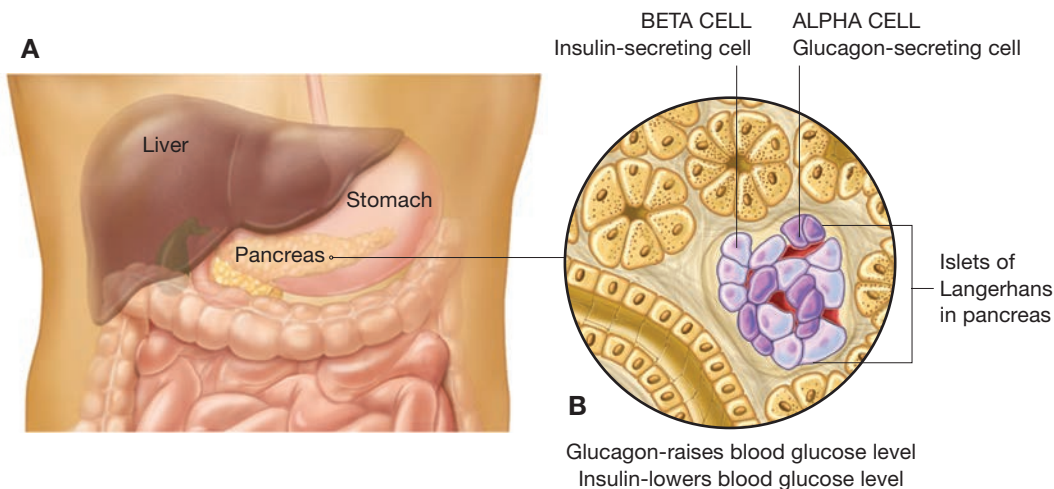
**insulin** (IN-suh-lin)

**islets of Langerhans**

(EYE-lets / of / LAHNG-er-hahnz)

**pancreatic islets** (pan-kree-AT-ik / EYE-lets)

The pancreas is located along the lower curvature of the stomach (see Figure 11.3A ■). It is the only organ in the body that has both endocrine and exocrine functions. The exocrine portion of the pancreas releases digestive enzymes through a duct into the duodenum of the small intestine. The endocrine sections of the pancreas are the **pancreatic islets** or **islets of Langerhans** (see Figure 11.3B ■). The islets cells produce two different hormones: **insulin** and **glucagon** (see again Table 11.1). Insulin, produced by beta ( $\beta$ ) islet cells, stimulates the cells of the body to take in glucose from the bloodstream, lowering the body's blood sugar level. This occurs after a meal has been eaten and the carbohydrates are absorbed into the bloodstream. In this way the cells obtain the glucose they need for cellular respiration.



■ **Figure 11.3**

The pancreas. This organ sits just below the stomach and is both an exocrine and an endocrine gland. The endocrine regions of the pancreas are called the islets of Langerhans and they secrete insulin and glucagon.



Another set of islet cells, the alpha ( $\alpha$ ) cells, secrete a different hormone, glucagon, which stimulates the liver to release glucose, thereby raising the blood glucose level. Glucagon is released when the body needs more sugar, such as at the beginning of strenuous activity or several hours after the last meal has been digested. Insulin and glucagon have opposite effects on blood sugar level. Insulin will reduce the blood sugar level, while glucagon will increase it.

## Parathyroid Glands

**calcium**

**parathyroid hormone**

(pair-ah-THIGH-royd / HOR-mohn)

### Med Term Tip

A calcium deficiency in the system can result in a condition called *tetany*, or muscle excitability and tremors. If the parathyroid glands are removed during thyroid surgery, calcium replacement in the body is often necessary.

The four tiny parathyroid glands are located on the dorsal surface of the thyroid gland (see Figure 11.4 ■). The **parathyroid hormone** (PTH) secreted by these glands regulates the amount of **calcium** in the blood (see again Table 11.1). If blood calcium levels fall too low, parathyroid hormone levels in the blood are increased and will stimulate bone breakdown to release more calcium into the blood.

## Pineal Gland

**circadian rhythm** (seer-KAY-dee-an)

**melatonin** (mel-ah-TOH-nin)

**thalamus** (THALL-mus)

### Med Term Tip

The pineal gland is an example of an organ named for its shape. *Pineal* means “shaped like a pine cone.”

The pineal gland is a small pine cone-shaped gland that is part of the **thalamus** region of the brain (see Figure 11.5 ■). The pineal gland secretes **melatonin**, a hormone not well understood, but that plays a role in regulating the body’s **circadian rhythm** (see again Table 11.1). This is the 24-hour clock that governs our periods of wakefulness and sleepiness.

## Pituitary Gland

**adrenocorticotrophic hormone**

(ah-dree-noh-kor-tih-koh-TROH-pik)

**anterior lobe**

**antidiuretic hormone**

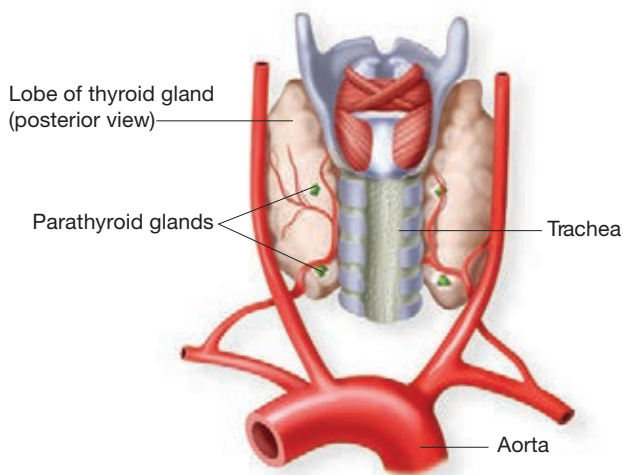
(an-tye-dye-yoo-RET-ik)

**follicle-stimulating hormone**

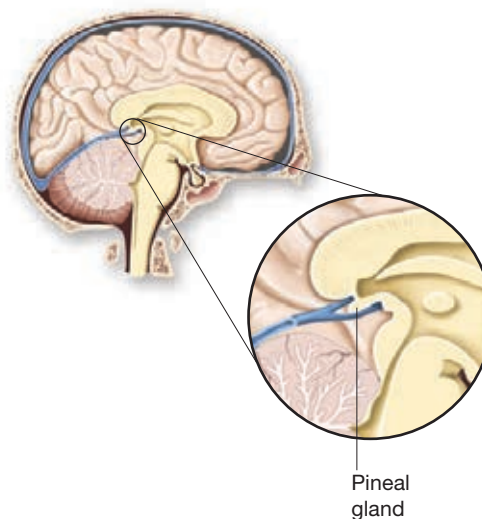
(FOLL-ih-kl / STIM-yoo-lay-ting)

**gonadotropins** (go-nad-oh-TROH-pins)

**growth hormone**



■ **Figure 11.4** The parathyroid glands. These four glands are located on the posterior side of the thyroid gland. They secrete parathyroid hormone.



■ **Figure 11.5** The pineal gland is a part of the thalamus region of the brain. It secretes melatonin.

**luteinizing hormone** (LOO-tee-in-eye-zing)  
**melanocyte-stimulating hormone**  
**oxytocin** (ok-see-TOH-sin)  
**posterior lobe**

**hypothalamus** (high-poh-THAL-ah-mus)  
**prolactin** (proh-LAK-tin)  
**somatotropin** (so-mat-oh-TROH-pin)  
**thyroid-stimulating hormone**

The pituitary gland is located underneath the brain (see Figure 11.6 ■). The small marble-shaped gland is divided into an **anterior lobe** and a **posterior lobe**. Both lobes are controlled by the **hypothalamus**, a region of the brain active in regulating automatic body responses.

The anterior pituitary secretes several different hormones (see again Table 11.1 and Figure 11.7 ■). **Growth hormone** (GH), also called **somatotropin**, promotes growth of the body by stimulating cells to rapidly increase in size and divide. **Thyroid-stimulating hormone** (TSH) regulates the function of the thyroid gland. **Adrenocorticotropic hormone** (ACTH) regulates the function of the adrenal cortex. **Prolactin** (PRL) stimulates milk production in the breast following pregnancy and birth. **Follicle-stimulating hormone** (FSH) and **luteinizing hormone** (LH) both exert their influence on the male and female gonads. Therefore, these two hormones together are referred to as the **gonadotropins**. Follicle-stimulating hormone is responsible for the development of ova in ovaries and sperm in testes. It also stimulates the ovary to secrete estrogen. Luteinizing hormone stimulates secretion of sex hormones in both males and females and plays a role in releasing ova in females. **Melanocyte-stimulating hormone** (MSH) stimulates melanocytes to produce more melanin, thereby darkening the skin.

The posterior pituitary secretes two hormones, **antidiuretic hormone** (ADH) and **oxytocin** (see again Table 11.1). Antidiuretic hormone promotes water reabsorption by the kidney tubules. Oxytocin stimulates uterine contractions during labor and delivery, and after birth the release of milk from the mammary glands.

#### What's In A Name?

Look for these word parts:

**somat/o** = body

**-tropin** = to stimulate

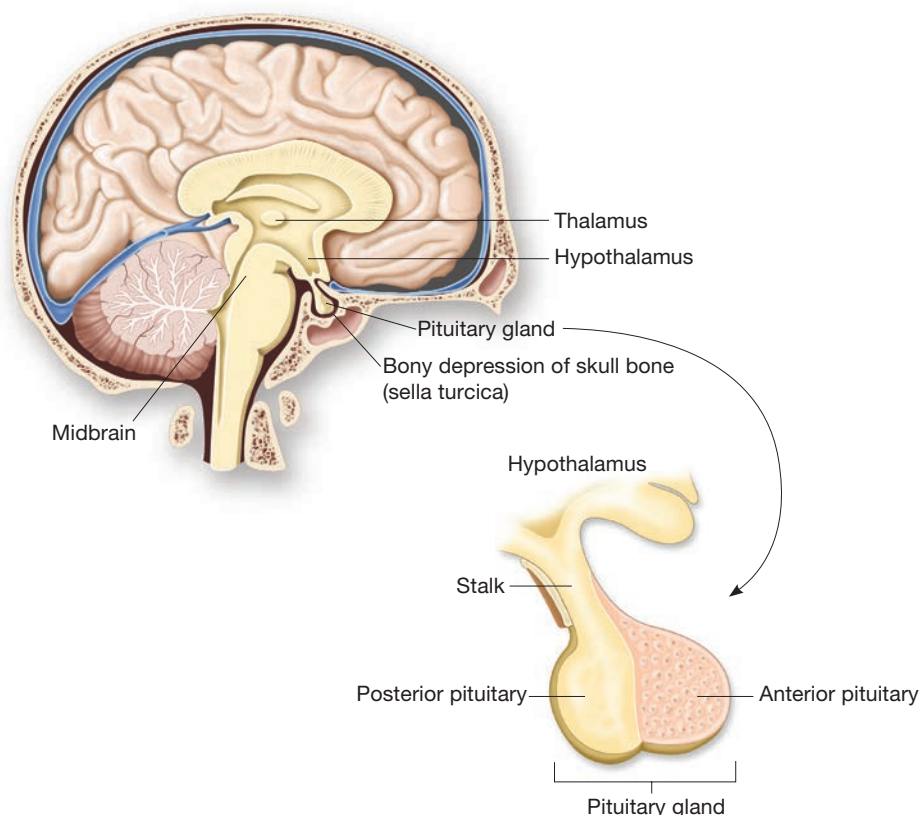
**hypo-** = below

#### Med Term Tip

The pituitary gland is sometimes referred to as the “master gland” because several of its secretions regulate other endocrine glands.

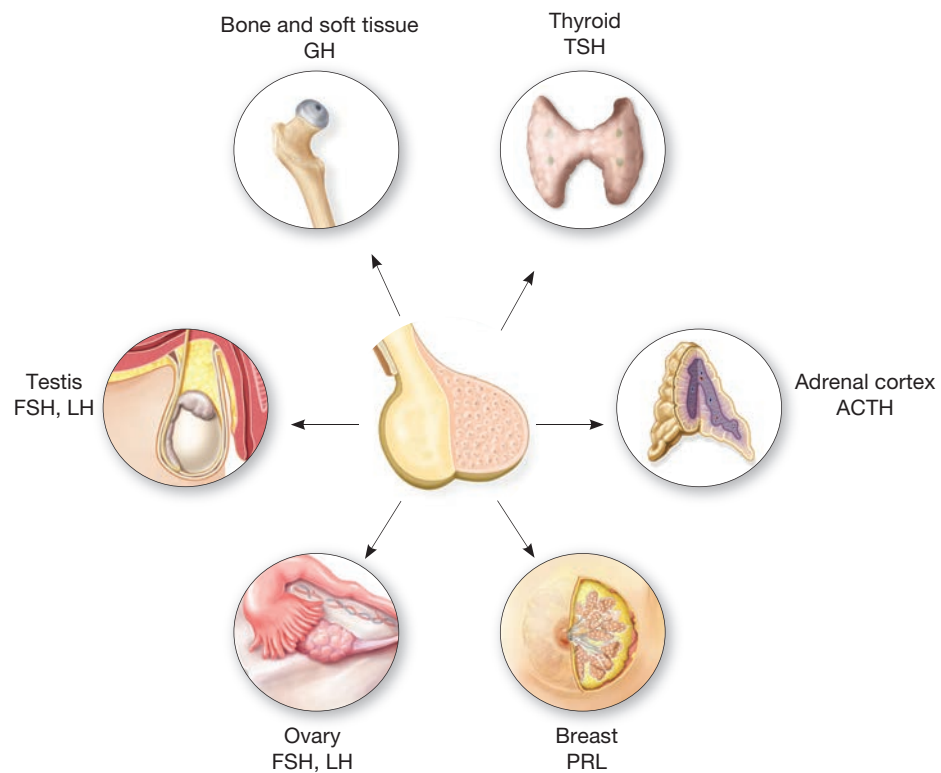
#### Med Term Tip

Many people use the term *diabetes* to refer to diabetes mellitus (DM). But there is another type of diabetes, called *diabetes insipidus* (DI), that is a result of the inadequate secretion of the antidiuretic hormone (ADH) from the pituitary gland.



■ **Figure 11.6** The pituitary gland lies just underneath the brain. It is subdivided into anterior and posterior lobes. Each lobe secretes different hormones.

■ **Figure 11.7** The anterior pituitary is sometimes called the master gland because it secretes many hormones that regulate other glands. This figure illustrates the different hormones and target tissues for the anterior pituitary.



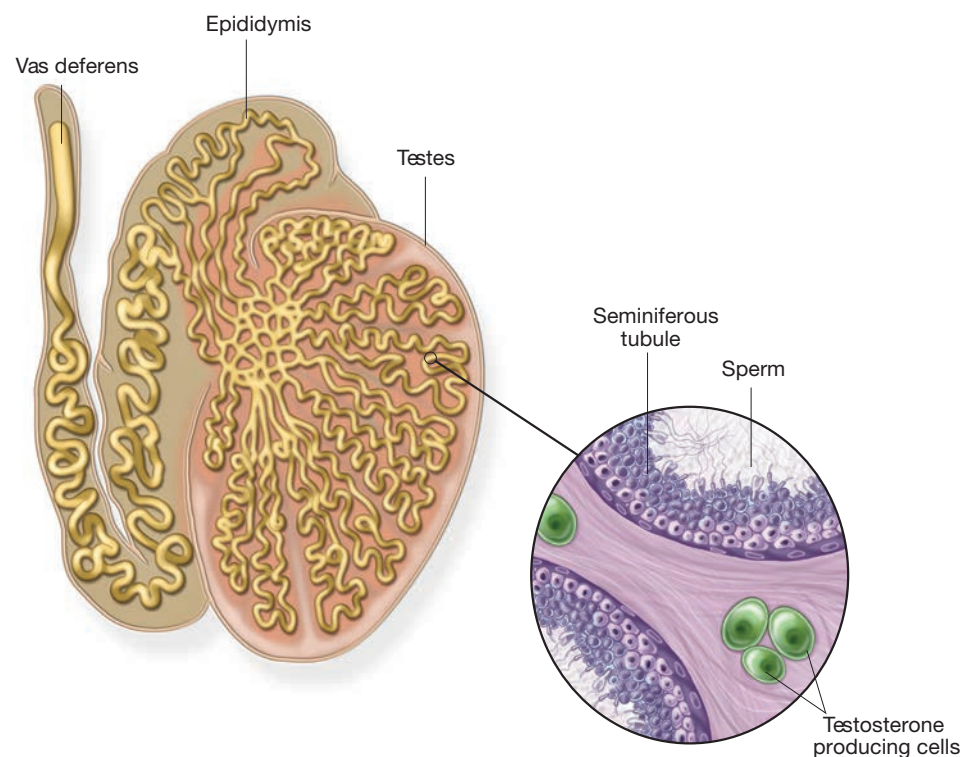
## Testes

**sperm**

**testosterone** (tess-TAHS-ter-own)

The testes are two oval glands located in the scrotal sac of the male (see Figure 11.8 ■). They are the male gonads, which produce the male gametes, **sperm**, and the male sex hormone, **testosterone** (see again Table 11.1). Testosterone produces the male secondary sexual characteristics and regulates sperm production.

■ **Figure 11.8** The testes. In addition to producing sperm, the testes secrete the male sex hormones, primarily testosterone.



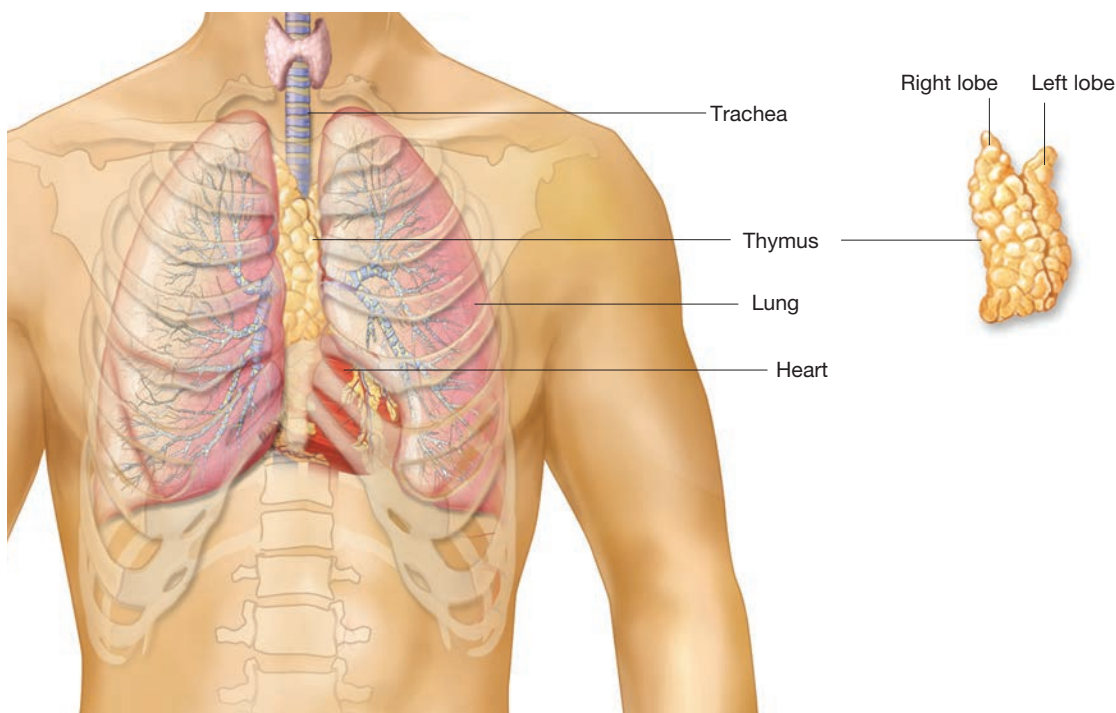
## Thymus Gland

T cells

**thymosin** (thigh-MOH-sin)

In addition to its role as part of the immune system, the thymus is also one of the endocrine glands because it secretes the hormone **thymosin** (see again Table 11.1). Thymosin, like the rest of the thymus gland, is important for proper development of the immune system. The thymus gland is located in the mediastinal cavity anterior and superior to the heart (see Figure 11.9 ■). The thymus is present at birth and grows to its largest size during puberty. At puberty it begins to shrink and eventually is replaced with connective and adipose tissue.

The most important function of the thymus is the development of the immune system in the newborn. It is essential to the growth and development of thymic lymphocytes or **T cells**, which are critical for the body's immune system.



■ **Figure 11.9** The thymus gland. This gland lies in the mediastinum of the thoracic cavity, just above the heart. It secretes thymosin.

## Thyroid Gland

basal metabolic rate

**calcitonin** (kal-sih-TOH-nin)

**iodine** (EYE-oh-dine)

**thyroxine** (thigh-ROKS-in)

**triiodothyronine**

(try-eye-oh-doh-THIGH-roh-neen)

The thyroid gland, which resembles a butterfly in shape, has right and left lobes (see Figure 11.10 ■). It is located on either side of the trachea and larynx. The thyroid cartilage, or Adam's apple, is located just above the thyroid gland. This gland produces the hormones **thyroxine** ( $T_4$ ) and **triiodothyronine** ( $T_3$ ) (see again Table 11.1). These hormones are produced in the thyroid gland from the mineral

### What's In A Name?

Look for these word parts:

**bas/o** = base

**-al** = pertaining to

**-ic** = pertaining to



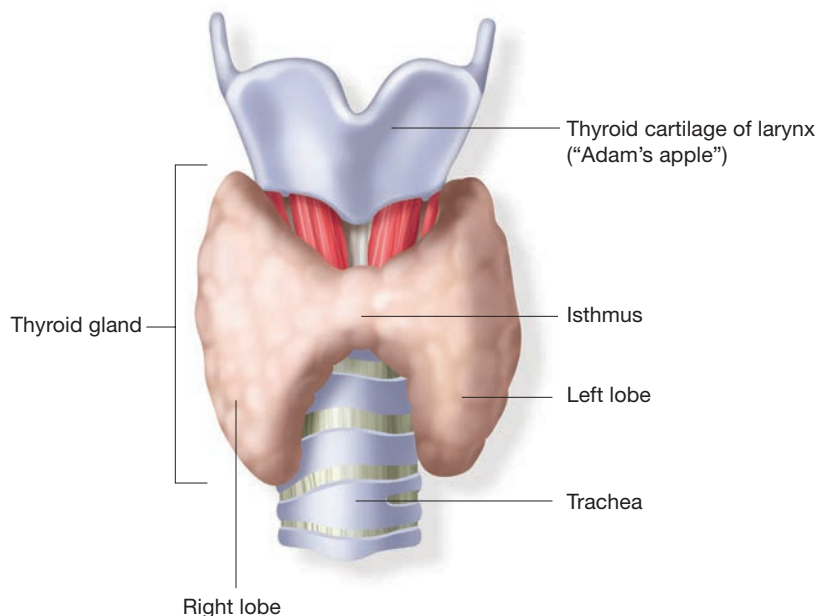
**Med Term Tip**

Iodine is found in many foods, including vegetables and sea-food. It is also present in iodized salt, which is one of the best sources of iodine for people living in the Goiter Belt, composed of states located away from salt-water. A lack of iodine in the diet can lead to thyroid disorders, including *goiter*.

**iodine.** Thyroxine and triiodothyronine help to regulate the production of energy and heat in the body to adjust the body's metabolic rate. The minimum rate of metabolism necessary to support the function of the body at rest is called the **basal metabolic rate (BMR)**.

The thyroid gland also secretes **calcitonin (CT)** in response to hypercalcemia (too high blood calcium level). Its action is the opposite of parathyroid hormone and stimulates the increased deposition of calcium into bone, thereby lowering blood levels of calcium.

■ **Figure 11.10** The thyroid gland is subdivided into two lobes, one on each side of the trachea.



## Practice As You Go

### A. Complete the Statement

1. The study of the endocrine system is called \_\_\_\_\_.
2. The master endocrine gland is the \_\_\_\_\_.
3. \_\_\_\_\_ is a general term for the sexual organs that produce gametes.
4. The term for the hormones produced by the outer layer of the adrenal cortex is \_\_\_\_\_.
5. The hormone produced by the testes is \_\_\_\_\_.
6. The two hormones produced by the ovaries are \_\_\_\_\_ and \_\_\_\_\_.
7. An inadequate supply of the hormone \_\_\_\_\_ causes diabetes insipidus.
8. The endocrine gland associated with the immune system is the \_\_\_\_\_.

# Terminology

## Word Parts Used to Build Endocrine System Terms

The following lists contain the combining forms, suffixes, and prefixes used to build terms in the remaining sections of this chapter.

### Combining Forms

<b>acr/o</b>	extremities
<b>aden/o</b>	gland
<b>adren/o</b>	adrenal gland
<b>adrenal/o</b>	adrenal gland
<b>calc/o</b>	calcium
<b>carcin/o</b>	cancer
<b>chem/o</b>	drug
<b>cortic/o</b>	outer layer
<b>crin/o</b>	to secrete
<b>cyt/o</b>	cell
<b>glyc/o</b>	sugar
<b>glycos/o</b>	sugar
<b>gynec/o</b>	female

<b>immun/o</b>	protection
<b>kal/i</b>	potassium
<b>ket/o</b>	ketones
<b>lapar/o</b>	abdomen
<b>lob/o</b>	lobe
<b>mast/o</b>	breast
<b>natr/o</b>	sodium
<b>neur/o</b>	nerve
<b>ophthalm/o</b>	eye
<b>or/o</b>	mouth
<b>ovari/o</b>	ovary
<b>pancreat/o</b>	pancreas

<b>parathyroid/o</b>	parathyroid gland
<b>pineal/o</b>	pineal gland
<b>pituitar/o</b>	pituitary gland
<b>radi/o</b>	radiation
<b>retin/o</b> (see Chapter 13)	retina
<b>testicul/o</b>	testes
<b>thym/o</b>	thymus gland
<b>thyr/o</b>	thyroid gland
<b>thyroid/o</b>	thyroid gland
<b>toxic/o</b>	poison
<b>vas/o</b>	vessel

### Suffixes

<b>-al</b>	pertaining to
<b>-an</b>	pertaining to
<b>-ar</b>	pertaining to
<b>-ary</b>	pertaining to
<b>-dipsia</b>	thirst
<b>-ectomy</b>	surgical removal
<b>-edema</b>	swelling
<b>-emia</b>	blood condition
<b>-emic</b>	pertaining to a blood condition

<b>-graphy</b>	process of recording
<b>-ia</b>	condition
<b>-ic</b>	pertaining to
<b>-ism</b>	state of
<b>-itis</b>	inflammation
<b>-logy</b>	study of
<b>-megaly</b>	enlarged
<b>-meter</b>	instrument to measure
<b>-oma</b>	tumor

<b>-osis</b>	abnormal condition
<b>-pathy</b>	disease
<b>-prandial</b>	pertaining to a meal
<b>-pressin</b>	to press down
<b>-scopic</b>	pertaining to visually examining
<b>-tic</b>	pertaining to
<b>-uria</b>	urine condition

### Prefixes

<b>anti-</b>	against
<b>endo-</b>	within
<b>ex-</b>	outward

<b>hyper-</b>	excessive
<b>hypo-</b>	insufficient
<b>pan-</b>	all

<b>poly-</b>	many
<b>post-</b>	after



## Adjective Forms of Anatomical Terms

Term	Word Parts	Definition
<b>adrenal</b> (ah-DREE-nall)	<b>adren/o</b> = adrenal gland <b>-al</b> = pertaining to	Pertaining to the adrenal glands.
<b>ovarian</b> (oh-VAIR-ee-an)	<b>ovari/o</b> = ovary <b>-an</b> = pertaining to	Pertaining to the ovary.
<b>pancreatic</b> (pan-kree-AT-ik)	<b>pancreat/o</b> = pancreas <b>-ic</b> = pertaining to	Pertaining to the pancreas.
<b>parathyroidal</b> (pair-ah-THIGH-roy-dal)	<b>parathyroid/o</b> = parathyroid gland <b>-al</b> = pertaining to	Pertaining to the parathyroid gland.
<b>pineal</b> (pih-NEAL)	<b>pineal/o</b> = pineal gland <b>-al</b> = pertaining to	Pertaining to the pineal gland.
<b>pituitary</b> (pih-TOO-ih-tair-ee)	<b>pituitar/o</b> = pituitary gland <b>-ary</b> = pertaining to	Pertaining to the pituitary gland.
<b>testicular</b> (tes-TIK-yoo-lar)	<b>testicul/o</b> = testes <b>-ar</b> = pertaining to	Pertaining to the testes.
<b>thymic</b> (THIGH-mik)	<b>thym/o</b> = thymus gland <b>-ic</b> = pertaining to	Pertaining to the thymus gland.
<b>thyroidal</b> (thigh-ROYD-all)	<b>thyroid/o</b> = thyroid gland <b>-al</b> = pertaining to	Pertaining to the thyroid gland.

## Practice As You Go


### B. Give the adjective form for each anatomical structure

1. The thymus gland \_\_\_\_\_
2. The pancreas \_\_\_\_\_
3. The thyroid gland \_\_\_\_\_
4. An ovary \_\_\_\_\_
5. A testis \_\_\_\_\_


## Pathology

Term	Word Parts	Definition
<b>Medical Specialties</b>		
<b>endocrinology</b> (en-doh-krin-ALL-oh-jee)	<b>endo-</b> = within <b>crin/o</b> = to secrete <b>-logy</b> = study of	Branch of medicine involving diagnosis and treatment of conditions and diseases of endocrine glands. Physician is an <i>endocrinologist</i> .
<b>Signs and Symptoms</b>		
<b>adrenomegaly</b> (ad-ree-noh-MEG-ah-lee)	<b>adren/o</b> = adrenal gland <b>-megaly</b> = enlarged	Having one or both adrenal glands enlarged.

## Pathology (continued)

Term	Word Parts	Definition
<b>adrenopathy</b> (ad-ren-OP-ah-thee)	<b>adren/o</b> = adrenal gland <b>-pathy</b> = disease	General term for adrenal gland disease.
<b>edema</b> (eh-DEE-mah)	<b>Word Watch</b>       Watch how the term edema is used in this condition. It may also appear as the suffix <b>-edema</b> .	Condition in which the body tissues contain excessive amounts of fluid.
<b>endocrinopathy</b> (en-doh-krin-OP-ah-thee)	<b>endo-</b> = within <b>crin/o</b> = to secrete <b>-pathy</b> = disease	General term for diseases of the endocrine system.
<b>exophthalmos</b> (eks-off-THAL-mohs)	<b>ex-</b> = outward <b>ophthalm/o</b> = eye	Condition in which the eyeballs protrude, such as in Graves' disease. This is generally caused by an overproduction of thyroid hormone.
<p>■ <b>Figure 11.11</b> A photograph of a woman with exophthalmos. This condition is associated with hypersecretion of the thyroid gland. (<i>Petit Format/ Science Source</i>)</p> 		
<b>glycosuria</b> (glye-kohs-YOO-ree-ah)	<b>glycos/o</b> = sugar <b>-uria</b> = urine condition	Having a high level of sugar excreted in the urine.
<b>gynecomastia</b> (gigh-neh-koh-MAST-ee-ah)	<b>gynec/o</b> = female <b>mast/o</b> = breast <b>-ia</b> = condition	Development of breast tissue in males. May be a symptom of adrenal feminization.
<b>hirsutism</b> (HER-soot-izm)	<b>-ism</b> = state of	Condition of having an excessive amount of hair. Term generally used to describe females who have the adult male pattern of hair growth. Can be the result of a hormonal imbalance.
<b>hypercalcemia</b> (high-per-kal-SEE-mee-ah)	<b>hyper-</b> = excessive <b>calc/o</b> = calcium <b>-emia</b> = blood condition	Condition of having a high level of calcium in the blood; associated with hypersecretion of parathyroid hormone.
<b>hyperglycemia</b> (high-per-glye-SEE-mee-ah)	<b>hyper-</b> = excessive <b>glyc/o</b> = sugar <b>-emia</b> = blood condition	Condition of having a high level of sugar in the blood; associated with diabetes mellitus.
<b>hyperkalemia</b> (high-per-kal-EE-mee-ah)	<b>hyper-</b> = excessive <b>kal/i</b> = potassium <b>-emia</b> = blood condition	The condition of having a high level of potassium in the blood.
<b>hypersecretion</b>	<b>hyper-</b> = excessive	Excessive hormone production by an endocrine gland.
<b>hypocalcemia</b> (high-poh-kal-SEE-mee-ah)	<b>hypo-</b> = insufficient <b>calc/o</b> = calcium <b>-emia</b> = blood condition	The condition of having a low level of calcium in the blood; associated with hyposecretion of parathyroid hormone. Hypocalcemia may result in tetany.
<b>hypoglycemia</b> (high-poh-glye-SEE-mee-ah)	<b>hypo-</b> = insufficient <b>glyc/o</b> = sugar <b>-emia</b> = blood condition	Condition of having a low level of sugar in the blood.


## Pathology (continued)

Term	Word Parts	Definition
<b>hyponatremia</b> (high-poh-nah-TREE-mee-ah)	<b>hypo-</b> = insufficient <b>natr/o</b> = sodium <b>-emia</b> = blood condition	Condition of having a low level of sodium in the blood.
<b>hyposecretion</b>	<b>hypo-</b> = insufficient	Deficient hormone production by an endocrine gland.
<b>obesity</b> (oh-BEE-sih-tee)		Having an abnormal amount of fat in the body.
<b>polydipsia</b> (pall-ee-DIP-see-ah)	<b>poly-</b> = many <b>-dipsia</b> = thirst	Excessive feeling of thirst.
<b>polyuria</b> (pall-ee-YOO-ree-ah)	<b>poly-</b> = many <b>-uria</b> = urine condition	Condition of producing an excessive amount of urine.
<b>syndrome</b> (SIN-droh-m)		Group of symptoms and signs that, when combined, present a clinical picture of a disease or condition.
<b>thyromegaly</b> (thigh-roh-MEG-ah-lee)	<b>thyr/o</b> = thyroid gland <b>-megaly</b> = enlarged	Having an enlarged thyroid gland.
<b>Adrenal Glands</b>		
<b>Addison's disease</b> (AD-ih-sons)		Disease named for British physician Thomas Addison; results from a deficiency in adrenocortical hormones. There may be an increased pigmentation of the skin, generalized weakness, and weight loss.
<b>adrenal feminization</b> (ad-REE-nal / fem-ih-nigh-ZAY-shun)	<b>adren/o</b> = adrenal gland <b>-al</b> = pertaining to	Development of female secondary sexual characteristics (such as breasts) in a male. Often as a result of increased estrogen secretion by the adrenal cortex.
<b>adrenal virilism</b> (ad-REE-nal / VIR-ill-izm)	<b>adren/o</b> = adrenal gland <b>-al</b> = pertaining to <b>-ism</b> = state of	Development of male secondary sexual characteristics (such as deeper voice and facial hair) in a female. Often as a result of increased androgen secretion by the adrenal cortex.
<b>adrenalitis</b> (ad-ree-nal-EYE-tis)	<b>adrenal/o</b> = adrenal gland <b>-itis</b> = inflammation	Inflammation of one or both adrenal glands.
<b>Cushing's syndrome</b> (CUSH-ings / SIN-droh-m)		Set of symptoms caused by excessive levels of cortisol due to high doses of corticosteroid drugs and adrenal tumors. The syndrome may present symptoms of weakness, edema, excess hair growth, skin discoloration, and osteoporosis.
<p>■ <b>Figure 11.12</b> Cushing's syndrome. A photograph of a woman with the characteristic facial features of Cushing's syndrome. (Biophoto Photo Associates/ Science Source)</p> 		
<b>pheochromocytoma</b> (fee-oh-kroh-moh-sigh-TOH-ma)	<b>cyt/o</b> = cell <b>-oma</b> = tumor	Usually benign tumor of the adrenal medulla that secretes epinephrine. Symptoms include anxiety, heart palpitations, dyspnea, profuse sweating, headache, and nausea.


## Pathology (continued)

Term	Word Parts	Definition
<b>Pancreas</b>		
<b>diabetes mellitus</b> (DM) (dye-ah-BEE-teez / MELL-ih-tus)		Chronic disorder of carbohydrate metabolism resulting in hyperglycemia and glycosuria. There are two distinct forms of diabetes mellitus: <i>insulin-dependent diabetes mellitus</i> (IDDM) or <i>type 1</i> , and <i>non-insulin-dependent diabetes mellitus</i> (NIDDM) or <i>type 2</i> .
<b>diabetic retinopathy</b> (dye-ah-BET-ik / ret-in-OP-ah-thee)	<b>-tic</b> = pertaining to <b>retin/o</b> = retina <b>-pathy</b> = disease	Secondary complication of diabetes that affects the blood vessels of the retina, resulting in visual changes and even blindness.
<b>insulin-dependent diabetes mellitus</b> (IDDM) (dye-ah-BEE-teez / MELL-ih-tus)		Also called <i>type 1 diabetes mellitus</i> . It develops early in life when the pancreas stops insulin production. Patient must take daily insulin injections.
<b>insulinoma</b> (in-sue-lin-OH-mah)	<b>-oma</b> = tumor	Tumor of the islets of Langerhans cells of the pancreas that secretes an excessive amount of insulin.
<b>ketoacidosis</b> (KEE-toh-ass-ih-DOH-sis)	<b>ket/o</b> = ketones <b>-osis</b> = abnormal condition	Acidosis due to an excess of acidic ketone bodies (waste products). A serious condition requiring immediate treatment that can result in death for the diabetic patient if not reversed. Also called <i>diabetic acidosis</i> .
<b>non-insulin-dependent diabetes mellitus</b> (NIDDM) (dye-ah-BEE-teez / MELL-ih-tus)		Also called <i>type 2 diabetes mellitus</i> . It typically develops later in life. The pancreas produces normal to high levels of insulin, but the cells fail to respond to it. Patients may take oral hypoglycemics to improve insulin function, or may eventually have to take insulin.
<b>peripheral neuropathy</b> (per-IF-eh-rall / noo-ROP-ah-thee)	<b>-al</b> = pertaining to <b>neur/o</b> = nerve <b>-pathy</b> = disease	Damage to the nerves in the lower legs and hands as a result of diabetes mellitus. Symptoms include either extreme sensitivity or numbness and tingling.
<b>Parathyroid Glands</b>		
<b>hyperparathyroidism</b> (HIGH-per-pair-ah-THIGH-royd-izm)	<b>hyper-</b> = excessive <b>parathyroid/o</b> = parathyroid gland <b>-ism</b> = state of	Hypersecretion of parathyroid hormone; may result in hypercalcemia and Recklinghausen disease.
<b>hypoparathyroidism</b> (HIGH-poh-pair-ah-THIGH-royd-izm)	<b>hypo-</b> = insufficient <b>parathyroid/o</b> = parathyroid gland <b>-ism</b> = state of	Hyposecretion of parathyroid hormone; may result in hypocalcemia and tetany.
<b>Recklinghausen disease</b> (REK-ling-how-zen)		Excessive production of parathyroid hormone resulting in degeneration of the bones.
<b>tetany</b> (TET-ah-nee)		Nerve irritability and painful muscle cramps resulting from hypocalcemia. Hypoparathyroidism is one cause of tetany.

## Pathology (continued)

Term	Word Parts	Definition
<b>Pituitary Gland</b>		
<b>acromegaly</b> (ak-roh-MEG-ah-lee)	<b>acr/o</b> = extremities <b>-megaly</b> = enlarged	Chronic disease of adults that results in an elongation and enlargement of the bones of the head and extremities. There can also be mood changes. Due to an excessive amount of growth hormone in an adult.
<p>■ <b>Figure 11.13</b> Skull X-ray (lateral view) of person with acromegaly showing abnormally enlarged mandible.            (Zephyr/Science Source)</p> 		
<b>diabetes insipidus (DI)</b> (dye-ah-BEE-teez / in-SIP-ih-dus)		Disorder caused by the inadequate secretion of antidiuretic hormone by the posterior lobe of the pituitary gland. There may be polyuria and polydipsia.
<b>dwarfism</b> (DWARF-izm)	<b>-ism</b> = state of	Condition of being abnormally short in height. It may be the result of a hereditary condition or a lack of growth hormone.
<b>gigantism</b> (JYE-gan-tizm)	<b>-ism</b> = state of	Excessive development of the body due to the overproduction of the growth hormone by the pituitary gland in a child or teenager. The opposite of <i>dwarfism</i> .
<b>hyperpituitarism</b> (HIGH-per-pih-TOO-ih-tuh-rizm)	<b>hyper-</b> = excessive <b>pituitar/o</b> = pituitary gland <b>-ism</b> = state of	Hypersecretion of one or more pituitary gland hormones.
<b>hypopituitarism</b> (HIGH-poh-pih-TOO-ih-tuh-rizm)	<b>hypo-</b> = insufficient <b>pituitar/o</b> = pituitary gland <b>-ism</b> = state of	Hyposecretion of one or more pituitary gland hormones.
<b>panhypopituitarism</b> (pan-high-poh-pih-TOO-ih-tuh-rizm)	<b>pan-</b> = all <b>hypo-</b> = insufficient <b>pituitar/o</b> = pituitary gland <b>-ism</b> = state of	Deficiency in all the hormones secreted by the pituitary gland. Often recognized because of problems with the glands regulated by the pituitary—adrenal cortex, thyroid, ovaries, and testes.

## Pathology (continued)

Term	Word Parts	Definition
<b>Thymus Gland</b>		
<b>thymitis</b> (thigh-MY-tis)	<b>thym/o</b> = thymus gland <b>-itis</b> = inflammation	Inflammation of the thymus gland.
<b>thymoma</b> (thigh-MOH-mah)	<b>thym/o</b> = thymus gland <b>-oma</b> = tumor	A tumor in the thymus gland.
<b>Thyroid Gland</b>		
<b>congenital hypothyroidism</b> (high-poh-THIGH-royd-izm)	<b>hypo-</b> = below <b>thyroid/o</b> = thyroid gland <b>-ism</b> = state of	Congenital condition in which a lack of thyroid hormones may result in arrested physical and mental development. Formerly called <i>cretinism</i> .
<b>goiter</b> (GOY-ter)		Enlargement of the thyroid gland.
<p>■ <b>Figure 11.14</b> Goiter. A photograph of a male with an extreme goiter or enlarged thyroid gland. (Eugene Gordon, Pearson Education)</p>		
<b>Graves' disease</b>		Condition named for Irish physician Robert Graves that results in overactivity of the thyroid gland and can cause a crisis situation. Symptoms include exophthalmos and goiter. A type of <i>hyperthyroidism</i> .
<b>Hashimoto's thyroiditis</b> (hash-ee-MOH-tohz / thigh-roy-DYE-tis)	<b>thyroid/o</b> = thyroid gland <b>-itis</b> = inflammation	Chronic autoimmune form of thyroiditis; results in hyposecretion of thyroid hormones.
<b>hyperthyroidism</b> (high-per-THIGH-royd-izm)	<b>hyper-</b> = excessive <b>thyroid/o</b> = thyroid gland <b>-ism</b> = state of	Hypersecretion of thyroid gland hormones.
<b>hypothyroidism</b> (high-poh-THIGH-royd-izm)	<b>hypo-</b> = insufficient <b>thyroid/o</b> = thyroid gland <b>-ism</b> = state of	Hyposecretion of thyroid gland hormones.
<b>myxedema</b> (miks-eh-DEE-mah)	<b>-edema</b> = swelling	Condition resulting from a hyposecretion of the thyroid gland in an adult. Symptoms can include swollen facial features, edematous skin, anemia, slow speech, drowsiness, and mental lethargy.



## Pathology (continued)

Term	Word Parts	Definition
<b>thyrotoxicosis</b> (thigh-roh-toks-ih-KOH-sis)	<b>thyr/o</b> = thyroid gland <b>toxic/o</b> = poison <b>-osis</b> = abnormal condition	Condition resulting from marked overproduction of the thyroid gland. Symptoms include rapid heart action, tremors, enlarged thyroid gland, exophthalmos, and weight loss.
<b>All Glands</b>		
<b>adenocarcinoma</b> (ad-eh-no-car-sih-NO-mah)	<b>aden/o</b> = gland <b>carcin/o</b> = cancer <b>-oma</b> = tumor	Cancerous tumor in a gland that is capable of producing the hormones secreted by that gland. One cause of hypersecretion pathologies.

## Practice As You Go

### C. Terminology Matching

Match each term to its definition.

- |                                  |   |
|----------------------------------|---|
| 1. _____ Cushing's disease       | a. enlarged thyroid                         |
| 2. _____ goiter                  | b. overactive adrenal cortex                |
| 3. _____ acromegaly              | c. hyperthyroidism                          |
| 4. _____ gigantism               | d. underactive adrenal cortex               |
| 5. _____ myxedema                | e. enlarged bones of head and extremities   |
| 6. _____ diabetes mellitus       | f. may cause polyuria and polydipsia        |
| 7. _____ diabetes insipidus      | g. an autoimmune disease                    |
| 8. _____ Hashimoto's thyroiditis | h. excessive growth hormone in a child      |
| 9. _____ Graves' disease         | i. disorder of carbohydrate metabolism      |
| 10. _____ Addison's disease      | j. insufficient thyroid hormone in an adult |

## Diagnostic Procedures

Term	Word Parts	Definition
<b>Clinical Laboratory Tests</b>		
<b>blood serum test</b>		Blood test to measure the level of substances such as calcium, electrolytes, testosterone, insulin, and glucose. Used to assist in determining the function of various endocrine glands.
<b>fasting blood sugar (FBS)</b>		Blood test to measure the amount of sugar circulating throughout the body after a 12-hour fast.

## Diagnostic Procedures (continued)

Term	Word Parts	Definition
<b>glucose tolerance test (GTT)</b> (GLOO-kohs)		Test to determine the blood sugar level. A measured dose of glucose is given to a patient either orally or intravenously. Blood samples are then drawn at certain intervals to determine the ability of the patient to use glucose. Used for diabetic patients to determine their insulin response to glucose.
<b>protein-bound iodine test (PBI)</b>		Blood test to measure the concentration of thyroxine ( $T_4$ ) circulating in the bloodstream. The iodine becomes bound to the protein in the blood and can be measured. Useful in establishing thyroid function.
<b>radioimmunoassay (RIA)</b> (ray-dee-oh-im-yoo-noh-ASS-ay)	<b>radi/o</b> = ray <b>immun/o</b> = protection	Blood test that uses radioactively tagged hormones and antibodies to measure the quantity of hormone in the plasma.
<b>thyroid function test (TFT)</b> (THIGH-royd)		Blood test used to measure the levels of thyroxine, triiodothyronine, and thyroid-stimulating hormone in the bloodstream to assist in determining thyroid function.
<b>total calcium</b>		Blood test to measure the total amount of calcium to assist in detecting parathyroid and bone disorders.
<b>two-hour postprandial glucose tolerance test</b> (post-PRAN-dee-al)	<b>post-</b> = after <b>-prandial</b> = pertaining to a meal	Blood test to assist in evaluating glucose metabolism. The patient eats a high-carbohydrate diet and then fasts overnight before the test. Then the blood sample is taken two hours after a meal.
<b>Diagnostic Imaging</b>		
<b>thyroid echography</b> (THIGH-royd / eh-KOG-rah-fee)	<b>-graphy</b> = process of recording	Ultrasound examination of the thyroid that can assist in distinguishing a thyroid nodule from a cyst.
<b>thyroid scan</b> (THIGH-royd)		Test in which radioactive iodine is administered that localizes in the thyroid gland. The gland can then be visualized with a scanning device to detect pathology such as tumors.

## Therapeutic Procedures

Term	Word Parts	Definition
<b>Medical Procedures</b>		
<b>chemical thyroidectomy</b> (thigh-royd-EK-toh-mee)	<b>chem/o</b> = drug <b>-al</b> = pertaining to <b>thyroid/o</b> = thyroid gland <b>-ectomy</b> = surgical removal	Large dose of radioactive iodine (RAI) is given in order to kill thyroid gland cells without having to actually do surgery.
<b>glucometer</b> (glue-COM-eh-ter)	<b>gluc/o</b> = glucose <b>-meter</b> = instrument to measure	Device designed for a diabetic to use at home to measure the level of glucose in the bloodstream.
<b>hormone replacement therapy (HRT)</b>		Artificial replacement of hormones in patients with hyposecretion disorders. May be oral pills, injections, or adhesive skin patches.

## Therapeutic Procedures (continued)

Term	Word Parts	Definition
<b>Surgical Procedures</b>		
<b>adrenalectomy</b> (ad-ree-nal-EK-toh-mee)	<b>adrenal/o</b> = adrenal gland <b>-ectomy</b> = surgical removal	Surgical removal of one or both adrenal glands.
<b>laparoscopic adrenalectomy</b> (lap-row-SKOP-ik / ad-ree-nal-EK-toh-mee)	<b>lapar/o</b> = abdomen <b>-scopic</b> = pertaining to visually examining <b>adren/o</b> = adrenal gland <b>-ectomy</b> = surgical removal	Removal of the adrenal gland through a small incision in the abdomen and using endoscopic instruments.
<b>lobectomy</b> (lobe-EK-toh-mee)	<b>lob/o</b> = lobe <b>-ectomy</b> = surgical removal	Removal of a lobe from an organ. In this case, one lobe of the thyroid gland.
<b>parathyroidectomy</b> (pair-ah-thigh-royd-EK-toh-mee)	<b>parathyroid/o</b> = parathyroid gland <b>-ectomy</b> = surgical removal	Surgical removal of one or more of the parathyroid glands.
<b>pinealectomy</b> (PIN-ee-ah-LEK-toh-mee)	<b>pineal/o</b> = pineal gland <b>-ectomy</b> = surgical removal	Surgical removal of the pineal gland.
<b>thymectomy</b> (thigh-MEK-toh-mee)	<b>thym/o</b> = thymus gland <b>-ectomy</b> = surgical removal	Surgical removal of the thymus gland.
<b>thyroidectomy</b> (thigh-royd-EK-toh-mee)	<b>thyroid/o</b> = thyroid gland <b>-ectomy</b> = surgical removal	Surgical removal of the thyroid gland.

## Practice As You Go

### D. Terminology Matching

Match the term to its definition.

- |   |  |
|---|--|
| 1. _____ protein-bound iodine test                    | a. measures levels of hormones in the blood  |
| 2. _____ fasting blood sugar                          | b. determines glucose metabolism after patient receives a measured dose of glucose |
| 3. _____ radioimmunoassay                             | c. test of glucose metabolism two hours after eating a meal                        |
| 4. _____ thyroid scan                                 | d. measures blood sugar level after 12-hour fast                                   |
| 5. _____ two-hour postprandial glucose tolerance test | e. measures $T_4$ concentration in the blood                                       |
| 6. _____ glucose tolerance test                       | f. uses radioactive iodine   |
| 7. _____ glucometer                                   | g. used instead of a surgical procedure  |
| 8. _____ chemical thyroidectomy                       | h. instrument to measure blood glucose   |

## Pharmacology

Classification	Word Parts	Action	Examples
<b>antithyroid agents</b>	<b>anti-</b> = against	Block production of thyroid hormones in patients with hypersecretion disorders.	methimazole, Tapazole; propylthiouracil
<b>corticosteroids</b> (kor-tih-koh-STAIR-oydz)	<b>cortic/o</b> = outer layer	Although the function of these hormones in the body is to regulate carbohydrate metabolism, they also have a strong anti-inflammatory action. Therefore they are used to treat severe chronic inflammatory diseases such as rheumatoid arthritis. Long-term use has adverse side effects such as osteoporosis and the symptoms of Cushing's disease. Also used to treat adrenal cortex hyposecretion disorders such as Addison's disease.	prednisone, Deltasone
<b>human growth hormone therapy</b>		Hormone replacement therapy with human growth hormone in order to stimulate skeletal growth. Used to treat children with abnormally short stature.	somatropin, Genotropin; somatrem, Protropin
<b>insulin</b> (IN-suh-lin)		Replaces insulin for type 1 diabetics or treats severe type 2 diabetics.	human insulin, Humulin L
<b>oral hypoglycemic agents</b> (high-poh-glye-SEE-mik)	<b>or/o</b> = mouth <b>-al</b> = pertaining to <b>hypo-</b> = insufficient <b>glyc/o</b> = sugar <b>-emic</b> = relating to a blood condition	Taken by mouth to cause a decrease in blood sugar; not used for insulin-dependent patients.	metformin, Glucophage; glipizide, Glucotrol
<b>thyroid replacement hormone</b>		Hormone replacement therapy for patients with hypothyroidism or who have had a thyroidectomy.	levothyroxine, Levo-T; liothyronine, Cytomel
<b>vasopressin</b> (vaz-oh-PRESS-in)	<b>vas/o</b> = vessel <b>-pressin</b> = to press down	Controls diabetes insipidus and promotes reabsorption of water in the kidney tubules.	desmopressin acetate, Desmopressin; conivaptan, Vaprisol

## Abbreviations

<b><math>\alpha</math></b>	alpha	<b>LH</b>	luteinizing hormone
<b>ACTH</b>	adrenocorticotrophic hormone	<b>MSH</b>	melanocyte-stimulating hormone
<b>ADH</b>	antidiuretic hormone	<b>Na<sup>+</sup></b>	sodium
<b><math>\beta</math></b>	beta	<b>NIDDM</b>	non-insulin-dependent diabetes mellitus
<b>BMR</b>	basal metabolic rate	<b>NPH</b>	neutral protamine Hagedorn (insulin)
<b>CT</b>	calcitonin	<b>PBI</b>	protein-bound iodine
<b>DI</b>	diabetes insipidus	<b>PRL</b>	prolactin
<b>DM</b>	diabetes mellitus	<b>PTH</b>	parathyroid hormone
<b>FBS</b>	fasting blood sugar	<b>RAI</b>	radioactive iodine
<b>FSH</b>	follicle-stimulating hormone	<b>RIA</b>	radioimmunoassay
<b>GH</b>	growth hormone	<b>T<sub>3</sub></b>	triiodothyronine
<b>GTT</b>	glucose tolerance test	<b>T<sub>4</sub></b>	thyroxine
<b>HRT</b>	hormone replacement therapy	<b>TFT</b>	thyroid function test
<b>IDDM</b>	insulin-dependent diabetes mellitus	<b>TSH</b>	thyroid-stimulating hormone
<b>K<sup>+</sup></b>	potassium		

## Practice As You Go

### E. What's the Abbreviation?

1. non-insulin-dependent diabetes mellitus \_\_\_\_\_
2. insulin-dependent diabetes mellitus \_\_\_\_\_
3. adrenocorticotrophic hormone \_\_\_\_\_
4. parathyroid hormone \_\_\_\_\_
5. triiodothyronine \_\_\_\_\_
6. thyroid-stimulating hormone \_\_\_\_\_
7. fasting blood sugar \_\_\_\_\_
8. prolactin \_\_\_\_\_



# Chapter Review

## Real-World Applications

### Medical Record Analysis

This Discharge Summary below contains 10 medical terms. Underline each term and write it in the list below the report. Then define each term.

#### Discharge Summary


Admitting Diagnosis:	Hyperglycemia, ketoacidosis, glycosuria
Final Diagnosis:	New-onset type 1 diabetes mellitus
History of Present Illness:	A 12-year-old female patient presented to her physician's office with a two-month history of weight loss, fatigue, polyuria, and polydipsia. Her family history is significant for a grandfather, mother, and older brother with type 1 diabetes mellitus. The pediatrician found hyperglycemia with a fasting blood sugar and glycosuria with a urine dipstick. She is being admitted at this time for management of new-onset diabetes mellitus.
Summary of Hospital Course:	At the time of admission, the FBS was 300 mg/100 mL and she was in ketoacidosis. She rapidly improved after receiving insulin; her blood glucose level normalized. The next day a glucose tolerance test confirmed the diagnosis of diabetes mellitus. The patient was started on insulin injections. Patient and family were instructed on diabetes mellitus, insulin, diet, exercise, and long-term complications.
Discharge Plans:	Patient was discharged to home with her parents. Her parents are to check her blood glucose levels twice daily and call the office for insulin dosage. She is to return to the office in two weeks.

Term	Definition
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____
7. _____	_____
8. _____	_____
9. _____	_____
10. _____	_____



### Chart Note Transcription

The chart note below contains 11 phrases that can be reworded with a medical term that you learned in this chapter. Each phrase is identified with an underline. Determine the medical term and write your answers in the space provided.

Pearson General Hospital Consultation Report	
Task	Edit View Time Scale Options Help Download Archive Date: 17 May 2015
	
Current Complaint:	A 56-year-old female was referred to the <u>specialist in the treatment of diseases of the endocrine glands</u> <b>1</b> for evaluation of weakness, edema, <u>an abnormal amount of fat in the body</u> , <b>2</b> and <u>an excessive amount of hair for a female</u> . <b>3</b>
Past History:	Patient reports she has been overweight most of her life in spite of a healthy diet and regular exercise. She was diagnosed with osteoporosis after incurring a pathological rib fracture following a coughing attack.
Signs and Symptoms:	Patient has moderate edema in bilateral feet and lower legs as well as a puffy face and an upper lip moustache. She is 100 lbs. over normal body weight for her age and height. She moves slowly and appears generally lethargic. A test to <u>measure the hormone levels in the blood plasma</u> <b>4</b> reports increased steroid hormone that <u>regulates carbohydrates in the body</u> . <b>5</b> A CT scan demonstrates a <u>gland tumor</u> <b>6</b> in the right <u>outer layer of the adrenal gland</u> . <b>7</b>
Diagnosis:	<u>A group of symptoms associated with hypersecretion of the adrenal cortex</u> <b>8</b> secondary to a <u>gland tumor</u> <b>9</b> in the right <u>outer layer of the adrenal gland</u> . <b>10</b>
Treatment:	<u>Surgical removal of the right adrenal gland</u> . <b>11</b>
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____
6.	_____
7.	_____
8.	_____
9.	_____
10.	_____
11.	_____

## Case Study

Below is a case study presentation of a patient with a condition covered in this chapter. Read the case study and answer the questions below. Some questions will ask for information not included within this chapter. Use your text, a medical dictionary, or any other reference material you choose to answer these questions.



(Flashon Studio/Shutterstock)

A 22-year-old college student was admitted to the emergency room after his friends called an ambulance when he passed out in a bar. He had become confused, developed slurred speech, and had difficulty walking after having only consumed one beer. In the ER he was noted to have diaphoresis, rapid respirations and pulse, and was disoriented. Upon examination, needle marks were found on his abdomen and outer thighs. The physician ordered blood serum tests that revealed hyperglycemia and ketoacidosis. Unknown to his friends, this young man has had diabetes mellitus since early childhood. The patient quickly recovered following an insulin injection.

## Questions

1. What pathological condition has this patient had since childhood? Look this condition up in a reference source and include a short description of it.

---



---

2. List and define each symptom noted in the ER in your own words.

---



---

3. What diagnostic test was performed? Describe it in your own words.

---



---

4. Explain the results of the test.

---



---

5. What specific type of diabetes does this young man probably have? Justify your answer.

---



---

6. Describe the other type of diabetes mellitus that this young man did not have.

---



---

# Practice Exercises

## A. Word Building Practice

The combining form **thyroid/o** refers to the thyroid. Use it to write a term that means:

- 1. removal of the thyroid \_\_\_\_\_
- 2. pertaining to the thyroid \_\_\_\_\_
- 3. state of excessive thyroid \_\_\_\_\_

The combining form **pancreat/o** refers to the pancreas. Use it to write a term that means:

- 4. pertaining to the pancreas \_\_\_\_\_
- 5. inflammation of the pancreas \_\_\_\_\_
- 6. removal of the pancreas \_\_\_\_\_
- 7. cutting into the pancreas \_\_\_\_\_

The combining form **adren/o** refers to the adrenal glands. Use it to write a term that means:

- 8. pertaining to the adrenal glands \_\_\_\_\_
- 9. enlargement of an adrenal gland \_\_\_\_\_
- 10. adrenal gland disease \_\_\_\_\_

The combining form **thym/o** refers to the thymus gland. Use it to write a term that means:

- 11. tumor of the thymus gland \_\_\_\_\_
- 12. removal of the thymus gland \_\_\_\_\_
- 13. pertaining to the thymus gland \_\_\_\_\_
- 14. inflammation of the thymus gland \_\_\_\_\_

## B. Define the Combining Form

	Definition	Example from Chapter
1. <b>natr/o</b>	_____	_____
2. <b>estr/o</b>	_____	_____
3. <b>pineal/o</b>	_____	_____
4. <b>pituitar/o</b>	_____	_____
5. <b>kal/i</b>	_____	_____
6. <b>calc/o</b>	_____	_____
7. <b>parathyroid/o</b>	_____	_____
8. <b>acr/o</b>	_____	_____
9. <b>glyc/o</b>	_____	_____
10. <b>gonad/o</b>	_____	_____

**C. What Does it Stand For?**

1. PBI \_\_\_\_\_
2.  $K^+$  \_\_\_\_\_
3.  $T_4$  \_\_\_\_\_
4. GTT \_\_\_\_\_
5. DM \_\_\_\_\_
6. BMR \_\_\_\_\_
7.  $Na^+$  \_\_\_\_\_
8. ADH \_\_\_\_\_

**D. Suffix Practice**

Use the following suffixes to create medical terms for the following definitions.

<b>-pressin</b>	<b>-uria</b>	<b>-tropin</b>
<b>-dipsia</b>	<b>-emia</b>	<b>-prandial</b>

1. the presence of sugar or glucose in the urine \_\_\_\_\_
2. to press down a vessel \_\_\_\_\_
3. excessive urination \_\_\_\_\_
4. condition of excessive calcium in the blood \_\_\_\_\_
5. excessive thirst \_\_\_\_\_
6. to stimulate the gonads \_\_\_\_\_
7. after a meal \_\_\_\_\_

**E. Define the Term**

1. corticosteroid \_\_\_\_\_
2. hirsutism \_\_\_\_\_
3. tetany \_\_\_\_\_
4. diabetic retinopathy \_\_\_\_\_
5. hyperglycemia \_\_\_\_\_
6. hypoglycemia \_\_\_\_\_
7. adrenaline \_\_\_\_\_
8. insulin \_\_\_\_\_
9. thyrotoxicosis \_\_\_\_\_
10. hypersecretion \_\_\_\_\_

**F. Fill in the Blank**

insulinoma  
gynecomastia

ketoacidosis  
panhypopituitarism

pheochromocytoma  
Hashimoto's thyroiditis

1. The doctor found that Marsha's high level of insulin and hypoglycemia was caused by a(n) \_\_\_\_\_.
2. Kevin developed \_\_\_\_\_ as a result of his diabetes mellitus and required emergency treatment.
3. It was determined that Karen had \_\_\_\_\_ when doctors realized she had problems with her thyroid gland, adrenal cortex, and ovaries.
4. Luke's high epinephrine level was caused by a(n) \_\_\_\_\_.
5. When it was determined that Carl's thyroiditis was an autoimmune condition, it became obvious that he had \_\_\_\_\_.
6. Excessive sex hormones caused Jack to develop \_\_\_\_\_.

**G. Pharmacology Challenge**

Fill in the classification for each drug description, then match the brand name.

Drug Description	Classification	Brand Name
1. _____ strong anti-inflammatory	_____	a. genotropin
2. _____ stimulates skeletal growth	_____	b. Desmopressin
3. _____ treats type 1 diabetes mellitus	_____	c. Tapazole
4. _____ blocks production of thyroid hormone	_____	d. Glucophage
5. _____ treats type 1 diabetes mellitus	_____	e. Deltasone
6. _____ controls diabetes insipidus	_____	f. Humulin

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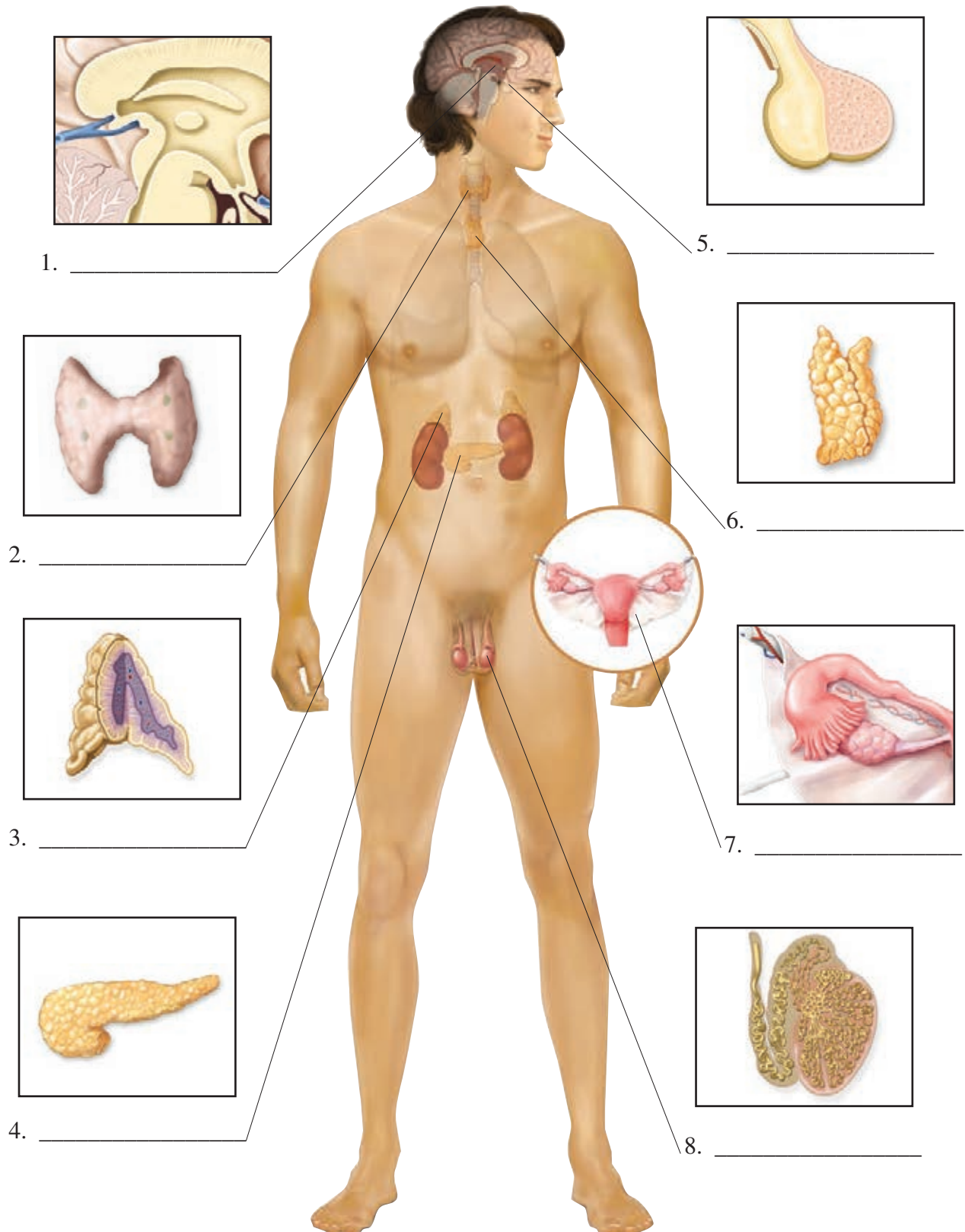
MyMedicalTerminologyLab is a premium online homework management system that includes a host of features to help you study. Registered users will find:

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## Labeling Exercise

### Image A

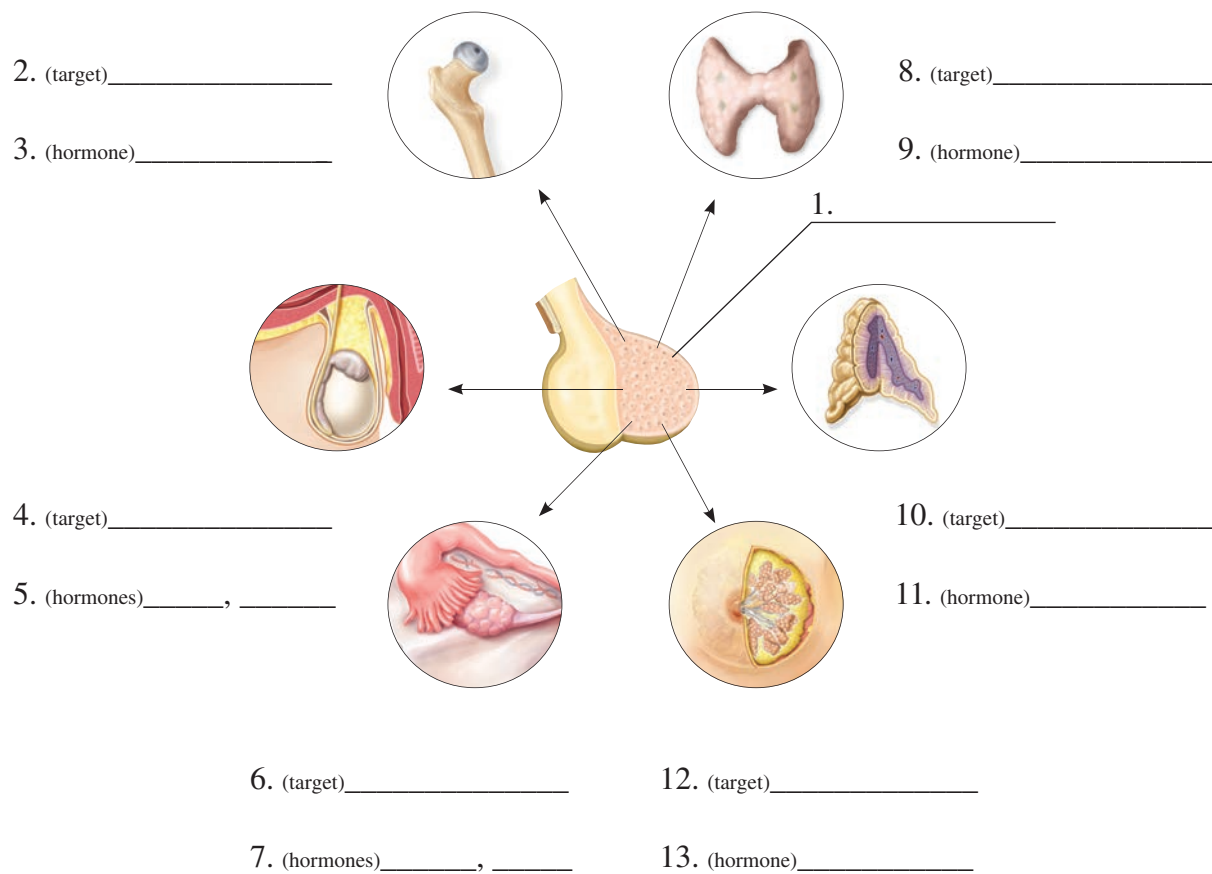
Write the labels for this figure on the numbered lines provided.





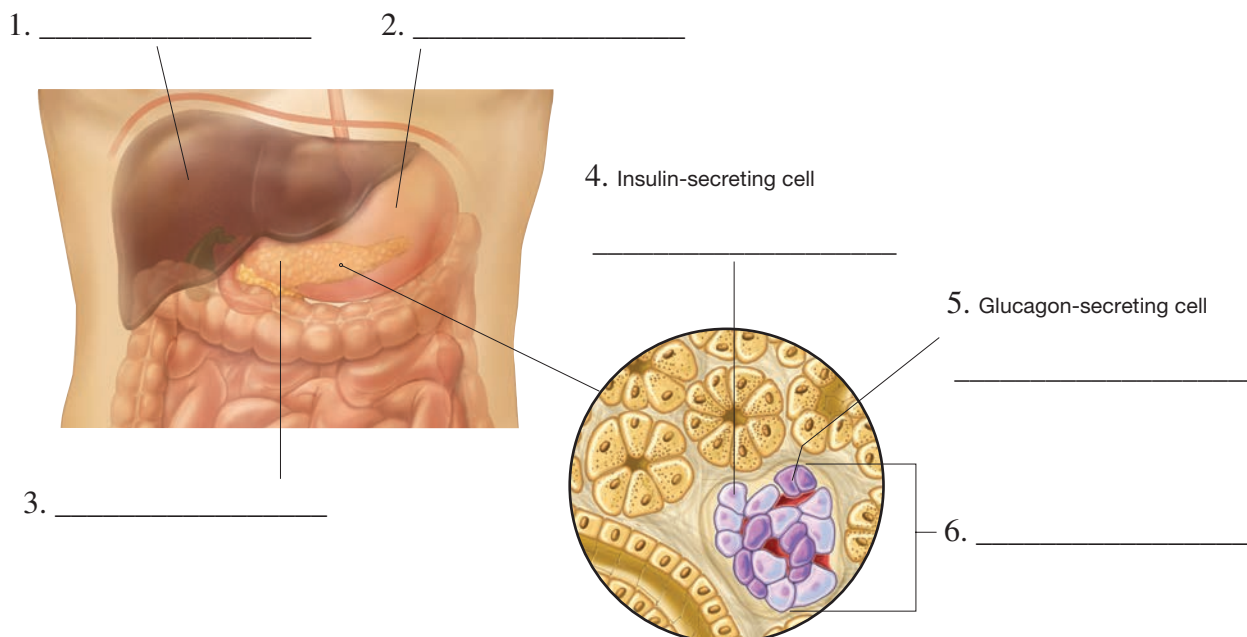
## Image B

Write the labels for this figure on the numbered lines provided.



## Image C

Write the labels for this figure on the numbered lines provided.



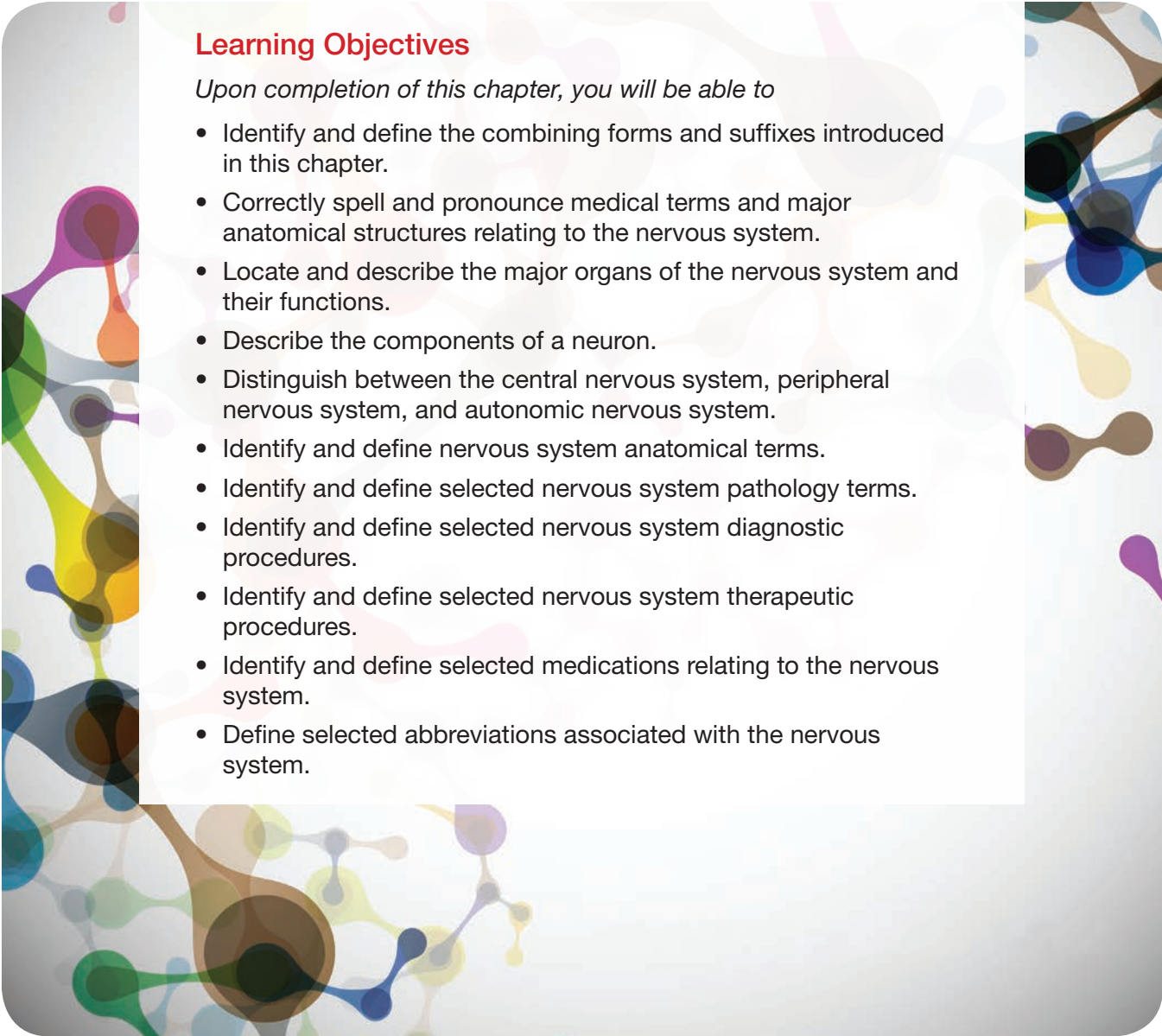


# 12

## Nervous System

### Learning Objectives

*Upon completion of this chapter, you will be able to*

- Identify and define the combining forms and suffixes introduced in this chapter.
  - Correctly spell and pronounce medical terms and major anatomical structures relating to the nervous system.
  - Locate and describe the major organs of the nervous system and their functions.
  - Describe the components of a neuron.
  - Distinguish between the central nervous system, peripheral nervous system, and autonomic nervous system.
  - Identify and define nervous system anatomical terms.
  - Identify and define selected nervous system pathology terms.
  - Identify and define selected nervous system diagnostic procedures.
  - Identify and define selected nervous system therapeutic procedures.
  - Identify and define selected medications relating to the nervous system.
  - Define selected abbreviations associated with the nervous system.
- 



# Nervous System at a Glance

## Function

The nervous system coordinates and controls body function. It receives sensory input, makes decisions, and then orders body responses.

## Organs

Here are the primary structures that comprise the nervous system:

**brain**  
**nerves**

**spinal cord**

## Word Parts

Here are the most common word parts (with their meanings) used to build nervous system terms. For a more comprehensive list, refer to the Terminology section of this chapter.

### Combining Forms

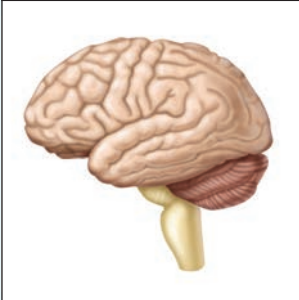
<b>alges/o</b>	sense of pain	<b>meningi/o</b>	meninges
<b>astr/o</b>	star	<b>ment/o</b>	mind
<b>centr/o</b>	center	<b>myel/o</b>	spinal cord
<b>cerebell/o</b>	cerebellum	<b>neur/o</b>	nerve
<b>cerebr/o</b>	cerebrum	<b>peripher/o</b>	away from center
<b>clon/o</b>	rapid contracting and relaxing	<b>poli/o</b>	gray matter
<b>concuss/o</b>	to shake violently	<b>pont/o</b>	pons
<b>dur/o</b>	dura mater	<b>radicul/o</b>	nerve root
<b>encephal/o</b>	brain	<b>thalam/o</b>	thalamus
<b>esthesi/o</b>	sensation, feeling	<b>thec/o</b>	sheath (meninges)
<b>gli/o</b>	glue	<b>tom/o</b>	to cut
<b>medull/o</b>	medulla oblongata	<b>ton/o</b>	tone
<b>mening/o</b>	meninges	<b>ventricul/o</b>	ventricle

### Suffixes

<b>-paresis</b>	weakness
<b>-phasia</b>	speech
<b>-taxia</b>	muscle coordination

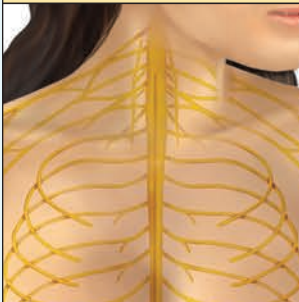
# Nervous System Illustrated

**brain, p. 422**



Coordinates body functions

**nerves, p. 426**



Transmit messages to and from the central nervous system

**spinal cord, p. 424**



Transmits messages to and from the brain

# Anatomy and Physiology of the Nervous System

brain

central nervous system

cranial nerves (KRAY-nee-al)

glands

muscles

nerves

peripheral nervous system (per-IF-er-al)

sensory receptors

spinal cord

spinal nerves

## What's In A Name?

Look for these word parts:

**centr/o** = center

**peripher/o** = away from center

**-al** = pertaining to

**-ory** = pertaining to

## Med Term Tip

Neuroglial tissue received its name as a result of its function. This tissue holds neurons together. Therefore, it was called *neuroglial*, a term literally meaning “nerve glue.”

The nervous system is responsible for coordinating all the activity of the body. To do this, it first receives information from both external and internal **sensory receptors** and then uses that information to adjust the activity of **muscles** and **glands** to match the needs of the body.

The nervous system can be subdivided into the **central nervous system** (CNS) and the **peripheral nervous system** (PNS). The central nervous system consists of the **brain** and **spinal cord**. Sensory information comes into the central nervous system, where it is processed. Motor messages then exit the central nervous system carrying commands to muscles and glands. The **nerves** of the peripheral nervous system are **cranial nerves** and **spinal nerves**. Sensory nerves carry information to the central nervous system, and motor nerves carry commands away from the central nervous system. All portions of the nervous system are composed of nervous tissue.

## Nervous Tissue

**axon** (AK-son)

**dendrites** (DEN-drights)

**myelin** (MY-eh-lin)

**nerve cell body**

**neuroglial cells** (noo-ROH-gee-all)

**neuron** (NOO-ron)

**neurotransmitter** (noo-roh-TRANS-mit-ter)

**synapse** (sih-NAPSE)

**synaptic cleft** (sih-NAP-tik)

## What's In A Name?

Look for these word parts:

**neur/o** = nerve

**-tic** = pertaining to

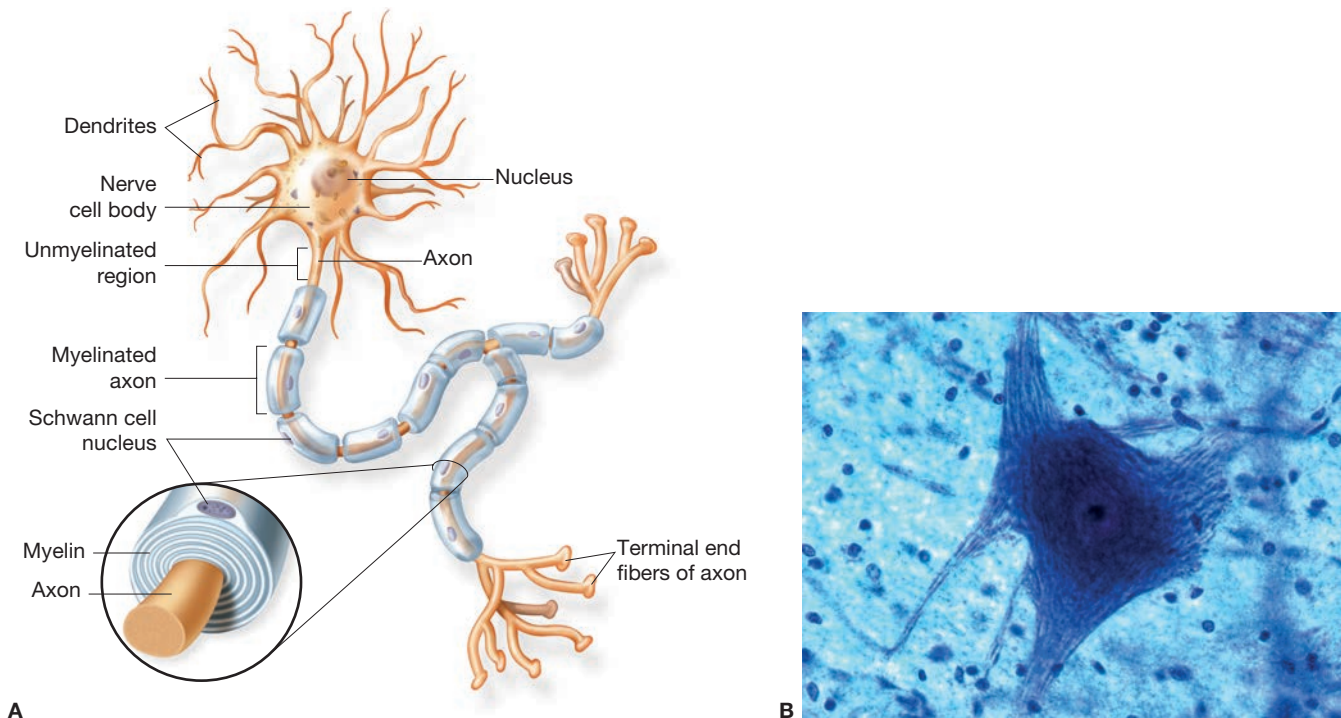
## Med Term Tip

A synapse is the point at which two nerves contact each other. The term *synapse* comes from the Greek word meaning “connection.”

Nervous tissue consists of two basic types of cells: **neurons** and **neuroglial cells**. Neurons are individual nerve cells. These are the cells that are capable of conducting electrical impulses in response to a stimulus. Neurons have three basic parts: **dendrites**, a **nerve cell body**, and an **axon** (see Figure 12.1A ■). Dendrites are highly branched projections that receive impulses. The nerve cell body contains the nucleus and many of the other organelles of the cell (see Figure 12.1B ■). A neuron has only a single axon, a projection from the nerve cell body that conducts the electrical impulse toward its destination. The point at which the axon of one neuron meets the dendrite of the next neuron is called a **synapse**. Electrical impulses cannot pass directly across the gap between two neurons, called the **synaptic cleft**. They instead require the help of a chemical messenger, called a **neurotransmitter**.

A variety of neuroglial cells are found in nervous tissue. Each has a different support function for the neurons. For example, some neuroglial cells produce **myelin**, a fatty substance that acts as insulation for many axons so that they conduct electrical impulses faster. Neuroglial cells *do not* conduct electrical impulses.





■ **Figure 12.1** A) The structure of a neuron, showing the dendrites, nerve cell body, and axon. B) Photomicrograph of typical neuron showing the nerve cell body, nucleus, and dendrites. (Christopher Meade/Shutterstock)

## Central Nervous System

**gray matter**

**meninges** (men-IN-jeez)

**myelinated** (MY-eh-lih-nayt-ed)

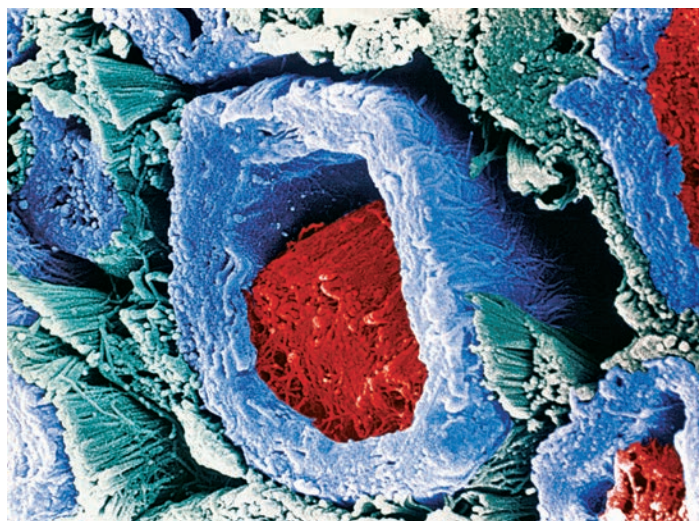
**tract**

**white matter**

Because the central nervous system is a combination of the brain and spinal cord, it is able to receive impulses from all over the body, process this information, and then respond with an action. This system consists of both **gray matter** and **white matter**. Gray matter is comprised of unsheathed or uncovered cell bodies and dendrites. White matter is **myelinated** nerve fibers (see Figure 12.2 ■). The myelin sheath makes the nervous tissue appear white. Bundles of nerve fibers interconnecting different parts of the central nervous system are called **tracts**. The central nervous system is encased and protected by three membranes known as the **meninges**.

### Med Term Tip

*Myelin* is a lipid and a very white molecule. This is why myelinated neurons are called *white matter*.



■ **Figure 12.2** Electronmicrograph illustrating an axon (red) wrapped in its myelin sheath (blue). (Quest/Science Photo Library/Science Source)



**What's In A Name?**

Look for these word parts:

**encephal/o** = brain

**-al** = pertaining to

**hypo-** = below

**Brain****brain stem**

**cerebellum** (ser-eh-BELL-um)

**cerebral cortex** (seh-REE-bral / KOR-teks)

**cerebral hemisphere**

**cerebrospinal fluid** (ser-eh-broh-SPY-nal)

**cerebrum** (SER-eh-brum)

**diencephalon** (dye-en-SEFF-ah-lon)

**frontal lobe**

**gyri** (JYE-rye)

**hypothalamus** (high-poh-THAL-ah-mus)

**medulla oblongata**

(meh-DULL-ah / ob-long-GAH-tah)

**midbrain**

**occipital lobe** (ock-SIP-ih-tal)

**parietal lobe** (pah-RYE-eh-tal)

**pons** (PONZ)

**sulci** (SULL-kye)

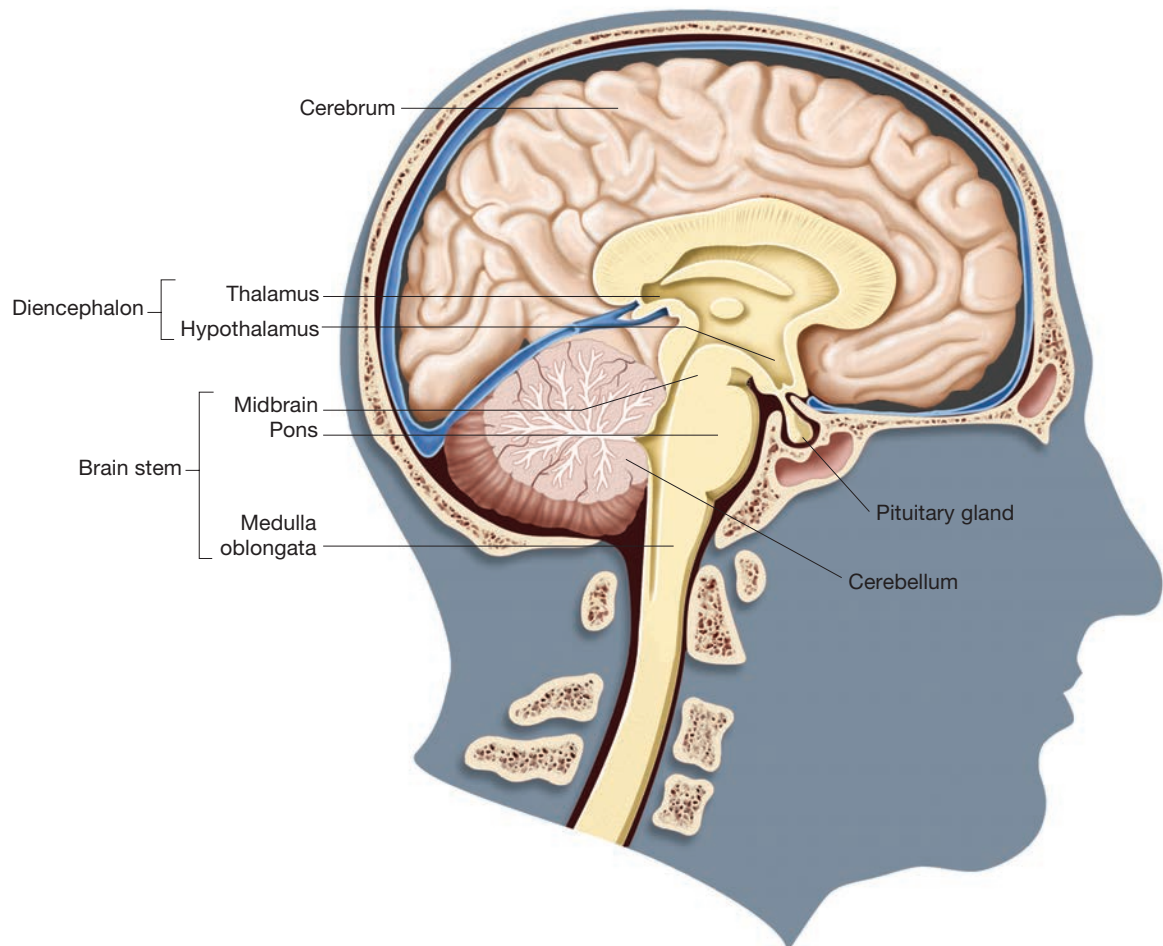
**temporal lobe** (TEM-por-al)

**thalamus** (THAL-ah-mus)

**ventricles** (VEN-trik-lz)

The brain is one of the largest organs in the body and coordinates most body activities. It is the center for all thought, memory, judgment, and emotion. Each part of the brain is responsible for controlling different body functions, such as temperature regulation, blood pressure, and breathing. There are four sections to the brain: the **cerebrum**, **cerebellum**, **diencephalon**, and **brain stem** (see Figure 12.3 ■).

The largest section of the brain is the cerebrum. It is located in the upper portion of the brain and is the area that processes thoughts, judgment, memory, problem solving, and language. The outer layer of the cerebrum is the **cerebral**



■ **Figure 12.3** The regions of the brain.

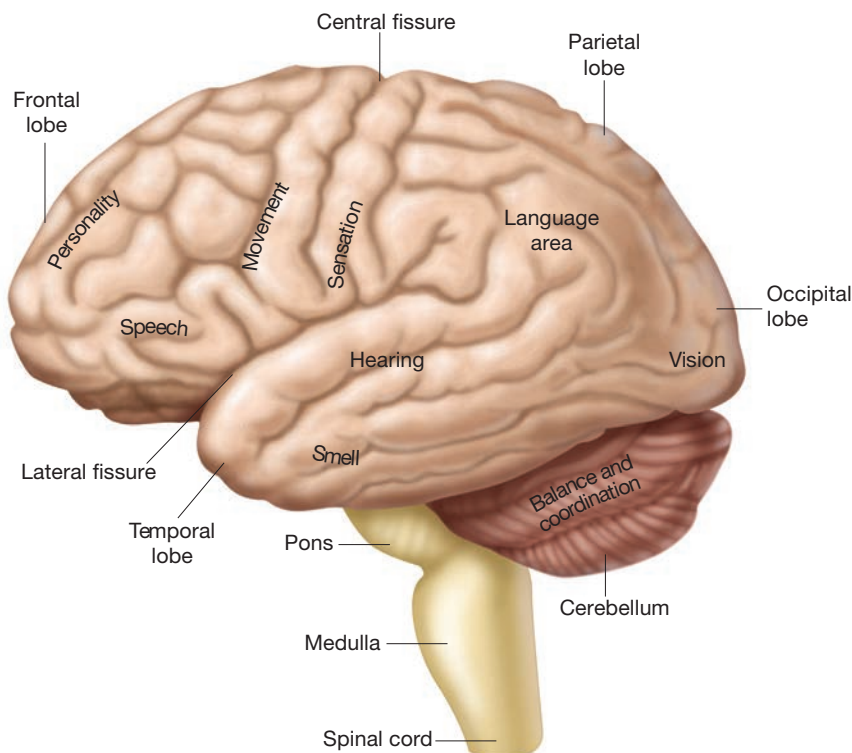
**cortex**, which is composed of folds of gray matter. The elevated portions of the cerebrum, or convolutions, are called **gyri** and are separated by fissures, or valleys, called **sulci**. The cerebrum is subdivided into left and right halves called **cerebral hemispheres**. Each hemisphere has four lobes. The lobes and their locations and functions are as follows (see Figure 12.4 ■):

1. **Frontal lobe:** Most anterior portion of the cerebrum; controls motor function, personality, and speech
2. **Parietal lobe:** Most superior portion of the cerebrum; receives and interprets nerve impulses from sensory receptors and interprets language
3. **Occipital lobe:** Most posterior portion of the cerebrum; controls vision
4. **Temporal lobe:** Left and right lateral portion of the cerebrum; controls hearing and smell

The diencephalon, located below the cerebrum, contains two of the most critical areas of the brain, the **thalamus** and the **hypothalamus**. The thalamus is composed of gray matter and acts as a center for relaying impulses from the eyes, ears, and skin to the cerebrum. Our pain perception is controlled by the thalamus. The hypothalamus, located just below the thalamus, controls body temperature, appetite, sleep, sexual desire, and emotions. The hypothalamus is actually responsible for controlling the autonomic nervous system, cardiovascular system, digestive system, and the release of hormones from the pituitary gland.

The cerebellum, the second largest portion of the brain, is located beneath the posterior part of the cerebrum. This part of the brain aids in coordinating voluntary body movements and maintaining balance and equilibrium. The cerebellum refines the muscular movement that is initiated in the cerebrum.

The final portion of the brain is the brain stem. This area has three components: **midbrain**, **pons**, and **medulla oblongata**. The midbrain acts as a pathway for impulses to be conducted between the brain and the spinal cord. The pons—a



■ **Figure 12.4** The functional regions of the cerebrum.

term meaning “bridge”—connects the cerebellum to the rest of the brain. The medulla oblongata is the most inferior positioned portion of the brain; it connects the brain to the spinal cord. However, this vital area contains the centers that control respiration, heart rate, temperature, and blood pressure. Additionally, this is the site where nerve tracts cross from one side of the brain to control functions and movement on the other side of the body. In other words, with few exceptions, the left side of the brain controls the right side of the body and vice versa.

The brain has four interconnected cavities called **ventricles**: one in each cerebral hemisphere, one in the thalamus, and one in front of the cerebellum. These contain **cerebrospinal fluid** (CSF), which is the watery, clear fluid that provides protection from shock or sudden motion to the brain and spinal cord.

## Spinal Cord

ascending tracts

central canal

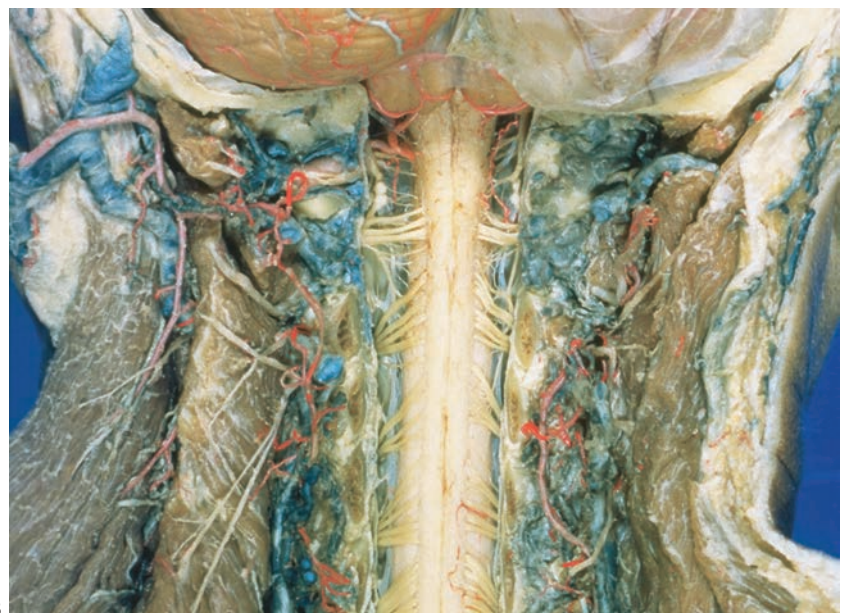
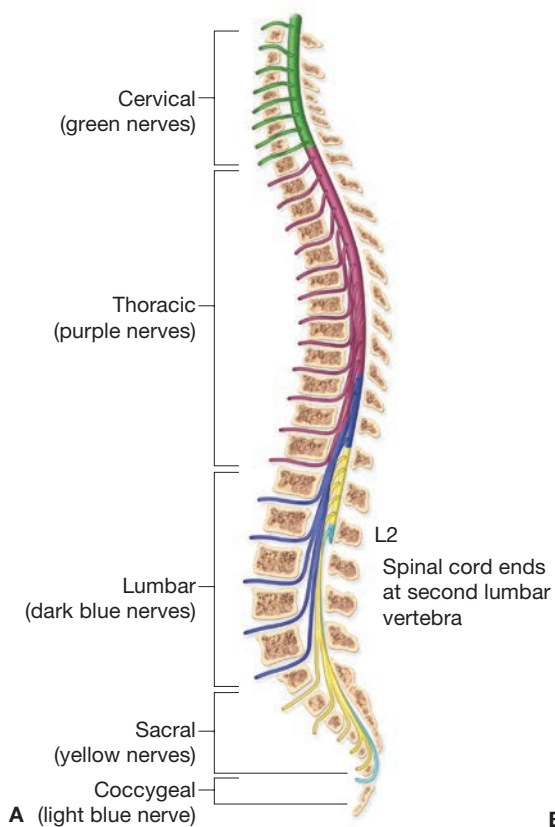
descending tracts

spinal cavity

vertebral canal

vertebral column

The function of the spinal cord is to provide a pathway for impulses traveling to and from the brain. The spinal cord is actually a column of nervous tissue extending from the medulla oblongata of the brain down to the level of the second lumbar vertebra within the **vertebral column**. The 33 vertebrae of the backbone line up to form a continuous canal for the spinal cord called the **spinal cavity** or **vertebral canal** (see Figure 12.5 ■).



■ **Figure 12.5** A) The levels of the spinal cord and spinal nerves. B) Photograph of the spinal cord as it descends from the brain. The spinal nerve roots are clearly visible branching off from the spinal cord. (VideoSurgery/Science Source)



Similar to the brain, the spinal cord is also protected by cerebrospinal fluid. It flows down the center of the spinal cord within the **central canal**. The inner core of the spinal cord consists of cell bodies and dendrites of peripheral nerves and therefore is gray matter. The outer portion of the spinal cord is myelinated white matter. The white matter is either **ascending tracts** carrying sensory information up to the brain or **descending tracts** carrying motor commands down from the brain to a peripheral nerve.

## Meninges

**arachnoid layer** (ah-RAK-noyd)

**dura mater** (DOO-rah / MATE-er)

**pia mater** (PEE-ah / MATE-er)

**subarachnoid space** (sub-ah-RAK-noyd)

**subdural space** (sub-DOO-ral)

The meninges are three layers of connective tissue membranes surrounding the brain and spinal cord (see Figure 12.6 ■). Moving from external to internal, the meninges are:

1. **Dura mater:** Meaning “tough mother”; it forms a tough, fibrous sac around the central nervous system
2. **Subdural space:** Actual space between the dura mater and arachnoid layers
3. **Arachnoid layer:** Meaning “spiderlike”; it is a thin, delicate layer attached to the pia mater by weblike filaments
4. **Subarachnoid space:** Space between the arachnoid layer and the pia mater; it contains cerebrospinal fluid that cushions the brain from the outside
5. **Pia mater:** Meaning “soft mother”; it is the innermost membrane layer and is applied directly to the surface of the brain and spinal cord

### Med Term Tip

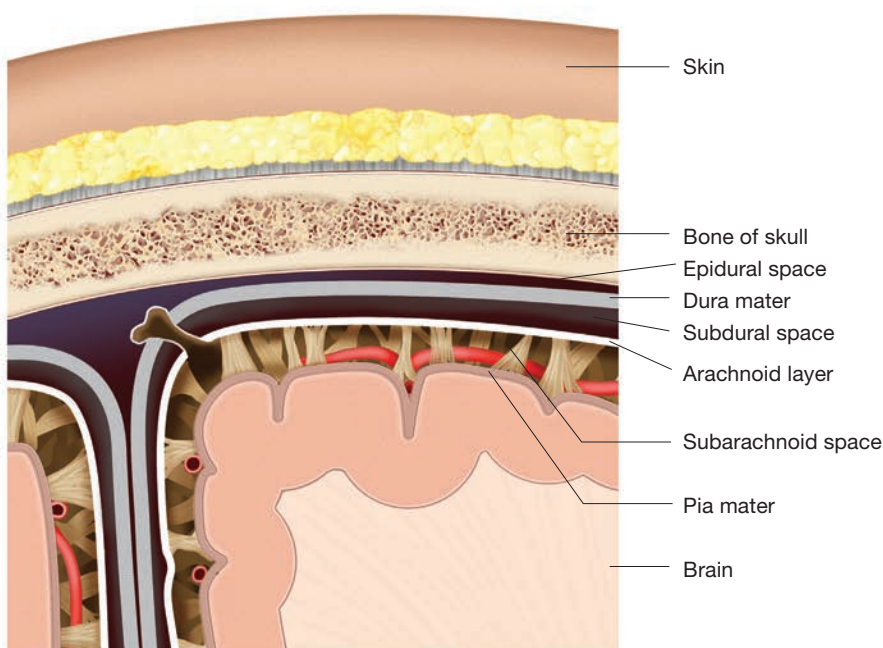
Certain disease processes attack the gray matter and the white matter of the central nervous system. For instance, *poliomyelitis* is a viral infection of the gray matter of the spinal cord. The combining term *poli/o* means “gray matter.” This disease has almost been eradicated, due to the polio vaccine.

### What's In A Name?

Look for these word parts:

-oid = resembling

sub- = under



■ **Figure 12.6** The meninges. This figure illustrates the location and structure of each layer of the meninges and their relationship to the skull and brain.

What's In A Name?

Look for these word parts:  
somat/o = body  
-ic = pertaining to  
auto- = self

Med Term Tip

Because nerve tracts cross from one side of the body to the other side of the brain, damage to one side of the brain results in symptoms appearing on the opposite side of the body. Since nerve cells that control the movement of the right side of the body are located in the left side of the medulla oblongata, a stroke that paralyzed the right side of the body would actually have occurred in the left side of the brain.

Med Term Tip

The term *autonomic* comes from the Latin word *autonomia*, meaning independent.

Peripheral Nervous System

- afferent neurons** (AFF-er-ent)

**autonomic nervous system** (aw-toh-NOM-ik)

**efferent neurons** (EFF-er-ent)

**ganglion** (GANG-lee-on)
- motor neurons**

**nerve root**

**sensory neurons**

**somatic nerves**

The peripheral nervous system (PNS) includes both the 12 pairs of cranial nerves and the 31 pairs of spinal nerves. A nerve is a group or bundle of axon fibers located outside the central nervous system that carries messages between the central nervous system and the various parts of the body. Whether a nerve is cranial or spinal is determined by where the nerve originates. Cranial nerves arise from the brain, mainly at the medulla oblongata. Spinal nerves split off from the spinal cord, and one pair (a left and a right) exits between each pair of vertebrae. The point where either type of nerve is attached to the central nervous system is called the **nerve root**. The names of most nerves reflect either the organ the nerve serves or the portion of the body the nerve is traveling through. The entire list of cranial nerves is found in Table 12.1 ■. Figure 12.7 ■ illustrates some of the major spinal nerves in the human body.

Although most nerves carry information to and from the central nervous system, individual neurons carry information in only one direction. **Afferent neurons**, also called **sensory neurons**, carry sensory information from a sensory receptor to the central nervous system. **Efferent neurons**, also called **motor neurons**, carry activity instructions from the central nervous system to muscles or glands out in the body (see Figure 12.8 ■). The nerve cell bodies of the neurons forming the nerve are grouped together in a knot-like mass, called a **ganglion**, located outside the central nervous system.

The nerves of the peripheral nervous system are subdivided into two divisions, the **autonomic nervous system** (ANS) and **somatic nerves**, each serving a different area of the body.

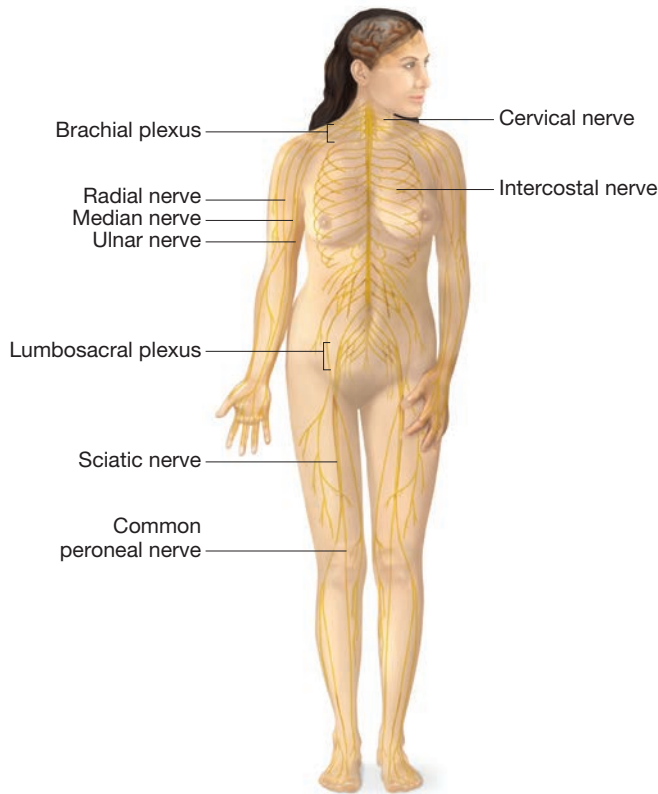
Autonomic Nervous System

- parasympathetic branch**

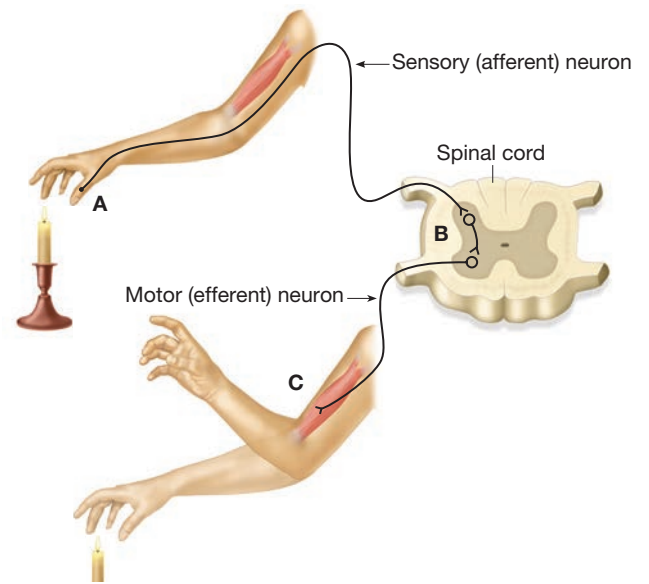
(pair-ah-sim-pah-THET-ik)
- sympathetic branch** (sim-pah-THET-ik)

The autonomic nervous system is involved with the control of involuntary or unconscious bodily functions. It may increase or decrease the activity of the smooth muscle found in viscera and blood vessels, cardiac muscle, and glands.

Table 12.1 Cranial Nerves		
Number	Name	Function
I	Olfactory	Transports impulses for sense of smell.
II	Optic	Carries impulses for sense of sight.
III	Oculomotor	Motor impulses for eye muscle movement and the pupil of the eye.
IV	Trochlear	Controls superior oblique muscle of eye on each side.
V	Trigeminal	Carries sensory facial impulses and controls muscles for chewing; branches into eyes, forehead, upper and lower jaw.
VI	Abducens	Controls an eyeball muscle to turn eye to side.
VII	Facial	Controls facial muscles for expression, salivation, and taste on two-thirds of tongue (anterior).
VIII	Vestibulocochlear	Responsible for impulses of equilibrium and hearing; also called <i>auditory nerve</i> .
IX	Glossopharyngeal	Carries sensory impulses from pharynx (swallowing) and taste on one-third of tongue.
X	Vagus	Supplies most organs in abdominal and thoracic cavities.
XI	Accessory	Controls the neck and shoulder muscles.
XII	Hypoglossal	Controls tongue muscles.



■ **Figure 12.7** The major spinal nerves.



■ **Figure 12.8** The functional structure of the peripheral nervous system. A) Afferent or sensory neurons carry sensory information to the spinal cord. B) The spinal cord receives incoming sensory information and delivers motor messages. C) Efferent or motor neurons deliver motor commands to muscles and glands.

The autonomic nervous system is divided into two branches: **sympathetic branch** and **parasympathetic branch**. The sympathetic nerves control the “fight-or-flight” reaction during times of stress and crisis. These nerves increase heart rate, dilate airways, increase blood pressure, inhibit digestion, and stimulate the production of adrenaline during a crisis. The parasympathetic nerves serve as a counterbalance for the sympathetic nerves, the “rest-and-digest” reaction. Therefore, they cause heart rate to slow down, lower blood pressure, and stimulate digestion.

#### What's In A Name?

Look for these word parts:  
 -ic = pertaining to  
 para- = beside

## Somatic Nerves

Somatic nerves serve the skin and skeletal muscles and are mainly involved with the conscious and voluntary activities of the body. The large variety of sensory receptors found in the dermis layer of the skin use somatic nerves to send their information, such as touch, temperature, pressure, and pain, to the brain. These are also the nerves that carry motor commands to skeletal muscles.

## Practice As You Go

### A. Complete the Statement

1. The organs of the nervous system are the \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
2. The two divisions of the nervous system are the \_\_\_\_\_ and \_\_\_\_\_.
3. The neurons that carry impulses away from the brain and spinal cord are called \_\_\_\_\_ neurons and the neurons that carry impulses to the brain and spinal cord are called \_\_\_\_\_ neurons.



4. The largest portion of the brain is the \_\_\_\_\_.
5. The second largest portion of the brain is the \_\_\_\_\_.
6. The occipital lobe controls \_\_\_\_\_.
7. The temporal lobe controls \_\_\_\_\_ and \_\_\_\_\_.
8. The two divisions of the autonomic nervous system are the \_\_\_\_\_ and \_\_\_\_\_.

## Terminology

### Word Parts Used to Build Nervous System Terms

The following lists contain the combining forms, suffixes, and prefixes used to build terms in the remaining sections of this chapter.

#### Combining Forms

<b>alges/o</b>	sense of pain
<b>angi/o</b>	vessel
<b>arteri/o</b>	artery
<b>astr/o</b>	star
<b>cephal/o</b>	head
<b>cerebell/o</b>	cerebellum
<b>cerebr/o</b>	cerebrum
<b>clon/o</b>	rapid contracting and relaxing
<b>concuss/o</b>	to shake violently
<b>crani/o</b>	skull
<b>cyt/o</b>	cell
<b>dur/o</b>	dura mater
<b>electr/o</b>	electricity

<b>encephal/o</b>	brain
<b>esthesi/o</b>	sensation, feeling
<b>gli/o</b>	glue
<b>hemat/o</b>	blood
<b>hem/o</b>	blood
<b>hydr/o</b>	water
<b>isch/o</b>	to hold back
<b>later/o</b>	side
<b>lumb/o</b>	low back
<b>medull/o</b>	medulla oblongata
<b>mening/o</b>	meninges
<b>meningi/o</b>	meninges
<b>ment/o</b>	mind
<b>my/o</b>	muscle

<b>myel/o</b>	spinal cord
<b>neur/o</b>	nerve
<b>poli/o</b>	gray matter
<b>pont/o</b>	pons
<b>radicul/o</b>	nerve root
<b>scler/o</b>	hard
<b>spin/o</b>	spine
<b>thalam/o</b>	thalamus
<b>thec/o</b>	sheath
<b>tom/o</b>	to cut
<b>ton/o</b>	tone
<b>vascul/o</b>	blood vessel
<b>ventricul/o</b>	ventricle
<b>vertebr/o</b>	vertebra

#### Suffixes

<b>-al</b>	pertaining to
<b>-algia</b>	pain
<b>-ar</b>	pertaining to
<b>-ary</b>	pertaining to
<b>-asthenia</b>	weakness
<b>-cele</b>	protrusion
<b>-eal</b>	pertaining to
<b>-ectomy</b>	surgical removal
<b>-gram</b>	record
<b>-graphy</b>	process of recording

<b>-ia</b>	condition, state
<b>-ic</b>	pertaining to
<b>-ine</b>	pertaining to
<b>-ion</b>	action
<b>-itis</b>	inflammation
<b>-logy</b>	study of
<b>-nic</b>	pertaining to
<b>-oma</b>	tumor, mass
<b>-osis</b>	abnormal condition
<b>-otomy</b>	cutting into

<b>-paresis</b>	weakness
<b>-pathy</b>	disease
<b>-phasia</b>	speech
<b>-plasty</b>	surgical repair
<b>-plegia</b>	paralysis
<b>-rrhaphy</b>	suture
<b>-taxia</b>	muscle coordination
<b>-tic</b>	pertaining to
<b>-trophic</b>	pertaining to development

## Prefixes

<b>a-</b>	without
<b>an-</b>	without
<b>anti-</b>	against
<b>bi-</b>	two
<b>de-</b>	without
<b>dys-</b>	abnormal, difficult
<b>endo-</b>	within

<b>epi-</b>	above
<b>hemi-</b>	half
<b>hyper-</b>	excessive
<b>intra-</b>	within
<b>mono-</b>	one
<b>para-</b>	abnormal, two like parts of a pair

<b>poly-</b>	many
<b>quadri-</b>	four
<b>semi-</b>	partial
<b>sub-</b>	under
<b>un-</b>	not

## Adjective Forms of Anatomical Terms

Term	Word Parts	Definition
<b>cerebellar</b> (ser-eh-BELL-ar)	<b>cerebell/o</b> = cerebellum <b>-ar</b> = pertaining to	Pertaining to the cerebellum.
<b>cerebral</b> (seh-REE-bral)	<b>cerebr/o</b> = cerebrum <b>-al</b> = pertaining to	Pertaining to the cerebrum.
<b>cerebrospinal</b> (ser-eh-broh-SPY-nal)	<b>cerebr/o</b> = cerebrum <b>spin/o</b> = spine <b>-al</b> = pertaining to	Pertaining to the cerebrum and spine.
<b>cranial</b> (KRAY-nee-al)	<b>crani/o</b> = skull <b>-al</b> = pertaining to	Pertaining to the skull.
<b>encephalic</b> (EN-seh-FAL-ik)	<b>encephal/o</b> = brain <b>-ic</b> = pertaining to	Pertaining to the brain.
<b>intracranial</b> (in-tra-KRAY-nee-al)	<b>intra-</b> = within <b>crani/o</b> = skull <b>-al</b> = pertaining to	Pertaining to within the skull.
<b>intrathecal</b> (in-tra-THEE-kal)	<b>intra-</b> = within <b>thec/o</b> = sheath <b>-al</b> = pertaining to	Pertaining to within the meninges, specifically the subdural or subarachnoid space.
<b>medullary</b> (MED-yoo-lair-ee)	<b>medull/o</b> = medulla oblongata <b>-ary</b> = pertaining to	Pertaining to the medulla oblongata.
<b>meningeal</b> (meh-NIN-jee-all)	<b>mening/o</b> = meninges <b>-eal</b> = pertaining to	Pertaining to the meninges.
<b>myelonic</b> (MY-eh-LON-ik)	<b>myel/o</b> = spinal cord <b>-nic</b> = pertaining to	Pertaining to the spinal cord.
<b>neural</b> (NOO-rall)	<b>neur/o</b> = nerve <b>-al</b> = pertaining to	Pertaining to nerves.
<b>neuroglial</b> (noo-ROG-lee-al)	<b>neur/o</b> = nerve <b>gli/o</b> = glue <b>-al</b> = pertaining to	Pertaining to the support cells, glial cells, of nerves.
<b>pontine</b> (pon-TEEN)	<b>pont/o</b> = pons <b>-ine</b> = pertaining to	Pertaining to the pons.
<b>spinal</b> (SPY-nal)	<b>spin/o</b> = spine <b>-al</b> = pertaining to	Pertaining to the spine.
<b>subdural</b> (sub-DOO-ral)	<b>sub-</b> = under <b>dur/o</b> = dura mater <b>-al</b> = pertaining to	Pertaining to under the dura mater.

## Adjective Forms of Anatomical Terms (continued)

Term	Word Parts	Definition
<b>thalamic</b> (tha-LAM-ik)	<b>thalam/o</b> = thalamus <b>-ic</b> = pertaining to	Pertaining to the thalamus.
<b>ventricular</b> (ven-TRIK-yoo-lar)	<b>ventricul/o</b> = ventricle <b>-ar</b> = pertaining to	Pertaining to the ventricles.
<b>vertebral</b> (VER-teh-bral)	<b>vertebr/o</b> = vertebra <b>-al</b> = pertaining to	Pertaining to the vertebrae.

## Practice As You Go

### B. Give the adjective form for each anatomical structure

1. The cerebrum and spinal cord \_\_\_\_\_
2. The meninges \_\_\_\_\_
3. Under the dura mater \_\_\_\_\_
4. The brain \_\_\_\_\_
5. A nerve \_\_\_\_\_
6. Within the skull \_\_\_\_\_

## Pathology

Term	Word Parts	Definition
<b>Medical Specialties</b>		
<b>anesthesiology</b> (AN-es-thee-zee-OL-oh-jee)	<b>an-</b> = without <b>esthesi/o</b> = sensation, feeling <b>-logy</b> = study of	Branch of medicine specializing in all aspects of anesthesia, including for surgical procedures, resuscitation measures, and the management of acute and chronic pain. Physician is an <i>anesthesiologist</i> .
<b>neurology</b> (noo-ROL-oh-jee)	<b>neur/o</b> = nerve <b>-logy</b> = study of	Branch of medicine concerned with diagnosis and treatment of diseases and conditions of the nervous system. Physician is a <i>neurologist</i> .
<b>neurosurgery</b> (noo-roh-SIR-jury)	<b>neur/o</b> = nerve	Branch of medicine concerned with treating conditions and diseases of the nervous system by surgical means. Physician is a <i>neurosurgeon</i> .
<b>Signs and Symptoms</b>		
<b>absence seizure</b>		Type of epileptic seizure that lasts only a few seconds to half a minute, characterized by a loss of awareness and an absence of activity. It is also known as a <i>petit mal seizure</i> .
<b>analgesia</b> (an-al-JEE-zee-ah)	<b>an-</b> = without <b>alges/o</b> = sense of pain <b>-ia</b> = state	Absence of pain.

## Pathology (continued)

Term	Word Parts	Definition
<b>anesthesia</b> (an-ess-THEE-zee-ah)	<b>an-</b> = without <b>esthesi/o</b> = feeling, sensation <b>-ia</b> = condition	Lack of feeling or sensation.
<b>aphasia</b> (ah-FAY-zee-ah)	<b>a-</b> = without <b>-phasia</b> = speech	Inability to communicate verbally or in writing due to damage of the speech or language centers in the brain.
<b>ataxia</b> (ah-TAK-see-ah)	<b>a-</b> = without <b>-taxia</b> = muscle coordination	Lack of muscle coordination.
<b>aura</b> (AW-ruh)		Sensations, such as seeing colors or smelling an unusual odor, that occur just prior to an epileptic seizure or migraine headache.
<b>cephalgia</b> (seff-al-AL-jee-ah)	<b>cephal/o</b> = head <b>-algia</b> = pain	Headache (HA).
<b>coma</b> (COH-mah)		Profound unconsciousness resulting from an illness or injury.
<b>conscious</b> (KON-shus)		Condition of being awake and aware of surroundings.
<b>convulsion</b> (kon-VULL-shun)		Severe involuntary muscle contractions and relaxations. These have a variety of causes, such as epilepsy, fever, and toxic conditions.
<b>delirium</b> (dee-LEER-ee-um)	<b>de-</b> = without	Abnormal mental state characterized by confusion, disorientation, and agitation.
<b>dementia</b> (dee-MEN-she-ah)	<b>de-</b> = without <b>ment/o</b> = mind <b>-ia</b> = condition	Progressive impairment of intellectual function that interferes with performing activities of daily living. Patients have little awareness of their condition. Found in disorders such as Alzheimer's.
<b>dysphasia</b> (dis-FAY-zee-ah)	<b>dys-</b> = abnormal, difficult <b>-phasia</b> = speech	Difficulty communicating verbally or in writing due to damage of the speech or language centers in the brain.
<b>focal seizure</b> (FOE-kal)	<b>-al</b> = pertaining to	Localized seizure often affecting one limb.
<b>hemiparesis</b> (hem-ee-par-EE-sis)	<b>hemi-</b> = half <b>-paresis</b> = weakness	Weakness or loss of motion on one side of the body.
<b>hemiplegia</b> (hem-ee-PLÉE-jee-ah)	<b>hemi-</b> = half <b>-plegia</b> = paralysis	Paralysis on only one side of the body.
<b>hyperesthesia</b> (high-per-ess-THEE-zee-ah)	<b>hyper-</b> = excessive <b>esthesi/o</b> = feeling, sensations <b>-ia</b> = condition	Abnormally heightened sense of feeling, sense of pain, or sensitivity to touch.
<b>monoparesis</b> (mon-oh-pah-REE-sis)	<b>mono-</b> = one <b>-paresis</b> = weakness	Muscle weakness in one limb.
<b>monoplegia</b> (mon-oh-PLÉE-jee-ah)	<b>mono-</b> = one <b>-plegia</b> = paralysis	Paralysis of one limb.
<b>neuralgia</b> (noo-RAL-jee-ah)	<b>neur/o</b> = nerve <b>-algia</b> = pain	Nerve pain.
<b>palsy</b> (PAWL-zee)		Temporary or permanent loss of the ability to control movement.

## Pathology (continued)

Term	Word Parts	Definition
<b>paralysis</b> (pah-RAL-ih-sis)		Temporary or permanent loss of function or voluntary movement.
<b>paraplegia</b> (pair-ah-PLÉE-jee-ah)	<b>para-</b> = two like parts of a pair <b>-plegia</b> = paralysis	Paralysis of the lower portion of the body and both legs.
<b>paresthesia</b> (par-es-THEE-zee-ah)	<b>para-</b> = abnormal <b>esthesi/o</b> = sensation, feeling <b>-ia</b> = condition	Abnormal sensation such as burning or tingling.
<b>quadriplegia</b> (kwod-rih-PLÉE-jee-ah)	<b>quadri-</b> = four <b>-plegia</b> = paralysis	Paralysis of all four limbs.
<b>seizure</b> (SEE-zyoor)		Sudden, uncontrollable onset of symptoms, such as in an epileptic seizure.
<b>semiconscious</b> (sem-ee-KON-shus)	<b>semi-</b> = partial	State of being aware of surroundings and responding to stimuli only part of the time.
<b>syncope</b> (SIN-koh-pee)		Fainting.
<b>tonic-clonic seizure</b>	<b>ton/o</b> = tone <b>clon/o</b> = rapid contracting and relaxing <b>-ic</b> = pertaining to	Type of severe epileptic seizure characterized by a loss of consciousness and convulsions. The seizure alternates between strong continuous muscle spasms (tonic) and rhythmic muscle contraction and relaxation (clonic). It is also known as a <i>grand mal seizure</i> .
<b>tremor</b> (TREM-or)		Involuntary, repetitive, alternating movement of a part of the body.
<b>unconscious</b> (un-KON-shus)	<b>un-</b> = not	State of being unaware of surroundings, with the inability to respond to stimuli.

### Brain

**Alzheimer's disease**  
(ALTS-high-merz)

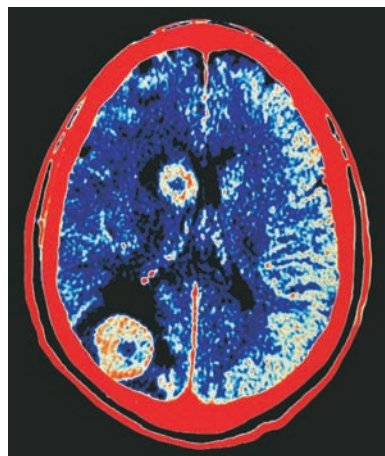
Chronic, organic mental disorder consisting of dementia, which is more prevalent in adults after 65 years of age. Involves progressive disorientation, apathy, speech and gait disturbances, and loss of memory. Named for German neurologist Alois Alzheimer.

**astrocytoma**  
(ass-troh-sigh-TOH-mah)

**astr/o** = star  
**cyt/o** = cell  
**-oma** = tumor

Tumor of the brain or spinal cord composed of astrocytes, one type of neuroglial cells.

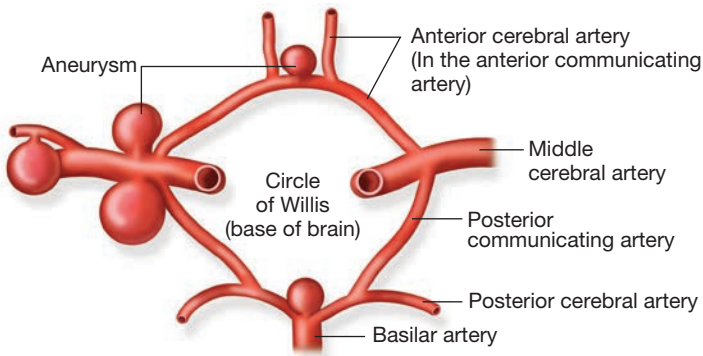
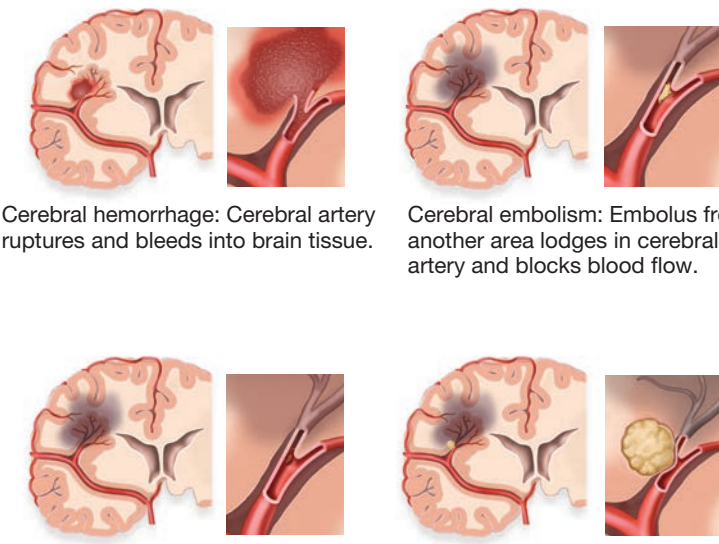
**brain tumor**



Intracranial mass, either benign or malignant. A benign tumor of the brain can still be fatal since it will grow and cause pressure on normal brain tissue.

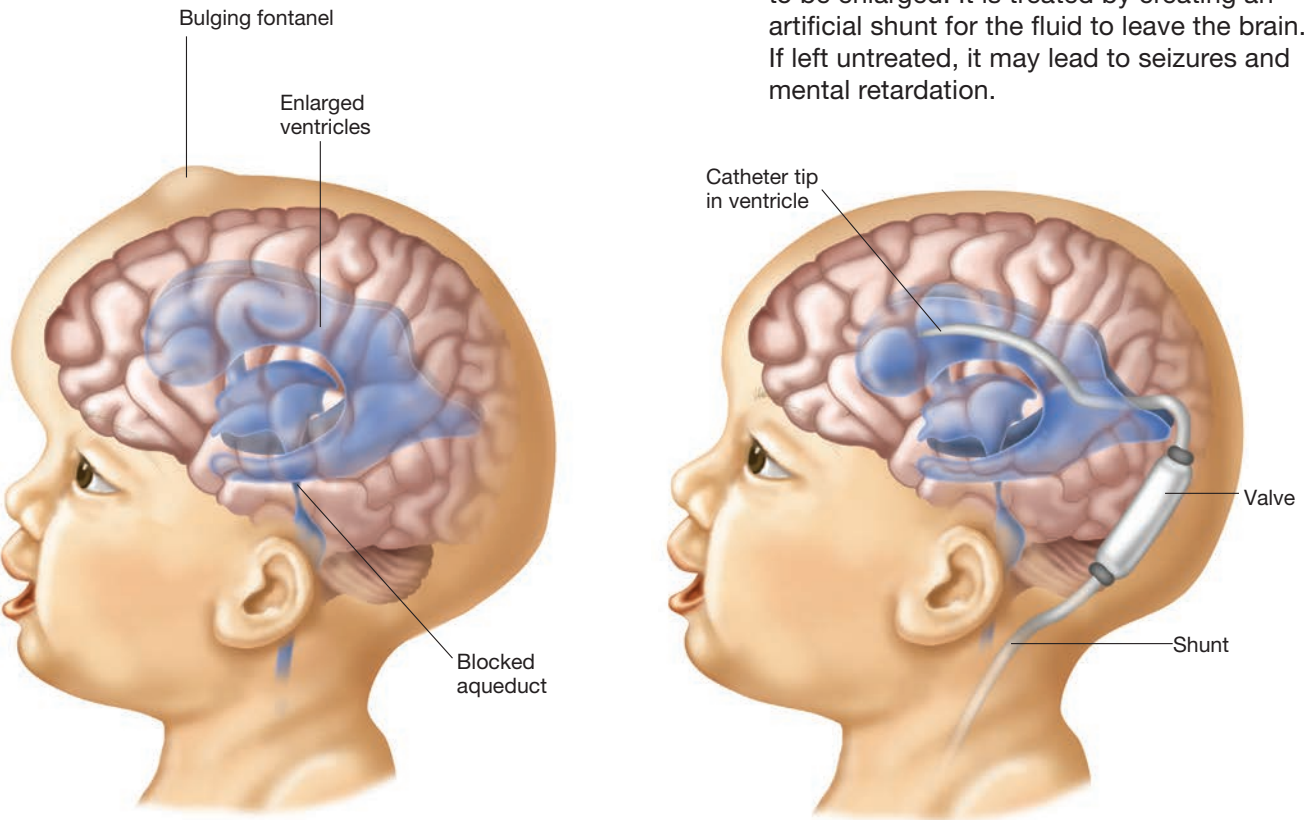
■ **Figure 12.9** Color-enhanced CT scan showing two malignant tumors in the brain. (Scott Camazine/Science Source)

## Pathology (continued)

Term	Word Parts	Definition
<b>cerebellitis</b> (ser-eh-bell-EYE-tis)	<b>cerebell/o</b> = cerebellum <b>-itis</b> = inflammation	Inflammation of the cerebellum.
<b>cerebral aneurysm</b> (AN-yoo-rizm)	<b>cerebr/o</b> = cerebrum <b>-al</b> = pertaining to	Localized abnormal dilation of a blood vessel, usually an artery; the result of a congenital defect or weakness in the wall of the vessel. A ruptured aneurysm is a common cause of a hemorrhagic cerebrovascular accident.
		<p>■ <b>Figure 12.10</b> Common locations for cerebral artery aneurysms in the Circle of Willis.</p>
<b>cerebral contusion</b> (kon-TOO-shun)	<b>cerebr/o</b> = cerebrum <b>-al</b> = pertaining to	Bruising of the brain from a blow or impact.
<b>cerebral palsy (CP)</b> (ser-REE-bral / PAWL-zee)	<b>cerebr/o</b> = cerebrum <b>-al</b> = pertaining to	Brain damage resulting from a defect, trauma, infection, or lack of oxygen before, during, or shortly after birth.
<b>cerebrovascular accident (CVA)</b> (ser-eh-broh-VASS-kyoo-lar)	<b>cerebr/o</b> = cerebrum <b>vascul/o</b> = blood vessel <b>-ar</b> = pertaining to	Development of an infarct due to loss in the blood supply to an area of the brain. Blood flow can be interrupted by a ruptured blood vessel (hemorrhage), a floating clot (embolus), a stationary clot (thrombosis), or compression. The extent of damage depends on the size and location of the infarct and often includes dysphasia and hemiplegia. Commonly called a <i>stroke</i> .
		<p>■ <b>Figure 12.11</b> The four common causes of cerebrovascular accidents.</p>



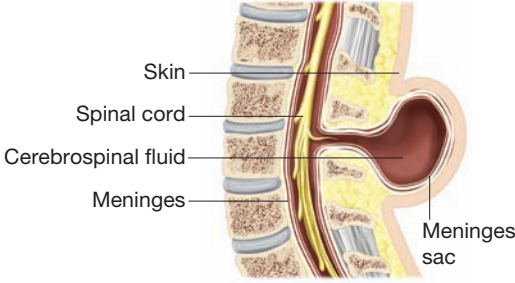
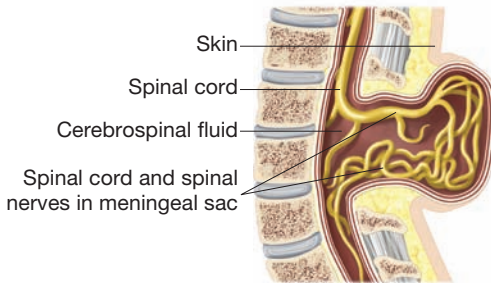
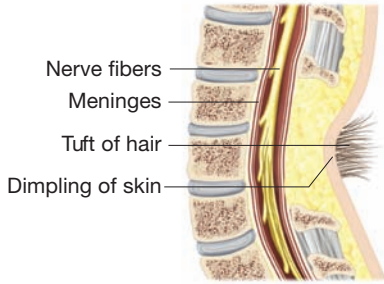
## Pathology (continued)

Term	Word Parts	Definition
<b>concussion</b> (kon-KUSH-un)	<b>concuss/o</b> = to shake violently <b>-ion</b> = action	Injury to the brain resulting from the brain being shaken inside the skull from a blow or impact. Symptoms vary and may include headache, blurred vision, nausea or vomiting, dizziness, and balance problems. Also called <i>mild traumatic brain injury</i> (TBI).
<b>encephalitis</b> (en-seff-ah-LYE-tis)	<b>encephal/o</b> = brain <b>-itis</b> = inflammation	Inflammation of the brain.
<b>epilepsy</b> (EP-ih-lep-see)		Recurrent disorder of the brain in which seizures and loss of consciousness occur as a result of uncontrolled electrical activity of the neurons in the brain.
<b>hydrocephalus</b> (high-droh-SEFF-ah-lus)	<b>hydr/o</b> = water <b>cephal/o</b> = head	Accumulation of cerebrospinal fluid within the ventricles of the brain, causing the head to be enlarged. It is treated by creating an artificial shunt for the fluid to leave the brain. If left untreated, it may lead to seizures and mental retardation.
 <p>The figure consists of two side-by-side illustrations of a child's head in profile, showing the brain and ventricles. The left illustration shows a child with hydrocephalus, characterized by a bulging fontanel (top of the head) and enlarged ventricles. A label points to the 'Blocked aqueduct' at the base of the brain. The right illustration shows the same child with a shunt system. A catheter tip is shown in the ventricle, connected to a valve and a shunt tube that leads to the abdominal cavity. Labels include 'Catheter tip in ventricle', 'Valve', and 'Shunt'.</p>		
<b>migraine</b> (MY-grain)		Specific type of headache characterized by severe head pain, sensitivity to light, dizziness, and nausea.
<b>Parkinson's disease</b> (PARK-in-sons)		Chronic disorder of the nervous system with fine tremors, muscular weakness, rigidity, and a shuffling gait. Named for British physician James Parkinson.


## Pathology (continued)

Term	Word Parts	Definition
<b>Reye's syndrome</b> (RISE / SIN-droh-m)		Combination of symptoms first recognized by Australian pathologist R. D. K. Reye that includes acute encephalopathy and damage to various organs, especially the liver. This occurs in children under age 15 who have had a viral infection. It is also associated with taking aspirin. For this reason, it's not recommended for children to use aspirin.
<b>transient ischemic attack (TIA)</b> (TRAN-shent / iss-KEM-ik)	<b>isch/o</b> = to hold back <b>hem/o</b> = blood <b>-ic</b> = pertaining to	Temporary interference with blood supply to the brain, causing neurological symptoms such as dizziness, numbness, and hemiparesis. May eventually lead to a full-blown stroke (cerebrovascular accident).
<b>traumatic brain injury (TBI)</b>	<b>-tic</b> = pertaining to	Damage to the brain resulting from impact (such as a car accident), blast waves (such as from an explosion), or a penetrating projectile (such as caused by a bullet). Symptoms may be mild, moderate, or severe and may include loss of consciousness, headache, vomiting, loss of motor coordination, and dizziness.
<b>Spinal Cord</b>		
<b>amyotrophic lateral sclerosis (ALS)</b> (ah-my-oh-TROFF-ik / LAT-er-al / skleh-ROH-sis)	<b>a-</b> = without <b>my/o</b> = muscle <b>-trophic</b> = pertaining to development <b>later/o</b> = side <b>-al</b> = pertaining to <b>scler/o</b> = hard <b>-osis</b> = abnormal condition	Disease with muscular weakness and atrophy due to degeneration of motor neurons of the spinal cord. Also called <i>Lou Gehrig's disease</i> , after the New York Yankees baseball player who died from the disease.
<b>meningocele</b> (men-IN-goh-seel)	<b>mening/o</b> = meninges <b>-cele</b> = protrusion	Congenital condition in which the meninges protrude through an opening in the vertebral column (see Figure 12.13A ■). See <i>spina bifida</i> .
<b>myelitis</b> (my-eh-LYE-tis)	<b>myel/o</b> = spinal cord <b>-itis</b> = inflammation	Inflammation of the spinal cord.
<b>myelomeningocele</b> (my-eh-loh-meh-NIN-goh-seel)	<b>myel/o</b> = spinal cord <b>mening/o</b> = meninges <b>-cele</b> = protrusion	Congenital condition in which the meninges and spinal cord protrude through an opening in the vertebral column (see Figure 12.13B ■). See <i>spina bifida</i> .
<b>poliomyelitis</b> (poh-lee-oh-my-eh-LYE-tis)	<b>poli/o</b> = gray matter <b>myel/o</b> = spinal cord <b>-itis</b> = inflammation	Viral inflammation of the gray matter of the spinal cord. Results in varying degrees of paralysis; may be mild and reversible or may be severe and permanent. This disease has been almost eliminated due to the discovery of a vaccine in the 1950s.

## Pathology (continued)

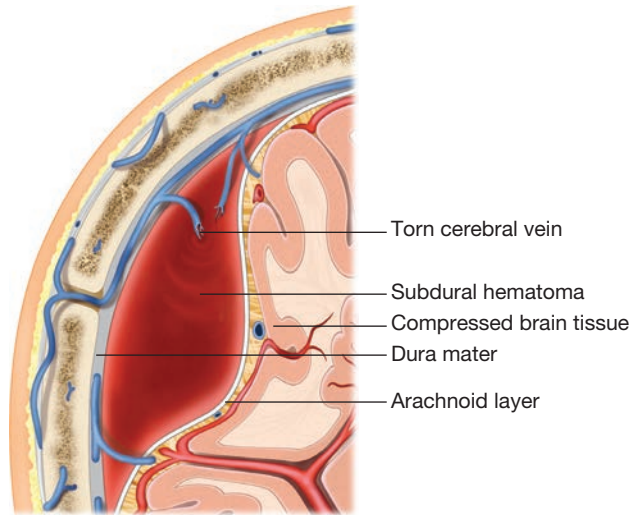
Term	Word Parts	Definition
<b>spina bifida</b> (SPY-nah / BIFF-ih-dah)	<b>spin/o</b> = spine <b>bi-</b> = two	Congenital defect in the walls of the spinal canal in which the laminae of the vertebra do not meet or close (see Figure 12.13C ■). May result in a meningocele or a myelomeningocele—meninges or the spinal cord being pushed through the opening.
<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  <p><b>A. Meningocele</b></p> </div> <div style="text-align: center;">  <p><b>B. Myelomeningocele</b></p> </div> </div> <div style="text-align: center; margin-top: 20px;">  <p><b>C. Spina bifida</b></p> </div>		
<p>■ <b>Figure 12.13</b> A) Meningocele, the meninges sac protrudes through the opening in the vertebra. B) Myelomeningocele, the meninges sac and spinal cord protrude through the opening in the vertebra. C) Spina bifida occulta, the vertebra is not complete, but there is not protrusion of nervous system structures.</p>		
<b>spinal cord injury</b> (SCI)	<b>spin/o</b> = spine <b>-al</b> = pertaining to	Damage to the spinal cord as a result of trauma. Spinal cord may be bruised or completely severed.
<b>Nerves</b>		
<b>Bell's palsy</b> (BELLZ / PAWL-zee)		One-sided facial paralysis due to inflammation of the facial nerve, probably viral in nature. The patient cannot control salivation, tearing of the eyes, or expression, but most will eventually recover.
<b>Guillain-Barré syndrome</b> (GHEE-yan / bah-RAY)		Disease of the nervous system in which nerves lose their myelin covering. May be caused by an autoimmune reaction. Characterized by loss of sensation and/or muscle control starting in the legs. Symptoms then move toward the trunk and may even result in paralysis of the diaphragm.
<b>multiple sclerosis (MS)</b> (MULL-tih-pl / skleh-ROH-sis)	<b>scler/o</b> = hard <b>-osis</b> = abnormal condition	Inflammatory disease of the central nervous system in which there is extreme weakness and numbness due to loss of myelin insulation around nerves.

## Pathology (continued)

Term	Word Parts	Definition
<b>myasthenia gravis</b> (my-ass-THEE-nee-ah / GRAV-iss)	<b>my/o</b> = muscle <b>-asthenia</b> = weakness	Disease with severe muscular weakness and fatigue due to insufficient neurotransmitter at a synapse.
<b>neuroma</b> (noo-ROH-mah)	<b>neur/o</b> = nerve <b>-oma</b> = tumor	Nerve tumor or tumor of the connective tissue sheath around a nerve.
<b>neuropathy</b> (noo-ROP-ah-thee)	<b>neur/o</b> = nerve <b>-pathy</b> = disease	General term for disease or damage to a nerve.
<b>polyneuritis</b> (pol-ee-noo-RYE-tis)	<b>poly-</b> = many <b>neur/o</b> = nerve <b>-itis</b> = inflammation	Inflammation of two or more nerves.
<b>radiculitis</b> (rah-dick-yoo-LYE-tis)	<b>radicul/o</b> = nerve root <b>-itis</b> = inflammation	Inflammation of a nerve root; may be caused by a herniated nucleus pulposus.
<b>radiculopathy</b> (rah-dick-yoo-LOP-ah-thee)	<b>radicul/o</b> = nerve root <b>-pathy</b> = disease	Refers to the condition that occurs when a herniated nucleus pulposus puts pressure on a nerve root. Symptoms include pain and numbness along the path of the affected nerve.
<b>shingles</b> (SHING-lz)		Eruption of painful blisters on the body along a nerve path. Thought to be caused by a <i>Herpes zoster</i> virus infection of the nerve root.
		
<p>■ <b>Figure 12.14</b> Photograph of the skin eruptions associated with shingles. (Stephen VanHorn/Shutterstock)</p>		
<b>Meninges</b>		
<b>epidural hematoma</b> (ep-ih-DOO-ral / hee-mah-TOH-mah)	<b>epi-</b> = above <b>dur/o</b> = dura mater <b>-al</b> = pertaining to <b>hemat/o</b> = blood <b>-oma</b> = mass	Mass of blood in the space outside the dura mater of the brain and spinal cord.
<b>meningioma</b> (meh-nin-jee-OH-mah)	<b>meningi/o</b> = meninges <b>-oma</b> = tumor	A tumor in the meninges.
<b>meningitis</b> (men-in-JYE-tis)	<b>mening/o</b> = meninges <b>-itis</b> = inflammation	Inflammation of the meninges around the brain or spinal cord caused by bacterial or viral infection. Symptoms include fever, headache, neck stiffness, lethargy, vomiting, irritability, and photophobia.

## Pathology (continued)

Term	Word Parts	Definition
<b>subdural hematoma</b> (sub-DOO-ral / hee-mah-TOH-mah)	<b>sub-</b> = under <b>dur/o</b> = dura mater <b>-al</b> = pertaining to <b>hemat/o</b> = blood <b>-oma</b> = mass	Mass of blood forming beneath the dura mater if the meninges are torn by trauma. May exert fatal pressure on the brain if the hematoma is not drained by surgery.



■ **Figure 12.15** A subdural hematoma. A meningeal vein is ruptured and blood has accumulated in the subdural space, producing pressure on the brain.

## Practice As You Go

### C. Terminology Matching

Match each pathology to its definition.

- |                               |  |
|-------------------------------|--|
| 1. _____ aura                 | a. mild traumatic brain injury         |
| 2. _____ meningitis           | b. sensations before a seizure         |
| 3. _____ coma                 | c. seizure with convulsions            |
| 4. _____ shingles             | d. congenital hernia of meninges       |
| 5. _____ syncope              | e. seizure without convulsion          |
| 6. _____ palsy                | f. inflammation of meninges            |
| 7. _____ absence seizure      | g. profound unconsciousness            |
| 8. _____ tonic-clonic seizure | h. <i>Herpes zoster</i> infection      |
| 9. _____ meningocele          | i. fainting                            |
| 10. _____ concussion          | j. loss of ability to control movement |

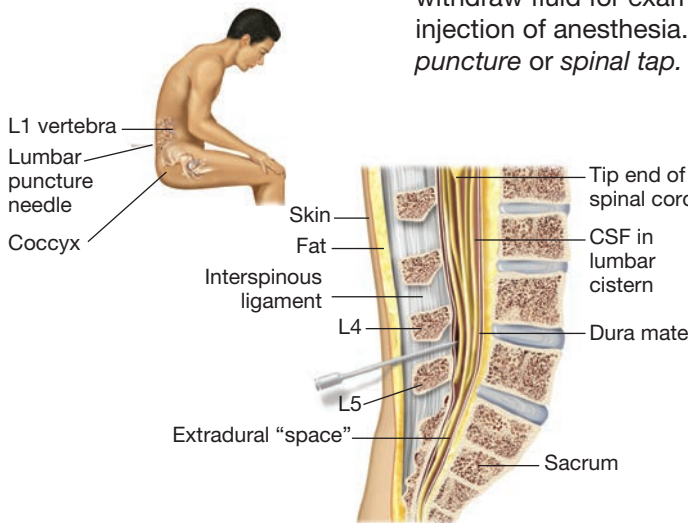


## Diagnostic Procedures

Term	Word Parts	Definition
<b>Clinical Laboratory Tests</b>		
<b>cerebrospinal fluid analysis</b> (ser-eh-broh-SPY-nal / an-NAL-ih-sis)	<b>cerebr/o</b> = cerebrum <b>spin/o</b> = spine <b>-al</b> = pertaining to	Laboratory examination of the clear, watery, colorless fluid from within the brain and spinal cord. Infections and the abnormal presence of blood can be detected in this test.
<b>Diagnostic Imaging</b>		
<b>brain scan</b>		Image of the brain taken after injection of radioactive isotopes into the circulation.
<b>cerebral angiography</b> (seh-REE-bral / an-jee-OG-rah-fee)	<b>cerebr/o</b> = cerebrum <b>-al</b> = pertaining to <b>angi/o</b> = vessel <b>-graphy</b> = process of recording	X-ray of the blood vessels of the brain after the injection of radiopaque dye.
<b>echoencephalography</b> (ek-oh-en-SEFF-ah-log-rah-fee)	<b>encephal/o</b> = brain <b>-graphy</b> = process of recording	Recording of the ultrasonic echoes of the brain. Useful in determining abnormal patterns of shifting in the brain.
<b>myelogram</b> (MY-eh-loh-gram)	<b>myel/o</b> = spinal cord <b>-gram</b> = record	X-ray record of the spinal cord.
<b>myelography</b> (my-eh-LOG-rah-fee)	<b>myel/o</b> = spinal cord <b>-graphy</b> = process of recording	Injection of radiopaque dye into the spinal canal. An X-ray is then taken to examine the normal and abnormal outlines made by the dye.
<b>positron emission tomography</b> (PET) (PAHZ-ih-tron / ee-MISH-un / toh-MOG-rah-fee)	<b>tom/o</b> = to cut <b>-graphy</b> = process of recording	Image of the brain produced by measuring gamma rays emitted from the brain after injecting glucose tagged with positively charged isotopes. Measurement of glucose uptake by the brain tissue indicates how metabolically active the tissue is.
<b>Additional Diagnostic Tests</b>		
<b>Babinski's reflex</b> (bah-BIN-skeez)		Reflex test developed by French neurologist Joseph Babinski to determine lesions and abnormalities in the nervous system. The Babinski reflex is present if the great toe extends instead of flexes when the lateral sole of the foot is stroked. The normal response to this stimulation is flexion of the toe.
<b>electroencephalogram (EEG)</b> (ee-lek-troh-en-SEFF-ah-loh-gram)	<b>electr/o</b> = electricity <b>encephal/o</b> = brain <b>-gram</b> = record	Record of the brain's electrical patterns.
<b>electroencephalography (EEG)</b> (ee-lek-troh-en-SEFF-ah-LOG-rah-fee)	<b>electr/o</b> = electricity <b>encephal/o</b> = brain <b>-graphy</b> = process of recording	Recording the electrical activity of the brain by placing electrodes at various positions on the scalp. Also used in sleep studies to determine if there is a normal pattern of activity during sleep.



## Diagnostic Procedures (continued)

Term	Word Parts	Definition
<b>lumbar puncture (LP)</b> (LUM-bar / PUNK-chur)	<b>lumb/o</b> = low back <b>-ar</b> = pertaining to	Puncture with a needle into the lumbar area (usually the fourth intervertebral space) to withdraw fluid for examination and for the injection of anesthesia. Also called <i>spinal puncture</i> or <i>spinal tap</i> .
		
<p>■ <b>Figure 12.16</b> A lumbar puncture. The needle is inserted between the lumbar vertebrae and into the spinal canal.</p>		
<b>nerve conduction velocity</b>		Test that measures how fast an impulse travels along a nerve. Can pinpoint an area of nerve damage.

## Therapeutic Procedures

Term	Word Parts	Definition
<b>Medical Procedures</b>		
<b>nerve block</b>		Injection of regional anesthetic to stop the passage of sensory or pain impulses along a nerve path.
<b>Surgical Procedures</b>		
<b>carotid endarterectomy</b> (kah-ROT-id / end-ar-ter-EK-toh-mee)	<b>endo-</b> = within <b>arteri/o</b> = artery <b>-ectomy</b> = surgical removal	Surgical procedure for removing an obstruction within the carotid artery, a major artery in the neck that carries oxygenated blood to the brain. Developed to prevent strokes, but is found to be useful only in severe stenosis with transient ischemic attack.
<b>cerebrospinal fluid shunts</b> (ser-eh-bro-SPY-nal)	<b>cerebr/o</b> = cerebrum <b>spin/o</b> = spine <b>-al</b> = pertaining to	Surgical procedure in which a bypass is created to drain cerebrospinal fluid. It is used to treat hydrocephalus by draining the excess cerebrospinal fluid from the brain and diverting it to the abdominal cavity.
<b>laminectomy</b> (lam-ih-NEK-toh-mee)	<b>-ectomy</b> = surgical removal	Removal of a portion of a vertebra, called the <i>lamina</i> , in order to relieve pressure on a spinal nerve.
<b>neurectomy</b> (noo-REK-toh-mee)	<b>neur/o</b> = nerve <b>-ectomy</b> = surgical removal	Surgical removal of a nerve.
<b>neuroplasty</b> (NOOR-oh-plas-tee)	<b>neur/o</b> = nerve <b>-plasty</b> = surgical repair	Surgical repair of a nerve.

## Therapeutic Procedures (continued)

Term	Word Parts	Definition
<b>neurorrhaphy</b> (noo-ROR-ah-fee)	<b>neur/o</b> = nerve <b>-rrhaphy</b> = suture	To suture a nerve back together. Actually refers to suturing the connective tissue sheath around the nerve.
<b>tractotomy</b> (track-TOT-oh-mee)	<b>-otomy</b> = cutting into	Surgical interruption of a nerve tract in the spinal cord. Used to treat intractable pain or muscle spasms.

## Practice As You Go

### D. Match each procedure term with its definition

- |                               |  |
|-------------------------------|--|
| 1. _____ brain scan           | a. image made by measuring gamma rays              |
| 2. _____ lumbar puncture      | b. record of brain's electrical activity           |
| 3. _____ cerebral angiography | c. obtains CSF from around spinal cord             |
| 4. _____ EEG                  | d. regional injection of anesthetic                |
| 5. _____ PET scan             | e. diagnostic image made with radioactive isotopes |
| 6. _____ nerve block          | f. X-ray of spinal cord                            |
| 7. _____ neurorrhaphy         | g. X-ray of brain's blood vessels                  |
| 8. _____ myelogram            | h. suture together sheath around a nerve           |

## Pharmacology

Classification	Word Parts	Action	Examples
<b>analgesic</b> (an-al-JEE-zik)	<b>an-</b> = without <b>algēs/o</b> = sense of pain <b>-ic</b> = pertaining to	Treats minor to moderate pain without loss of consciousness.	aspirin, Bayer, Ecotrin; acetaminophen, Tylenol; ibuprofen, Motrin
<b>anesthetic</b> (an-ess-THET-ik)	<b>an-</b> = without <b>esthesi/o</b> = feeling, sensation <b>-tic</b> = pertaining to	Produces a loss of sensation or a loss of consciousness.	lidocaine, Xylocaine; pentobarbital, Nembutal; propofol, Diprivan; procaine, Novocain
<b>anticonvulsant</b> (an-tye-kon-VULL-sant)	<b>anti-</b> = against	Reduces the excitability of neurons and therefore prevents the uncontrolled neuron activity associated with seizures.	carbamazepine, Tegretol; phenobarbital, Nembutal
<b>dopaminergic drugs</b> (dope-ah-men-ER-gik)	<b>-ic</b> = pertaining to	Treat Parkinson's disease by either replacing the dopamine that is lacking or increasing the strength of the dopamine that is present.	levodopa; L-dopa, Larodopa; levodopa/carbidopa, Sinemet

## Pharmacology (continued)

Classification	Word Parts	Action	Examples
<b>hypnotic</b> (hip-NOT-tik)	<b>-ic</b> = pertaining to	Promotes sleep.	secobarbital, Seconal; temazepam, Restoril
<b>narcotic analgesic</b> (nar-KOT-tik)	<b>-ic</b> = pertaining to <b>an-</b> = without <b>alges/o</b> = sense of pain <b>-ic</b> = pertaining to	Treats severe pain; has the potential to be habit forming if taken for a prolonged time. Also called <i>opiate</i> .	morphine, MS Contin; oxycodone, OxyContin; meperidine, Demerol
<b>sedative</b> (SED-ah-tiv)		Has a relaxing or calming effect.	amobarbital, Amytal; butabarbital, Butisol

## Abbreviations

<b>ALS</b>	amyotrophic lateral sclerosis	<b>ICP</b>	intracranial pressure
<b>ANS</b>	autonomic nervous system	<b>LP</b>	lumbar puncture
<b>CNS</b>	central nervous system	<b>MS</b>	multiple sclerosis
<b>CP</b>	cerebral palsy	<b>PET</b>	positron emission tomography
<b>CSF</b>	cerebrospinal fluid	<b>PNS</b>	peripheral nervous system
<b>CVA</b>	cerebrovascular accident	<b>SCI</b>	spinal cord injury
<b>CVD</b>	cerebrovascular disease	<b>TBI</b>	traumatic brain injury
<b>EEG</b>	electroencephalogram, electroencephalography	<b>TIA</b>	transient ischemic attack
<b>HA</b>	headache		

## Practice As You Go

### E. What's the Abbreviation?

- cerebrospinal fluid \_\_\_\_\_
- cerebrovascular disease \_\_\_\_\_
- electroencephalogram \_\_\_\_\_
- intracranial pressure \_\_\_\_\_
- positron emission tomography \_\_\_\_\_
- cerebrovascular accident \_\_\_\_\_
- autonomic nervous system \_\_\_\_\_



# Chapter Review

## Real-World Applications

### Medical Record Analysis

This Discharge Summary contains 12 medical terms. Underline each term and write it in the list below the report. Then define each term.

#### Discharge Summary

Admitting Diagnosis:	Paraplegia following motorcycle accident.
Final Diagnosis:	Comminuted L2 fracture with epidural hematoma and spinal cord injury resulting in complete paraplegia at the L2 level.
History of Present Illness:	Patient is a 23-year-old male who was involved in a motorcycle accident. He was unconscious for 35 minutes but was fully aware of his surroundings upon regaining consciousness. He was immediately aware of total anesthesia and paralysis below the waist.
Summary of Hospital Course:	CT scan revealed extensive bone destruction at the fracture site and that the spinal cord was severed. Patient was unable to voluntarily contract any lower extremity muscles and was not able to feel touch or pinpricks. Lumbar laminectomy with spinal fusion was performed to stabilize the fracture and remove the epidural hematoma. The immediate postoperative recovery period proceeded normally. Patient began physical therapy and occupational therapy. After two months, X-rays indicated full healing of the spinal fusion and patient was transferred to a rehabilitation institute.
Discharge Plans:	Patient was transferred to a rehabilitation institute to continue intensive PT and OT.

Term	Definition
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____
7. _____	_____
8. _____	_____
9. _____	_____
10. _____	_____
11. _____	_____
12. _____	_____

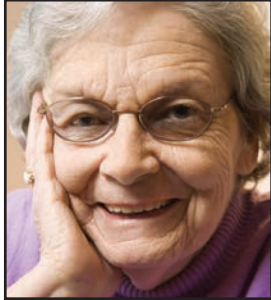
## Chart Note Transcription

The chart note below contains 11 phrases that can be reworded with a medical term that you learned in this, or an earlier, chapter. Each phrase is identified with an underline. Determine the medical term and write your answers in the space provided.

Pearson General Hospital Consultation Report	
Task	Edit View Time Scale Options Help Download Archive Date: 17 May 2015
Current Complaint:	Patient is a 38-year-old female referred to the <u>specialist in the treatment of diseases of the nervous system</u> <b>1</b> by her family physician with complaints of <u>difficulty with speech</u> , <b>2</b> <u>loss of motion on one side of the body</u> , <b>3</b> and <u>severe involuntary muscle contractions</u> . <b>4</b>
Past History:	Patient is married and nulliparous. Has been well prior to current symptoms.
Signs and Symptoms:	Her husband reports he first noted loss of motion on one side of the body when she began to drag her left foot. It has progressed to involve both left upper and lower extremities, with approximately a 50% loss in control of left lower extremity and a 25% loss of control in left upper extremity. Difficulty with speech is mild and mainly with recalling the names of common objects. Severe involuntary muscle contractions appear to be triggered by stress and last approximately two minutes. Results of a <u>recording of the electrical activity of the brain</u> <b>5</b> and a <u>puncture with a needle into the low back to withdraw fluid for examination</u> <b>6</b> were normal. However, an <u>injection with radioactive isotopes</u> <b>7</b> revealed the presence of a mass in the right <u>outer layer of the largest section of the brain</u> . <b>8</b>
Diagnosis:	<u>Astrocyte tumor</u> <b>9</b> in the right <u>outer layer of the largest section of the brain</u> . <b>8</b>
Treatment:	A right <u>skull incision</u> <b>10</b> was performed to permit <u>the surgical use of extreme cold</u> <b>11</b> to destroy the tumor. Patient experienced moderate improvement in <u>loss of motion on one side of the body</u> <b>3</b> and <u>severe involuntary muscle contractions</u> , <b>4</b> but <u>difficulty with speech</u> <b>2</b> was unchanged.
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____
6.	_____
7.	_____
8.	_____
9.	_____
10.	_____
11.	_____

## Case Study

Below is a case study presentation of a patient with a condition covered in this chapter. Read the case study and answer the questions below. Some questions will ask for information not included within this chapter. Use your text, a medical dictionary, or any other reference material you choose to answer these questions.



(iofoto/Shutterstock)

Anna Moore, an 83-year-old female, is admitted to the ER with aphasia, hemiparesis on her left side, syncope, and delirium. Her daughter called the ambulance after discovering her mother in this condition at home. Mrs. Moore has a history of hypertension, atherosclerosis, and diabetes mellitus. She was admitted to the hospital after a brain scan revealed an infarct in the right cerebral hemisphere leading to a diagnosis of CVA of the middle cerebral artery.

## Questions

1. What pathological condition does Ms. Moore have? Look this condition up in a reference source and include a short description of it.

---



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2. List and define each of the patient's presenting symptoms in the ER.

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3. The patient has a history of three significant conditions. Describe each in your own words.

---



---

4. What diagnostic test did the physician perform? Describe this test and the results in your own words.

---



---

5. What is an infarct and what causes it?

---



---

6. List and describe the four common causes of a CVA.

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## Practice Exercises

### A. Terminology Matching

Match each cranial nerve to its function.

- |                            |                                       |
|----------------------------|---------------------------------------|
| 1. _____ olfactory         | a. carries facial sensory impulses    |
| 2. _____ optic             | b. turns eye to side                  |
| 3. _____ oculomotor        | c. controls tongue muscles            |
| 4. _____ trochlear         | d. controls eye muscles and pupils    |
| 5. _____ trigeminal        | e. swallowing                         |
| 6. _____ abducens          | f. controls facial muscles            |
| 7. _____ facial            | g. controls oblique eye muscles       |
| 8. _____ vestibulocochlear | h. smell                              |
| 9. _____ glossopharyngeal  | i. controls neck and shoulder muscles |
| 10. _____ vagus            | j. hearing and equilibrium            |
| 11. _____ accessory        | k. vision                             |
| 12. _____ hypoglossal      | l. organs in lower body cavities      |

### B. Word Building Practice

The combining form **neur/o** refers to the nerve. Use it to write a term that means:

- inflammation of the nerve \_\_\_\_\_
- specialist in nerves \_\_\_\_\_
- pain in the nerve \_\_\_\_\_
- inflammation of many nerves \_\_\_\_\_
- removal of a nerve \_\_\_\_\_
- surgical repair of a nerve \_\_\_\_\_
- nerve tumor \_\_\_\_\_
- suture of a nerve \_\_\_\_\_

The combining form **mening/o** refers to the meninges or membranes. Use it to write a term that means:

- inflammation of the meninges \_\_\_\_\_
- protrusion of the meninges \_\_\_\_\_
- protrusion of the spinal cord and the meninges \_\_\_\_\_

The combining form **encephal/o** refers to the brain. Use it to write a term that means:

12. X-ray record of the brain \_\_\_\_\_
13. disease of the brain \_\_\_\_\_
14. inflammation of the brain \_\_\_\_\_
15. protrusion of the brain \_\_\_\_\_

The combining form **cerebr/o** refers to the cerebrum. Use it to write a term that means:

16. pertaining to the cerebrum and spinal cord \_\_\_\_\_
17. pertaining to the cerebrum \_\_\_\_\_

### **C. What Does it Stand For?**

1. TIA \_\_\_\_\_
2. MS \_\_\_\_\_
3. SCI \_\_\_\_\_
4. CNS \_\_\_\_\_
5. PNS \_\_\_\_\_
6. HA \_\_\_\_\_
7. CP \_\_\_\_\_
8. LP \_\_\_\_\_
9. ALS \_\_\_\_\_

### **D. Define the Procedures and Tests**

1. myelography \_\_\_\_\_
2. cerebral angiography \_\_\_\_\_
3. Babinski's reflex \_\_\_\_\_
4. nerve conduction velocity \_\_\_\_\_
5. cerebrospinal fluid analysis \_\_\_\_\_
6. PET scan \_\_\_\_\_
7. echoencephalography \_\_\_\_\_
8. lumbar puncture \_\_\_\_\_

**E. Define the Suffix**

	Definition	Example from Chapter
1. <b>-plegia</b>	_____	_____
2. <b>-taxia</b>	_____	_____
3. <b>-trophic</b>	_____	_____
4. <b>-paresis</b>	_____	_____
5. <b>-phasia</b>	_____	_____

**F. Define the Combining Form**

	Definition	Example from Chapter
1. <b>mening/o</b>	_____	_____
2. <b>encephal/o</b>	_____	_____
3. <b>cerebell/o</b>	_____	_____
4. <b>myel/o</b>	_____	_____
5. <b>cephal/o</b>	_____	_____
6. <b>thalam/o</b>	_____	_____
7. <b>neur/o</b>	_____	_____
8. <b>radicul/o</b>	_____	_____
9. <b>cerebr/o</b>	_____	_____
10. <b>pont/o</b>	_____	_____

**G. Define the Term**

1. astrocytoma \_\_\_\_\_
2. epilepsy \_\_\_\_\_
3. anesthesia \_\_\_\_\_
4. hemiparesis \_\_\_\_\_
5. neurosurgeon \_\_\_\_\_
6. analgesia \_\_\_\_\_
7. focal seizure \_\_\_\_\_
8. quadriplegia \_\_\_\_\_
9. subdural hematoma \_\_\_\_\_
10. intrathecal \_\_\_\_\_

## H. Terminology Matching

Match each term to its definition.

- |                                   |  |
|-----------------------------------|--|
| 1. _____ neurologist              | a. sudden attack                       |
| 2. _____ cerebrovascular accident | b. a type of severe headache           |
| 3. _____ concussion               | c. loss of intellectual ability        |
| 4. _____ aphasia                  | d. physician who treats nerve problems |
| 5. _____ migraine                 | e. stroke                              |
| 6. _____ seizure                  | f. mild traumatic brain injury         |
| 7. _____ dementia                 | g. loss of ability to speak            |
| 8. _____ ataxia                   | h. congenital anomaly                  |
| 9. _____ spina bifida             | i. state of being unaware              |
| 10. _____ unconscious             | j. lack of muscle coordination         |

## I. Fill in the Blank

Parkinson's disease	transient ischemic attack	cerebral palsy	cerebrospinal fluid shunt
Bell's palsy	subdural hematoma	amyotrophic lateral	nerve conduction velocity
delirium	cerebral aneurysm	sclerosis	

- Dr. Martin noted that a 96-year-old patient suffered from \_\_\_\_\_ when she determined that he was confused, disoriented, and agitated.
- Lucinda's \_\_\_\_\_ resulted in increasing muscle weakness as the motor neurons in her spinal cord degenerated.
- The diagnosis of \_\_\_\_\_ was correct because the weakness affected only one side of Charles's face.
- A cerebral angiogram was ordered because Dr. Larson suspected Mrs. Constantine had a(n) \_\_\_\_\_.
- Roberta's symptoms included fine tremors, muscular weakness, rigidity, and a shuffling gait, leading to a diagnosis of \_\_\_\_\_.
- Matthew's hydrocephalus required the placement of a(n) \_\_\_\_\_.
- Because Mae's hemiparesis was temporary, the final diagnosis was \_\_\_\_\_.
- Following a car accident, a CT scan showed a(n) \_\_\_\_\_ was putting pressure on the brain, necessitating immediate neurosurgery.
- Birth trauma resulted in the newborn developing \_\_\_\_\_.
- A(n) \_\_\_\_\_ test was performed in order to pinpoint the exact position of the nerve damage.

**J. Pharmacology Challenge**

Fill in the classification for each drug description, then match the brand name.

Drug Description	Classification	Brand Name
1. _____ produces loss of sensation	_____	a. L-Dopa
2. _____ treats Parkinson's disease	_____	b. Amytal
3. _____ promotes sleep	_____	c. OxyContin
4. _____ medication for mild pain	_____	d. Seconal
5. _____ produces a calming effect	_____	e. Xylocaine
6. _____ treats severe pain	_____	f. Tegretol
7. _____ treats seizures	_____	g. Motrin

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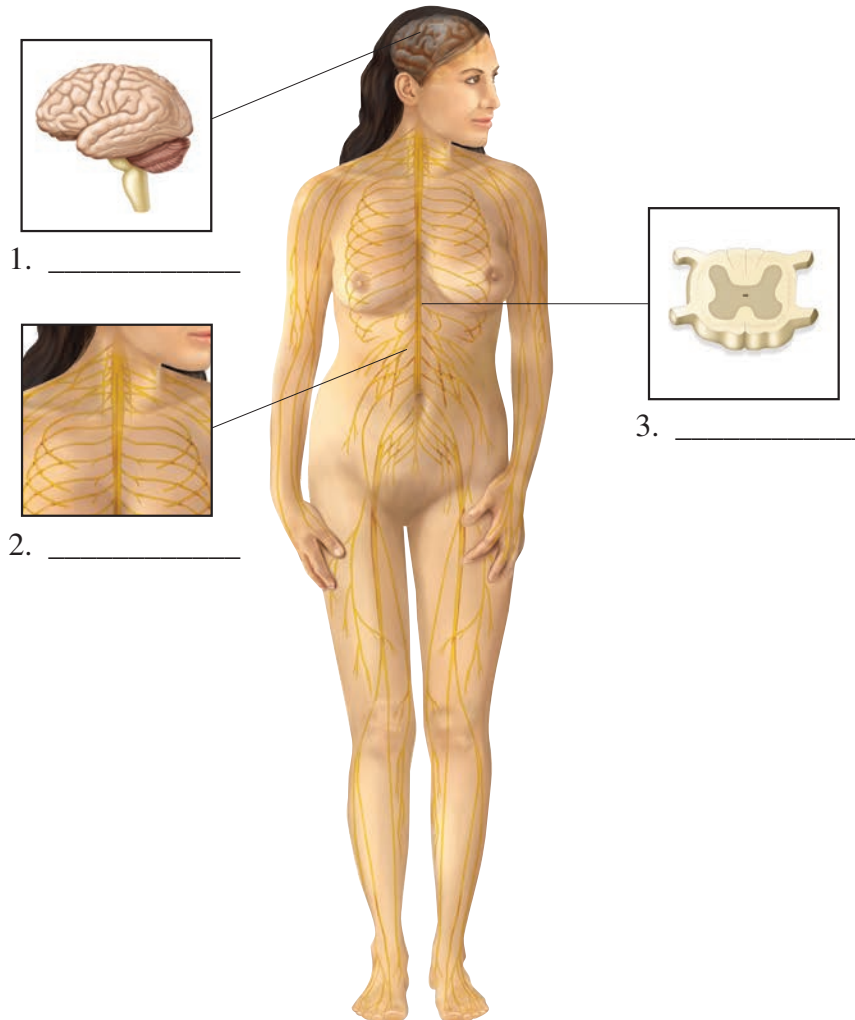
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## Labeling Exercise

### Image A

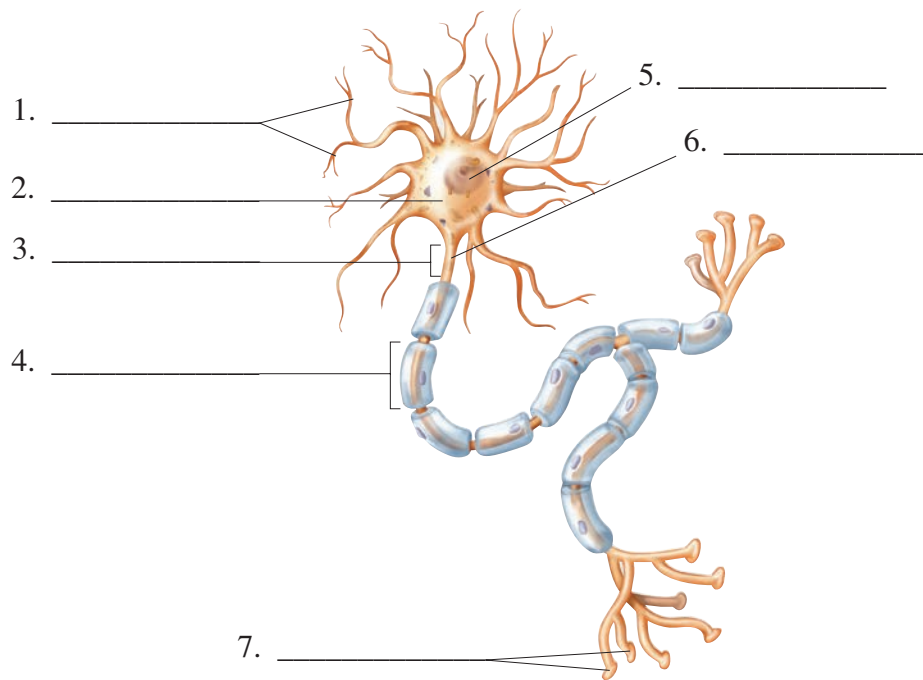
Write the labels for this figure on the numbered lines provided.





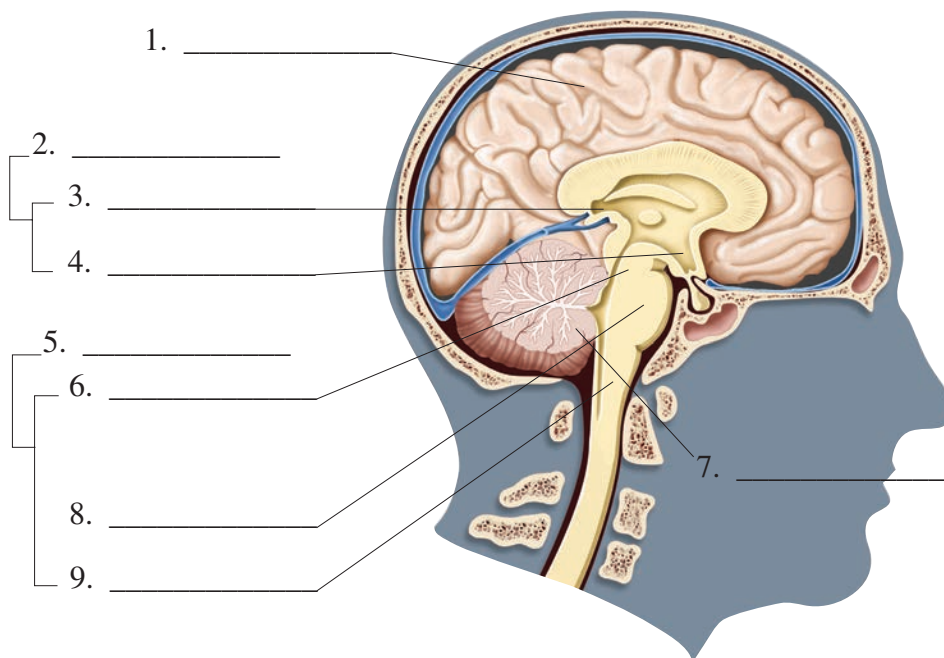
## Image B

Write the labels for this figure on the numbered lines provided.



## Image C

Write the labels for this figure on the numbered lines provided.






# 13

## Special Senses: The Eye and Ear

### Learning Objectives

*Upon completion of this chapter, you will be able to*

- Identify and define the combining forms, suffixes, and prefixes introduced in this chapter.
  - Correctly spell and pronounce medical terms and major anatomical structures relating to the eye and ear.
  - Locate and describe the major structures of the eye and ear and their functions.
  - Describe how we see.
  - Describe the path of sound vibration.
  - Identify and define eye and ear anatomical terms.
  - Identify and define selected eye and ear pathology terms.
  - Identify and define selected eye and ear diagnostic procedures.
  - Identify and define selected eye and ear therapeutic procedures.
  - Identify and define selected medications relating to the eye and ear.
  - Define selected abbreviations associated with the eye and ear.
- 



# Section I: The Eye at a Glance

## Function

The eye contains the sensory receptor cells for vision.

## Structures

Here are the primary structures that comprise the eye:

<b>choroid</b>	<b>eyelids</b>
<b>conjunctiva</b>	<b>lacrimal apparatus</b>
<b>eye muscles</b>	<b>retina</b>
<b>eyeball</b>	<b>sclera</b>

## Word Parts

Here are the most common word parts (with their meanings) used to build eye terms. For a more comprehensive list, refer to the Terminology section of this chapter.

### Combining Forms

<b>ambly/o</b>	dull, dim	<b>mi/o</b>	lessening
<b>aque/o</b>	water	<b>mydr/i</b>	widening
<b>blast/o</b>	immature	<b>nyctal/o</b>	night
<b>blephar/o</b>	eyelid	<b>ocul/o</b>	eye
<b>chromat/o</b>	color	<b>ophthalm/o</b>	eye
<b>conjunctiv/o</b>	conjunctiva	<b>opt/o</b>	eye, vision
<b>corne/o</b>	cornea	<b>optic/o</b>	eye, vision
<b>cycl/o</b>	ciliary body	<b>papill/o</b>	optic disk
<b>dacry/o</b>	tears	<b>phac/o</b>	lens
<b>dipl/o</b>	double	<b>phot/o</b>	light
<b>emmetr/o</b>	correct, proper	<b>presby/o</b>	old age
<b>glauc/o</b>	gray	<b>pupill/o</b>	pupil
<b>ir/o</b>	iris	<b>retin/o</b>	retina
<b>irid/o</b>	iris	<b>scler/o</b>	sclera
<b>kerat/o</b>	cornea	<b>stigmat/o</b>	point
<b>lacrim/o</b>	tears	<b>uve/o</b>	choroid
<b>macul/o</b>	macula lutea	<b>vitre/o</b>	glassy

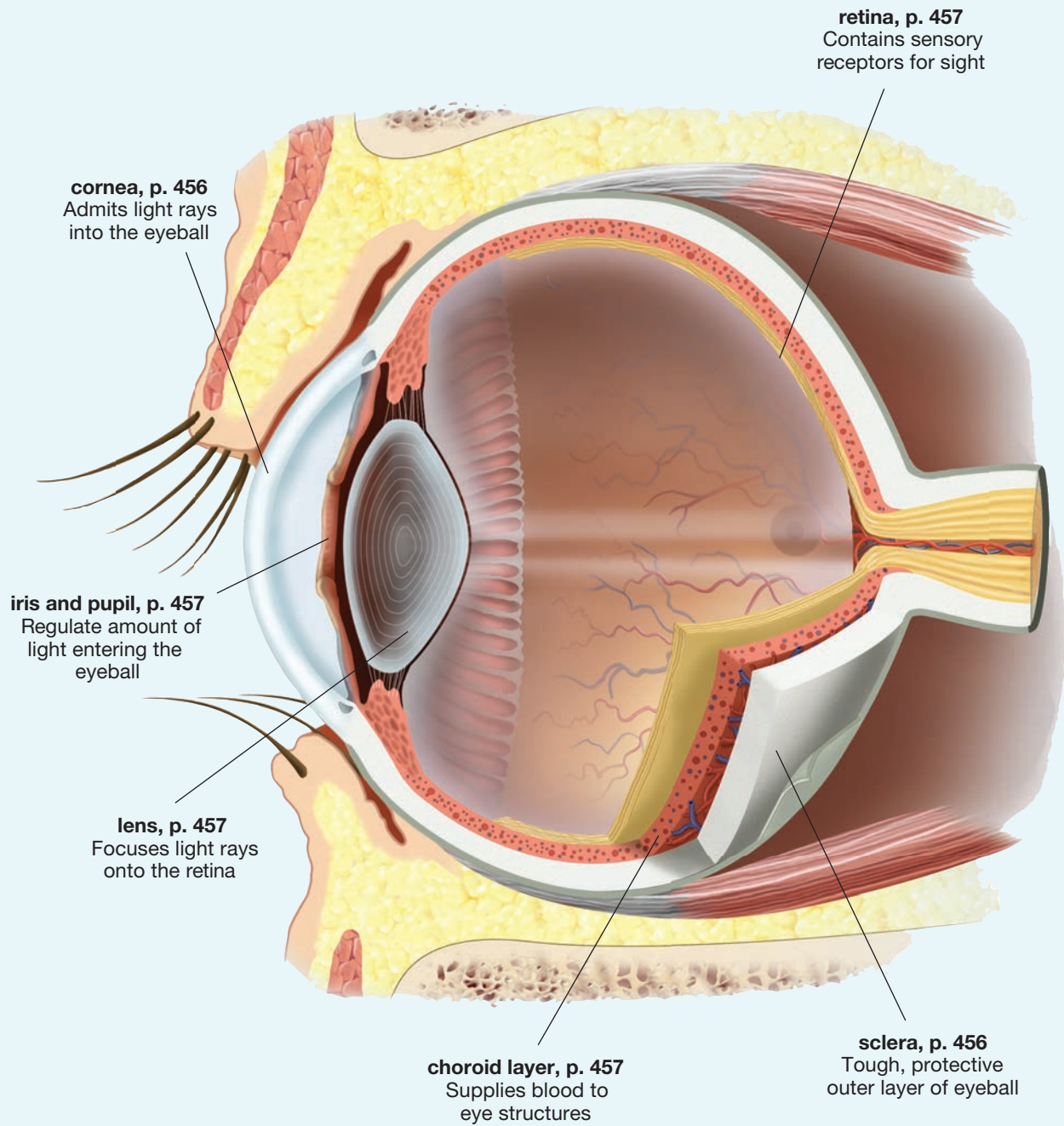
### Suffixes

<b>-ician</b>	specialist	<b>-opsia</b>	vision condition
<b>-metrist</b>	specialist in measuring	<b>-phobia</b>	fear
<b>-opia</b>	vision condition	<b>-tropia</b>	turned condition

### Prefixes

<b>eso-</b>	inward
<b>exo-</b>	outward
<b>myo-</b>	to shut

# The Eye Illustrated





# Anatomy and Physiology of the Eye

**conjunctiva** (kon-JUNK-tih-vah)

**eye muscles**

**eyeball**

**eyelids**

**lacrimal apparatus** (LAK-rim-al)

**ophthalmology** (off-thal-MALL-oh-gee)

**optic nerve** (OP-tik)

## Med Term Tip

When studying the functions and terminology of the eye, it is helpful to know the meanings of the terms *opaque* and *transparent*. Opaque means that light is unable to pass through. Transparent, however, means that light is permitted through.

The study of the eye is known as **ophthalmology** (Ophth). The **eyeball** is the incredible organ of sight that transmits an external image by way of the nervous system—the **optic nerve**—to the brain. The brain then translates these sensory impulses into an image with computer-like accuracy.

In addition to the eyeball, several external structures play a role in vision. These are the **eye muscles**, **eyelids**, **conjunctiva**, and **lacrimal apparatus**.

## The Eyeball

**choroid** (KOR-oyd)

**retina** (RET-in-ah)

**sclera** (SKLAIR-ah)

The actual eyeball is composed of three layers: the **sclera**, the **choroid**, and the **retina**.

## Med Term Tip

The color of the sclera may indicate the presence of disease. For instance, a yellowish cast to the sclera can be present in liver disease and certain anemias.

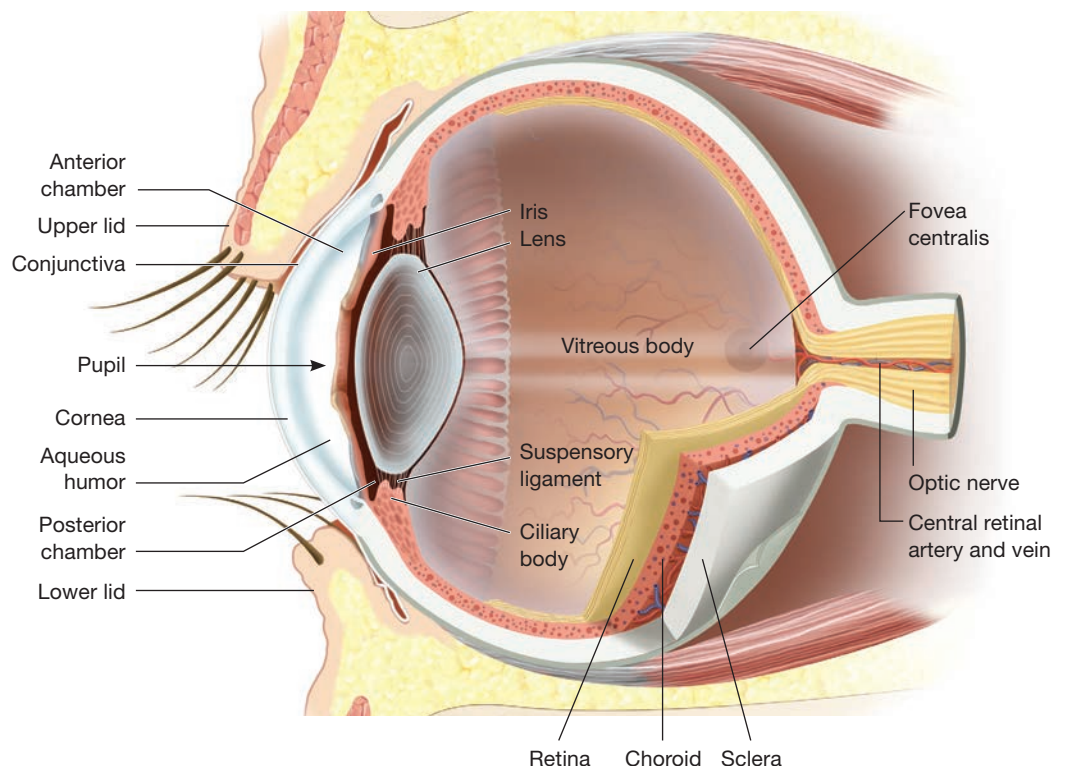
## Sclera

**cornea** (COR-nee-ah)

**refracts**

The outer layer, the sclera, provides a tough protective coating for the inner structures of the eye. Another term for the sclera is the “white of the eye.”

The anterior portion of the sclera is called the **cornea** (see Figure 13.1 ■). This clear, transparent area of the sclera allows light to enter the interior of the eyeball. The cornea actually bends, or **refracts**, the light rays.



■ **Figure 13.1** The internal structures of the eye.

## Choroid

**ciliary body** (SIL-ee-air-ee)

**iris**

**lens**

**pupil**

The second or middle layer of the eyeball is called the choroid. This opaque layer provides the blood supply for the eye.

The anterior portion of the choroid layer consists of the **iris**, **pupil**, and **ciliary body** (see again Figure 13.1). The iris is the colored portion of the eye and contains smooth muscle. The pupil is the opening in the center of the iris that allows light rays to enter the eyeball. The iris muscles contract or relax to change the size of the pupil, thereby controlling how much light enters the interior of the eyeball. Immediately posterior to the iris is the ciliary body. This is a ring of smooth muscle. Sitting in the center of the ring is the **lens**. The lens is not actually part of the choroid layer, but it is attached to the ciliary body by many thin ligaments called *suspensory ligaments*. The muscular ciliary body contracts or relaxes to pull on the edge of the lens, changing the shape of the lens so it can focus incoming light onto the retina.

## Retina

**aqueous humor** (AY-kwee-us)

**cones**

**fovea centralis** (FOH-vee-ah / sen-TRAH-lis)

**macula lutea** (MAK-yoo-lah / loo-TEE-ah)

**optic disk**

**retinal blood vessels** (RET-in-al)

**rods**

**vitreous humor** (VIT-ree-us)

The third and innermost layer of the eyeball is the retina. It contains the sensory receptor cells (**rods** and **cones**) that respond to light rays. Rods are active in dim light and help us to see in gray tones. Cones are active only in bright light and are responsible for color vision. When someone looks directly at an object, the image falls on an area called the **macula lutea**, or “yellow spot” (see again Figure 13.1). In the center of the macula lutea is a depression called the **fovea centralis**, meaning “central pit.” This pit contains a high concentration of sensory receptor cells and, therefore, is the point of clearest vision. Also visible on the retina is the **optic disk**. This is the point where the **retinal blood vessels** enter and exit the eyeball and where the optic nerve leaves the eyeball (see Figure 13.2 ■). There are no sensory receptor cells in the optic disk and therefore it causes a blind spot in each eye’s field of vision. The interior spaces of the eyeball are not empty. The spaces between the cornea and lens are filled with **aqueous humor**, a watery fluid, and the large open area between the lens and retina contains **vitreous humor**, a semisolid gel.

### Med Term Tip

The function of the choroid, to provide the rest of the eyeball with blood, is responsible for an alternate name for this layer—*uvea*. The combining form *uve/o* means “vascular.”

### Med Term Tip

The term *ciliary* comes from the Latin word *cilium*, which is taken to refer to the eyelashes (or hair-like structures). In this case, the ciliary body received its name because of the many, very fine ligaments extending from it and attaching to the edge of the lens.

### What’s In A Name?

*aque/o* = water

*centr/o* = center

*vitre/o* = glassy

*-ous* = pertaining to



■ **Figure 13.2** Photograph of the retina of the eye. The optic disk appears yellow and the retinal arteries radiate out from it. (Science Source)



## Muscles of the Eye

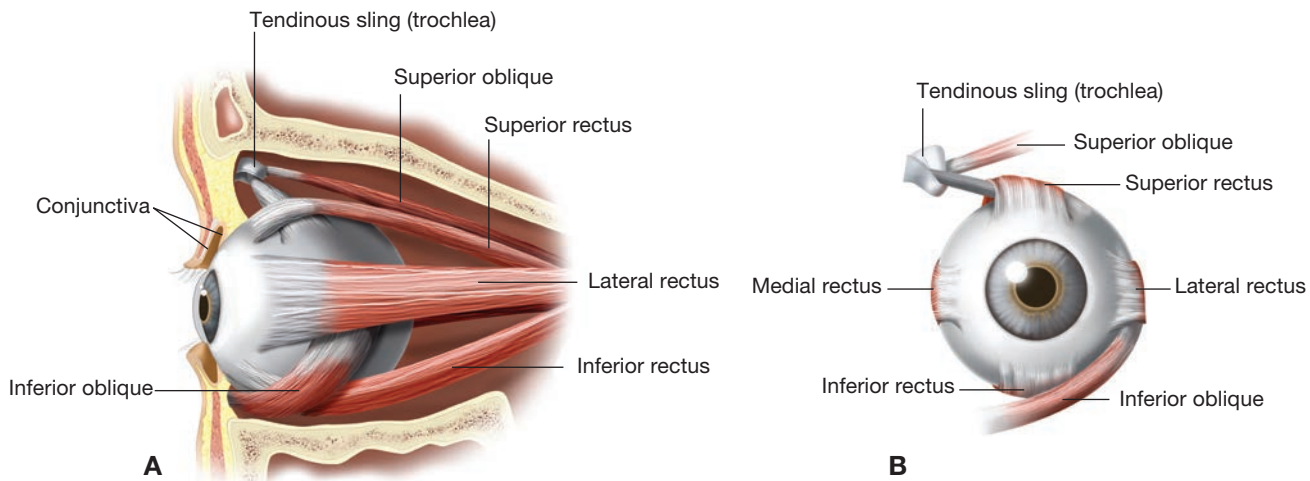
**oblique muscles** (oh-BLEEK)

**rectus muscles** (REK-tus)

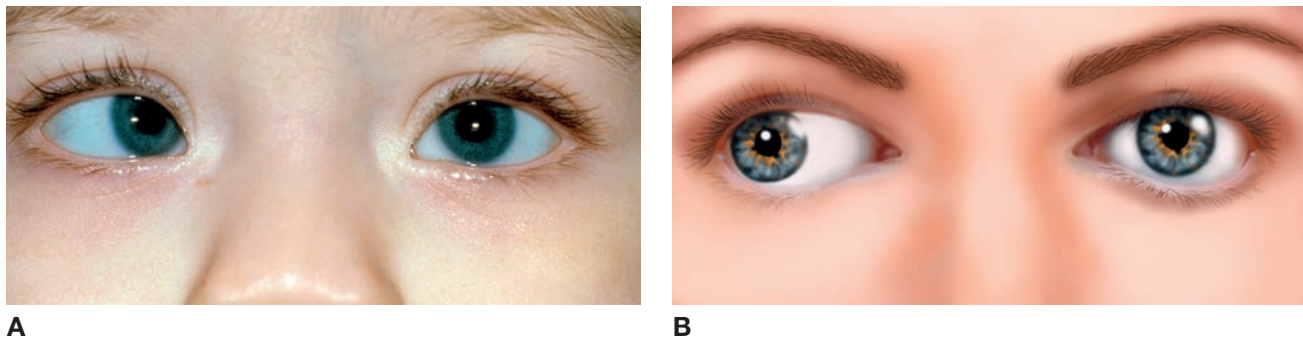
### Med Term Tip

Like many other muscles, the names *rectus* and *oblique* provide clues regarding the direction of their fibers, or their *line of pull*. Rectus means straight and oblique means slanted. Rectus muscles have a straight line of pull. Since the fibers of an oblique muscle are slanted on an angle, they produce rotation.

Six muscles connect the actual eyeball to the skull (see Figure 13.3 ■). These muscles allow for change in the direction of each eye's sightline. In addition, they provide support for the eyeball in the eye socket. Children may be born with a weakness in some of these muscles and may require treatments such as eye exercises or even surgery to correct this problem, commonly referred to as crossed eyes or *strabismus* (see Figure 13.4 ■). The muscles involved are the four **rectus** and two **oblique muscles**. Rectus (meaning "straight") muscles pull the eye up, down, left, or right in a straight line. Oblique muscles are on an angle and produce diagonal eye movement.



■ **Figure 13.3** The arrangement of the external eye muscles, A) lateral and B) anterior views.



■ **Figure 13.4** Examples of common forms of strabismus. A) Esotropia with the right eye turning inward. (Biophoto Associates/Science Source) B) Exotropia with the right eye turning outward. (Gwen Shockey/Science Source)

## The Eyelids

**cilia** (SIL-ee-ah)  
**eyelashes**

**sebaceous glands** (see-BAY-shus)

### What's In A Name?

seb/o = oil  
-ous = pertaining to

A pair of eyelids over each eyeball provides protection from foreign particles, injury from the sun and intense light, and trauma (see again Figure 13.1). Both the upper and lower edges of the eyelids have **eyelashes**, or **cilia**, that protect the eye from foreign particles. In addition, **sebaceous glands** located in the eyelids secrete lubricating oil onto the eyeball.

## Conjunctiva

mucous membrane

The conjunctiva of the eye is a **mucous membrane** lining. It forms a continuous covering on the underside of each eyelid and across the anterior surface of each eyeball (see again Figure 13.1). This serves as protection for the eye by sealing off the eyeball in the socket.

### What's In A Name?

muc/o = mucus

-ous = pertaining to

## Lacrimal Apparatus

lacrimal ducts

lacrimal gland

nasal cavity

nasolacrimal duct (naz-oh-LAK-rim-al)

tears

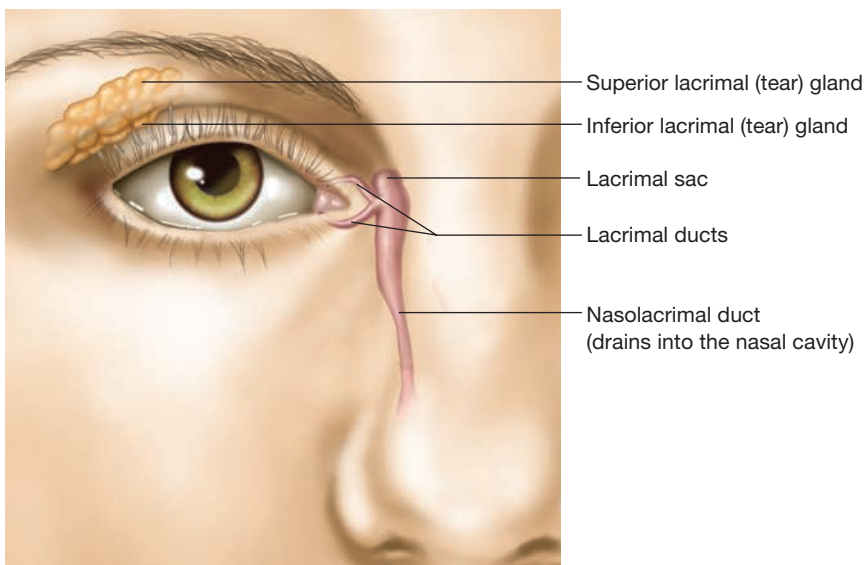
The **lacrimal gland** is located under the outer upper corner of each eyelid. These glands produce **tears**. Tears serve the important function of washing and lubricating the anterior surface of the eyeball. **Lacrimal ducts**, located in the inner corner of the eye socket, then collect the tears and drain them into the **nasolacrimal duct**. This duct ultimately drains the tears into the **nasal cavity** (see Figure 13.5 ■).

### What's In A Name?

lacrim/o = tears

nas/o = nose

-al = pertaining to



■ **Figure 13.5** The structure of the lacrimal apparatus.

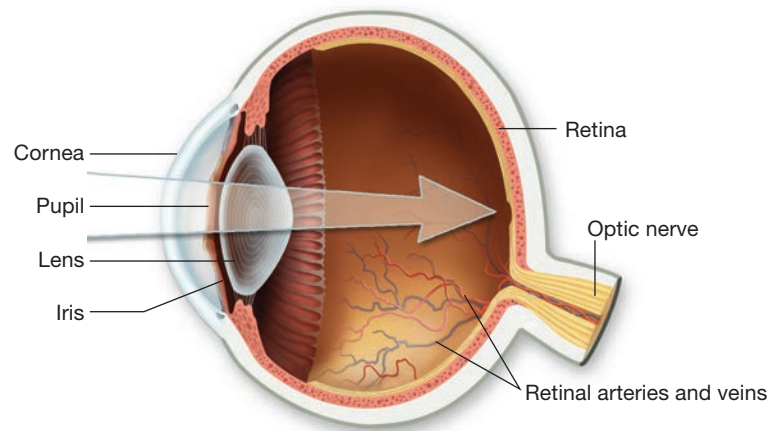
## How We See

When light rays strike the eye, they first pass through the cornea, pupil, aqueous humor, lens, and vitreous humor (see Figure 13.6 ■). They then strike the retina and stimulate the rods and cones. When the light rays hit the retina, an upside-down image is sent along nerve impulses to the optic nerve (see Figure 13.7 ■). The optic nerve transmits these impulses to the brain, where the upside-down image is translated into the right-side-up image we are looking at.

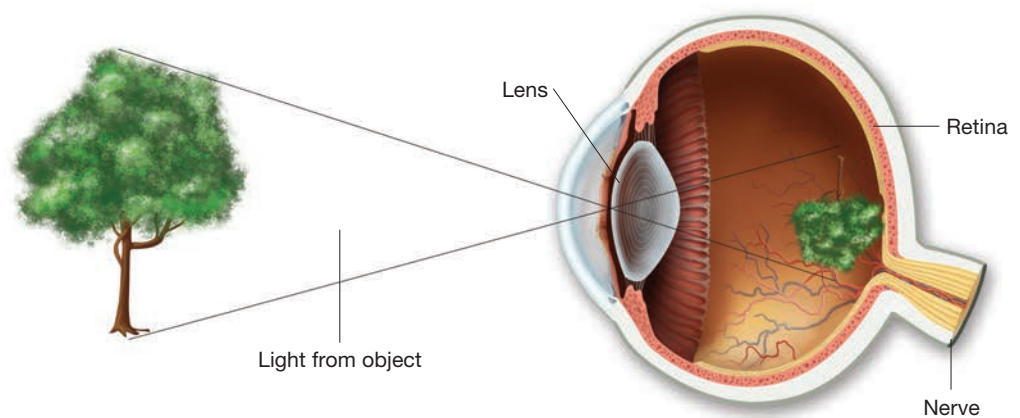
Vision requires proper functioning of four mechanisms:

1. Coordination of the external eye muscles so that both eyes move together.
2. The correct amount of light admitted by the pupil.
3. The correct focus of light on the retina by the lens.
4. The optic nerve transmitting sensory images to the brain.

■ **Figure 13.6** The path of light through the cornea, iris, lens, and striking the retina.



■ **Figure 13.7** The image formed on the retina is inverted. The brain rights the image as part of the interpretation process.



## Practice As You Go

### A. Complete the Statement

1. The study of the eye is \_\_\_\_\_.
2. Another term for eyelashes is \_\_\_\_\_.
3. The glands responsible for tears are called \_\_\_\_\_ glands.
4. The clear, transparent portion of the sclera is called the \_\_\_\_\_.
5. The innermost layer of the eye, which is composed of sensory receptors, is the \_\_\_\_\_.
6. The pupil of the eye is actually a hole in the \_\_\_\_\_.

# Terminology

## Word Parts Used to Build Eye Terms

The following lists contain the combining forms, suffixes, and prefixes used to build terms in the remaining sections of this chapter.

### Combining Forms

<b>aden/o</b>	gland
<b>ambly/o</b>	dull, dim
<b>angi/o</b>	vessel
<b>bi/o</b>	life
<b>blast/o</b>	immature
<b>blephar/o</b>	eyelid
<b>chromat/o</b>	color
<b>conjunctiv/o</b>	conjunctiva
<b>corne/o</b>	cornea
<b>cry/o</b>	cold
<b>cycl/o</b>	ciliary body
<b>cyst/o</b>	sac
<b>dacry/o</b>	tears
<b>dipl/o</b>	double

<b>emmetr/o</b>	correct, proper
<b>esthesi/o</b>	sensation, feeling
<b>glauco/o</b>	gray
<b>ir/o</b>	iris
<b>irid/o</b>	iris
<b>kerat/o</b>	cornea
<b>lacrim/o</b>	tears
<b>macul/o</b>	macula lutea
<b>mi/o</b>	lessening
<b>myc/o</b>	fungus
<b>mydr/i</b>	widening
<b>nyctal/o</b>	night
<b>ocul/o</b>	eye
<b>ophthalm/o</b>	eye

<b>opt/o</b>	eye, vision
<b>optic/o</b>	eye, vision
<b>papill/o</b>	optic disk
<b>phac/o</b>	lens
<b>phot/o</b>	light
<b>presby/o</b>	old age
<b>pupill/o</b>	pupil
<b>retin/o</b>	retina
<b>scler/o</b>	sclera
<b>stigmat/o</b>	point
<b>ton/o</b>	tone
<b>uve/o</b>	choroid
<b>xer/o</b>	dry

### Suffixes

<b>-al</b>	pertaining to
<b>-algia</b>	pain
<b>-ar</b>	pertaining to
<b>-ary</b>	pertaining to
<b>-atic</b>	pertaining to
<b>-ectomy</b>	surgical removal
<b>-edema</b>	swelling
<b>-graphy</b>	process of recording
<b>-ia</b>	condition
<b>-ic</b>	pertaining to
<b>-ician</b>	specialist
<b>-ism</b>	state of
<b>-itis</b>	inflammation
<b>-logist</b>	one who studies

<b>-logy</b>	study of
<b>-malacia</b>	abnormal softening
<b>-meter</b>	instrument to measure
<b>-metrist</b>	specialist in measuring
<b>-metry</b>	process of measuring
<b>-oma</b>	tumor; mass
<b>-opia</b>	vision condition
<b>-opsia</b>	vision condition
<b>-osis</b>	abnormal condition
<b>-otomy</b>	cutting into
<b>-pathy</b>	disease

<b>-pexy</b>	surgical fixation
<b>-phobia</b>	fear
<b>-plasty</b>	surgical repair
<b>-plegia</b>	paralysis
<b>-ptosis</b>	drooping
<b>-rrhagia</b>	abnormal flow condition
<b>-scope</b>	instrument for viewing
<b>-scopy</b>	process of visually examining
<b>-tic</b>	pertaining to
<b>-tropia</b>	turned condition

## Prefixes

<b>a-</b>	without
<b>an-</b>	without
<b>anti-</b>	against
<b>de-</b>	without
<b>eso-</b>	inward

<b>exo-</b>	outward
<b>extra-</b>	outside of
<b>hemi-</b>	half
<b>hyper-</b>	excessive
<b>intra-</b>	within

<b>micro-</b>	small
<b>mono-</b>	one
<b>myo-</b>	to shut

## Adjective Forms of Anatomical Terms

Term	Word Parts	Definition
<b>conjunctival</b> (kon-JUNK-tih-vall)	<b>conjunctiv/o</b> = conjunctiva <b>-al</b> = pertaining to	Pertaining to the conjunctiva.
<b>corneal</b> (KOR-nee-all)	<b>corne/o</b> = cornea <b>-al</b> = pertaining to <b>Word Watch</b>       Be careful using the combining forms <b>core/o</b> meaning “pupil” and <b>corne/o</b> meaning “cornea.”	Pertaining to the cornea.
<b>extraocular</b> (EKS-truh-OCK-yoo-lar)	<b>extra-</b> = outside of <b>ocul/o</b> = eye <b>-ar</b> = pertaining to	Pertaining to being outside the eyeball; for example, the extraocular eye muscles.
<b>intraocular</b> (in-trah-OCK-yoo-lar)	<b>intra-</b> = within <b>ocul/o</b> = eye <b>-ar</b> = pertaining to	Pertaining to within the eye.
<b>iridal</b> (ir-id-al)	<b>irid/o</b> = iris <b>-al</b> = pertaining to	Pertaining to the iris.
<b>lacrimal</b> (LAK-rim-al)	<b>lacrim/o</b> = tears <b>-al</b> = pertaining to	Pertaining to tears.
<b>macular</b> (MACK-yoo-lar)	<b>macul/o</b> = macula lutea <b>-ar</b> = pertaining to	Pertaining to the macula lutea.
<b>ocular</b> (OCK-yoo-lar)	<b>ocul/o</b> = eye <b>-ar</b> = pertaining to	Pertaining to the eye.
<b>ophthalmic</b> (off-THAL-mik)	<b>ophthalm/o</b> = eye <b>-ic</b> = pertaining to	Pertaining to the eye.
<b>optic</b> (OP-tik)	<b>opt/o</b> = eye, vision <b>-ic</b> = pertaining to	Pertaining to the eye or vision.
<b>optical</b> (OP-tih-kal)	<b>optic/o</b> = eye, vision <b>-al</b> = pertaining to	Pertaining to the eye or vision.
<b>pupillary</b> (PYOO-pih-lair-ee)	<b>pupill/o</b> = pupil <b>-ary</b> = pertaining to	Pertaining to the pupil.
<b>retinal</b> (RET-in-al)	<b>retin/o</b> = retina <b>-al</b> = pertaining to	Pertaining to the retina.
<b>scleral</b> (SKLAIR-all)	<b>scler/o</b> = sclera <b>-al</b> = pertaining to	Pertaining to the sclera.
<b>uveal</b> (YOO-vee-al)	<b>uve/o</b> = choroid <b>-al</b> = pertaining to	Pertaining to the choroid layer of the eye.

## Practice As You Go

### B. Give the adjective form for each anatomical structure

1. The pupil \_\_\_\_\_
2. The eye or vision \_\_\_\_\_ or \_\_\_\_\_
3. The retina \_\_\_\_\_
4. Tears \_\_\_\_\_
5. Within the eye \_\_\_\_\_
6. Outside of the eye \_\_\_\_\_

Pathology		
Term	Word Parts	Definition
<b>Medical Specialties</b>		
<b>ophthalmologist</b> (opf-thal-MOLL-oh-jist)	<b>ophthalm/o</b> = eye <b>-logist</b> = one who studies	Medical doctor who has specialized in the diagnosis and treatment of eye conditions and diseases.
<b>ophthalmology</b> (Ophth.) (opf-thal-MOLL-oh-jee)	<b>ophthalm/o</b> = eye <b>-logy</b> = study of	Branch of medicine involving the diagnosis and treatment of conditions and diseases of the eye and surrounding structures.
<b>optician</b> (op-TISH-an)	<b>opt/o</b> = vision <b>-ician</b> = specialist	Person trained in grinding and fitting corrective lenses.
<b>optometrist</b> (op-TOM-eh-trist)	<b>opt/o</b> = vision <b>-metrist</b> = specialist in measuring	Doctor of optometry.
<b>optometry</b> (op-TOM-eh-tree)	<b>opt/o</b> = vision <b>-metry</b> = process of measuring	Medical profession specializing in examining the eyes, testing visual acuity, and prescribing corrective lenses.
<b>Signs and Symptoms</b>		
<b>blepharoptosis</b> (blef-ah-rop-TOH-sis)	<b>blephar/o</b> = eyelid <b>-ptosis</b> = drooping	Drooping eyelid.
<b>cycloplegia</b> (sigh-kloh-PLÉE-jee-ah)	<b>cycl/o</b> = ciliary body <b>-plegia</b> = paralysis	Paralysis of the ciliary body. This affects changing the shape of the lens to bring images into focus.
<b>diplopia</b> (dip-LOH-pee-ah)	<b>diplo/o</b> = double <b>-opia</b> = vision condition	Condition of seeing double.
<b>emmetropia</b> (EM) (em-eh-TROH-pee-ah)	<b>emmetr/o</b> = correct, proper <b>-opia</b> = vision condition	State of normal vision.
<b>iridoplegia</b> (ir-id-oh-PLÉE-jee-ah)	<b>irid/o</b> = iris <b>-plegia</b> = paralysis	Paralysis of the iris. This affects changing the size of the pupil to regulate the amount of light entering the eye.

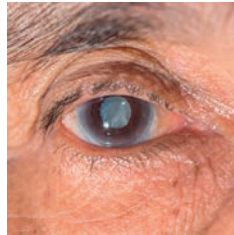


## Pathology (continued)

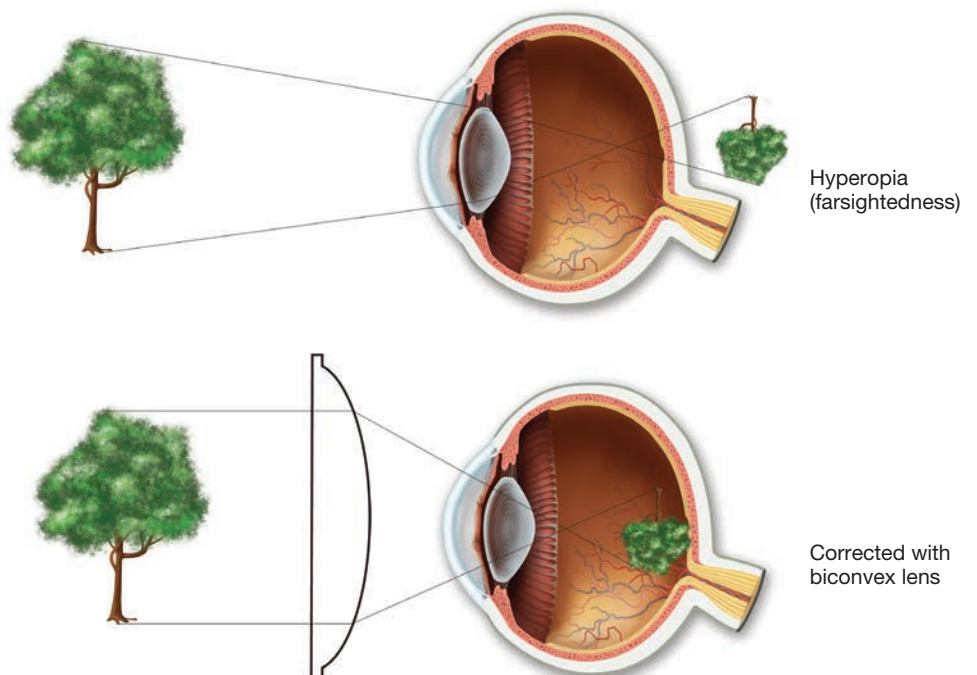
Term	Word Parts	Definition
<b>nyctalopia</b> (nik-tah-LOH-pee-ah)	<b>nyctal/o</b> = night <b>-opia</b> = vision condition  <b>Med Term Tip</b> The simple translation of <i>nyctalopia</i> is “night vision.” However, it is used to mean “night blindness.”	Difficulty seeing in dim light; also called <i>night blindness</i> . Usually due to damaged rods.
<b>ophthalmalgia</b> (off-thal-MAL-jee-ah)	<b>ophthalm/o</b> = eye <b>-algia</b> = pain	Eye pain.
<b>ophthalmoplegia</b> (off-thal-moh-PLEE-jee-ah)	<b>ophthalm/o</b> = eye <b>-plegia</b> = paralysis	Paralysis of one or more of the extraocular eye muscles.
<b>ophthalmorrhagia</b> (off-thal-moh-RAH-jee-ah)	<b>ophthalm/o</b> = eye <b>-rrhagia</b> = abnormal flow condition	Bleeding from the eye.
<b>papilledema</b> (pah-pill-eh-DEEM-ah)	<b>papill/o</b> = optic disk <b>-edema</b> = swelling	Swelling of the optic disk. Often as a result of increased intraocular pressure. Also called <i>choked disk</i> .
<b>photophobia</b> (foh-toh-FOH-bee-ah)	<b>phot/o</b> = light <b>-phobia</b> = fear	Although the term translates into <i>fear of light</i> , it actually means a strong sensitivity to bright light.
<b>presbyopia</b> (prez-bee-OH-pee-ah)	<b>presby/o</b> = old age <b>-opia</b> = vision condition	Visual loss due to old age, resulting in difficulty in focusing for near vision (such as reading).
<b>scleromalacia</b> (sklair-oh-mah-LAY-she-ah)	<b>scler/o</b> = sclera <b>-malacia</b> = abnormal softening	Softening of the sclera.
<b>xerophthalmia</b> (zeer-of-THAL-mee-ah)	<b>xer/o</b> = dry <b>ophthalm/o</b> = eye <b>-ia</b> = condition	Dry eyes.
<b>Eyeball</b>		
<b>achromatopsia</b> (ah-kroh-mah-TOP-see-ah)	<b>a-</b> = without <b>chromat/o</b> = color <b>-opsia</b> = vision condition	Severe, congenital deficiency in color vision; complete color blindness; more common in males.
<b>amblyopia</b> (am-blee-OH-pee-ah)	<b>ambly/o</b> = dull, dim <b>-opia</b> = vision condition	Loss of vision not as a result of eye pathology. Usually occurs in patients who see two images. In order to see only one image, the brain will no longer recognize the image being sent to it by one of the eyes. May occur if strabismus is not corrected. This condition is not treatable with a prescription lens. Commonly referred to as <i>lazy eye</i> .
<b>astigmatism</b> (Astigm) (ah-STIG-mah-tizm)	<b>a-</b> = without <b>stigmat/o</b> = point <b>-ism</b> = state of	Condition in which light rays are focused unevenly on the retina, causing a distorted image, due to an abnormal curvature of the cornea.

## Pathology (continued)

Term	Word Parts	Definition
<b>cataract</b> (KAT-ah-rakt)	<b>Med Term Tip</b> The term <i>cataract</i> comes from the Latin word meaning “waterfall.” This refers to how a person with a cataract sees the world—as if looking through a waterfall.	Damage to the lens causing it to become opaque or cloudy, resulting in diminished vision. Treatment is usually surgical removal of the cataract or replacement of the lens.
<b>corneal abrasion</b>	<b>corne/o</b> = cornea <b>-al</b> = pertaining to	Scraping injury to the cornea. If it does not heal, it may develop into an ulcer.
<b>glaucoma</b> (glau-KOH-mah)	<b>glauc/o</b> = gray <b>-oma</b> = mass	Increase in intraocular pressure, which, if untreated, may result in atrophy (wasting away) of the optic nerve and blindness. Glaucoma is treated with medication and surgery. There is an increased risk of developing glaucoma in persons over age 60, those of African ancestry, people who have sustained a serious eye injury, or anyone with a family history of diabetes or glaucoma.
<b>hyperopia</b> (high-per-OH-pee-ah)	<b>hyper-</b> = excessive <b>-opia</b> = vision condition	With this condition a person can see things in the distance but has trouble reading material at close range. Also known as <i>farsightedness</i> . This condition is corrected with converging or biconvex lenses.

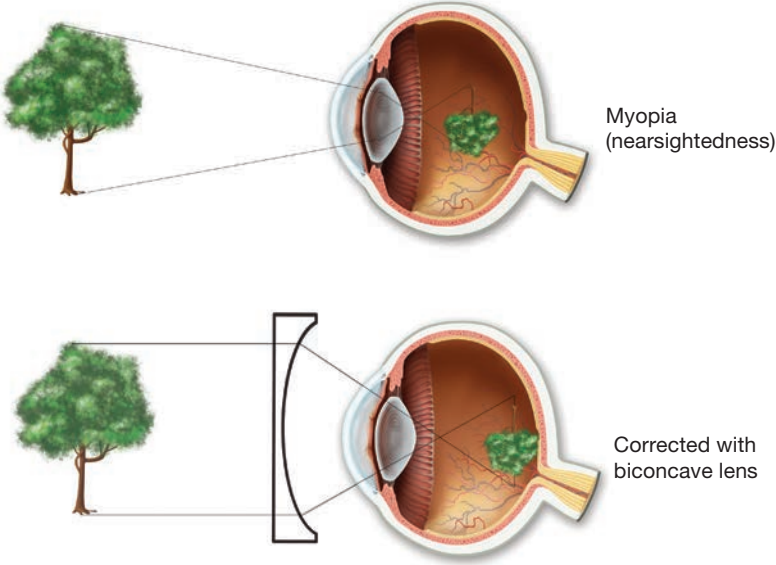


■ **Figure 13.8** Photograph of a person with a cataract in the right eye. (ARZTSAMUI/Shutterstock)



■ **Figure 13.9** Hyperopia (farsightedness). In the uncorrected top figure, the image would come into focus behind the retina, making the image on the retina blurry. The bottom image shows how a biconvex lens corrects this condition.

## Pathology (continued)

Term	Word Parts	Definition
<b>iritis</b> (eye-RYE-tis)	<b>ir/o</b> = iris <b>-itis</b> = inflammation	Inflammation of the iris.
<b>keratitis</b> (kair-ah-TYE-tis)	<b>kerat/o</b> = cornea <b>-itis</b> = inflammation <b>Word Watch</b>       Be careful using the combining form <b>kerat/o</b> , which means both “cornea” and the “hard protein keratin.”	Inflammation of the cornea.
<b>legally blind</b>		Describes a person who has severely impaired vision. Usually defined as having visual acuity of 20/200 that cannot be improved with corrective lenses or having a visual field of less than 20 degrees.
<b>macular degeneration</b> (MAK-yoo-lar)	<b>macul/o</b> = macula lutea <b>-ar</b> = pertaining to	Deterioration of the macular area of the retina of the eye. May be treated with laser surgery to destroy the blood vessels beneath the macula.
<b>monochromatism</b> (mon-oh-KROH-mah-tizm)	<b>mono-</b> = one <b>chromat/o</b> = color <b>-ism</b> = state of	Unable to perceive one color.
<b>myopia (MY)</b> (my-OH-pee-ah)  <b>Med Term Tip</b> ..... The term <i>myopia</i> appears to use the combining form <b>my/o</b> , which means “muscle.” This combining form comes from the Greek word <i>mys</i> . But in this case the term uses the prefix <b>myo-</b> , which comes from the Greek word <i>myo</i> or <i>myein</i> , meaning “to shut.”	<b>myo-</b> = to shut <b>-opia</b> = vision condition	With this condition a person can see things close up but distance vision is blurred. Also known as <i>nearsightedness</i> . This condition is corrected with diverging or biconcave lenses. Named because persons with myopia often partially shut their eyes, squint, in order to see better.
<p>■ <b>Figure 13.10</b> Myopia (nearsightedness). In the uncorrected top figure, the image comes into focus in front of the lens, making the image on the retina blurry. The bottom image shows how a biconcave lens corrects this condition.</p>		 <p>Myopia (nearsightedness)</p> <p>Corrected with biconcave lens</p>
<b>oculomycosis</b> (ock-yoo-loh-my-KOH-sis)	<b>ocul/o</b> = eye <b>myc/o</b> = fungus <b>-osis</b> = abnormal condition	Fungus infection of the eye.

## Pathology (continued)

Term	Word Parts	Definition
<b>retinal detachment</b> (RET-in-al)	<b>retin/o</b> = retina <b>-al</b> = pertaining to	Occurs when the retina becomes separated from the choroid layer. This separation seriously damages blood vessels and nerves, resulting in blindness. May be treated with surgical or medical procedures to stabilize the retina and prevent separation.
<b>retinitis pigmentosa</b> (ret-in-EYE-tis / pig-men-TOH-sah)	<b>retin/o</b> = retina <b>-itis</b> = inflammation	Progressive disease of the eye resulting in the retina becoming hard (sclerosed), pigmented (colored), and atrophied (wasting away). There is no known cure for this condition.
<b>retinoblastoma</b> (RET-in-noh-blast-OH-mah)	<b>retin/o</b> = retina <b>blast/o</b> = immature <b>-oma</b> = tumor	Malignant eye tumor occurring in children, usually under the age of 3. Requires enucleation.
<b>retinopathy</b> (ret-in-OP-ah-thee)	<b>retin/o</b> = retina <b>-pathy</b> = disease	General term for disease affecting the retina.
<b>scleritis</b> (skler-EYE-tis)	<b>scler/o</b> = sclera <b>-itis</b> = inflammation	Inflammation of the sclera.
<b>uveitis</b> (yoo-vee-EYE-tis)	<b>uve/o</b> = choroid <b>-itis</b> = inflammation	Inflammation of the choroid layer.
<b>Conjunctiva</b>		
<b>conjunctivitis</b> (kon-junk-tih-VYE-tis)	<b>conjunctiv/o</b> = conjunctiva <b>-itis</b> = inflammation	Inflammation of the conjunctiva usually as the result of a bacterial infection. Commonly called <i>pinkeye</i> .
<b>pterygium</b> (teh-RIJ-ee-um)		Hypertrophied conjunctival tissue in the inner corner of the eye.
<b>Eyelids</b>		
<b>blepharitis</b> (blef-ah-RYE-tis)	<b>blephar/o</b> = eyelid <b>-itis</b> = inflammation	Inflammation of the eyelid.
<b>hordeolum</b> (hor-DEE-oh-lum)		Refers to a sty (or sty), a small purulent inflammatory infection of a sebaceous gland of the eyelid; treated with hot compresses and/or surgical incision.
<b>Lacrimal Apparatus</b>		
<b>dacryoadenitis</b> (dak-ree-oh-ad-eh-NYE-tis)	<b>dacry/o</b> = tears <b>aden/o</b> = gland <b>-itis</b> = inflammation	Inflammation of the lacrimal gland.
<b>dacryocystitis</b> (dak-ree-oh-sis-TYE-tis)	<b>dacry/o</b> = tears <b>cyst/o</b> = sac <b>-itis</b> = inflammation	Inflammation of the lacrimal sac.
<b>Eye Muscles</b>		
<b>esotropia</b> (ST) (ess-oh-TROH-pee-ah)	<b>eso-</b> = inward <b>-tropia</b> = turned condition	Inward turning of the eye; also called <i>cross-eyed</i> . An example of a form of strabismus (muscle weakness of the eye).
<b>exotropia</b> (XT) (eks-oh-TROH-pee-ah)	<b>exo-</b> = outward <b>-tropia</b> = turned condition	Outward turning of the eye; also called <i>wall-eyed</i> . Also an example of strabismus (muscle weakness of the eye).

## Pathology (continued)

Term	Word Parts	Definition
<b>strabismus</b> (strah-BIZ-mus)		Eye muscle weakness commonly seen in children resulting in the eyes looking in different directions at the same time. May be corrected with glasses, eye exercises, and/or surgery.
<b>Brain-Related Vision Pathologies</b>		
<b>hemianopia</b> (hem-ee-ah-NOP-ee-ah)	<b>hemi-</b> = half <b>an-</b> = without <b>-opia</b> = vision condition	Loss of vision in half of the visual field. A stroke patient may suffer from this disorder.
<b>nystagmus</b> (niss-TAG-mus)		Jerky-appearing involuntary eye movements, usually left and right. Often an indication of brain injury.

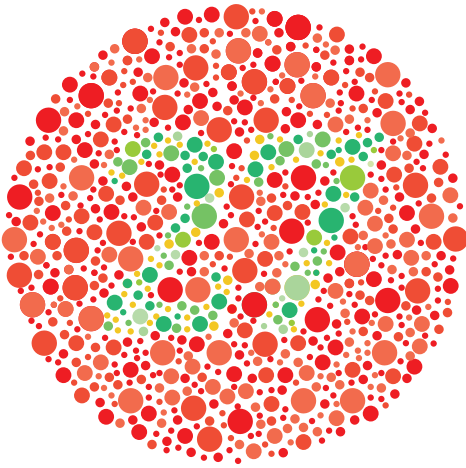
## Practice As You Go

### C. Terminology Matching

Match each term to its definition.


- |                        |  |
|------------------------|--|
| 1. _____ emmetropia    | a. opacity of the lens                 |
| 2. _____ hyperopia     | b. a form of strabismus                |
| 3. _____ cataract      | c. nearsightedness                     |
| 4. _____ astigmatism   | d. due to abnormal curvature of cornea |
| 5. _____ esotropia     | e. lazy eye                            |
| 6. _____ xerophthalmia | f. involuntary movements of the eye    |
| 7. _____ myopia        | g. farsightedness                      |
| 8. _____ nystagmus     | h. normal vision                       |
| 9. _____ amblyopia     | i. dry eyes                            |
| 10. _____ presbyopia   | j. old-age vision loss                 |

## Diagnostic Procedures


Term	Word Parts	Definition
<b>Eye Examination Tests</b>		
<b>color vision tests</b>   <p>■ <b>Figure 13.11</b> An example of color blindness test. A person with red-green color blindness would not be able to distinguish the green 74 from the surrounding red circles.</p>		Use of polychromic (multicolored) charts to determine the ability of the patient to recognize color.
<b>fluorescein angiography</b> (floo-oh-RESS-ee-in / an-jee-OG-rah-fee)	<b>angi/o</b> = vessel <b>-graphy</b> = process of recording	Process of injecting a dye (fluorescein) to observe the movement of blood and detect lesions in the macular area of the retina. Used to determine if there is a detachment of the retina.
<b>fluorescein staining</b> (floo-oh-RESS-ee-in)		Application of dye eyedrops of a bright green fluorescent color used to look for corneal abrasions or ulcers.
<b>keratometer</b> kair-ah-TOM-eh-ter	<b>kerat/o</b> = cornea <b>-meter</b> = instrument to measure	An instrument used to measure the curvature of the cornea.
<b>keratometry</b> (kair-ah-TOM-eh-tree)	<b>kerat/o</b> = cornea <b>-metry</b> = process of measuring	Measurement of the curvature of the cornea using an instrument called a <i>keratometer</i> .
<b>ophthalmoscope</b> (off-THAL-moh-scope)	<b>ophthalm/o</b> = eye <b>-scope</b> = instrument for viewing	Instrument used to examine the inside of the eye through the pupil.
<b>ophthalmoscopy</b> (off-thal-MOSS-koh-pee)	<b>ophthalm/o</b> = eye <b>-scopy</b> = process of visually examining	Examination of the interior of the eyes using an instrument called an <i>ophthalmoscope</i> (see Figure 13.12 ■). The physician dilates the pupil in order to see the cornea, lens, and retina. Used to identify abnormalities in the blood vessels of the eye and some systemic diseases.



## Diagnostic Procedures (continued)

Term	Word Parts	Definition
<p>■ <b>Figure 13.12</b> Examination of the interior of the eye using an ophthalmoscope. (Monkey Business Images/Shutterstock)</p>		
<b>optometer</b> (op-TOM-eh-ter)	<b>opt/o</b> = vision <b>-meter</b> = instrument to measure	Instrument used to measure how well the eye is able to focus images clearly on the retina.
<b>refractive error test</b> (ree-FRAK-tiv)		Vision test for a defect in the ability of the eye to accurately focus the image that is hitting it. Refractive errors result in myopia and hyperopia.
<b>slit lamp microscopy</b>	<b>micro-</b> = small <b>-scopy</b> = process of visually examining	Examining the conjunctiva, cornea, iris, and lens of the eye.
<b>Snellen chart</b> (SNEL-en)		Chart used for testing distance vision named for Dutch ophthalmologist Herman Snellen. It contains letters of varying sizes and is administered from a distance of 20 feet. A person who can read at 20 feet what the average person can read at this distance is said to have 20/20 vision.
<b>tonometry</b> (tohn-OM-eh-tree)	<b>ton/o</b> = tone <b>-metry</b> = process of measuring	Measurement of the intraocular pressure of the eye using a <i>tonometer</i> to check for the condition of glaucoma. Generally part of a normal eye exam for adults.
<b>visual acuity (VA) test</b> (VIZH-oo-al / ah-KYOO-ih-tee)	<b>-al</b> = pertaining to	Measurement of the sharpness of a patient's vision. Usually, a Snellen chart is used for this test in which the patient identifies letters from a distance of 20 feet.

## Therapeutic Procedures

Terms	Word Parts	Definition
<b>Surgical Procedures</b>		
<b>blepharectomy</b> (blef-ah-REK-toh-mee)	<b>blephar/o</b> = eyelid <b>-ectomy</b> = surgical removal	Surgical removal of all or part of the eyelid.
<b>blepharoplasty</b> (BLEF-ah-roh-plass-tee)	<b>blephar/o</b> = eyelid <b>-plasty</b> = surgical repair	Surgical repair of the eyelid. A common plastic surgery to correct blepharoptosis.
<b>conjunctivoplasty</b> (kon-junk-tih-VOH-plas-tee)	<b>conjunctiv/o</b> = conjunctiva <b>-plasty</b> = surgical repair	Surgical repair of the conjunctiva.
<b>cryoextraction</b> (cry-oh-eks-TRAK-shun)	<b>cry/o</b> = cold	Procedure in which cataract is lifted from the lens with an extremely cold probe.
<b>cryoretinopexy</b> (cry-oh-RET-ih-noh-pek-see)	<b>cry/o</b> = cold <b>retin/o</b> = retina <b>-pexy</b> = surgical fixation	Surgical fixation of the retina by using extreme cold.
<b>enucleation</b> (ee-new-klee-AY-shun)		Surgical removal of an eyeball.
<b>iridectomy</b> (ir-id-EK-toh-mee)	<b>irid/o</b> = iris <b>-ectomy</b> = surgical removal	Surgical removal of a small portion of the iris.
<b>iridosclerotomy</b> (ir-ih-doh-skleh-ROT-oh-mee)	<b>irid/o</b> = iris <b>scler/o</b> = sclera <b>-otomy</b> = cutting into	To cut into the iris and sclera.
<b>keratoplasty</b> (KAIR-ah-toh-plass-tee)	<b>kerat/o</b> = cornea <b>-plasty</b> = surgical repair	Surgical repair of the cornea is the simple translation of this term that is utilized to mean corneal transplant.
<b>laser-assisted in situ keratomileusis (LASIK)</b> (in-SIH-tyoo / kair-ah-toh-mih-LOO-sis)	<b>kerat/o</b> = cornea	Correction of myopia using laser surgery to remove corneal tissue.
<div>  </div>		
<p>■ <b>Figure 13.13</b> LASIK surgery uses a laser to reshape the cornea. (mehmetcan/Shutterstock)</p>		
<b>laser photocoagulation</b> (LAY-zer / foh-toh-koh-ag-yoo-LAY-shun)	<b>phot/o</b> = light	Use of a laser beam to destroy very small precise areas of the retina. May be used to treat retinal detachment or macular degeneration.

## Therapeutic Procedures (continued)

Terms	Word Parts	Definition
<b>phacoemulsification</b> (fak-oh-ee-mull-sih-fih-KAY-shun)	<b>phac/o</b> = lens	Use of high-frequency sound waves to emulsify (liquefy) a lens with a cataract, which is then aspirated (removed by suction) with a needle.
<b>photorefractive keratectomy (PRK)</b> (foh-toh-ree-FRAK-tiv / kair-ah-TEK-toh-mee)	<b>phot/o</b> = light <b>kerat/o</b> = cornea <b>-ectomy</b> = surgical removal	Use of a laser to reshape the cornea and correct errors of refraction.
<b>prosthetic lens implant</b> (pros-THET-ik)		Use of an artificial lens to replace the lens removed during cataract surgery.
<b>radial keratotomy (RK)</b> (RAY-dee-all / kair-ah-TOT-oh-mee)	<b>-al</b> = pertaining to <b>kerat/o</b> = cornea <b>-otomy</b> = cutting into	Spokelike incisions around the cornea that result in it becoming flatter. A surgical treatment for myopia.
<b>retinopexy</b> (ret-ih-noh-PEX-ee)	<b>retin/o</b> = retina <b>-pexy</b> = surgical fixation	Surgical fixation of the retina. One treatment for a detaching retina.
<b>scleral buckling</b> (SKLAIR-al)	<b>scler/o</b> = sclera <b>-al</b> = pertaining to	Placing a band of silicone around the outside of the sclera that stabilizes a detaching retina.
<b>sclerotomy</b> (skleh-ROT-oh-mee)	<b>scler/o</b> = sclera <b>-otomy</b> = cutting into	To cut into the sclera.
<b>strabotomy</b> (strah-BOT-oh-mee)	<b>-otomy</b> = cutting into	Incision into the eye muscles in order to correct strabismus.

## Practice As You Go

### D. Terminology Matching

Match each term to its definition.

- |                               |  |
|-------------------------------|--|
| 1. _____ fluorescein staining | a. examining the interior of the eyeball |
| 2. _____ ophthalmoscopy       | b. used to mean corneal transplant       |
| 3. _____ tonometry            | c. liquefies a cataract                  |
| 4. _____ enucleation          | d. looks for corneal abrasions or ulcers |
| 5. _____ keratoplasty         | e. surgical removal of the eyeball       |
| 6. _____ phacoemulsification  | f. measures intraocular pressure         |

## Pharmacology

Classification	Word Parts	Action	Examples
<b>anesthetic ophthalmic solution</b> (off-THAL-mik)	<b>an-</b> = without <b>esthesi/o</b> = sensation, feeling <b>-tic</b> = pertaining to <b>ophthalm/o</b> = eye <b>-ic</b> = pertaining to	Eyedrops for pain relief associated with eye infections, corneal abrasions, or surgery.	proparacain, Ak-Taine, Ocu-Caine; tetracaine, Opticaine, Pontocaine
<b>antibiotic ophthalmic solution</b> (off-THAL-mik)	<b>anti-</b> = against <b>bi/o</b> = life <b>-tic</b> = pertaining to <b>ophthalm/o</b> = eye <b>-ic</b> = pertaining to	Eyedrops for the treatment of bacterial eye infections.	erythromycin, Del-Mycin, Ilotycin Ophthalmic
<b>antiglaucoma medications</b> (an-tye-glau-KOH-mah)	<b>anti-</b> = against <b>glauco/o</b> = gray <b>-oma</b> = mass	Reduce intraocular pressure by lowering the amount of aqueous humor in the eyeball. May achieve this by either reducing the production of aqueous humor or increasing its outflow.	timolol, Betimol, Timoptic; acetazolamide, Ak-Zol, Dazamide; prostaglandin analogs, Lumigan, Xalatan
<b>artificial tears</b>		Medications, many of them over-the-counter, to treat dry eyes.	buffered isotonic solutions, Akwa Tears, Refresh Plus, Moisture Eyes
<b>miotic drops</b> (my-OT-ik)	<b>mi/o</b> = lessening <b>-tic</b> = pertaining to	Any substance that causes the pupil to constrict. These medications may also be used to treat glaucoma.	physostigmine, Eserine Sulfate, Isopto Eserine; carbachol, Carbostat, Miostat
<b>mydriatic drops</b> (mid-ree-AT-ik)	<b>mydr/i</b> = widening <b>-atic</b> = pertaining to	Any substance that causes the pupil to dilate by paralyzing the iris and/or ciliary body muscles. Particularly useful during eye examinations and eye surgery.	atropine sulfate, Atropine-Care Ophthalmic, Atropisol Ophthalmic
<b>ophthalmic decongestants</b>	<b>ophthalm/o</b> = eye <b>-ic</b> = pertaining to <b>de-</b> = without	Over-the-counter medications that constrict the arterioles of the eye and reduce redness and itching of the conjunctiva.	tetrahydrozoline, Visine, Murine

## Abbreviations

<b>ARMD</b>	age-related macular degeneration	<b>EM</b>	emmetropia
<b>Astigm</b>	astigmatism	<b>EOM</b>	extraocular movement
<b>c.gl.</b>	correction with glasses	<b>ICCE</b>	intracapsular cataract extraction
<b>D</b>	diopter (lens strength)	<b>IOP</b>	intraocular pressure
<b>DVA</b>	distance visual acuity	<b>LASIK</b>	laser-assisted in situ keratomileusis
<b>ECCE</b>	extracapsular cataract extraction	<b>OD</b>	right eye
<b>EENT</b>	eye, ear, nose, and throat	<b>Ophth.</b>	ophthalmology

**Abbreviations** (continued)

<b>OS</b>	left eye	<b>s.gl.</b>	without correction or glasses
<b>OU</b>	each eye/both eyes	<b>SMD</b>	senile macular degeneration
<b>PERRLA</b>	pupils equal, round, react to light and accommodation	<b>ST</b>	esotropia
<b>PRK</b>	photorefractive keratectomy	<b>VA</b>	visual acuity
<b>REM</b>	rapid eye movement	<b>VF</b>	visual field
<b>RK</b>	radial keratotomy	<b>XT</b>	exotropia

**Med Term Tip**

The abbreviations for right eye (OD) and left eye (OS) are easy to remember when we know their origins. OD stands for *oculus* (eye) *dexter* (right). OS has its origin in *oculus* (eye) *sinister* (left). At one time in history it was considered to be sinister if a person looked at another from only the left side. Hence the term *oculus sinister* means “left eye.”

**Practice As You Go****E. What's the Abbreviation?**

1. pressure equalizing tube \_\_\_\_\_
2. emmetropia \_\_\_\_\_
3. exotropia \_\_\_\_\_
4. left eye \_\_\_\_\_
5. extraocular movement \_\_\_\_\_
6. visual acuity \_\_\_\_\_



## Section II: The Ear at a Glance

### Function

The ear contains the sensory receptors for hearing and equilibrium (balance).

### Structures

Here are the primary structures that comprise the ear:

**auricle**  
**external ear**

**inner ear**  
**middle ear**

### Word Parts

Here are the most common word parts (with their meanings) used to build ear terms. For a more comprehensive list, refer to the Terminology section of this chapter.

### Combining Forms

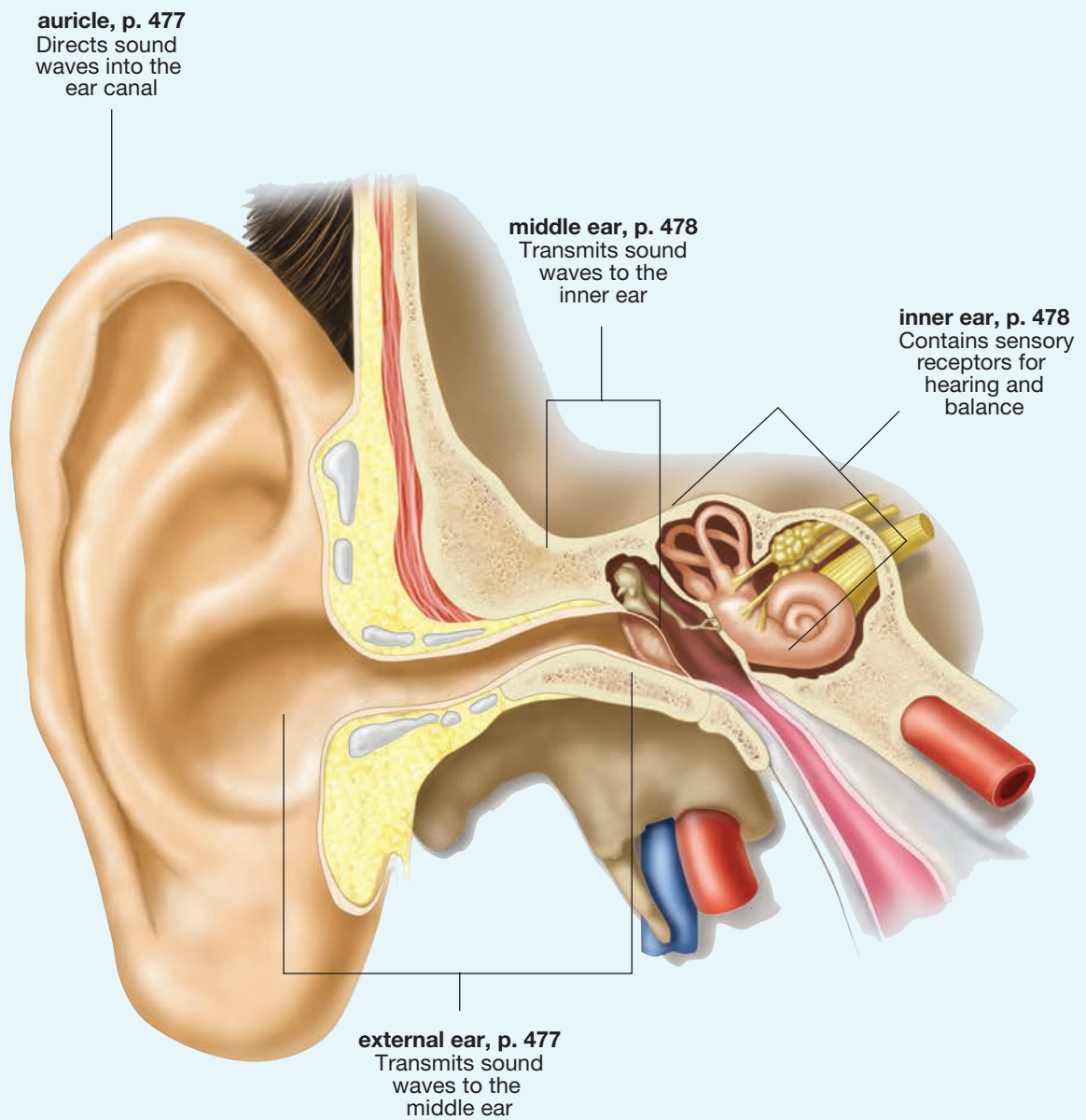
<b>acous/o</b>	hearing	<b>labyrinth/o</b>	labyrinth (inner ear)
<b>audi/o</b>	hearing	<b>myring/o</b>	tympanic membrane
<b>audit/o</b>	hearing	<b>ot/o</b>	ear
<b>aur/o</b>	ear	<b>salping/o</b>	auditory tube (eustachian tube)
<b>auricul/o</b>	ear	<b>staped/o</b>	stapes
<b>cerumin/o</b>	cerumen	<b>tympan/o</b>	tympanic membrane
<b>cochle/o</b>	cochlea	<b>vestibul/o</b>	vestibule

### Suffixes

<b>-cusis</b>	hearing
<b>-otia</b>	ear condition



# The Ear Illustrated



# Anatomy and Physiology of the Ear

**audiology** (aw-dee-OL-oh-jee)

**cochlear nerve** (KOK-lee-ar)

**equilibrium** (ee-kwih-LIB-ree-um)

**external ear**

**hearing**

**inner ear**

**middle ear**

**otology** (oh-TOL-oh-jee)

**vestibular nerve** (ves-TIB-yoo-lar)

**vestibulocochlear nerve**

(ves-tib-yoo-loh-KOK-lee-ar)

The study of the ear is referred to as **otology** (Oto), and the study of hearing disorders is called **audiology**. While there is a large amount of overlap between these two areas, there are also examples of ear problems that do not affect hearing. The ear is responsible for two senses: **hearing** and **equilibrium**, or our sense of balance. Hearing and equilibrium sensory information is carried to the brain by cranial nerve VIII, the **vestibulocochlear nerve**. This nerve is divided into two major branches. The **cochlear nerve** carries hearing information, and the **vestibular nerve** carries equilibrium information.

The ear is subdivided into three areas: **external ear**, **middle ear**, and **inner ear**.

## External Ear

**auditory canal** (AW-dih-tor-ee)

**auricle** (AW-rih-kl)

**cerumen** (seh-ROO-men)

**external auditory meatus**

(AW-dih-tor-ee / me-A-tus)

**pinna** (PIN-ah)

**tympanic membrane** (tim-PAN-ik)

The external ear consists of three parts: the **auricle**, the **auditory canal**, and the **tympanic membrane** (see Figure 13.14 ■). The auricle or **pinna** is what is commonly referred to as the *ear* because this is the only visible portion. The auricle with its earlobe has a unique shape in each person and functions like a funnel to capture sound waves as they go past the outer ear and channel them through the **external auditory meatus**. The sound then moves along the auditory canal and causes the

### What's In A Name?

**cochle/o** = cochlea

**vestibul/o** = vestibule

**-al** = pertaining to

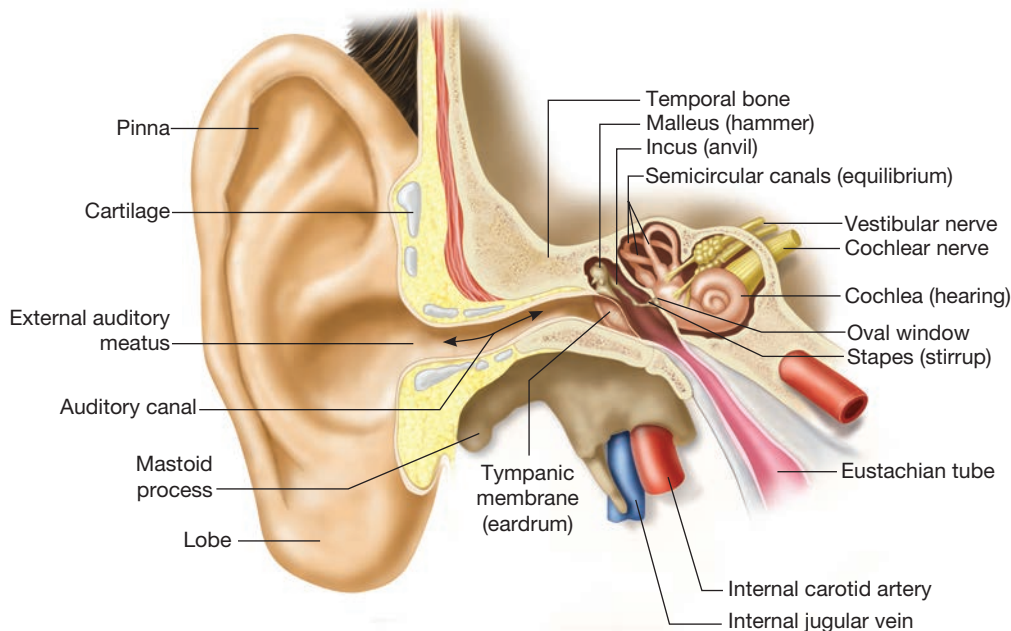
**-ar** = pertaining to

**ex-** = outward

### What's In A Name?

**-al** = pertaining to

**ex-** = outward



■ **Figure 13.14** The internal structures of the outer, middle, and inner ear.

**Med Term Tip**

The term *tympanic membrane* comes from the Greek word for “drumhead.” The tympanic membrane or eardrum vibrates to sound waves like a drum head.

tympanic membrane (eardrum) to vibrate. The tympanic membrane actually separates the external ear from the middle ear. Earwax or **cerumen** is produced in oil glands in the auditory canal. This wax helps to protect and lubricate the ear. It is also just barely liquid at body temperature. This causes cerumen to slowly flow out of the auditory canal, carrying dirt and dust with it. Therefore, the auditory canal is self-cleaning.

## Middle Ear

**auditory tube** (AW-dih-tor-ee)

**eustachian tube** (yoo-STAY-she-en)

**incus** (ING-kus)

**malleus** (MAL-ee-us)

**ossicles** (OSS-ih-klz)

**oval window**

**stapes** (STAY-pee-z)

**Med Term Tip**

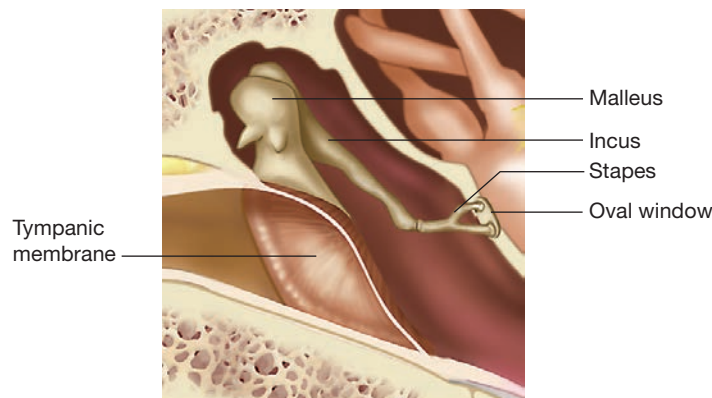
The three bones in the middle ear are referred to by terms that are similar to their shape. Thus, the malleus is called the hammer, the incus is the anvil, and the stapes is the stirrup (see again Figure 13.15).

The middle ear is located in a small cavity in the temporal bone of the skull. This air-filled cavity contains three tiny bones called **ossicles** (see Figure 13.15 ■). These three bones—the **malleus**, **incus**, and **stapes**—are vital to the hearing process. They amplify the vibrations in the middle ear and transmit them to the inner ear from the malleus to the incus and finally to the stapes. The stapes, the last of the three ossicles, is attached to a very thin membrane that covers the opening to the inner ear called the **oval window**.

The **eustachian tube** or **auditory tube** connects the nasopharynx with the middle ear (see again Figure 13.14). Each time you swallow the eustachian tube opens. This connection allows pressure to equalize between the middle ear cavity and the atmospheric pressure.

■ **Figure 13.15**

Close-up view of the ossicles within the middle ear. These three bones extend from the tympanic membrane to the oval window.

**What's In A Name?**

-ar = pertaining to

-ule = small

semi- = partial

## Inner Ear

**cochlea** (KOK-lee-ah)

**labyrinth** (LAB-ih-rinth)

**organs of Corti** (KOR-tee)

**sacculle** (SAK-yool)

**semicircular canals**

**utricle** (YOO-trih-kl)

**vestibule** (VES-tih-byul)

**Med Term Tip**

The term *vestibule* comes from the Latin word *vestibulum*, meaning “entrance.” It received this name because it is the entryway into the inner ear.

The inner ear is also located in a cavity within the temporal bone (see again Figure 13.14). This fluid-filled cavity is referred to as the **labyrinth** because of its shape. The first structure of the inner ear is the **vestibule**. Each of the remaining inner ear structures—the **cochlea** (the sensory organ for hearing) and the **semicircular canals**, **utricle**, and **sacculle** (the sensory organs for equilibrium)—open off the vestibule. Each of these organs contains hair cells, which are the actual sensory receptor cells. In the cochlea, the hair cells are referred to as **organs of Corti**.

## How We Hear

**conductive hearing loss** (kon-DUK-tiv)

**sensorineural hearing loss** (sen-soh-ree-NOO-ral)

Figure 13.16 ■ outlines the path of sound through the outer ear and middle ear and into the cochlea of the inner ear. Sound waves traveling down the external auditory canal strike the eardrum, causing it to vibrate. The ossicles conduct these vibrations across the middle ear from the eardrum to the oval window. Oval window movements initiate vibrations in the fluid that fills the cochlea. As the fluid vibrations strike a hair cell, they bend the small hairs and stimulate the nerve ending. The nerve ending then sends an electrical impulse to the brain on the cochlear portion of the vestibulocochlear nerve.

Hearing loss can be divided into two main categories: **conductive hearing loss** and **sensorineural hearing loss**. Conductive refers to disease or malformation of the outer or middle ear. All sound is weaker and muffled in conductive hearing loss since it is not conducted correctly to the inner ear. Sensorineural hearing loss is the result of damage or malformation of the inner ear (cochlea) or the cochlear nerve. In this hearing loss, some sounds are distorted and heard incorrectly. There can also be a combination of both conductive and sensorineural hearing loss.

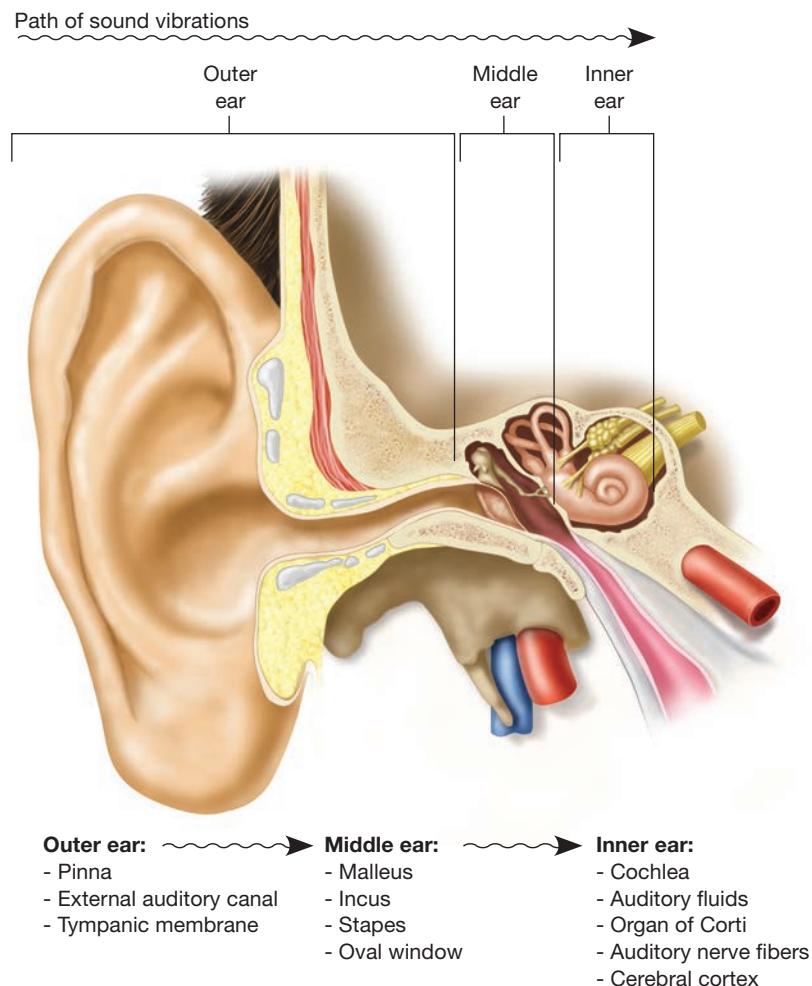
### What's In A Name?

neur/o = nerve

-al = pertaining to

### Med Term Tip

Hearing impairment is becoming a greater problem for the general population for several reasons. First, people are living longer. Hearing loss can accompany old age, and there are a greater number of people over age 50 requiring hearing assistance. In addition, sound technology has produced music quality that was never available before. However, listening to loud music either naturally or through earphones can cause gradual damage to the hearing mechanism.



■ **Figure 13.16** The path of sound waves through the outer, middle, and inner ear.

## Practice As You Go

### F. Complete the Statement

1. The three bones in the middle ear are the \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
2. The study of the ear is called \_\_\_\_\_.
3. Another term for the eardrum is \_\_\_\_\_.
4. \_\_\_\_\_ is produced in the oil glands in the auditory canal.
5. The \_\_\_\_\_ tube connects the nasopharynx with the middle ear.
6. The \_\_\_\_\_ is responsible for conducting impulses from the ear to the brain.

## Terminology

### Word Parts Used to Build Ear Terms

The following lists contain the combining forms, suffixes, and prefixes used to build terms in the remaining sections of this chapter.

#### Combining Forms

<b>acous/o</b>	hearing
<b>audi/o</b>	hearing
<b>audit/o</b>	hearing
<b>aur/o</b>	ear
<b>auricul/o</b>	ear
<b>bi/o</b>	life
<b>cerumin/o</b>	cerumen

<b>cochle/o</b>	cochlea
<b>labyrinth/o</b>	labyrinth
<b>laryng/o</b>	larynx
<b>myc/o</b>	fungus
<b>myring/o</b>	tympanic membrane
<b>neur/o</b>	nerve
<b>ot/o</b>	ear

<b>presby/o</b>	old age
<b>py/o</b>	pus
<b>rhin/o</b>	nose
<b>salping/o</b>	auditory tube
<b>staped/o</b>	stapes
<b>tympan/o</b>	tympanic membrane
<b>vestibul/o</b>	vestibule

#### Suffixes

<b>-al</b>	pertaining to
<b>-algia</b>	pain
<b>-ar</b>	pertaining to
<b>-cusis</b>	hearing
<b>-ectomy</b>	surgical removal
<b>-emetic</b>	pertaining to vomiting
<b>-gram</b>	record
<b>-ic</b>	pertaining to
<b>-itis</b>	inflammation

<b>-logy</b>	study of
<b>-meter</b>	instrument to measure
<b>-metry</b>	process of measuring
<b>-oma</b>	mass; tumor
<b>-ory</b>	pertaining to
<b>-osis</b>	abnormal condition
<b>-otia</b>	ear condition
<b>-otomy</b>	cutting into
<b>-plasty</b>	surgical repair

<b>-rrhagia</b>	abnormal flow
<b>-rrhea</b>	discharge
<b>-rrhexis</b>	rupture
<b>-sclerosis</b>	hardening
<b>-scope</b>	instrument to visually examine
<b>-scopy</b>	process of visually examining
<b>-tic</b>	pertaining to



## Prefixes

<b>an-</b>	without	<b>bi-</b>	two	<b>micro-</b>	small
<b>anti-</b>	against	<b>macro-</b>	large	<b>mono-</b>	one

## Adjective Forms of Anatomical Terms

Term	Word Parts	Definition
<b>acoustic</b> (ah-KOOS-tik)	<b>acous/o</b> = hearing <b>-tic</b> = pertaining to	Pertaining to hearing.
<b>auditory</b> (AW-dih-tor-ee)	<b>audit/o</b> = hearing <b>-ory</b> = pertaining to	Pertaining to hearing.
<b>aural</b> (AW-ral)	<b>aur/o</b> = ear <b>-al</b> = pertaining to <b>Word Watch</b>       Be careful when using two terms that sound the same— <i>aural</i> meaning “pertaining to the ear” and <i>oral</i> meaning “pertaining to the mouth.”	Pertaining to the ear.
<b>auricular</b> (aw-RIK-cu-lar)	<b>auricul/o</b> = ear <b>-ar</b> = pertaining to	Pertaining to the ear.
<b>binaural</b> (bin-AW-rall)	<b>bi-</b> = two <b>aur/o</b> = ear <b>-al</b> = pertaining to	Pertaining to both ears.
<b>cochlear</b> (KOK-lee-ar)	<b>cochle/o</b> = cochlea <b>-ar</b> = pertaining to	Pertaining to the cochlea.
<b>monaural</b> (mon-AW-rall)	<b>mono-</b> = one <b>aur/o</b> = ear <b>-al</b> = pertaining to	Pertaining to one ear.
<b>otic</b> (OH-tik)	<b>ot/o</b> = ear <b>-ic</b> = pertaining to	Pertaining to the ear.
<b>tympanic</b> (tim-PAN-ik)	<b>tympan/o</b> = tympanic membrane <b>-ic</b> = pertaining to	Pertaining to the tympanic membrane.
<b>vestibular</b> (ves-TIB-you-lar)	<b>vestibul/o</b> = vestibule <b>-ar</b> = pertaining to	Pertaining to the vestibule.

## Practice As You Go

### G. Give the adjective form for each anatomical structure

1. The cochlea \_\_\_\_\_
2. The ear \_\_\_\_\_, \_\_\_\_\_, or \_\_\_\_\_
3. The vestibule \_\_\_\_\_
4. Hearing \_\_\_\_\_ or \_\_\_\_\_
5. One ear \_\_\_\_\_



## Pathology

Term	Word Parts	Definition
<b>Medical Specialties</b>		
<b>audiology</b> (aw-dee-OL-oh-jee)	<b>audi/o</b> = hearing <b>-logy</b> = study of	Medical specialty involved with measuring hearing function and identifying hearing loss. Specialist is an <i>audiologist</i> .
<b>otorhinolaryngology (ENT)</b> (oh-toh-rye-noh-lair-in-GOL-oh-jee)	<b>ot/o</b> = ear <b>rhin/o</b> = nose <b>laryng/o</b> = larynx <b>-logy</b> = study of	Branch of medicine involving the diagnosis and treatment of conditions and diseases of the ear, nose, and throat. Also referred to as <i>ENT</i> . Physician is an <i>otorhinolaryngologist</i> .
<b>Signs and Symptoms</b>		
<b>macrotia</b> (mah-KROH-she-ah)	<b>macro-</b> = large <b>-otia</b> = ear condition	Condition of having abnormally large ears.
<b>microtia</b> (my-KROH-she-ah)	<b>micro-</b> = small <b>-otia</b> = ear condition	Condition of having abnormally small ears.
<b>otalgia</b> (oh-TAL-jee-ah)	<b>ot/o</b> = ear <b>-algia</b> = pain	Ear pain.
<b>otopyorrhea</b> (oh-toh-pye-oh-REE-ah)	<b>ot/o</b> = ear <b>py/o</b> = pus <b>-rrhea</b> = discharge	Discharge of pus from the ear.
<b>otorrhagia</b> (oh-toh-RAH-jee-ah)	<b>ot/o</b> = ear <b>-rrhagia</b> = abnormal flow	Bleeding from the ear.
<b>presbycusis</b> (pres-bih-KOO-sis)	<b>presby/o</b> = old age <b>-cusis</b> = hearing condition	Normal loss of hearing that can accompany the aging process.
<b>residual hearing</b> (rih-ZID-joo-al)	<b>-al</b> = pertaining to	Amount of hearing that is still present after damage has occurred to the auditory mechanism.
<b>tinnitus</b> (tin-EYE-tus)		Ringing in the ears.
<b>tympanorrhexis</b> (tim-pan-oh-REK-sis)	<b>tympan/o</b> = tympanic membrane <b>-rrhexis</b> = rupture	Rupture of the tympanic membrane.
<b>vertigo</b> (VER-tih-goh)		Dizziness caused by the sensation that the room is spinning.
<b>Hearing Loss</b>		
<b>anacusis</b> (an-ah-KOO-sis)	<b>an-</b> = without <b>-cusis</b> = hearing	Total absence of hearing; inability to perceive sound. Also called <i>deafness</i> .
<b>deafness</b>		Inability to hear or having some degree of hearing impairment.
<b>External Ear</b>		
<b>ceruminoma</b> (seh-roo-men-OH-ma)	<b>cerumin/o</b> = cerumen <b>-oma</b> = mass	Excessive accumulation of earwax resulting in a hard wax plug. Sound becomes muffled.

## Pathology (continued)

Term	Word Parts	Definition
<b>otitis externa</b> (OE) (oh-TYE-tis / ex-TERN-ah)	<b>ot/o</b> = ear <b>-itis</b> = inflammation	External ear infection. May be caused by bacteria or fungus. Also called <i>otomycosis</i> and commonly referred to as <i>swimmer's ear</i> .
<b>otomycosis</b> (oh-toh-my-KOH-sis)	<b>ot/o</b> = ear <b>myc/o</b> = fungus <b>-osis</b> = abnormal condition	Fungal infection of the ear. One type of otitis externa.
<b>Middle Ear</b>		
<b>myringitis</b> (mir-ing-JYE-tis)	<b>myring/o</b> = tympanic membrane <b>-itis</b> = inflammation	Inflammation of the tympanic membrane.
<b>otitis media</b> (OM) (oh-TYE-tis / MEE-dee-ah)	<b>ot/o</b> = ear <b>-itis</b> = inflammation	Seen frequently in children; commonly referred to as a <i>middle ear infection</i> . Often preceded by an upper respiratory infection during which pathogens move from the pharynx to the middle ear via the eustachian tube. Fluid accumulates in the middle ear cavity. The fluid may be watery, <i>serous otitis media</i> , or full of pus, <i>purulent otitis media</i> .
<b>otosclerosis</b> (oh-toh-sklair-OH-sis)	<b>ot/o</b> = ear <b>-sclerosis</b> = hardening	Loss of mobility of the stapes bone, leading to progressive hearing loss.
<b>salpingitis</b> (sal-pin-JIGH-tis)	<b>salping/o</b> = auditory tube <b>-itis</b> = inflammation  <b>Word Watch</b>       Be careful using the combining form <i>salping/o</i> , which can mean either "eustachian tube" or "fallopian tube."	Inflammation of the auditory tube.
<b>tympanitis</b> (tim-pan-EYE-tis)	<b>tympan/o</b> = tympanic membrane <b>-itis</b> = inflammation	Inflammation of the tympanic membrane.
<b>Inner Ear</b>		
<b>acoustic neuroma</b> (ah-KOOS-tik / noor-OH-mah)	<b>acous/o</b> = hearing <b>-tic</b> = pertaining to <b>neur/o</b> = nerve <b>-oma</b> = tumor	Benign tumor of the eighth cranial nerve sheath. The pressure causes symptoms such as tinnitus, headache, dizziness, and progressive hearing loss.
<b>labyrinthitis</b> (lab-ih-rin-THIGH-tis)	<b>labyrinth/o</b> = labyrinth <b>-itis</b> = inflammation	May affect both the hearing and equilibrium portions of the inner ear. Also referred to as an <i>inner ear infection</i> .
<b>Ménière's disease</b> (may-nee-AIRZ)		Abnormal condition within the labyrinth of the inner ear that can lead to a progressive loss of hearing. The symptoms are vertigo, hearing loss, and tinnitus (ringing in the ears). Named for French physician Prosper Ménière.

## Practice As You Go

### H. Terminology Matching

Match each term to its definition.

- |                          |                               |
|--------------------------|-------------------------------|
| 1. _____ anacusis        | a. small ears                 |
| 2. _____ otitis externa  | b. dizziness                  |
| 3. _____ microtia        | c. ringing in the ears        |
| 4. _____ otopyorrhea     | d. a fungal infection         |
| 5. _____ labyrinthitis   | e. absence of hearing         |
| 6. _____ tinnitus        | f. ruptured eardrum           |
| 7. _____ otosclerosis    | g. pus discharge from the ear |
| 8. _____ vertigo         | h. swimmer's ear              |
| 9. _____ otomycosis      | i. loss of mobility of stapes |
| 10. _____ tympanorrhexis | j. inner ear infection        |


## Diagnostic Procedures

Term	Word Parts	Definition
<b>Audiology Tests</b>		
<b>audiogram</b> (AW-dee-oh-gram)	<b>audi/o</b> = hearing <b>-gram</b> = record	Graphic record that illustrates the results of audiometry.
<b>audiometer</b> (aw-dee-OM-eh-ter)	<b>audi/o</b> = hearing <b>-meter</b> = instrument to measure	Instrument to measure hearing.
<b>audiometry</b> (aw-dee-OM-eh-tree)	<b>audi/o</b> = hearing <b>-metry</b> = process of measuring	Test of hearing ability by determining the lowest and highest intensity (decibels) and frequencies (hertz) that a person can distinguish. The patient may sit in a soundproof booth and receive sounds through earphones as the technician decreases the sound or lowers the tones.



■ **Figure 13.17** Audiometry exam being administered to a young child who is wearing the ear phones through which sounds are given. (Capifrutta/Shutterstock)



## Diagnostic Procedures (continued)

Term	Word Parts	Definition
<b>decibel</b> (dB) (DES-ih-bel)		Measures the intensity or loudness of a sound. Zero decibels is the quietest sound measured and 120 dB is the loudest sound commonly measured.
<b>hertz</b> (Hz)		Measurement of the frequency or pitch of sound. The lowest pitch on an audiogram is 250 Hz. The measurement can go as high as 8000 Hz, which is the highest pitch measured.
<b>Rinne and Weber tuning-fork tests</b> (RIN-eh)		Tests that assess both nerve and bone conduction of sound. The physician holds a tuning fork, an instrument that produces a constant pitch when it is struck, against or near the bones on the side of the head.
<b>Otology Tests</b>		
<b>otoscope</b> (OH-toh-scope)	<b>ot/o</b> = ear <b>-scope</b> = instrument to visually examine	Instrument to view inside the ear canal.
<b>otoscopy</b> (oh-TOSS-koh-pee)	<b>ot/o</b> = ear <b>-scopy</b> = process of visually examining	Examination of the ear canal, eardrum, and outer ear using an <i>otoscope</i> .  <b>Med Term Tip</b> Small children are prone to placing objects in their ears. In some cases, as with peas and beans, these become moist in the ear canal and swell, which makes removal difficult. <i>Otосcopy</i> , or the examination of the ear using an <i>otoscope</i> , can aid in identifying and removing the cause of hearing loss if it is due to foreign bodies.
<p>■ <b>Figure 13.18</b> An otoscope, used to visually examine the external auditory ear canal and tympanic membrane. (Patrick Watson, Pearson Education)</p> 		
<b>tympanogram</b> (TIM-pah-no-gram)	<b>tympan/o</b> = tympanic membrane <b>-gram</b> = record	Graphic record that illustrates the results of tympanometry.
<b>tympanometer</b> (tim-pah-NOM-eh-ter)	<b>tympan/o</b> = tympanic membrane <b>-meter</b> = instrument to measure	Instrument used to measure the movement of the tympanic membrane.
<b>tympanometry</b> (tim-pah-NOM-eh-tree)	<b>tympan/o</b> = tympanic membrane <b>-metry</b> = process of measuring	Measurement of the movement of the tympanic membrane. Can indicate the presence of pressure in the middle ear.

Diagnostic Procedures (continued)

Term	Word Parts	Definition
Balance Tests		
falling test		Test used to observe balance and equilibrium. The patient is observed balancing on one foot, then with one foot in front of the other, and then walking forward with eyes open. The same test is conducted with the patient's eyes closed. Swaying and falling with the eyes closed can indicate an ear and equilibrium malfunction.

Therapeutic Procedures

Term	Word Parts	Definition
Audiology Procedures		
American Sign Language (ASL)		Nonverbal method of communicating in which the hands and fingers are used to indicate words and concepts. Used by both persons who are deaf and persons with speech impairments.
		
■ Figure 13.19 Two women having a conversation using American Sign Language. (Vladimir Mucibabic/Shutterstock)		
hearing aid		Apparatus or mechanical device used by persons with impaired hearing to amplify sound. Also called an <i>amplification device</i> .
Surgical Procedures		
cochlear implant (KOK-lee-ar)	cochle/o = cochlea -ar = pertaining to	Mechanical device surgically placed under the skin behind the outer ear (pinna) that converts sound signals into magnetic impulses to stimulate the auditory nerve. Can be beneficial for those with profound sensorineural hearing loss.
		
■ Figure 13.20 Photograph of a child with a cochlear implant. This device sends electrical impulses directly to the brain. (George Dodson, Pearson Education)		

## Therapeutic Procedures (continued)

Term	Word Parts	Definition
<b>labyrinthectomy</b> (lab-ih-rin-THEK-toh-mee)	<b>labyrinth/o</b> = labyrinth <b>-ectomy</b> = surgical removal	Surgical removal of the labyrinth.
<b>labyrinthotomy</b> (lab-ih-rinth-OT-oh-mee)	<b>labyrinth/o</b> = labyrinth <b>-otomy</b> = cutting into	To cut into the labyrinth.
<b>myringectomy</b> (mir-in-GEK-toh-mee)	<b>myring/o</b> = tympanic membrane <b>-ectomy</b> = surgical removal	Surgical removal of the tympanic membrane.
<b>myringoplasty</b> (mir-IN-goh-plass-tee)	<b>myring/o</b> = tympanic membrane <b>-plasty</b> = surgical repair	Surgical repair of the tympanic membrane.
<b>myringotomy</b> (mir-in-GOT-oh-mee)	<b>myring/o</b> = tympanic membrane <b>-otomy</b> = cutting into	Surgical puncture of the eardrum with removal of fluid and pus from the middle ear to eliminate a persistent ear infection and excessive pressure on the tympanic membrane. A pressure equalizing tube is placed in the tympanic membrane to allow for drainage of the middle ear cavity; this tube typically falls out on its own.
<b>otoplasty</b> (OH-toh-plas-tee)	<b>ot/o</b> = ear <b>-plasty</b> = surgical repair	Surgical repair of the external ear.
<b>pressure equalizing tube</b> (PE tube)		Small tube surgically placed in a child's eardrum to assist in drainage of trapped fluid and to equalize pressure between the middle ear cavity and the atmosphere.
<b>salpingotomy</b> (sal-pin-GOT-oh-mee)	<b>salping/o</b> = auditory tube <b>-otomy</b> = cutting into	To cut into the auditory tube.
<b>stapedectomy</b> (stay-pee-DEK-toh-mee)	<b>staped/o</b> = stapes <b>-ectomy</b> = pertaining to	Removal of the stapes bone to treat otosclerosis (hardening of the bone). A prosthesis or artificial stapes may be implanted.
<b>tympanectomy</b> (tim-pan-EK-toh-mee)	<b>tympan/o</b> = tympanic membrane <b>-ectomy</b> = surgical removal	Surgical removal of the tympanic membrane.
<b>tympanoplasty</b> (tim-pan-oh-PLASS-tee)	<b>tympan/o</b> = tympanic membrane <b>-plasty</b> = surgical repair	Surgical repair of the tympanic membrane.
<b>tympanotomy</b> (tim-pan-OT-oh-mee)	<b>tympan/o</b> = tympanic membrane <b>-otomy</b> = cutting into	To cut into the tympanic membrane.



## Practice As You Go

### I. Terminology Matching

Match each term to its definition.

- |                           |                                      |
|---------------------------|--------------------------------------|
| 1. _____ myringotomy      | a. removal of stapes bone            |
| 2. _____ tympanoplasty    | b. reconstruction of eardrum         |
| 3. _____ otoplasty        | c. surgical puncture of eardrum      |
| 4. _____ stapedectomy     | d. repairs external ear              |
| 5. _____ Rinne & Weber    | e. drains off fluid                  |
| 6. _____ falling test     | f. treats sensorineural hearing loss |
| 7. _____ PE tube          | g. tuning-fork tests                 |
| 8. _____ cochlear implant | h. balance test                      |

## Pharmacology

Classification	Word Parts	Action	Examples
<b>antibiotic otic solution</b> (OH-tik)	<b>anti-</b> = against <b>bi/o</b> = life <b>-tic</b> = pertaining to <b>ot/o</b> = ear <b>-ic</b> = pertaining to	Eardrops to treat otitis externa.	Neomycin, polymyxin B and hydrocortisone solution, Otocort, Cortisporin, Otic Care
<b>antiemetic</b> (an-tyeee-MIT-tik)	<b>anti-</b> = against <b>-emetic</b> = pertaining to vomiting	Effective in treating the nausea associated with vertigo.	meclizine, Antivert, Meni-D; prochlorperazine, Compazine
<b>anti-inflammatory otic solution</b> (OH-tik)	<b>anti-</b> = against <b>-ory</b> = pertaining to <b>ot/o</b> = ear <b>-ic</b> = pertaining to	Reduces inflammation, itching, and edema associated with otitis externa.	antipyrine and benzoaine, A/B Otic
<b>wax emulsifiers</b>		Substances used to soften earwax to prevent buildup within the external ear canal.	carbamide peroxide, Debrox Drops, Murine Ear Wax Removal Drops

## Abbreviations

<b>AD</b>	right ear	<b>Hz</b>	hertz
<b>AS</b>	left ear	<b>OE</b>	otitis externa
<b>ASL</b>	American Sign Language	<b>OM</b>	otitis media
<b>AU</b>	both ears	<b>Oto</b>	otology
<b>BC</b>	bone conduction	<b>PE tube</b>	pressure equalizing tube
<b>Db</b>	decibel	<b>PORP</b>	partial ossicular replacement prosthesis
<b>EENT</b>	eye, ear, nose, throat	<b>SOM</b>	serous otitis media
<b>ENT</b>	ear, nose, and throat	<b>TORP</b>	total ossicular replacement prosthesis
<b>HEENT</b>	head, ear, eye, nose, throat		

## Practice As You Go

### J. What's the Abbreviation?

1. otitis externa \_\_\_\_\_
2. eye, ear, nose, and throat \_\_\_\_\_
3. bone conduction \_\_\_\_\_
4. both ears \_\_\_\_\_
5. otitis media \_\_\_\_\_



# Chapter Review

## Real-World Applications

### Medical Record Analysis

This Ophthalmology Consultation Report contains 11 medical terms. Underline each term and write it in the list below the report. Then define each term.

#### Ophthalmology Consultation Report

Reason for Consultation:	Evaluation of progressive loss of vision in right eye.
History of Present Illness:	Patient is a 79-year-old female who has noted gradual deterioration of vision and increasing photophobia during the past year, particularly in the right eye. She states that it feels like there is a film over her right eye. She denies any change in vision in her left eye. Patient has used corrective lenses her entire adult life for hyperopia.
Results of Physical Examination:	Visual acuity test showed no change in this patient's long-standing hyperopia. The pupils react properly to light. Intraocular pressure is normal. Ophthalmoscopy after application of mydriatic drops revealed presence of large opaque cataract in lens of right eye. There is a very small cataract forming in the left eye. There is no evidence of retinopathy, macular degeneration, or keratitis.
Assessment:	Diminished vision in right eye secondary to cataract.
Recommendations:	Phacoemulsification of cataract followed by prosthetic lens implant.

#### Term

#### Definition

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_
11. \_\_\_\_\_

## Chart Note Transcription

The chart note below contains 10 phrases that can be reworded with a medical term that you learned in this chapter. Each phrase is identified with an underline. Determine the medical term and write your answers in the space provided.

Pearson General Hospital Consultation Report	
Task	Edit View Time Scale Options Help Download Archive Date: 17 May 2015
Current Complaint:	An eight-year-old female was referred to the <u>specialist in the treatment of diseases of the ear, nose, and throat</u> <b>1</b> by her pediatrician for evaluation of chronic left <u>middle ear infection</u> . <b>2</b>
Past History:	Patient's mother reports that her daughter began to experience recurrent ear infections at approximately six months of age. Frequency of the infections has increased during the past two years, and she is missing school. Mother also reports the child's teacher feels she is having difficulty hearing in the classroom.
Signs and Symptoms:	Both ears <b>3</b> <u>visual examination of the external ear canal and eardrum</u> <b>4</b> revealed that the <u>membrane between the external ear canal and middle ear</u> <b>5</b> is normal on the right and bulging on the left. An excessive amount of <u>earwax</u> <b>6</b> was noted in <u>both ears</u> . <b>3</b> <u>Measurement of the movement of the eardrum</u> <b>7</b> indicates that there is a buildup of fluid in the left middle ear. <u>Tests of hearing ability</u> <b>8</b> report normal hearing on the right and <u>loss of hearing as a result of the blocking of sound transmission in the middle ear</u> <b>9</b> on the left. Patient also noted to have acute pharyngitis with purulent drainage at time of evaluation.
Diagnosis:	Hearing loss secondary to chronic left middle ear infection.
Treatment:	Left <u>eardrum incision</u> <b>10</b> with placement of pressure equalizing tube for drainage.
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____
6.	_____
7.	_____
8.	_____
9.	_____
10.	_____

### Case Study

Below is a case study presentation of a patient with a condition covered in this chapter. Read the case study and answer the questions below. Some questions will ask for information not included within this chapter. Use your text, a medical dictionary, or any other reference material you choose to answer these questions.



(© MY-Music/Alamy)

This 35-year-old male musician was seen in the EENT clinic complaining of a progressive hearing loss over the past 15 years. He is now unable to hear what is being said if there is any environmental noise present. He states that he has played with a group of musicians using amplified instruments and no earplugs for the past 20 years. External ear structures appear normal bilaterally with otoscopy. Tympanometry is normal bilaterally. Audiometry reveals diminished hearing bilaterally. Rinne and Weber tuning-fork tests indicate that the patient has a moderate amount of conductive hearing loss but rule out sensorineural hearing loss. Diagnosis is moderate bilateral conductive hearing loss as a result of prolonged exposure to loud noise. Patient is referred for evaluation for a hearing aid.

### Questions

1. Which type of hearing loss does this patient appear to have? Look this condition up in a reference source and include a short description of it.

---

---

2. Explain how the other type of hearing loss (the type ruled out by the Rinne and Weber tuning-fork tests) is different from what this patient has.

---

---

3. What diagnostic tests did the physician perform? Describe them in your own words.

---

---

4. Explain the difference between a hearing aid and a cochlear implant.

---

---

5. How do you think this patient could have avoided this hearing loss?

---

---

## Practice Exercises

### A. Pharmacology Challenge

Fill in the classification for each drug description, then match the brand name.

Drug Description	Classification	Brand Name
1. _____ treats dry eyes	_____	a. Atropine-Care
2. _____ reduces intraocular pressure	_____	b. A/B Otic
3. _____ eardrops for ear infection	_____	c. Timoptic
4. _____ dilates pupil	_____	d. Opticaine
5. _____ treats nausea from vertigo	_____	e. Debrox Drops
6. _____ eyedrops for bacterial infection	_____	f. Eserine Sulfate
7. _____ treats ear itching	_____	g. Antivert
8. _____ constricts pupil	_____	h. Refresh Plus
9. _____ softens cerumen	_____	i. Otcort
10. _____ eyedrops for pain	_____	j. Del-Mycin

### B. Word Building Practice

The combining form **blephar/o** refers to the eyelid. Use it to write a term that means:

1. inflammation of the eyelid \_\_\_\_\_
2. surgical repair of the eyelid \_\_\_\_\_
3. drooping of the upper eyelid \_\_\_\_\_

The combining form **retin/o** refers to the retina. Use it to write a term that means:

4. a disease of the retina \_\_\_\_\_
5. surgical fixation of the retina \_\_\_\_\_

The combining form **ophthalm/o** refers to the eye. Use it to write a term that means:

6. the study of the eye \_\_\_\_\_
7. pertaining to the eye \_\_\_\_\_
8. an eye examination using a scope \_\_\_\_\_

The combining form **irid/o** refers to the iris. Use it to write a term that means:

9. iris paralysis \_\_\_\_\_
10. removal of the iris \_\_\_\_\_



The combining form **ot/o** refers to the ear. Write a word that means:

11. ear surgical repair \_\_\_\_\_
12. pus flow from the ear \_\_\_\_\_
13. pain in the ear \_\_\_\_\_
14. inflammation of the ear \_\_\_\_\_

The combining form **tympan/o** refers to the eardrum. Write a word that means:

15. eardrum rupture \_\_\_\_\_
16. eardrum incision \_\_\_\_\_
17. eardrum inflammation \_\_\_\_\_

The combining form **audi/o** refers to hearing. Write a word that means:

18. record of hearing \_\_\_\_\_
19. instrument to measure hearing \_\_\_\_\_
20. study of hearing \_\_\_\_\_

### C. Name That Suffix

	Suffix	Example from Chapter
1. to turn	_____	_____
2. vision	_____	_____
3. inflammation of	_____	_____
4. the study of	_____	_____
5. cutting into	_____	_____
6. surgical repair	_____	_____
7. surgical fixation	_____	_____
8. pain	_____	_____
9. ear condition	_____	_____
10. hearing	_____	_____

### D. Define the Combining Form

	Definition	Example from Chapter
1. <b>dacry/o</b>	_____	_____
2. <b>uve/o</b>	_____	_____

	Definition	Example from Chapter
3. <b>aque/o</b>	_____	_____
4. <b>phot/o</b>	_____	_____
5. <b>kerat/o</b>	_____	_____
6. <b>vitre/o</b>	_____	_____
7. <b>dipl/o</b>	_____	_____
8. <b>glauco/o</b>	_____	_____
9. <b>presby/o</b>	_____	_____
10. <b>ambly/o</b>	_____	_____
11. <b>aur/o</b>	_____	_____
12. <b>staped/o</b>	_____	_____
13. <b>acous/o</b>	_____	_____
14. <b>salping/o</b>	_____	_____
15. <b>myring/o</b>	_____	_____

### E. Answer the Question

- Describe the difference between conductive hearing loss and sensorineural hearing loss. \_\_\_\_\_  
\_\_\_\_\_
- List in order the eyeball structures light rays pass through. \_\_\_\_\_,  
\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_
- Describe the role of the conjunctiva. \_\_\_\_\_
- List the ossicles and what they do. \_\_\_\_\_

### F. What Does it Stand For?

- Oto \_\_\_\_\_
- OU \_\_\_\_\_
- REM \_\_\_\_\_
- Hz \_\_\_\_\_
- SMD \_\_\_\_\_
- PERRLA \_\_\_\_\_
- IOP \_\_\_\_\_

8. dB \_\_\_\_\_

9. OD \_\_\_\_\_

10. VF \_\_\_\_\_

### G. Fill in the Blank

emmetropia	tonometry	Ménière's disease
hyperopia	cataract	hordeolum
acoustic neuroma	strabismus	myopia
otorhinolaryngologist	presbycusis	
conjunctivitis	inner ear	

- Cheri is having a regular eye checkup. The pressure reading test that the physician will do to detect glaucoma is \_\_\_\_\_.
- Carlos's ophthalmologist tells him that he has normal vision. This is called \_\_\_\_\_.
- Ana has been given an antibiotic eye ointment for pinkeye. The medical term for this condition is \_\_\_\_\_.
- Adrian is nearsighted and cannot read signs in the distance. This is called \_\_\_\_\_.
- Ivan is scheduled to have surgery to have the opaque lens of his right eye removed. This condition is a(n) \_\_\_\_\_.
- Roberto has developed a sty on the corner of his left eye. He has been told to treat it with hot compresses. This condition is called a(n) \_\_\_\_\_.
- Judith has twin boys with crossed eyes that will require surgical correction. The medical term for this condition is \_\_\_\_\_.
- Beth is farsighted and has difficulty reading textbooks. Her eyeglass correction will be for \_\_\_\_\_.
- Grace was told by her physician that her hearing loss was a part of the aging process. The term for this is \_\_\_\_\_.
- Stacey is having frequent middle ear infections and wishes to be treated by a specialist. She would go to a(n) \_\_\_\_\_.
- Warren was told that his dizziness may be caused by a problem in the \_\_\_\_\_ area.
- Shantel is suffering from an abnormal condition of the inner ear, vertigo, and tinnitus. She may have \_\_\_\_\_.
- Keisha was told that her tumor of the eighth cranial nerve was benign, but she still experienced a hearing loss as a result of the tumor. This tumor is called a(n) \_\_\_\_\_.

**H. Define the Term**

1. amblyopia \_\_\_\_\_
2. diplopia \_\_\_\_\_
3. mydriatic \_\_\_\_\_
4. miotic \_\_\_\_\_
5. presbyopia \_\_\_\_\_
6. tinnitus \_\_\_\_\_
7. stapes \_\_\_\_\_
8. tympanometry \_\_\_\_\_
9. eustachian tube \_\_\_\_\_
10. labyrinth \_\_\_\_\_
11. audiogram \_\_\_\_\_
12. otitis media \_\_\_\_\_

**MyMedicalTerminologyLab™**

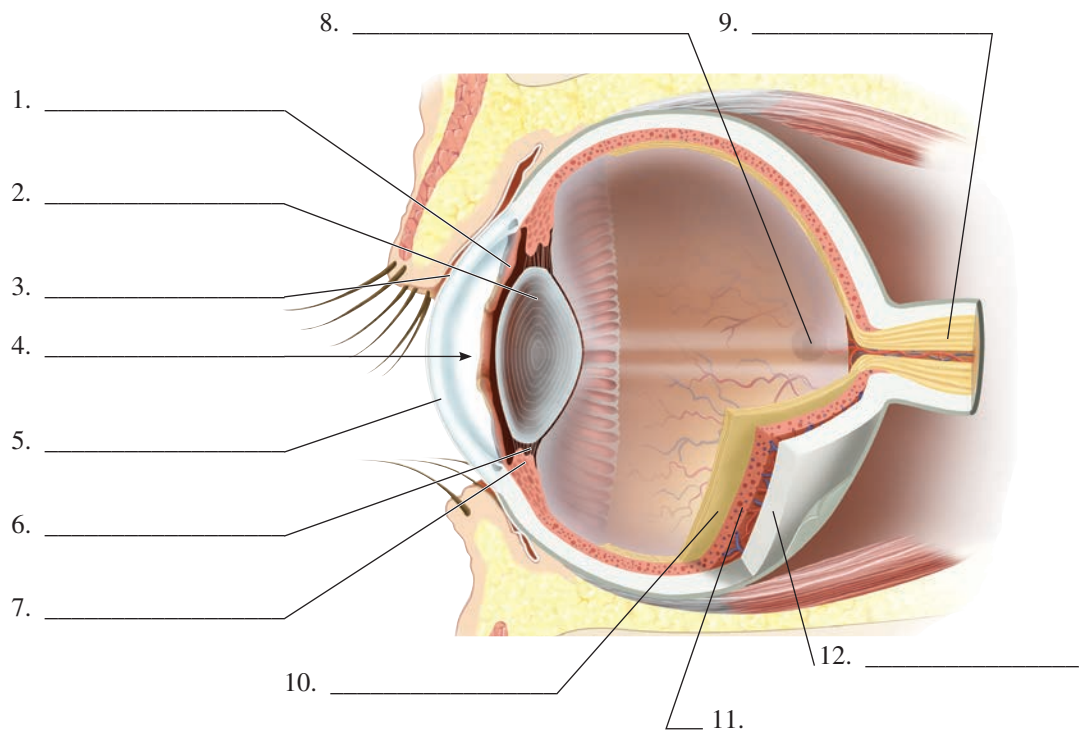
MyMedicalTerminologyLab is a premium online homework management system that includes a host of features to help you study. Registered users will find:

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## Labeling Exercise

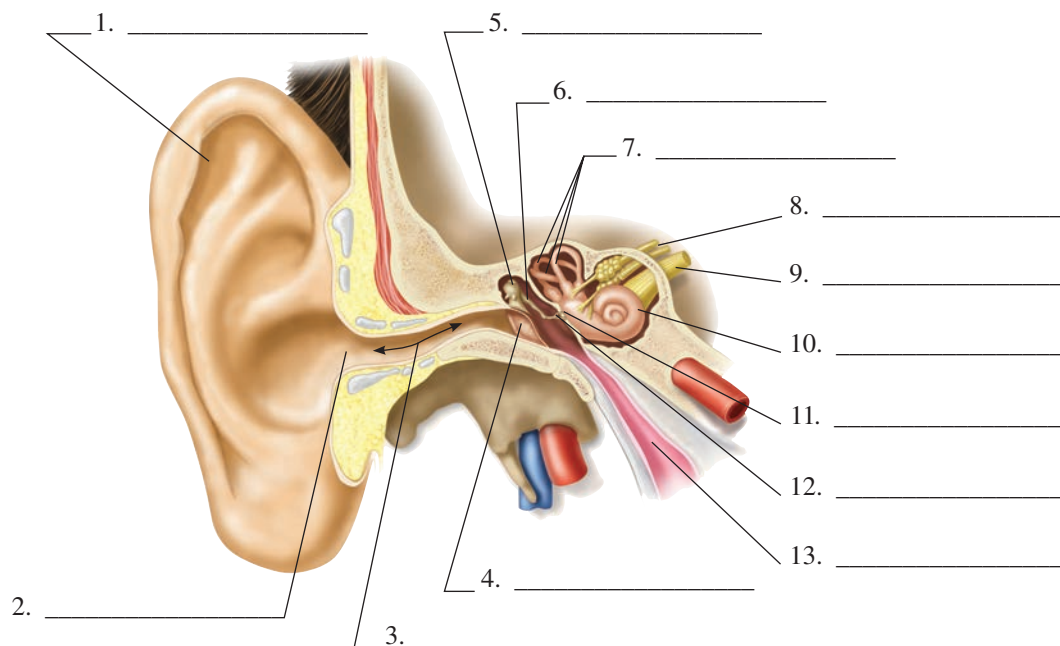
### Image A

Write the labels for this figure on the numbered lines provided.



### Image B

Write the labels for this figure on the numbered lines provided.






# 14

## Special Topics



### Learning Objectives

*Upon completion of this chapter, you will be able to*

- Identify and define the combining forms, suffixes, and prefixes introduced in this chapter.
  - Correctly spell and pronounce medical terms relating to the medical fields introduced in this chapter.
  - Describe pertinent information relating to pharmacology.
  - Describe pertinent information relating to mental health.
  - Describe pertinent information relating to diagnostic imaging.
  - Describe pertinent information relating to rehabilitation services.
  - Describe pertinent information relating to surgery.
  - Describe pertinent information relating to oncology.
  - Identify and define vocabulary terms relating to the topics.
  - Identify and define selected pathology terms relating to the topics.
  - Identify and define selected diagnostic procedures relating to the topics.
  - Identify and define selected therapeutic procedures relating to the topics.
  - Define selected abbreviations associated with the topics.
- 





# Introduction

There are many specialized areas within medicine, and each has medical terms relating to that field. This chapter presents medical terminology from six of these fields:

1. Pharmacology, page 500
2. Mental Health, page 509
3. Diagnostic Imaging, page 516
4. Rehabilitation Services, page 522
5. Surgery, page 528
6. Oncology, page 534

## Section I: Pharmacology at a Glance

### Word Parts

Here are the most common word parts (with their meanings) used to build pharmacology terms.

#### Combining Forms

<b>aer/o</b>	air	<b>muscul/o</b>	muscle
<b>bucc/o</b>	cheek	<b>or/o</b>	mouth
<b>chem/o</b>	drug	<b>pharmac/o</b>	drug
<b>cutane/o</b>	skin	<b>rect/o</b>	rectum
<b>derm/o</b>	skin	<b>thec/o</b>	sheath (meninges)
<b>enter/o</b>	intestine	<b>topic/o</b>	a specific area
<b>hal/o</b>	to breathe	<b>toxic/o</b>	poison
<b>iatr/o</b>	physician, medicine, treatment	<b>vagin/o</b>	vagina
<b>idi/o</b>	distinctive	<b>ven/o</b>	vein
<b>lingu/o</b>	tongue		

#### Suffixes

<b>-al</b>	pertaining to	<b>-ist</b>	specialist
<b>-ar</b>	pertaining to	<b>-logy</b>	study of
<b>-ary</b>	pertaining to	<b>-ous</b>	pertaining to
<b>-genic</b>	produced by	<b>-phylaxis</b>	protection
<b>-ical</b>	pertaining to		

#### Prefixes

<b>anti-</b>	against	<b>para-</b>	beside
<b>contra-</b>	against	<b>pro-</b>	before
<b>in-</b>	inward	<b>sub-</b>	under
<b>intra-</b>	within	<b>trans-</b>	across
<b>non-</b>	not		

# Pharmacology

**pharmacology** (far-ma-KALL-oh-jee)

**Pharmacology** is the study of the origin, characteristics, and effects of drugs. Drugs are obtained from many different sources. Some drugs, such as vitamins, are found naturally in the foods we eat. Others, such as hormones, are obtained from animals. Penicillin and some of the other antibiotics are developed from mold, which is a fungus. Plants have been the source of many of today's drugs. Many drugs, such as those used in chemotherapy, are synthetic, meaning they are developed by artificial means in a laboratory.

## Drug Names

**brand name**

**chemical name**

**generic name**

**nonproprietary name**

(non-prah-PRYE-ah-tair-ee)

**pharmaceutical** (far-mih-SOO-tih-kal)

**pharmacist** (FAR-mah-sist)

**proprietary name**

(proh-PRYE-ah-tair-ee)

**trademark**

All drugs are chemicals. The **chemical name** describes the chemical formula or molecular structure of a particular drug. For example, the chemical name for ibuprofen, an over-the-counter pain medication, is 2-*p*-isobutylphenyl propionic acid. Just as in this case, chemical names are usually very long, so a shorter name is given to the drug. This name is the **generic** or **nonproprietary name**, and it is recognized and accepted as the official name for a drug.

Each drug has only one generic name, such as ibuprofen, and this name is not subject to copyright protection, so any **pharmaceutical** manufacturer may use it. However, the pharmaceutical company that originally developed the drug has exclusive rights to produce it for 17 years. After that time, any manufacturer may produce and sell the drug. When a company manufactures a drug for sale, it must choose a **brand name**, or **proprietary name**, for its product. This is the company's **trademark** for the drug. For example, ibuprofen is known by several brand names, including Motrin™, Advil™, and Nuprin™. All three contain the same ibuprofen; they are just marketed by different pharmaceutical companies. (See Table 14.1 ■ for examples of different drug names.)

Generic drugs are usually priced lower than brand name drugs. A physician can indicate on the prescription if the **pharmacist** may substitute a generic drug for a brand name. The physician may prefer that a particular brand name drug be used if he or she believes it to be more effective than the generic drug.

### Med Term Tip

The terms *drug* and *medication* have the same meaning. However, the general public often uses the term *drug* to refer to a narcotic type of medication. The term can also mean illegal chemical substances. For purposes of medical terminology, use of the word *drug* means medication.

### What's In A Name?

Look for these word parts:

chem/o = drug

pharmac/o = drug

-ary = pertaining to

-ical = pertaining to

-ist = specialist

-logy = study of

non- = not

**Table 14.1** Examples of Different Drug Names

Chemical Name	Generic Name	Brand Names
2- <i>p</i> -isobutylphenyl propionic acid	Ibuprofen	Motrin™
		Advil™
		Nuprin™
Acetylsalicylic acid	Aspirin	Anacin™
		Bufferin™
		Excedrin™
S-2-[1-(methylamino) ethyl] benzenemethanol hydrochloride	Pseudoephedrine hydrochloride	Sudafed™
		Actifed™
		Nucofed™

## Legal Classification of Drugs

controlled substances  
Drug Enforcement Agency  
over-the-counter drug

prescription (prih-SKRIP-shun)  
prescription drug (prih-SKRIP-shun)

A **prescription drug** can only be ordered by licensed healthcare practitioners such as physicians, dentists, or physician assistants. These drugs must include the words “Caution: Federal law prohibits dispensing without prescription” on their labels. Antibiotics, such as penicillin, and heart medications, such as digoxin, are available only by prescription. A **prescription** is the written explanation to the pharmacist regarding the name of the medication, the dosage, and the times of administration. A licensed practitioner can also give a prescription order orally to a pharmacist.

**Med Term Tip**  
It is critical that patients receive the correct drug, but it is not possible to list or remember all the drug names. You must acquire the habit of looking up any drug name you do not recognize in the *Physician's Desk Reference (PDR)*. Every medical office or medical facility should have a copy of this book.

A drug that does not require a prescription is referred to as an **over-the-counter (OTC) drug**. Many medications or drugs can be purchased without a prescription, for example, aspirin, antacids, and antidiarrheal medications. However, taking aspirin along with an anticoagulant, such as coumadin, can cause internal bleeding in some people, and OTC antacids interfere with the absorption of the prescription drug tetracycline into the body. It is better for the physician or pharmacist to advise the patient on the proper OTC drugs to use with prescription drugs.

Certain drugs are **controlled substances** if they have a potential for being addictive (habit forming) or can be abused. The **Drug Enforcement Agency (DEA)** enforces the control of these drugs. Some of the more commonly prescribed controlled substances are:

- butabarbital
- chloral hydrate
- codeine
- diazepam
- oxycontin
- morphine
- phenobarbital
- secobarbital

Controlled drugs are classified as Schedule I through Schedule V, indicating their potential for abuse. The differences between each schedule are listed in Table 14.2 ■.

Table 14.2 Schedule for Controlled Substances	
Classification	Meaning
Schedule I	Drugs with the highest potential for addiction and abuse. They are not accepted for medical use. Examples are heroin and LSD.
Schedule II	Drugs with a high potential for addiction and abuse accepted for medical use in the United States. Examples are codeine, cocaine, morphine, opium, and secobarbital.
Schedule III	Drugs with a moderate to low potential for addiction and abuse. Examples are butabarbital, anabolic steroids, and acetaminophen with codeine.
Schedule IV	Drugs with a lower potential for addiction and abuse than Schedule III drugs. Examples are chloral hydrate, phenobarbital, and diazepam.
Schedule V	Drugs with a low potential for addiction and abuse. An example is low-strength codeine combined with other drugs to suppress coughing.

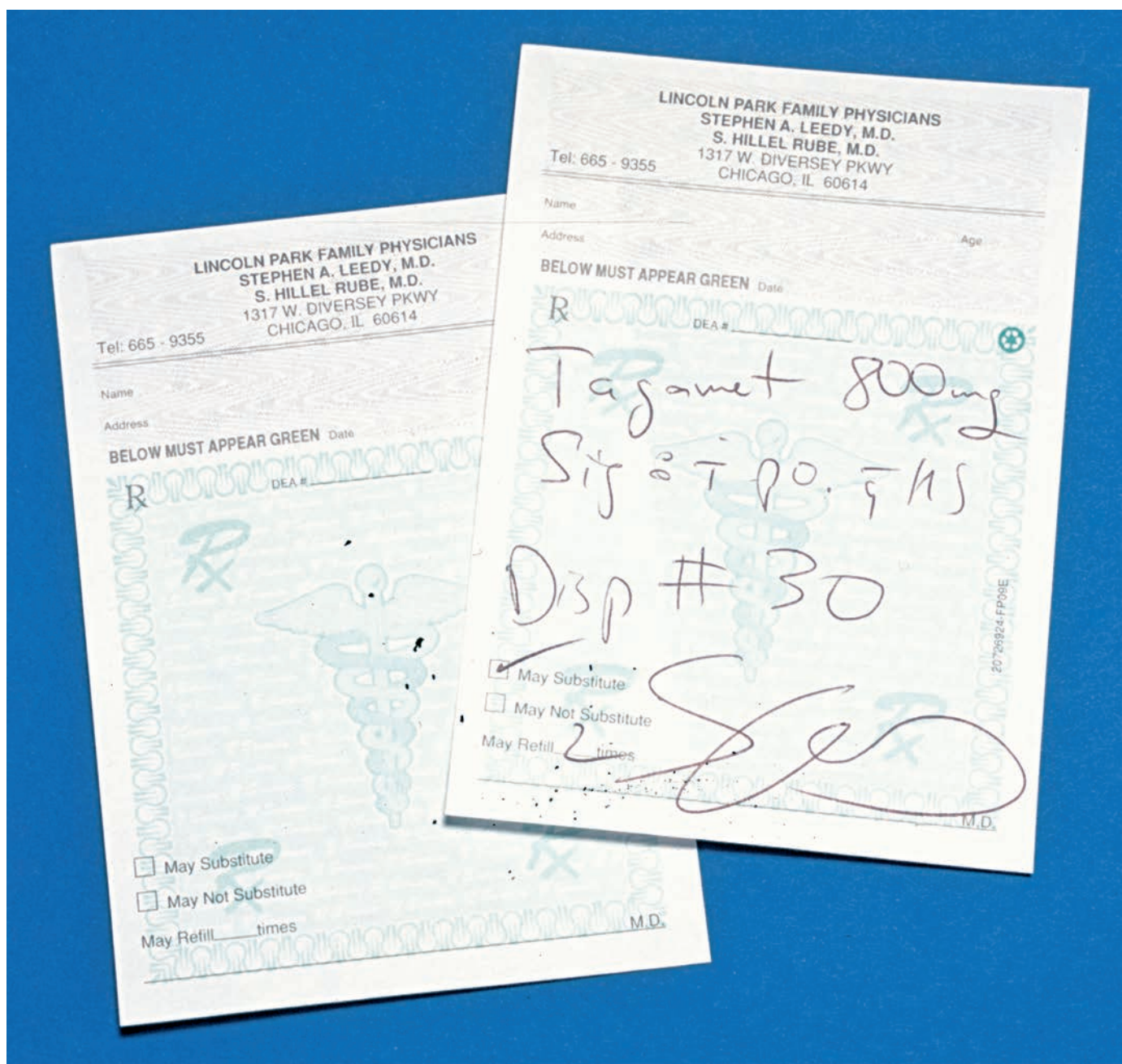
## How to Read a Prescription

A prescription is not difficult to read once you understand the symbols that are used. Symbols and abbreviations based on Latin and Greek words are used to save time for the physician. For example, the abbreviation *po*, meaning to be taken by mouth, comes from the Latin term *per os*, which means “by mouth.”

See Figure 14.1 ■ for an example of a prescription. In this example, the prescribed medication (Rx) is Tagamet (a medication to reduce stomach acid) in the 800 milligram (mg) size. The instructions on the label are to say (Sig) to take 1 (ī) by mouth (po) every (q) bedtime (hs). The pharmacist is to dispense (disp) 30 tablets (#30). The prescription concludes by informing the pharmacist to refill the prescription two times, and he or she may substitute with another

### Med Term Tip

Many abbreviations have multiple meanings, such as *od*, which can mean overdose (*od*) or right eye (*OD*), depending on whether the letters are lowercase or uppercase. Care must be taken when reading abbreviations since some may be written too quickly, making them difficult to decipher. Never create your own abbreviations.



■ **Figure 14.1** A sample prescription written by a physician. (Michal Heron, Pearson Education)



medication. Each prescription must contain the date, physician’s name, address, and Drug Enforcement Agency number as well as the patient’s name and date of birth. The physician must also sign his or her name at the bottom of the prescription. A blank prescription cannot be handed to a patient.

The physician’s instruction to the patient will be placed on the label. The pharmacist will also include instructions about the medication and alert the patient to side effects that may need to be reported to the physician. Additionally, any special instructions regarding the medication (i.e., take with meals, do not take along with dairy products, etc.) are supplied by the pharmacist.

### Routes and Methods of Drug Administration

- aerosol (AIR-oh-sol)

buccal (BUCK-al)

eardrops

eyedrops

inhalation (in-hah-LAY-shun)

oral (OR-al)

parenteral (par-EN-ter-al)
- rectal (REK-tal)

sublingual (sub-LING-gwal)

suppositories (suh-POZ-ih-tor-ees)

topical (TOP-ih-kal)

transdermal (tranz-DER-mal)

vaginal (VAJ-in-al)

The method by which a drug is introduced into the body is referred to as the *route of administration*. To be effective, drugs must be administered by a particular route. In some cases, there may be a variety of routes by which a drug can be administered. For instance, the female hormone estrogen can be administered orally in pill form or by a patch applied to the skin. The most common routes of administration are described in Table 14.3 ■.

Table 14.3 Common Routes of Drug Administration

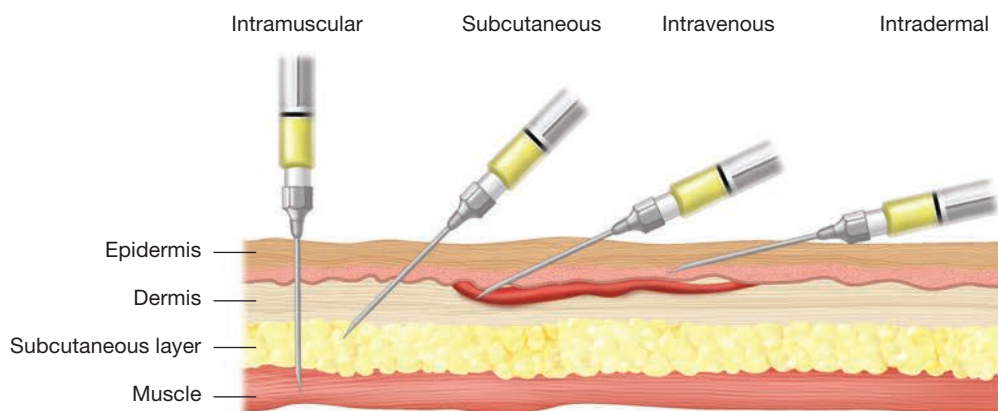
Method	Word Parts	Description
oral	or/o = mouth -al = pertaining to	Includes all drugs given by mouth. The advantages are ease of administration and a slow rate of absorption via the stomach and intestinal wall. The disadvantages include slowness of absorption and destruction of some chemical compounds by gastric juices. In addition, some medications, such as aspirin, can have a corrosive action on the stomach lining.
sublingual	sub- = under lingu/o = tongue -al = pertaining to	Includes drugs that are held under the tongue and not swallowed. The medication is absorbed by the blood vessels on the underside of the tongue as the saliva dissolves it. The rate of absorption is quicker than the oral route. Nitroglycerin to treat angina pectoris (chest pain) is administered by this route.

■ **Figure 14.2** Sublingual medication administration. Photograph of a male patient placing a nitroglycerin tablet under his tongue. (Michal Heron, Pearson Education)



**Table 14.3 Common Routes of Drug Administration (continued)**

Method	Word Parts	Description
<b>inhalation</b>	<b>in-</b> = inward <b>hal/o</b> = to breathe	Includes drugs inhaled directly into the nose and mouth. <b>Aerosol</b> ( <b>aer/o</b> = air) sprays are administered by this route.
<p>■ <b>Figure 14.3</b> Inhalation medication administration. Photograph of a young girl using a metered dose inhaler. (Michal Heron, Pearson Education)</p> 		
<b>parenteral</b>	<b>para-</b> = beside <b>enter/o</b> = intestine <b>-al</b> = pertaining to	An invasive method of administering drugs as it requires the skin to be punctured by a needle. The needle with syringe attached is introduced either under the skin or into a muscle, vein, or body cavity.
<b>intracavitary</b> (in-trah-KAV-ih-tair-ee)	<b>intra-</b> = within <b>-ary</b> = pertaining to	Injection into a body cavity such as the peritoneal cavity or the chest cavity. One type of parenteral route of administration.
<b>intradermal (ID)</b> (in-trah-DER-mal)	<b>intra-</b> = within <b>derm/o</b> = skin <b>-al</b> = pertaining to	Very shallow injection just under the top layer of the skin. Commonly used in skin testing for allergies and tuberculosis testing. One type of parenteral route of administration.



■ **Figure 14.4** Parenteral medication administration. The angle of needle insertion for four different types of parenteral injections.



<b>intramuscular (IM)</b> (in-trah-MUSS-kyoo-lar)	<b>intra-</b> = within <b>muscul/o</b> = muscle <b>-ar</b> = pertaining to	Injection directly into the muscle of the buttocks, thigh, or upper arm. Used when there is a large amount of medication or it is irritating (see again Figure 14.4). One type of parenteral route of administration.
<b>intrathecal</b> (in-trah-THEE-kal)	<b>intra-</b> = within <b>thec/o</b> = sheath (meninges) <b>-al</b> = pertaining to	Injection into the meningeal space surrounding the brain and spinal cord. One type of parenteral route of administration.



**Table 14.3 Common Routes of Drug Administration (continued)**

Method	Word Parts	Description
<b>intravenous</b> (IV) (in-trah-VEE-nus)	<b>intra-</b> = within <b>ven/o</b> = vein <b>-ous</b> = pertaining to	Injection into the veins. This route may be set up to deliver medication very quickly or to deliver a continuous drip of medication (see again Figure 14.4). One type of parenteral route of administration.
<b>subcutaneous</b> (Subc, Subq) (sub-kyoo-TAY-nee-us)	<b>sub-</b> = under <b>cutane/o</b> = skin <b>-ous</b> = pertaining to	Injection into the subcutaneous layer of the skin, usually the upper, outer arm or abdomen (see again Figure 14.4); for example, insulin injection. One type of parenteral route of administration.
<b>transdermal</b>	<b>trans-</b> = across <b>derm/o</b> = skin <b>-al</b> = pertaining to	Includes medications that coat the underside of a patch, which is applied to the skin where it is then absorbed. Examples include birth control patches, nicotine patches, and sea sickness patches.
<b>rectal</b>	<b>rect/o</b> = rectum <b>-al</b> = pertaining to	Includes medications introduced directly into the rectal cavity in the form of <b>suppositories</b> or solution. Drugs may have to be administered by this route if the patient is unable to take them by mouth due to nausea, vomiting, or surgery.
<b>topical</b>	<b>topic/o</b> = a specific area <b>-al</b> = pertaining to	Includes medications applied directly to the skin or mucous membranes. They are distributed in ointment, cream, or lotion form, and are used to treat skin infections and eruptions.
<b>vaginal</b>	<b>vagin/o</b> = vagina <b>-al</b> = pertaining to	Includes tablets and suppositories that may be inserted vaginally to treat vaginal yeast infections and other irritations.
<b>eyedrops</b>		Includes drops used during eye examinations to dilate the pupil of the eye for better examination of the interior of the eye. They are also placed into the eye to control eye pressure in glaucoma and treat infections.
<b>eardrops</b>		Includes drops placed directly into the ear canal for the purpose of relieving pain or treating infection.
<b>buccal</b>	<b>bucc/o</b> = cheek <b>-al</b> = pertaining to	Includes drugs that are placed under the lip or between the cheek and gum.

## Pharmacology Terms

Term	Word Parts	Definition
<b>addiction</b> (ah-DICK-shun)		Acquired dependence on a drug.
<b>additive</b>		Sum of the action of two (or more) drugs given. In this case, the total strength of the medications is equal to the sum of the strength of each individual drug.
<b>antidote</b> (AN-tih-doh-t)	<b>anti-</b> = against	Substance that will neutralize poisons or their side effects.
<b>broad spectrum</b>		Ability of a drug to be effective against a wide range of microorganisms.
<b>contraindication</b> (kon-trah-in-dih-KAY-shun)	<b>contra-</b> = against	Condition in which a particular drug should not be used.
<b>cumulative action</b>		Action that occurs in the body when a drug is allowed to accumulate or stay in the body.

## Pharmacology Terms (continued)

Term	Word Parts	Definition
<b>drug interaction</b>		Occurs when the effect of one drug is altered because it was taken at the same time as another drug.
<b>drug tolerance</b>		Decrease in susceptibility to a drug after continued use of the drug.
<b>habituation</b> (hah-bich-yoo-AY-shun)		Development of an emotional dependence on a drug due to repeated use.
<b>iatrogenic</b> (eye-ah-troh-JEN-ik)	<b>iatr/o</b> = medicine <b>-genic</b> = produced by	Usually an unfavorable response resulting from taking a medication.
<b>idiosyncrasy</b> (id-ee-oh-SIN-krah-see)	<b>idi/o</b> = distinctive	Unusual or abnormal response to a drug or food.
<b>placebo</b> (plah-SEE-boh)		Inactive, harmless substance used to satisfy a patient's desire for medication. This is also used in research when given to a control group of patients in a study in which another group receives a drug. The effect of the placebo versus the drug is then observed.
<b>potentiation</b> (poe-ten-chee-AY-shun)		Giving a patient a second drug to boost (potentiate) the effect of another drug. The total strength of the drugs is greater than the sum of the strength of the individual drugs.
<b>prophylaxis</b> (proh-fih-LAK-sis)	<b>pro-</b> = before <b>-phylaxis</b> = protection	Prevention of disease. For example, an antibiotic can be used to prevent the occurrence of a disease.
<b>side effect</b>		Response to a drug other than the effect desired. Also called an <i>adverse reaction</i> .
<b>tolerance</b> (TAHL-er-ans)		Development of a capacity for withstanding a large amount of a substance, such as foods, drugs, or poison, without any adverse effect. A decreased sensitivity to further doses will develop.
<b>toxicity</b> (tok-SISS-ih-tee)	<b>toxic/o</b> = poison	Extent or degree to which a substance is poisonous.
<b>unit dose</b>		Drug dosage system that provides prepackaged, prelabeled, individual medications that are ready for immediate use by the patient.

## Abbreviations

@	at	non rep	do not repeat
ā	before	NPO, npo	nothing by mouth
ac	before meals	NS	normal saline
ad lib	as desired	od	overdose
ante	before	oint	ointment
APAP	acetaminophen (Tylenol™)	OTC	over-the-counter
aq	aqueous (water)	oz	ounce
ASA	aspirin	̄p	after
bid	twice a day	pc	after meals
̄c	with	PCA	patient-controlled administration
cap(s)	capsule(s)	PDR	<i>Physician's Desk Reference</i>
d	day	per	with
d/c, DISC	discontinue	po	by mouth
DC, disc	discontinue	prn	as needed
DEA	Drug Enforcement Agency	pt	patient
dil	dilute	q	every
disp	dispense	qam	every morning
dtd	give of such a dose	qh	every hour
Dx	diagnosis	qhs	at bedtime
et	and	qid	four times a day
FDA	Federal Drug Administration	qs	quantity sufficient
gm	gram	Rx	take
gr	grain	̄s	without
gt	drop	Sig	label as follows/directions
gtt	drops	sl	under the tongue
hs	at bedtime	sol	solution
ī	one	̄s̄s	one-half
ID	intradermal	stat	at once/immediately
īī	two	Subc, Subq	subcutaneous
īīī	three	suppos, supp	suppository
IM	intramuscular	susp	suspension
inj	injection	syr	syrup
IV	intravenous	T, tbsp	tablespoon
kg	kilogram	t, tsp	teaspoon
L	liter	tab	tablet
mcg	microgram	tid	three times a day
mEq	milliequivalent	TO	telephone order
mg	milligram	top	apply topically
mL	milliliter	VO	verbal order
no sub	no substitute	wt	weight
noc	night	x	times



## Section II: Mental Health at a Glance

### Word Parts

Here are the most common word parts (with their meanings) used to build mental health terms.

#### Combining Forms

<b>amnes/o</b>	forgetfulness	<b>ped/o</b>	child
<b>anxi/o</b>	fear, worry	<b>pharmac/o</b>	drug
<b>compuls/o</b>	drive, compel	<b>phob/o</b>	irrational fear
<b>delus/o</b>	false belief	<b>phren/o</b>	mind
<b>depress/o</b>	to press down	<b>psych/o</b>	mind
<b>electr/o</b>	electricity	<b>pyr/o</b>	fire
<b>hallucin/o</b>	imagined perception	<b>schiz/o</b>	split
<b>klept/o</b>	to steal	<b>soci/o</b>	society
<b>ment/o</b>	mind	<b>somat/o</b>	body
<b>narc/o</b>	stupor, sleep	<b>somn/o</b>	sleep
<b>neur/o</b>	nerve	<b>vers/o</b>	to turn
<b>obsess/o</b>	besieged by thoughts		

#### Suffixes

<b>-al</b>	pertaining to	<b>-lepsy</b>	seizure
<b>-ar</b>	pertaining to	<b>-logist</b>	one who studies
<b>-ia</b>	state, condition	<b>-logy</b>	study of
<b>-iatric</b>	pertaining to medical treatment	<b>-mania</b>	frenzy
<b>-iatrist</b>	physician	<b>-orexia</b>	appetite
<b>-iatry</b>	medical treatment	<b>-philic</b>	pertaining to being attracted to
<b>-ic</b>	pertaining to	<b>-phoria</b>	condition to bear
<b>-ile</b>	pertaining to	<b>-therapy</b>	treatment
<b>-ism</b>	state of	<b>-tic</b>	pertaining to

#### Prefixes

<b>an-</b>	without	<b>ex-</b>	outward
<b>anti-</b>	against	<b>hyper-</b>	excessive
<b>auto-</b>	self	<b>in-</b>	not
<b>bi-</b>	two	<b>para-</b>	abnormal
<b>de-</b>	without	<b>post-</b>	after
<b>dis-</b>	apart	<b>pre-</b>	before
<b>dys-</b>	difficult		

# Mental Health Disciplines

## Psychology

**abnormal psychology**

**clinical psychologist** (sigh-KALL-oh-jist)

**normal psychology**

**psychology** (sigh-KALL-oh-jee)

### Med Term Tip

All social interactions pose some problems for some people. These problems are not necessarily abnormal. One means of judging if behavior is abnormal is to compare one person's behavior with others in the community. Also, if a person's behavior interferes with the activities of daily living, it is often considered abnormal.

**Psychology** is the study of human behavior and thought processes. This behavioral science is primarily concerned with understanding how human beings interact with their physical environment and with each other. Behavior can be divided into two categories: normal and abnormal. The study of **normal psychology** includes how the personality develops, how people handle stress, and the stages of mental development. In contrast, **abnormal psychology** studies and treats behaviors that are outside of normal and that are detrimental to the person or society. These maladaptive behaviors range from occasional difficulty coping with stress, to bizarre actions and beliefs, to total withdrawal. A **clinical psychologist**, though not a physician, is a specialist in evaluating and treating persons with mental and emotional disorders.

## Psychiatry

**psychiatric nurse** (sigh-kee-AT-rik)

**psychiatric social worker**

**psychiatrist** (sigh-KIGH-ah-trist)

**psychiatry** (sigh-KIGH-ah-tree)

**Psychiatry** is the branch of medicine that deals with the diagnosis, treatment, and prevention of mental disorders. A **psychiatrist** is a medical physician specializing in the care of patients with mental, emotional, and behavioral disorders. Other health professions also have specialty areas in caring for clients with mental illness. Good examples are **psychiatric nurses** and **psychiatric social workers**.

### What's In A Name?

Look for these word parts:

**psych/o** = mind

**-iatric** = pertaining to medical treatment

**-iatrist** = physician

**-iatry** = medical treatment

**-logist** = one who studies

**-logy** = study of

## Pathology

The legal definition of mental disorder is "impaired judgment and lack of self-control." The guide for terminology and classifications relating to psychiatric disorders is the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5), which is published by the American Psychiatric Association (2013). The DSM organizes mental disorders into 19 major diagnostic categories of disorders. These categories and examples of conditions included in each are described below.

### Med Term Tip

Mental disorders are sometimes more simply characterized by whether they are a *neurosis* or a *psychosis*. Neuroses are inappropriate coping mechanisms to handle stress, such as phobias and panic attacks. Psychoses involve extreme distortions of reality and disorganization of a person's thinking, including bizarre behaviors, hallucinations, and delusions. Schizophrenia is an example of a psychosis.

Term	Word Parts	Definition
<b>Anxiety Disorders</b>	<b>anxi/o</b> = fear, worry <b>dis-</b> = apart	Characterized by persistent worry and apprehension.
<b>panic disorder</b>	<b>-ic</b> = pertaining to <b>dis-</b> = apart	Feeling of intense apprehension, terror, or sense of impending danger.
<b>general anxiety disorder</b> (ang-ZY-eh-tee)	<b>anxi/o</b> = fear, worry <b>dis-</b> = apart	Feeling of dread in the absence of a clearly identifiable stress trigger.
<b>phobias</b> (FOH-bee-ahs)	<b>phob/o</b> = irrational fear <b>-ia</b> = state, condition	Irrational fear, such as <i>arachnophobia</i> , or fear of spiders.
<b>Obsessive–Compulsive and Related Disorders</b>	<b>dis-</b> = apart	Characterized by obsessive preoccupations and repetitive behaviors.
<b>obsessive–compulsive disorder</b> (OCD) (ob-SESS-iv / kom-PUHL-siv)	<b>obsess/o</b> = besieged by thoughts <b>compuls/o</b> = drive, compel <b>dis-</b> = apart	Performing repetitive rituals to reduce anxiety.

## Pathology (continued)

Term	Word Parts	Definition
<b>Neurocognitive Disorders</b>	<b>neur/o</b> = nerve <b>dis-</b> = apart	Deterioration of mental functions due to temporary or permanent brain dysfunction.
<b>dementia</b> (dee-MEN-she-ah)	<b>de-</b> = without <b>ment/o</b> = mind <b>-ia</b> = state, condition	Progressive confusion and disorientation.
<b>Alzheimer's disease (AD)</b> (ALTS-high-merz)	<b>dis-</b> = apart	Degenerative brain disorder with gradual loss of cognitive abilities.
<b>Neurodevelopmental Disorders</b>	<b>neur/o</b> = nerve <b>-al</b> = pertaining to <b>dis-</b> = apart	Impairment in the growth or development of the central nervous system.
<b>intellectual development disorder</b>	<b>-al</b> = pertaining to <b>dis-</b> = apart	Below average intellectual functioning.
<b>attention-deficit/hyperactivity disorder (ADHD)</b>	<b>hyper-</b> = excessive <b>dis-</b> = apart	Inattention and impulsive behavior.
<b>autism spectrum disorder</b> (AW-tizm)	<b>auto-</b> = self <b>-ism</b> = state of <b>dis-</b> = apart	Range of conditions involving deficits in social interaction, communication skills, and restricted patterns of behavior.
<b>Dissociative Disorders</b>	<b>dis-</b> = apart <b>soci/o</b> = society	Disorders in which severe emotional conflict is so repressed that a split in the personality may occur or the person may lose memory.
<b>dissociative amnesia</b> (am-NEE-zee-ah)	<b>dis-</b> = apart <b>soci/o</b> = society <b>amnes/o</b> = forgetfulness <b>-ia</b> = state, condition	Loss of memory.
<b>dissociative identity disorder</b>	<b>dis-</b> = apart <b>soci/o</b> = society	Having two or more distinct personalities.
<b>Feeding and Eating Disorders</b>		Abnormal behaviors related to eating.
<b>anorexia nervosa</b> (an-oh-REK-see-ah / ner-VOH-sah)	<b>an-</b> = without <b>-orexia</b> = appetite	Disorder characterized by distorted body image, a pathological fear of becoming fat, and severe weight loss due to excessive dieting.



■ **Figure 14.5** Photograph of a young woman suffering from anorexia nervosa, posterior view. (© Wellcome Image Library/Custom Medical Stock Photo, Inc.)



Pathology (continued)		
Term	Word Parts	Definition
<b>bulimia</b> (boo-LIM-ee-ah)	<b>-ia</b> = state, condition	Binge eating and intentional vomiting.
<b>Disruptive, Impulse Control, and Conduct Disorders</b>	<b>dis-</b> = apart	Inability to resist an impulse to perform some act that is harmful to the individual or others.
<b>kleptomania</b> (klep-toh-MAY-nee-ah)	<b>klept/o</b> = to steal <b>-mania</b> = frenzy	Stealing.
<b>pyromania</b> (pie-roh-MAY-nee-ah)	<b>pyr/o</b> = fire <b>-mania</b> = frenzy	Setting fires.
<b>explosive disorder</b>	<b>ex-</b> = outward <b>dis-</b> = apart	Violent rages.
<b>Depressive Disorders</b>	<b>depress/o</b> = to press down <b>dis-</b> = apart	Characterized by instability in mood.
<b>major depressive disorder</b>	<b>depress/o</b> = to press down <b>dis-</b> = apart	Feelings of hopelessness, helplessness, worthlessness; lack of pleasure in any activity; potential for suicide.
<b>mania</b> (MAY-nee-ah)	<b>-mania</b> = frenzy	Extreme elation.
<b>Bipolar and Related Disorders</b>	<b>bi-</b> = two <b>-ar</b> = pertaining to <b>dis-</b> = apart	
<b>bipolar disorder (BPD)</b>	<b>bi-</b> = two <b>-ar</b> = pertaining to	Alternation between periods of deep depression and mania.
<b>Med Term Tip</b> ..... The healthcare professional must take all threats of suicide from patients seriously. Psychologists tell us that there is no clear suicide type, which means that we cannot predict who will actually take his or her own life. Always tell the physician about any discussion a patient has concerning suicide. If you believe a patient is in danger of suicide, do not be afraid to ask, "Are you thinking about suicide?"		
<b>Personality Disorders</b>	<b>dis-</b> = apart	Inflexible or maladaptive behavior patterns that affect a person's ability to function in society.
<b>paranoid personality disorder</b>	<b>dis-</b> = apart	Exaggerated feelings of persecution.
<b>narcissistic personality disorder</b> (nar-sis-SIST-ik)	<b>dis-</b> = apart	Abnormal sense of self-importance.
<b>antisocial personality disorder</b>	<b>anti-</b> = against <b>soci/o</b> = society <b>-al</b> = pertaining to <b>dis-</b> = apart	Behaviors that are against legal or social norms.
<b>Schizophrenia Spectrum and Other Psychotic Disorders</b>	<b>schiz/o</b> = split <b>phren/o</b> = mind <b>-ia</b> = state, condition	Mental disorders characterized by distortions of reality.
<b>delusional disorder</b> (dee-LOO-zhun-al)	<b>delus/o</b> = false belief <b>-al</b> = pertaining to <b>dis-</b> = apart	A false belief held even in the face of contrary evidence.
<b>hallucination</b> (hah-loo-sih-NAY-shun)	<b>hallucin/o</b> = imagined perception	Perceiving something that is not there.

## Pathology (continued)

Term	Word Parts	Definition
<b>Paraphilic Disorders</b>	<b>para-</b> = abnormal <b>-philic</b> = pertaining to being attracted to <b>dis-</b> = apart	Disorders include aberrant sexual activity and sexual dysfunction.
<b>pedophilic disorder</b> (pee-doh-FILL-ik)	<b>ped/o</b> = child <b>-philic</b> = pertaining to being attracted to <b>dis-</b> = apart	Sexual interest in children.
<b>sexual masochism disorder</b> (MAS-oh-kizm)	<b>-al</b> = pertaining to <b>-ism</b> = state of <b>dis-</b> = apart	Gratification derived from being hurt or abused.
<b>voyeuristic disorder</b> (VOY-er-iss-tick)	<b>-tic</b> = pertaining to	Gratification derived from observing others engaged in sexual acts.
<b>Sleep–Wake Disorders</b>	<b>dis-</b> = apart	Disorders relating to either sleeping or wakefulness.
<b>insomnia disorder</b> (in-SOM-nee-ah)	<b>in-</b> = not <b>somn/o</b> = sleep <b>-ia</b> = state, condition	Inability to sleep.
<b>narcolepsy</b> (NAR-koh-lep-see)	<b>narc/o</b> = stupor, sleep <b>-lepsy</b> = seizure	Recurring episodes of sleeping during the daytime and often difficulty sleeping at night.
<b>Somatic Symptom and Related Disorders</b>	<b>somat/o</b> = body <b>-ic</b> = pertaining to <b>dis-</b> = apart	Patient has physical symptoms for which no physical disease can be determined.
<b>somatic symptom disorder (SSD)</b>	<b>somat/o</b> = body <b>-ic</b> = pertaining to <b>dis-</b> = apart	Having physical symptoms that cause distress and disrupt daily life. Includes a preoccupation with the symptoms and behaviors based on the symptoms.
<b>conversion disorder</b>	<b>vers/o</b> = to turn <b>dis-</b> = apart	Anxiety is transformed into physical symptoms such as heart palpitations, paralysis, or blindness.
<b>Substance Use and Addictive Disorders</b>	<b>dis-</b> = apart	
<b>substance use disorders</b>	<b>dis-</b> = apart	Overindulgence or dependence on chemical substances including alcohol, illegal drugs, and prescription drugs.
<b>gambling disorder</b>	<b>dis-</b> = apart	Inability to stop gambling.
<b>Gender Dysphoria</b>	<b>dys-</b> = abnormal <b>-phoria</b> = condition to bear	
<b>gender dysphoria</b> (dis-FOR-ee-ah)	<b>dys-</b> = abnormal <b>-phoria</b> = condition to bear	Occurs when birth gender is contrary to the gender a person identifies as. Includes both male to female (MTF) and female to male (FTM).
<b>Trauma- and Stressor-Related Disorders</b>	<b>dis-</b> = apart	
<b>posttraumatic stress disorder (PTSD)</b>	<b>post-</b> = after <b>-ic</b> = pertaining to <b>dis-</b> = apart	Results from exposure to actual or implied death, serious injury, or sexual violence. Condition impairs person's social interactions and capacity to work.

## Pathology (continued)

Term	Word Parts	Definition
<b>Elimination Disorders</b>	<b>dis-</b> = apart	
<b>enuresis</b>		Act of voiding urine in inappropriate places after toilet training.
<b>encopresis</b>		Act of voiding feces in inappropriate places after toilet training.
<b>Sexual Dysfunctions</b>	<b>-al</b> = pertaining to <b>dys-</b> = abnormal, difficult	Having difficulty during any stage of normal sexual activity that negatively impacts quality of life.
<b>erectile dysfunction</b>	<b>-ile</b> = pertaining to <b>dys-</b> = difficult	The inability to achieve or maintain an erection.
<b>premature ejaculation</b>	<b>pre-</b> = before	Ejaculation of semen before or shortly after penetration.

## Therapeutic Procedures

Term	Word Parts	Definition
<b>electroconvulsive therapy (ECT)</b> (ee-lek-troh-kon-VULL-siv)	<b>electr/o</b> = electricity	Procedure occasionally used for cases of prolonged major depression. This controversial treatment involves placement of an electrode on one or both sides of the patient's head and a current is turned on, briefly causing a convulsive seizure. A low level of voltage is used in modern electroconvulsive therapy, and the patient is administered a muscle relaxant and anesthesia. Advocates of this treatment state that it is a more effective way to treat severe depression than using drugs. It is not effective with disorders other than depression, such as schizophrenia and alcoholism.
<b>Psychopharmacology</b> (sigh-koh-far-mah-KALL-oh-jee)	<b>psych/o</b> = mind <b>pharmac/o</b> = drug <b>-logy</b> = study of	Study of the effects of drugs on the mind and particularly the use of drugs in treating mental disorders. The main classes of drugs for the treatment of mental disorders are:
<b>antipsychotic drugs</b>	<b>anti-</b> = against <b>psych/o</b> = mind <b>-tic</b> = pertaining to	These major tranquilizers include chlorpromazine (Thorazine™), haloperidol (Haldol™), clozapine (Clozaril™), and risperidone. These drugs have transformed the treatment of patients with psychoses and schizophrenia by reducing patient agitation and panic and shortening schizophrenic episodes. One of the side effects of these drugs is involuntary muscle movements, which approximately one-fourth of all adults who take the drugs develop.
<b>antidepressant drugs</b>	<b>anti-</b> = against <b>depress/o</b> = to press down	Classified as stimulants; alter the patient's mood by affecting levels of neurotransmitters in the brain. Antidepressants, such as serotonin norepinephrine reuptake inhibitors, are nonaddictive but they can produce unpleasant side effects such as dry mouth, weight gain, blurred vision, and nausea.
<b>minor tranquilizers</b>		Include Valium™ and Xanax™. These are also classified as central nervous system depressants and are prescribed for anxiety.
<b>lithium</b>		Special category of drug used successfully to calm patients who suffer from bipolar disorder (depression alternating with manic excitement).

## Therapeutic Procedures (continued)

Term	Word Parts	Definition
<b>Psychotherapy</b> (sigh-koh-THAIR-ah-pee)	<b>psych/o</b> = mind <b>-therapy</b> = treatment	A method of treating mental disorders by mental rather than chemical or physical means. It includes:
<b>psychoanalysis</b>	<b>psych/o</b> = mind	Method of obtaining a detailed account of the past and present emotional and mental experiences from the patient to determine the source of the problem and eliminate the effects. It is a system developed by Sigmund Freud that encourages the patient to discuss repressed, painful, or hidden experiences with the hope of eliminating or minimizing the problem.
<b>humanistic psychotherapy</b>	<b>-tic</b> = pertaining to <b>psych/o</b> = mind <b>-therapy</b> = treatment	Therapist does not delve into the patients' past when using these methods. Instead, it is believed that patients can learn how to use their own internal resources to deal with their problems. The therapist creates a therapeutic atmosphere, which builds patient self-esteem and encourages discussion of problems, thereby gaining insight in how to handle them. Also called <i>client-centered</i> or <i>nondirective psychotherapy</i> .
<b>family and group psychotherapy</b>	<b>psych/o</b> = mind <b>-therapy</b> = treatment	Often described as solution focused, the therapist places minimal emphasis on patient past history and strong emphasis on having patient state and discuss goals and then find a way to achieve them.

## Abbreviations

<b>AD</b>	Alzheimer's disease	<b>MA</b>	mental age
<b>ADD</b>	attention-deficit disorder	<b>MMPI</b>	Minnesota Multiphasic Personality Inventory
<b>ADHD</b>	attention-deficit/hyperactivity disorder	<b>MTF</b>	male to female
<b>BPD</b>	bipolar disorder	<b>OCD</b>	obsessive-compulsive disorder
<b>CA</b>	chronological age	<b>PTSD</b>	posttraumatic stress disorder
<b>DSM</b>	<i>Diagnostic and Statistical Manual of Mental Disorders</i>	<b>SAD</b>	seasonal affective disorder
<b>ECT</b>	electroconvulsive therapy	<b>SSD</b>	somatic symptom disorder
<b>FTM</b>	female to male		



## Section III: Diagnostic Imaging at a Glance

### Word Parts

Here are the most common word parts (with their meanings) used to build diagnostic imaging terms.

#### Combining Forms

<b>anter/o</b>	front	<b>radi/o</b>	ray (X-ray)
<b>fluor/o</b>	fluorescence, luminous	<b>roentgen/o</b>	X-ray
<b>later/o</b>	side	<b>son/o</b>	sound
<b>nucle/o</b>	nucleus	<b>tom/o</b>	to cut
<b>poster/o</b>	back		

#### Suffixes

<b>-al</b>	pertaining to	<b>-logist</b>	one who studies
<b>-ar</b>	pertaining to	<b>-logy</b>	study of
<b>-graphy</b>	process of recording	<b>-lucent</b>	to shine through
<b>-ic</b>	pertaining to	<b>-opaque</b>	nontransparent
<b>-ior</b>	pertaining to	<b>-scopy</b>	process of visually examining

#### Prefix

<b>ultra-</b>	beyond
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# Diagnostic Imaging

roentgenology (rent-gen-ALL-oh-jee)

X-rays

Diagnostic imaging is the medical specialty that uses a variety of methods to produce images of the internal structures of the body. These images are then used to diagnose disease. This area of medicine began as **roentgenology** (**roentgen/o** = X-ray; **-logy** = study of), named after German physicist Wilhelm Roentgen who discovered roentgen rays in 1895. This discovery, now commonly known as **X-rays**, revolutionized the diagnosis of disease.

## What's In A Name?

Look for these word parts:


**roentgen/o** = X-ray

**-logy** = study of

Diagnostic Imaging Terms		
Term	Word Parts	Definition
<b>anteroposterior view</b> (AP view)	<b>anter/o</b> = front <b>poster/o</b> = back <b>-ior</b> = pertaining to	Positioning the patient so that the X-rays pass through the body from the anterior side to the posterior side.
<b>barium</b> (Ba) (BAH-ree-um)		Soft metallic element from the earth used as a radiopaque X-ray dye.
<b>film</b>		Thin sheet of cellulose material coated with a light-sensitive substance that is used in taking photographs. There is a special photographic film that is sensitive to X-rays.
<b>film badge</b>		Badge containing film that is sensitive to X-rays. This is worn by all personnel in radiology to measure the amount of X-rays to which they are exposed.
<b>lateral view</b>	<b>later/o</b> = side <b>-al</b> = pertaining to	Positioning of the patient so that the side of the body faces the X-ray machine.
<b>oblique view</b> (oh-BLEEK)		Positioning of the patient so that the X-rays pass through the body on an angle.
<b>posteroanterior view</b> (PA view)	<b>poster/o</b> = back <b>anter/o</b> = front <b>-ior</b> = pertaining to	Positioning of the patient so that the X-rays pass through the body from the posterior side to the anterior side.
<b>radiography</b> (ray-dee-OG-rah-fee)	<b>radi/o</b> = X-ray <b>-graphy</b> = process of recording	Making of X-ray pictures.
<b>radioisotope</b> (ray-dee-oh-EYE-soh-tohp)	<b>radi/o</b> = X-ray	Radioactive form of an element.
<b>radiologist</b> (ray-dee-ALL-oh-jist)	<b>radi/o</b> = X-ray <b>-logist</b> = one who studies	Physician who uses images to diagnose abnormalities and radiant energy to treat various conditions such as cancer.
<b>radiolucent</b> (ray-dee-oh-LOO-cent)	<b>radi/o</b> = X-ray <b>-lucent</b> = to shine through	Structures that allow X-rays to pass through, expose the photographic plate, and appear as black areas on the X-ray.
<b>radiopaque</b> (ray-dee-oh-PAYK)	<b>radi/o</b> = X-ray <b>-opaque</b> = nontransparent	Structures that are impenetrable to X-rays, appearing as a light area on the radiograph (X-ray).



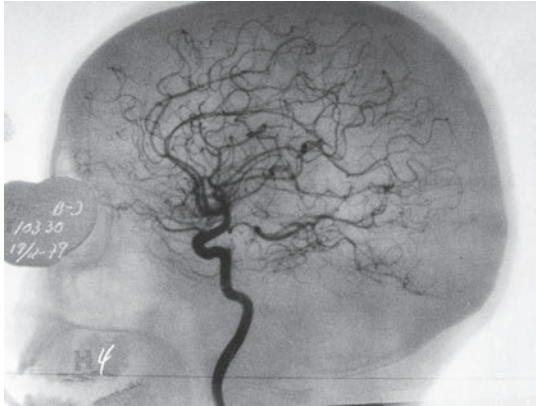
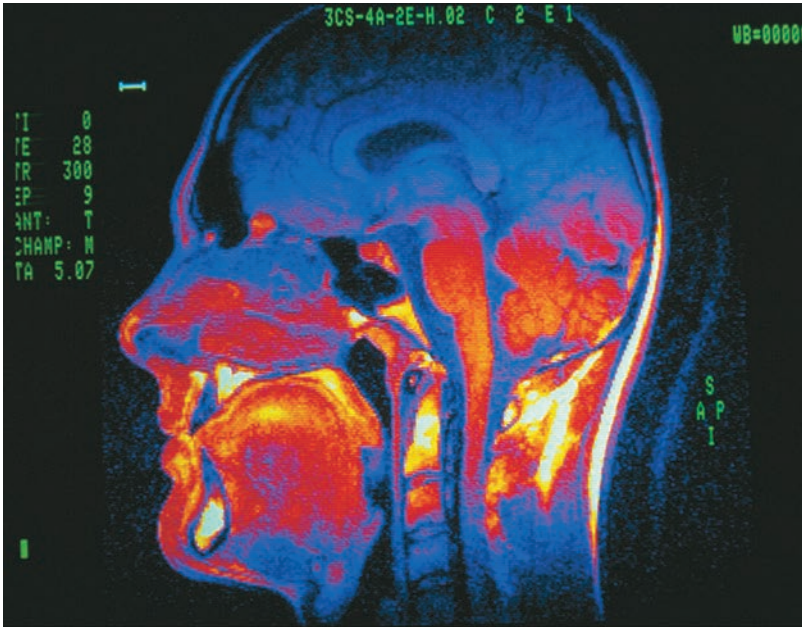
## Diagnostic Imaging Terms (continued)

Term	Word Parts	Definition
<b>roentgen</b> (RENT-gen)	<b>roentgen/o</b> = X-ray	Unit for describing an exposure dose of radiation.
<b>scan</b>		Recording on a photographic plate the emission of radioactive waves after a substance has been injected into the body.
<p>■ <b>Figure 14.6</b> Nuclear medicine. Bone scan produced after injection of radioactive substance into the body. (Photodisc/Getty Images)</p>		
<b>shield</b>		Device used to protect against radiation.
<b>tagging</b>		Attaching a radioactive material to a chemical, and tracing it as it moves through the body.
<b>uptake</b>		Absorption of radioactive material and medicines into an organ or tissue.
<b>X-ray</b>		High-energy wave that can penetrate most solid matter and present the image on photographic film.

## Diagnostic Imaging Procedures

Term	Word Parts	Definition
<b>computed tomography scan</b> (CT scan) (toh-MOG-rah-fee)	<b>tom/o</b> = to cut <b>-graphy</b> = process of recording	Imaging technique that is able to produce a cross-sectional view of the body. X-ray pictures are taken at multiple angles through the body. A computer then uses all these images to construct a composite cross-section. Refer back to Figure 12.9 in Chapter 12 for an example of a computed tomography scan showing a brain tumor.

## Diagnostic Imaging Procedures (continued)

Term	Word Parts	Definition
<b>contrast studies</b>		Radiopaque substance is injected or swallowed. X-rays are then taken that will outline the body structure containing the radiopaque substance. For example, angiograms and myelograms.
<p>■ <b>Figure 14.7</b> Contrast study. X-ray of cerebral blood vessels taken after injection of radiopaque substance into the bloodstream.</p> <p>(Neil Goldstein, Pearson Education)</p>		
<b>Doppler ultrasonography</b>	<b>ultra-</b> = beyond <b>son/o</b> = sound <b>-graphy</b> = process of recording	Use of ultrasound to record the velocity of blood flowing through blood vessels. Used to detect blood clots and blood vessel obstructions.
<b>fluoroscopy</b> (floo-or-OS-koh-pee)	<b>fluor/o</b> = luminous <b>-scopy</b> = process of visually examining	X-rays strike a fluorescing screen rather than a photographic plate, causing it to glow. The glowing screen changes from minute to minute; therefore movement, such as the heart beating or the digestive tract moving, can be seen.
<b>magnetic resonance imaging (MRI)</b> (REZ-oh-nence)	<b>-ic</b> = pertaining to	Use of electromagnetic energy to produce an image of soft tissues in any plane of the body. Atoms behave differently when placed in a strong magnetic field. When the body is exposed to this magnetic field the nuclei of the body's atoms emit radio-frequency signals that can be used to create an image.
		<p>■ <b>Figure 14.8</b> Color-enhanced magnetic resonance image (MRI), showing a sagittal view of the head. (Science Source)</p>

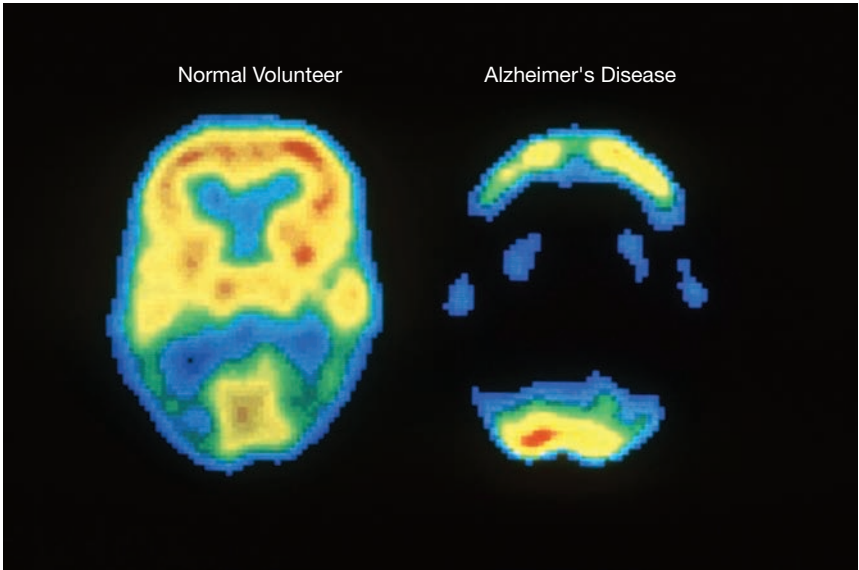
Diagnostic Imaging Procedures (continued)

Term	Word Parts	Definition
nuclear medicine scan	nucle/o = nucleus -ar = pertaining to	Use of radioactive substances to diagnose diseases. A radioactive substance known to accumulate in certain body tissues is injected or inhaled. After waiting for the substance to travel to the body area of interest, the radioactivity level is recorded. Commonly referred to as a <i>scan</i> (see again Figure 14.6). See Table 14.4 ■ for examples of the radioactive substances used in nuclear medicine.

Table 14.4 Substances Used to Visualize Various Body Organs in Nuclear Medicine

Organ	Substance
bone	technetium ( <sup>99m</sup> Tc)-labeled phosphate
tumors	gallium ( <sup>67</sup> Ga)
lungs	xenon ( <sup>133</sup> Xe)
liver	technetium ( <sup>99m</sup> Tc)-labeled sulfur
heart	thallium ( <sup>201</sup> Tl)
thyroid	iodine ( <sup>131</sup> I)

positron emission tomography (PET) (POS-ih-tron / eh-MIS-shun / toh-MOG-rah-fee)	tom/o = to cut -graphy = process of recording	Image is produced following the injection of radioactive glucose. The glucose will accumulate in areas of high metabolic activity. Therefore, this process will highlight areas that are consuming a large quantity of glucose. This may show an active area of the brain or a tumor.
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■ **Figure 14.9** Positron emission tomography (PET) image, showing the difference in the metabolic activity of the brain of a person with Alzheimer’s disease and that of a healthy person. (Science Source)

radiology (ray-dee-ALL-oh-jee)	radi/o = X-ray -logy = study of	Use of high-energy radiation, X-rays, to expose a photographic plate. The image is a black-and-white picture with radiopaque structures such as bone appearing white and radiolucent tissue such as muscles appearing dark.
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## Diagnostic Imaging Procedures (continued)

Term	Word Parts	Definition
<b>ultrasound (US)</b> (ULL-trah-sound)	<b>ultra-</b> = beyond	Use of high-frequency sound waves to produce an image. Sound waves directed into the body from a transducer will bounce off internal structures and echo back to the transducer. The speed of the echo is dependent on the density of the tissue. A computer is able to correlate speed of echo with density and produce an image. Used to visualize internal organs, heart valves, and fetuses.



■ **Figure 14.10** Ultrasound showing the outline of a fetus.  
(Mikael Damkier/Shutterstock)

## Abbreviations

<b><sup>67</sup>Ga</b>	radioactive gallium	<b>IVP</b>	intravenous pyelogram
<b><sup>99m</sup>Tc</b>	radioactive technetium	<b>KUB</b>	kidneys, ureters, bladder
<b><sup>131</sup>I</b>	radioactive iodine	<b>LAT</b>	lateral
<b><sup>201</sup>Tl</b>	radioactive thallium	<b>LGI</b>	lower gastrointestinal series
<b><sup>133</sup>Xe</b>	radioactive xenon	<b>LL</b>	left lateral
<b>Angio</b>	angiography	<b>mA</b>	milliampere
<b>AP</b>	anteroposterior	<b>mCi</b>	millicurie
<b>Ba</b>	barium	<b>MRA</b>	magnetic resonance angiography
<b>BaE</b>	barium enema	<b>MRI</b>	magnetic resonance imaging
<b>CAT</b>	computerized axial tomography	<b>NMR</b>	nuclear magnetic resonance
<b>Ci</b>	curie	<b>PA</b>	posteroanterior
<b>CT</b>	computerized tomography	<b>PET</b>	positron emission tomography
<b>CXR</b>	chest X-ray	<b>PTC</b>	percutaneous transhepatic cholangiography
<b>decub</b>	lying down	<b>R</b>	roentgen
<b>DI</b>	diagnostic imaging	<b>Ra</b>	radium
<b>DSA</b>	digital subtraction angiography	<b>rad</b>	radiation-absorbed dose
<b>ERCP</b>	endoscopic retrograde cholangiopancreatography	<b>RL</b>	right lateral
<b>Fx, FX</b>	fracture	<b>RRT</b>	registered radiologic technologist
<b>GB</b>	gallbladder X-ray	<b>UGI</b>	upper gastrointestinal series
<b>IVC</b>	intravenous cholangiogram	<b>US</b>	ultrasound



## Section IV: Rehabilitation Services at a Glance

### Word Parts

Here are the most common word parts (with their meanings) used to build rehabilitation services terms.

#### Combining Forms

<b>cry/o</b>	cold	<b>my/o</b>	muscle
<b>cutane/o</b>	skin	<b>orth/o</b>	straight, correct
<b>electr/o</b>	electricity	<b>phon/o</b>	sound
<b>erg/o</b>	work	<b>physic/o</b>	body
<b>habilitat/o</b>	ability	<b>prosthet/o</b>	addition
<b>hydr/o</b>	water	<b>therm/o</b>	heat

#### Suffixes

<b>-al</b>	pertaining to	<b>-ous</b>	pertaining to
<b>-graphy</b>	process of recording	<b>-phoresis</b>	carrying
<b>-ic</b>	pertaining to	<b>-therapy</b>	treatment
<b>-nomics</b>	pertaining to laws	<b>-tic</b>	pertaining to

#### Prefixes

<b>re-</b>	again
<b>trans-</b>	across
<b>ultra-</b>	beyond



# Rehabilitation Services

occupational therapy

physical therapy

The goal of rehabilitation is to prevent disability and restore as much function as possible following disease, illness, or injury. Rehabilitation services include the healthcare specialties of **physical therapy** (PT) and **occupational therapy** (OT).


**What's In A Name?**  
Look for these word parts:  
physic/o = body  
-al = pertaining to

## Physical Therapy

Physical therapy (PT) involves treating disorders using physical means and methods. Physical therapy personnel assess joint motion, muscle strength and endurance, function of heart and lungs, performance of activities required in daily living, and the ability to carry out other responsibilities. Physical therapy treatment includes gait training, therapeutic exercise, massage, joint and soft tissue mobilization, thermotherapy, cryotherapy, electrical stimulation, ultrasound, and hydrotherapy. These methods strengthen muscles, improve motion and circulation, reduce pain, and increase function.


## Occupational Therapy

Occupational therapy (OT) assists patients to regain, develop, and improve skills that are important for independent functioning (activities of daily living). Occupational therapy personnel work with people who, because of illness, injury, or developmental or psychological impairments, require specialized training in skills that will enable them to lead independent, productive, and satisfying lives in regard to personal care, work, and leisure. Occupational therapists instruct patients in the use of adaptive equipment and techniques, body mechanics, and energy conservation. They also employ modalities such as heat, cold, and therapeutic exercise.

Rehabilitation Services Terms		
Term	Word Parts	Definition
activities of daily living (ADLs)		Activities usually performed in the course of a normal day, such as eating, dressing, and washing.
<div></div> <div><p>■ <b>Figure 14.11</b> Photograph of an occupational therapist assisting a patient with learning independence in activities of daily living (ADLs). (Gina Sanders/Shutterstock)</p></div>		



## Rehabilitation Services Terms (continued)

Term	Word Parts	Definition
<b>adaptive equipment</b>   <p>■ <b>Figure 14.12</b> Using adaptive equipment. A) Male putting on shoe. B) Female eating one handed. (Michal Heron, Pearson Education)</p>		Modification of equipment or devices to improve the function and independence of a person with a disability.
<b>body mechanics</b>	-ic = pertaining to	Use of good posture and position while performing activities of daily living to prevent injury and stress on body parts.
<b>ergonomics</b> (er-goh-NOM-iks)	erg/o = work -nomics = pertaining to laws	Study of human work including how the requirements for performing work and the work environment affect the musculoskeletal and nervous systems.
<b>fine motor skills</b>		Use of precise and coordinated movements in such activities as writing, buttoning, and cutting.
<b>gait</b> (GAYT)		Manner of walking.
<b>gross motor skills</b>		Use of large muscle groups that coordinate body movements such as walking, running, jumping, and balance.
<b>lower extremity</b> (LE)		Refers to one of the legs.
<b>mobility</b>		State of having normal movement of all body parts.
<b>orthotics</b> (or-THOT-iks)	orth/o = straight -tic = pertaining to	Use of equipment, such as splints and braces, to support a paralyzed muscle, promote a specific motion, or correct musculoskeletal deformities.
<b>physical medicine</b>	physic/o = body -al = pertaining to	Branch of medicine focused on restoring function. Primarily cares for patients with musculoskeletal and nervous system disorders. Physician is a <i>physiatrist</i> .
<b>prosthetics</b> (pros-THET-iks)	prosthet/o = addition -ic = pertaining to	Artificial devices, such as limbs and joints, that replace a missing body part.

## Rehabilitation Services Terms (continued)

Term	Word Parts	Definition
<b>range of motion (ROM)</b>		Range of movement of a joint, from maximum flexion through maximum extension. It is measured as degrees of a circle.
<b>rehabilitation</b>	<b>re-</b> = again <b>habilitat/o</b> = ability	Process of treatment and exercise that can help a person with a disability attain maximum function and well-being.
<b>upper extremity (UE)</b>		Refers to one of the arms.

## Therapeutic Procedures

Term	Word Parts	Definition
<b>active exercises</b>		Exercises that a patient performs without assistance.
<b>active range of motion (AROM)</b>		Range of motion for joints that a patient is able to perform without assistance from someone else.
<b>active-resistive exercises</b>		Exercises in which the patient works against resistance applied to a muscle, such as a weight. Used to increase strength.
<b>cryotherapy</b> (cry-oh-THAIR-ah-pee)	<b>cry/o</b> = cold <b>-therapy</b> = treatment	Using cold for therapeutic purposes.
<b>debridement</b> (day-breed-MON)		Removal of dead or damaged tissue from a wound. Commonly performed for burn therapy.
<b>electromyography (EMG)</b> (ee-LEK-troh-my-OG-rah-fee)	<b>electr/o</b> = electricity <b>my/o</b> = muscle <b>-graphy</b> = process of recording	The recording of a muscle's response to electrical stimulation. The graphic record produced is an <i>electromyogram</i> .

### gait training

Assisting a patient to learn to walk again or how to use an assistive device to walk.




■ **Figure 14.13** Physical therapist assisting a patient to walk in the parallel bars. (auremat/Shutterstock)

## Therapeutic Procedures (continued)

Term	Word Parts	Definition
<b>hydrotherapy</b> (high-droh-THAIR-ah-pee)	<b>hydr/o</b> = water <b>-therapy</b> = treatment	Application of warm water as a therapeutic treatment. Can be done in baths, swimming pools, and whirlpools.
<b>massage</b>		Kneading or applying pressure by hands to a part of the patient's body to promote muscle relaxation and reduce tension.
<b>mobilization</b>		Treatments such as exercise and massage to restore movement to joints and soft tissue.
<b>moist hot packs</b>		Applying moist warmth to a body part to produce a slight dilation of blood vessels in the skin. Causes muscle relaxation in the deeper regions of the body and increases circulation, which aids healing.
<b>nerve conduction velocity</b>		Test to determine if nerves have been damaged by recording the rate at which an electrical impulse travels along a nerve. If the nerve is damaged, the velocity will be decreased.
<b>pain control</b>		Managing pain through a variety of means, including medications, biofeedback, and mechanical devices.
<b>passive range of motion (PROM)</b>		Therapist putting a patient's joints through available range of motion without assistance from the patient.
<b>phonophoresis</b> (foh-noh-foh-REE-sis)	<b>phon/o</b> = sound <b>-phoresis</b> = carrying	Use of ultrasound waves to introduce medication across the skin and into the subcutaneous tissues.
<b>postural drainage with clapping</b>	<b>-al</b> = pertaining to	Draining secretions from the bronchi or a lung cavity by having the patient lie so that gravity allows drainage to occur. Clapping is using the hand in a cupped position to perform percussion on the chest. Assists in loosening secretions and mucus.
<b>therapeutic exercise</b> (thair-ah-PEW-tik)	<b>-ic</b> = pertaining to	Exercise planned and carried out to achieve a specific physical benefit, such as improved range of motion, muscle strength, or cardiovascular function.
<b>thermotherapy</b> (ther-moh-THAIR-ah-pee)	<b>therm/o</b> = heat <b>-therapy</b> = treatment	Applying heat to the body for therapeutic purposes.
<b>traction</b>		Process of pulling or drawing, usually with a mechanical device. Used in treating orthopedic (bone and joint) problems and injuries.
<b>transcutaneous electrical nerve stimulation (TENS)</b> (tranz-kyoo-TAY-nee-us)	<b>trans-</b> = across <b>cutane/o</b> = skin <b>-ous</b> = pertaining to <b>electr/o</b> = electricity <b>-al</b> = pertaining to	Application of an electric current to a peripheral nerve to relieve pain.

## Therapeutic Procedures (continued)

Term	Word Parts	Definition
<b>ultrasound (US)</b>	<b>ultra-</b> = beyond	Use of high-frequency sound waves to create heat in soft tissues under the skin. It is particularly useful for treating injuries to muscles, tendons, and ligaments, as well as muscle spasms.
		<p>■ <b>Figure 14.14</b> Patient receiving ultrasound treatment to the left elbow. (GWImages/Shutterstock)</p>
<b>whirlpool</b>		Bath in which there are continuous jets of hot water reaching the body surfaces.

## Abbreviations

<b>AAROM</b>	active assistive range of motion	<b>PROM</b>	passive range of motion
<b>ADLs</b>	activities of daily living	<b>PT</b>	physical therapy
<b>AROM</b>	active range of motion	<b>ROM</b>	range of motion
<b>EMG</b>	electromyogram	<b>TENS</b>	transcutaneous electrical nerve stimulation
<b>e-stim</b>	electrical stimulation	<b>UE</b>	upper extremity
<b>LE</b>	lower extremity	<b>US</b>	ultrasound
<b>OT</b>	occupational therapy		



## Section V: Surgery at a Glance

### Word Parts

Here are the most common word parts (with their meanings) used to build surgical terms.

#### Combining Forms

<b>alges/o</b>	pain	<b>hem/o</b>	blood
<b>aspir/o</b>	to breathe in	<b>later/o</b>	side
<b>cis/o</b>	to cut	<b>lith/o</b>	stone
<b>cry/o</b>	cold	<b>recumb/o</b>	to lie back
<b>cutane/o</b>	skin	<b>sect/o</b>	to cut
<b>dilat/o</b>	to widen	<b>specul/o</b>	to look at
<b>electr/o</b>	electricity	<b>tenacul/o</b>	to hold
<b>esthesi/o</b>	sensation, feeling	<b>topic/o</b>	a specific area
<b>hal/o</b>	to breathe	<b>ven/o</b>	vein

#### Suffixes

<b>-al</b>	pertaining to	<b>-otomy</b>	to cut into
<b>-ia</b>	state, condition	<b>-ous</b>	pertaining to
<b>-ic</b>	pertaining to	<b>-scopic</b>	pertaining to visually examining
<b>-ion</b>	action	<b>-stasis</b>	standing still
<b>-ist</b>	specialist	<b>-stat</b>	to keep from moving
<b>-logist</b>	one who studies		

#### Prefixes

<b>an-</b>	without	<b>peri-</b>	around
<b>dis-</b>	apart	<b>post-</b>	after
<b>endo-</b>	within	<b>pre-</b>	before
<b>ex-</b>	outward	<b>re-</b>	again
<b>in-</b>	inward	<b>sub-</b>	under
<b>intra-</b>	within		

# Surgery

operative report  
surgeon

surgery

**Surgery** is the branch of medicine dealing with operative procedures to correct deformities and defects, repair injuries, and diagnose and cure diseases. A **surgeon** is a physician who has completed additional training of five years or more in a surgical specialty area. These specialty areas include orthopedics; neurosurgery; gynecology; ophthalmology; urology; and thoracic, vascular, cardiac, plastic, and general surgery. The surgeon must complete an **operative report** for every procedure that he or she performs. This is a detailed description that includes:

- Preoperative diagnosis
- Indication for the procedure
- Name of the procedure
- Surgical techniques employed
- Findings during surgery
- Postoperative diagnosis
- Name of the surgeon

This report also includes information pertaining to the patient such as name, address, age, patient number, and date of the procedure.

Surgical terminology includes terms related to anesthesiology, surgical instruments, surgical procedures, incisions, and suture materials. Specific surgical procedures are frequently named by using the combining form for the body part being operated on and adding a suffix that describes the procedure. For example, an incision into the chest is a *thoracotomy*, removal of the stomach is *gastrectomy*, and surgical repair of the skin is *dermatoplasty*. A list of the most frequently used surgical suffixes is found in Chapter 1 and common surgical procedures are defined in each system chapter.

## Anesthesia

**anesthesia** (an-ess-THEE-zee-ah)

**anesthesiologist** (an-es-thee-zee-OL-oh-jist)

**general anesthesia**

**inhalation** (in-hah-LAY-shun)

**intravenous** (in-trah-VEE-nus)

**local anesthesia**

**nurse anesthetist** (ah-NES-the-tist)

**regional anesthesia**

**subcutaneous** (sub-kyoo-TAY-nee-us)

**topical anesthesia**

An **anesthesiologist** is a physician who specializes in the practice of administering anesthetics. A **nurse anesthetist** is a registered nurse who has received additional training and education in the administration of anesthetic medications. **Anesthesia** results in the loss of feeling or sensation. The most common types of anesthesia are general, regional, local, and topical anesthesia (see Table 14.5 ■).

### What's In A Name?

Look for these word parts:  
**an-** = without  
**esthesi/o** = sensation, feeling  
**-ist** = specialist  
**-logist** = one who studies

## Surgical Instruments

Physicians have developed surgical instruments since the time of the early Egyptians. Instruments include surgical knives, saws, clamps, drills, and needles. Some of the more commonly used surgical instruments are listed in Table 14.6 ■ and are shown in Figure 14.15 ■.



**Table 14.5** Types of Anesthesia

Type	Word Parts	Description
<b>general anesthesia (GA)</b>	<b>an-</b> = without <b>esthesi/o</b> = sensation, feeling <b>-ia</b> = state, condition	Produces a loss of consciousness including an absence of pain sensation. The patient's vital signs (VS)—heart rate, breathing rate, pulse, and blood pressure—are carefully monitored when using a general anesthetic.
<b>intravenous (IV)</b>	<b>intra-</b> = within <b>ven/o</b> = vein <b>-ous</b> = pertaining to	Route for administering general anesthesia via injection into a vein.
<b>inhalation</b>	<b>in-</b> = inward <b>hal/o</b> = to breathe	Route for administering general anesthesia by breathing it in.
<b>regional anesthesia</b>	<b>-al</b> = pertaining to <b>an-</b> = without <b>esthesi/o</b> = sensation, feeling <b>-ia</b> = state, condition	Also referred to as a <i>nerve block</i> . This anesthetic interrupts a patient's pain sensation in a particular region of the body, such as the arm. The anesthetic is injected near the nerve that will be blocked from sensation. The patient usually remains conscious.
<b>local anesthesia</b>	<b>-al</b> = pertaining to <b>an-</b> = without <b>esthesi/o</b> = sensation, feeling <b>-ia</b> = state, condition	Produces a loss of sensation in one localized part of the body. The patient remains conscious.
<b>subcutaneous</b>	<b>sub-</b> = under <b>cutane/o</b> = skin <b>-ous</b> = pertaining to	Method of applying local anesthesia involving injecting the anesthetic under the skin. This type of anesthetic is used to deaden the skin prior to suturing a laceration.
<b>topical</b>	<b>topic/o</b> = a specific area <b>-al</b> = pertaining to	Method of applying local anesthesia involving placing a liquid or gel directly onto a specific area of skin. This type of anesthetic is used on the skin, the cornea, and the mucous membranes in dental work.

**Table 14.6** Common Surgical Instruments

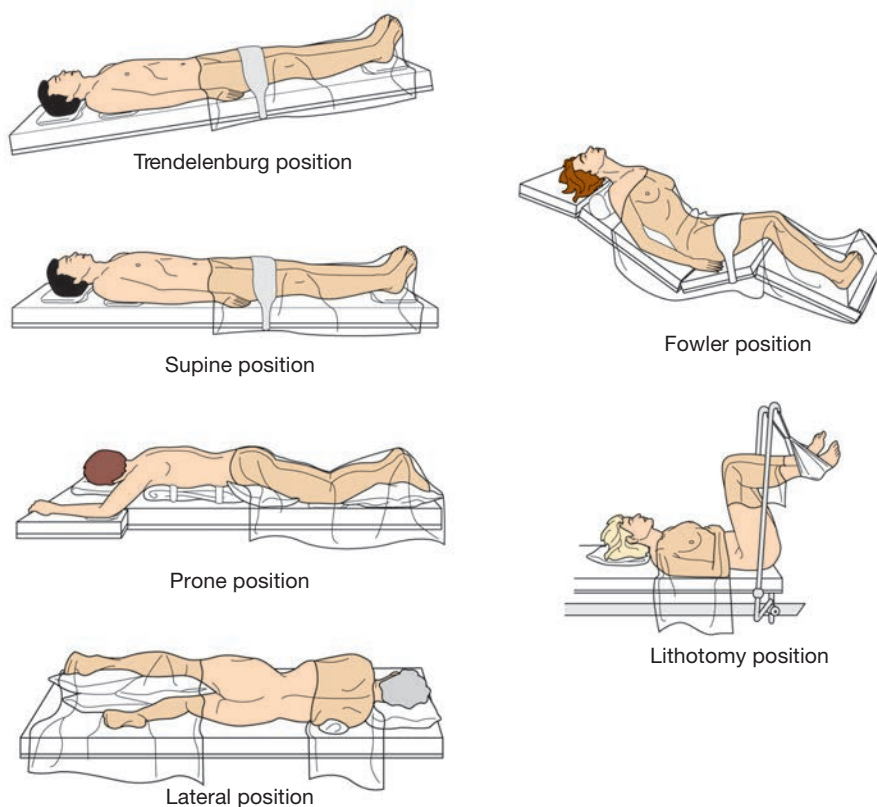
Instrument	Word Parts	Use
<b>aspirator</b> (AS-pih-ray-tor)	<b>aspir/o</b> = to breathe in	Suctions fluid
<b>clamp</b>		Grasps tissue; controls bleeding
<b>curette</b> (kyoo-RET)		Scrapes and removes tissue
<b>dilator</b> (dye-LAY-tor)	<b>dilat/o</b> = to widen	Enlarges an opening by stretching
<b>forceps</b> (FOR-seps)		Grasps tissue
<b>hemostat</b> (HEE-moh-stat)	<b>hem/o</b> = blood <b>-stat</b> = to keep from moving	Forceps to grasp blood vessel to control bleeding
<b>probe</b>		Explores tissue
<b>scalpel</b>		Cuts and separates tissue
<b>speculum</b> (SPEK-yoo-lum)	<b>specul/o</b> = to look at	Spreads apart walls of a cavity
<b>tenaculum</b> (teh-NAK-yoo-lum)	<b>tenacul/o</b> = to hold	Long-handled clamp
<b>trepine</b> (treh-FINE)		Saw that removes disk-shaped piece of tissue or bone



■ **Figure 14.15** Surgical instruments prepared for a procedure. (Brian Warling, Pearson Education)

## Surgical Positions

Patients are placed in specific positions so the surgeon is able to reach the area that is to be operated on. Table 14.7 ■ describes and Figure 14.16 ■ illustrates some common surgical positions.



■ **Figure 14.16** Examples of common surgical positions.

**Table 14.7** Common Surgical Positions

Position	Word Parts	Description
<b>Fowler</b>		Sitting with back positioned at a 45° angle
<b>lateral recumbent</b> (ree-KUM-bent)	<b>later/o</b> = side <b>-al</b> = pertaining to <b>recumb/o</b> = to lie back	Lying on either the left or right side
<b>lithotomy</b> (lith-OT-oh-mee)	<b>lith/o</b> = stone <b>-otomy</b> = to cut into	Lying face up with hips and knees bent at 90° angles
<b>prone</b> (PROHN)		Lying horizontal and face down
<b>supine</b> (soo-PINE)		Lying horizontal and face up; also called <i>dorsal recumbent</i>
<b>Trendelenburg</b> (TREN-deh-len-berg)		Lying face up and on an incline with head lower than legs

## Surgery Terms

Term	Word Parts	Definition
<b>analgesic</b> (an-al-JEE-zik)	<b>an-</b> = without <b>alges/o</b> = pain <b>-ic</b> = pertaining to	Medication to relieve pain.
<b>anesthetic</b> (an-ess-THET-ik)	<b>an-</b> = without <b>esthesi/o</b> = sensation, feeling <b>-ic</b> = pertaining to	Medication to produce partial to complete loss of sensation.
<b>cauterization</b> (kaw-ter-ih-ZAY-shun)		Use of heat, cold, electricity, or chemicals to scar, burn, or cut tissues.
<b>circulating nurse</b>		Nurse who assists the surgeon and scrub nurse by providing needed materials during the procedure and by handling the surgical specimen. This person does not wear sterile clothing and may enter and leave the operating room during the procedure.
<b>cryosurgery</b> (cry-oh-SER-jer-ee)	<b>cry/o</b> = cold	Technique of exposing tissues to extreme cold to produce cell injury and destruction. Used in the treatment of malignant tumors or to control pain and bleeding.
<b>day surgery</b>		Type of outpatient surgery in which the patient is discharged on the same day he or she is admitted; also called <i>ambulatory surgery</i> .
<b>dissection</b> (dih-SEK-shun)	<b>dis-</b> = apart <b>sect/o</b> = to cut	Surgical cutting of parts for separation and study.
<b>draping</b>		Process of covering the patient with sterile cloths that allow only the operative site to be exposed to the surgeon.

## Surgery Terms (continued)

Term	Word Parts	Definition
<b>electrocautery</b> (ee-lek-troh-KAW-ter-ee)	<b>electr/o</b> = electricity	Use of an electric current to stop bleeding by coagulating blood vessels.
<b>endoscopic surgery</b> (en-doh-SKOP-ik)	<b>endo-</b> = within <b>-scopic</b> = pertaining to visually examining	Use of a lighted instrument to examine the interior of a cavity.
<b>excision</b> (ek-SIZH-un)	<b>ex-</b> = outward <b>cis/o</b> = to cut <b>-ion</b> = action	To cut out. The surgical removal of part or all of an organ or structure.
<b>hemostasis</b> (hee-moh-STAY-sis)	<b>hem/o</b> = blood <b>-stasis</b> = standing still	Stopping the flow of blood using instruments, pressure, and/or medication.
<b>incision</b> (in-SIZH-un)	<b>in-</b> = inward <b>cis/o</b> = to cut <b>-ion</b> = action	To cut into or to cut open an organ or structure.
<b>intraoperative</b> (in-trah-OP-er-ah-tiv)	<b>intra-</b> = within	Period of time during surgery.
<b>laser surgery</b>		Use of a controlled beam of light for cutting, hemostasis, or tissue destruction.
<b>perioperative</b> (per-ee-OP-er-ah-tiv)	<b>peri-</b> = around	Period of time that includes before, during, and after a surgical procedure.
<b>postoperative</b> (post-op) (post-OP-er-ah-tiv)	<b>post-</b> = after	Period of time immediately following surgery.
<b>preoperative</b> (preop) (pree-OP-er-ah-tiv)	<b>pre-</b> = before	Period of time preceding surgery.
<b>resection</b> (ree-SEK-shun)	<b>re-</b> = again <b>sect/o</b> = to cut	To surgically cut out or remove; excision.
<b>scrub nurse</b>		Surgical assistant who hands instruments to the surgeon. This person wears sterile clothing and maintains the sterile operative field.
<b>suture material</b> (SOO-cher)		Used to close a wound or incision. Examples are cotton, catgut, silk thread, or staples. They may or may not be removed when the wound heals, depending on the type of material that is used.

## Abbreviations

<b>D &amp; C</b>	dilation and curettage	<b>PARR</b>	postanesthetic recovery room
<b>Endo</b>	endoscopy	<b>post-op</b>	postoperative
<b>EUA</b>	exam under anesthesia	<b>preop,</b> <b>pre-op</b>	preoperative
<b>GA</b>	general anesthesia	<b>prep</b>	preparation, prepared
<b>I &amp; D</b>	incision and drainage	<b>T &amp; A</b>	tonsillectomy and adenoidectomy
<b>MUA</b>	manipulation under anesthesia	<b>TAH</b>	total abdominal hysterectomy
<b>OR</b>	operating room	<b>TURP</b>	transurethral resection of prostate



## Section VI: Oncology at a Glance

### Word Parts

Here are the most common word parts (with their meanings) used to build oncology terms.

#### Combining Forms

<b>bi/o</b>	life	<b>morbid/o</b>	ill
<b>capsul/o</b>	to box	<b>mort/o</b>	death
<b>carcin/o</b>	cancerous	<b>mutat/o</b>	to change
<b>chem/o</b>	drug	<b>onc/o</b>	tumor
<b>cyt/o</b>	cell	<b>path/o</b>	disease
<b>immun/o</b>	protection	<b>radic/o</b>	root
<b>lapar/o</b>	abdomen	<b>radi/o</b>	radiation
<b>laps/o</b>	to slide back	<b>tox/o</b>	poison
<b>miss/o</b>	to send back		

#### Suffixes

<b>-al</b>	pertaining to	<b>-opsy</b>	view of
<b>-gen</b>	that which produces	<b>-otomy</b>	to cut into
<b>-genic</b>	producing	<b>-plasia</b>	formation of cells
<b>-logic</b>	pertaining to studying	<b>-plasm</b>	formation
<b>-logist</b>	one who studies	<b>-stasis</b>	standing still
<b>-logy</b>	study of	<b>-therapy</b>	treatment
<b>-oma</b>	tumor		

#### Prefixes

<b>en-</b>	inward	<b>meta-</b>	beyond
<b>hyper-</b>	excessive	<b>neo-</b>	new
<b>in-</b>	inward	<b>re-</b>	again

# Oncology

**benign** (bee-NINE)

**carcinoma** (kar-sin-NOH-mah)

**malignant** (mah-LIG-nant)

**oncology** (ong-KALL-oh-jee)

**protocol** (PROH-toh-kall)

**tumors**

**Oncology** is the branch of medicine dealing with **tumors**. A tumor can be classified as **benign** or **malignant**. A benign tumor is one that is generally not progressive or recurring. Often, a benign tumor will have the suffix *-oma* at the end of the term. However, a malignant tumor indicates that there is a cancerous growth present (see Figure 14.17 ■). These terms will usually have the word *carcinoma* added. The medical specialty of oncology primarily treats patients who have cancer.

The treatment for cancer can consist of a variety or a combination of treatments. The **protocol** (prot) for a particular patient will consist of the actual plan of care, including the medications, surgeries, and treatments such as chemotherapy and radiation therapy. Often, the entire healthcare team, including the physician, oncologist, radiologist, nurse, patient, and family, will assist in designing the treatment plan.

## Staging Tumors

**grade**

**metastases** (meh-TASS-tah-seez)

**pathologist** (path-ALL-oh-jist)

**staging**

The process of classifying tumors based on their degree of tissue invasion and the potential response to therapy is referred to as **staging**. The TNM staging system is frequently used, with the *T* referring to the tumor's size and invasion, the *N* referring to lymph node involvement, and the *M* referring to the presence of **metastases** (mets) of the tumor cells (see Figure 14.18 ■).

### What's In A Name?

Look for these word parts:

**carcin/o** = cancer

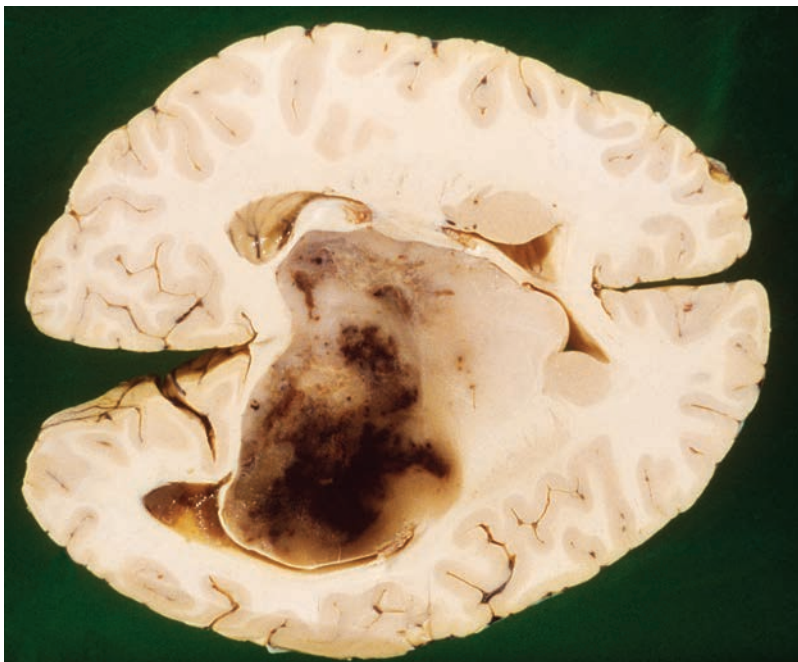
**onc/o** = tumor

**-logy** = study of

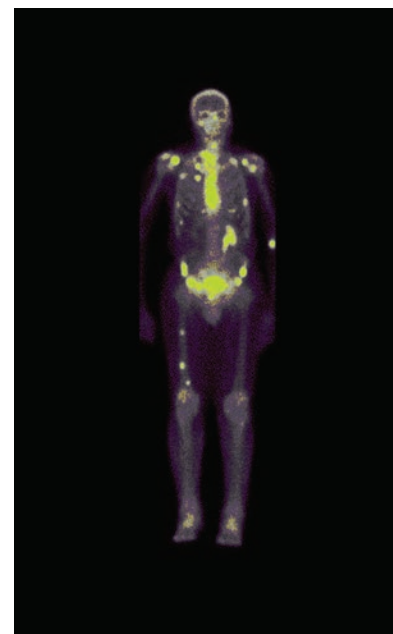
**-oma** = tumor

### Med Term Tip

Carcinoma or cancer (Ca) can affect almost every organ in the body. The medical term reflects the area of the body affected as well as the type of tumor cell. For example, there can be an esophageal carcinoma, gastric adenocarcinoma, or adenocarcinoma of the uterus.



■ **Figure 14.17** Photograph of a brain specimen with a large malignant tumor. (Biophoto Associates/Photo Researchers, Inc.)



■ **Figure 14.18** Nuclear medicine bone scan showing metastatic tumors in the skeleton. (Medical Body Scans/Science Source)



What's In A Name?

Look for these word parts:  
path/o = disease  
-logist = one who studies  
meta- = beyond

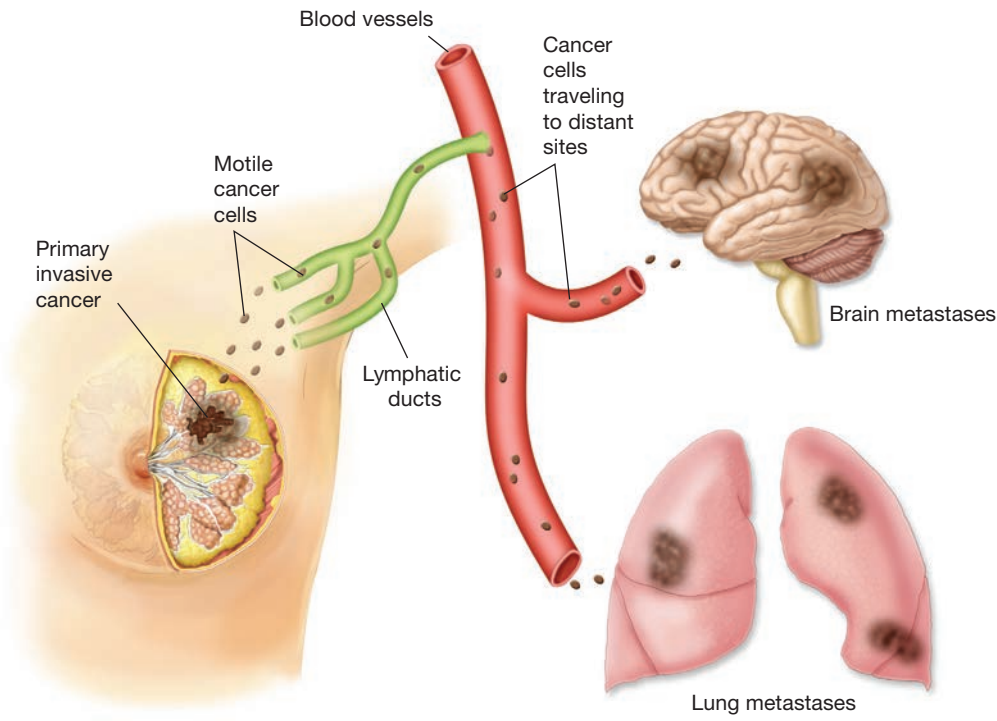
In addition, a tumor can be graded from grade I through grade IV. The **grade** is based on the microscopic appearance of the tumor cells. The **pathologist** rates or grades the cells based on whether the tumor resembles the normal tissue. The classification system is illustrated in Table 14.8 ■. The cells in a grade I tumor are well differentiated, which makes it easier to treat than the more advanced grades.

Table 14.8 Tumor Grade Classification

Grade	Meaning
GX	Grade cannot be determined
GI	Cells are well differentiated
GII	Cells are moderately differentiated
GIII	Cells are poorly differentiated
GIV	Cells are undifferentiated

Oncology Terms		
Term	Word Parts	Definition
<b>carcinogen</b> (kar-SIN-oh-jen)	<b>carcin/o</b> = cancer <b>-gen</b> = that which produces  <b>Med Term Tip</b> ..... The term <i>benign</i> comes from the Latin term <i>bene</i> , which means “kind or good.” On the other hand, the term <i>malignant</i> comes from the Latin term <i>mal</i> , meaning “bad or malicious.”	Substance or chemical agent that produces or increases the risk of developing cancer. For example, cigarette smoke and insecticides are considered to be carcinogens.
<b>carcinoma in situ (CIS)</b> (kar-sin-NOH-mah)	<b>carcin/o</b> = cancer <b>-oma</b> = tumor	Malignant tumor whose cells have not spread beyond the original site.
<b>encapsulated</b> (en-CAP-soo-lay-ted)	<b>en-</b> = inward <b>capsul/o</b> = to box	Growth enclosed in a sheath of tissue that prevents tumor cells from invading surrounding tissue.
<b>hyperplasia</b> (high-per-PLAY-zee-ah)	<b>hyper-</b> = excessive <b>-plasia</b> = formation of cells	Excessive development of normal cells within an organ.
<b>invasive disease</b> (in-VAY-siv)	<b>in-</b> = inward	Tendency of a malignant tumor to spread to immediately surrounding tissue and organs.

## Oncology Terms (continued)

Term	Word Parts	Definition
<b>metastasis</b> (mets) (meh-TASS-tah-sis)	<b>meta-</b> = beyond <b>-stasis</b> = standing still	Movement and spread of cancer cells from one part of the body to another. Metastases is the plural.
<p>■ <b>Figure 14.19</b> Illustration showing how the primary breast tumor metastasized through the lymphatic and blood vessels to secondary sites in the brain and lungs.</p> 		
<b>morbidity</b> (mor-BID-ih-tee)	<b>morbid/o</b> = ill	Number representing the sick persons in a particular population.
<b>mortality</b> (mor-TAL-ih-tee)	<b>mort/o</b> = death	Number representing the deaths in a particular population.
<b>mutation</b> (mew-TAY-shun)	<b>mutat/o</b> = to change	Change or transformation from the original.
<b>neoplasm</b> (NEE-oh-plazm)	<b>neo-</b> = new <b>-plasm</b> = formation	New and abnormal growth or tumor. These can be benign or malignant.
<b>oncogenic</b> (ong-koh-JEN-ik)	<b>onc/o</b> = tumor <b>-genic</b> = producing	Cancer causing.
<b>primary site</b>		Term used to designate where a malignant tumor first appeared.
<b>relapse</b> (REE-laps)	<b>re-</b> = again <b>laps/o</b> = to slide back	Return of disease symptoms after a period of improvement.
<b>remission</b> (rih-MISH-un)	<b>re-</b> = again <b>miss/o</b> = to send back	Period during which the symptoms of a disease or disorder leave. Can be temporary.

## Diagnostic Procedures

Term	Word Parts	Definition
<b>biopsy</b> (BX, bx) (BYE-op-see)	<b>bi/o</b> = life <b>-opsy</b> = view of	Excision of a small piece of tissue for microscopic examination to assist in determining a diagnosis.
<b>cytologic testing</b> (sigh-toh-LAH-jik)	<b>cyt/o</b> = cell <b>-logic</b> = pertaining to studying	Examination of cells to determine their structure and origin. Pap smears are considered a form of cytologic testing.
<b>exploratory surgery</b>		Surgery performed for the purpose of determining if cancer is present or if a known cancer has spread. Biopsies are generally performed.
<b>staging laparotomy</b> (lap-ah-ROT-oh-mee)	<b>lapar/o</b> = abdomen <b>-otomy</b> = to cut into	Surgical procedure in which the abdomen is entered to determine the extent and staging of a tumor.

## Therapeutic Procedures

Term	Word Parts	Definition
<b>chemotherapy</b> (chemo) (kee-moh-THAIR-ah-pee)	<b>chem/o</b> = drug <b>-therapy</b> = treatment	Treating disease by using chemicals that have a toxic effect on the body, especially cancerous tissue.
<b>hormone therapy</b>		Treatment of cancer with natural hormones or with chemicals that produce hormone-like effects.
<b>immunotherapy</b> (im-yoo-noh-THAIR-ah-pee)	<b>immun/o</b> = protection <b>-therapy</b> = treatment	Strengthening the immune system to attack cancerous cells.
<b>palliative therapy</b> (PAL-ee-ah-tiv)		Treatment designed to reduce the intensity of painful symptoms, but does not produce a cure.
<b>radiation therapy</b>	<b>radi/o</b> = radiation	Exposing tumors and surrounding tissues to X-rays, gamma rays, neutrons, protons, and other sources to kill cancer cells and shrink tumors.
<b>radical surgery</b>	<b>radic/o</b> = root <b>-al</b> = pertaining to	Extensive surgery to remove as much tissue associated with a tumor as possible.
<b>radioactive implant</b> (ray-dee-oh-AK-tiv)	<b>radi/o</b> = radiation	Embedding a radioactive source directly into tissue to provide a highly localized radiation dosage to damage nearby cancerous cells. Also called <i>brachytherapy</i> .

## Abbreviations

<b>BX, bx</b>	biopsy	<b>met</b>	metastases
<b>Ca</b>	cancer	<b>MTX</b>	methotrexate
<b>chemo</b>	chemotherapy	<b>prot</b>	protocol
<b>CIS</b>	carcinoma in situ	<b>st</b>	stage
<b>5-FU</b>	5-fluorouracil	<b>TNM</b>	tumor, nodes, metastases
<b>GA</b>	gallium		



# Chapter Review

## Real-World Applications

### Chart Note Transcription

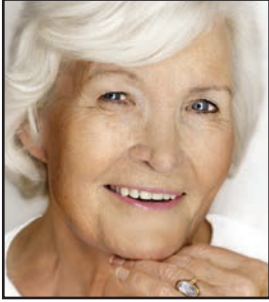
The chart note below contains 11 phrases that can be reworded with a medical term that you learned in this chapter. Each phrase is identified with an underline. Determine the medical term and write your answers in the space provided.

Current Complaint:	A 56-year-old male was referred to a <u>specialist in the treatment of cancer</u> <b>1</b> for treatment of a suspicious right kidney mass discovered by his internist on a CT scan.
Past History:	Patient had been aware of right side pain, difficulty urinating, and weight loss during the past six months.
Signs and Symptoms:	<u>Surgery to determine if cancer is present</u> <b>2</b> was performed and <u>small samples of tissue removed for examination under a microscope</u> <b>3</b> were taken from the suspicious right kidney mass. After it was determined to be <u>cancerous with a tendency to grow worse</u> , <b>4</b> a right nephrectomy was performed. Reports indicate that the <u>new and abnormal growth</u> <b>5</b> was <u>graded to be moderately differentiated</u> <b>6</b> and well <u>enclosed in a sheath of tissue</u> <b>7</b> with no signs of <u>spreading to another part of the body</u> . <b>8</b>
Diagnosis:	<u>Cancerous tumor of the right kidney</u> . <b>9</b>
Treatment:	Post surgery the patient began a <u>plan of treatment</u> <b>10</b> of <u>the use of chemical agents with a specific toxic effect</u> . <b>11</b>

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_
11. \_\_\_\_\_

## Case Study

Below is a case study presentation of a patient with a condition covered by this chapter. Read the case study and answer the questions below. Some questions will ask for information not included within this chapter. Use your text, a medical dictionary, or any other reference material you choose to answer these questions.



(Martina Ebel/Shutterstock)

Patient is a 72-year-old female complaining of increasing dyspnea with activity during the past six months. She now has a frequent harsh cough producing thick sputum and occasional hemoptysis. Patient is thin and short of stature. She is not SOB sitting in examination room. CT scan of the bronchial tree confirmed the presence of a mass in the right lung. Sputum was collected for sputum culture and sensitivity and sputum cytology. Sputum specimen was negative for the presence of bacteria. Sputum cytology revealed bronchogenic carcinoma. Patient will be referred to thoracic surgeon for consultation regarding lobectomy. Following recovery from this surgery she is to return to oncology clinic for chemotherapy and to determine if the tumor has metastasized.

## Questions

1. What is this patient's diagnosis? Look it up and write a short description.

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2. The patient had three complaints. List the three complaints and describe each in your own words.

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3. Describe in your own words the diagnostic imaging procedure used on this patient and the results.

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4. List and describe in your own words the clinical laboratory diagnostic tests run on this patient and the results of each test.

---

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5. What surgical procedure will this patient undergo? Describe it in your own words.

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6. What does the term *metastasized* mean?

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---

## Practice Exercises

### A. Complete the Statement

1. The reference book containing important information regarding medications is the \_\_\_\_\_.
2. A person specializing in the dispensing of medications is a \_\_\_\_\_.
3. The accepted official name for a drug is the \_\_\_\_\_ name.
4. The trade name for a drug is the \_\_\_\_\_ name.
5. What does the chemical name represent? \_\_\_\_\_
6. What federal agency enforces controls over the use of drugs causing dependency? \_\_\_\_\_

### B. Drug Administration Practice

Name the route of drug administration for the following descriptions.

1. under the tongue \_\_\_\_\_
2. into the anus or rectum \_\_\_\_\_
3. applied to the skin \_\_\_\_\_
4. injected under the first layer of skin \_\_\_\_\_
5. injected into a muscle \_\_\_\_\_
6. injected into a vein \_\_\_\_\_
7. by mouth \_\_\_\_\_

### C. Define the Term

1. idiosyncrasy \_\_\_\_\_
2. parenteral \_\_\_\_\_
3. placebo \_\_\_\_\_
4. toxicity \_\_\_\_\_
5. side effect \_\_\_\_\_
6. unit dose \_\_\_\_\_
7. habituation \_\_\_\_\_
8. antidote \_\_\_\_\_
9. contraindication \_\_\_\_\_
10. prophylaxis \_\_\_\_\_



**D. What Does it Stand For?**

1. gr \_\_\_\_\_
2. bid \_\_\_\_\_
3. tid \_\_\_\_\_
4. ad lib \_\_\_\_\_
5. prn \_\_\_\_\_
6. ante \_\_\_\_\_
7. OTC \_\_\_\_\_
8. gt \_\_\_\_\_
9. Sig \_\_\_\_\_
10. stat \_\_\_\_\_
11. mg \_\_\_\_\_
12. aq \_\_\_\_\_
13. noc \_\_\_\_\_
14. NPO \_\_\_\_\_
15. hs \_\_\_\_\_
16. IV \_\_\_\_\_
17. TO \_\_\_\_\_
18. gtt \_\_\_\_\_
19. pc \_\_\_\_\_
20. d/c \_\_\_\_\_

**E. Prescription Practice**

Write out the following prescription instructions in the space provided.

1. Pravachol, 20 mg, Sig.  $\dot{\text{i}}$  – daily hs, 30, refill 3x, no sub. \_\_\_\_\_
2. Lanoxin, 0.125 mg, Sig.  $\ddot{\text{iii}}$  — stat, then  $\ddot{\text{ii}}$  q AM, 100, refills prn. \_\_\_\_\_
3. Synthroid, 0.075 mg, Sig.  $\dot{\text{i}}$  – daily, 100, refill x4. \_\_\_\_\_
4. Norvasc, 5 mg,  $\dot{\text{i}}$  – q am, 60, refillable. \_\_\_\_\_

**F. Terminology Matching**

Match each term to its definition.

- |                                   |                             |
|-----------------------------------|-----------------------------|
| 1. _____ neurocognitive disorder  | a. conversion disorder      |
| 2. _____ elimination disorder     | b. kleptomania              |
| 3. _____ dissociative disorder    | c. pedophilic disorder      |
| 4. _____ eating disorder          | d. narcissistic personality |
| 5. _____ sleep–wake disorder      | e. insomnia                 |
| 6. _____ depressive disorder      | f. mania                    |
| 7. _____ impulse control disorder | g. panic attacks            |
| 8. _____ somatic symptom disorder | h. amnesia                  |
| 9. _____ personality disorder     | i. dementia                 |
| 10. _____ paraphilic disorder     | j. anorexia nervosa         |
| 11. _____ anxiety disorder        | k. enuresis                 |

**G. Name the Treatment**

Identify each mental health treatment from its description.

- depressant drugs prescribed for anxiety \_\_\_\_\_
- client-centered psychotherapy \_\_\_\_\_
- drug used to calm patients with bipolar disorder \_\_\_\_\_
- reduces patient agitation and panic and shortens schizophrenic episodes \_\_\_\_\_
- obtains a detailed account of the past and present emotional and mental experiences \_\_\_\_\_
- stimulants that alter the patient's mood by affecting neurotransmitter levels \_\_\_\_\_

**H. Name the Anesthesia**

Identify the type of anesthesia for each description.

- produces loss of consciousness and absence of pain \_\_\_\_\_
- produces loss of sensation in one localized part of the body \_\_\_\_\_
- anesthetic applied directly onto a specific skin area \_\_\_\_\_
- also referred to as a nerve block \_\_\_\_\_

## I. Terminology Matching

Match the term to its definition.

- |                                |  |
|--------------------------------|--|
| 1. _____ ultrasound            | a. radiopaque substances used to outline hollow structures |
| 2. _____ MRI                   | b. records velocity of blood flowing through vessels       |
| 3. _____ Doppler US            | c. image created by electromagnetic energy                 |
| 4. _____ nuclear medicine scan | d. glowing screen shows movement                           |
| 5. _____ CT scan               | e. making an X-ray   |
| 6. _____ contrast study        | f. multiple-angle X-rays compiled into a cross-section     |
| 7. _____ fluoroscopy           | g. uses radioactive substances                             |
| 8. _____ radiography           | h. image of internal organs using sound waves              |
| 9. _____ PET scan              | i. indicates metabolic activity                            |

## J. What Does it Stand For?

1. ROM \_\_\_\_\_
2. OT \_\_\_\_\_
3. ADLs \_\_\_\_\_
4. LE \_\_\_\_\_
5. EMG \_\_\_\_\_
6. TENS \_\_\_\_\_
7. PT \_\_\_\_\_
8. PROM \_\_\_\_\_
9. e-stim \_\_\_\_\_
10. US \_\_\_\_\_

## K. Name the Procedure Described

Identify the rehabilitation procedure described by each phrase.

1. kneading or applying pressure by hands \_\_\_\_\_
2. removal of dead and damaged tissue from a wound \_\_\_\_\_
3. using water for treatment purposes \_\_\_\_\_
4. drainage of secretions from the bronchi \_\_\_\_\_
5. exercises performed by a patient without resistance \_\_\_\_\_
6. medication introduced by ultrasound waves \_\_\_\_\_
7. use of cold for therapeutic purposes \_\_\_\_\_
8. pulling with a mechanical device \_\_\_\_\_

**L. Terminology Matching**

Match each term to its definition.

- |                             |   |
|-----------------------------|---|
| 1. _____ forceps            | a. scrapes and removes tissue                           |
| 2. _____ tenaculum          | b. cuts and separates tissue                            |
| 3. _____ Trendelenburg      | c. lying horizontal and face up                         |
| 4. _____ lithotomy          | d. lying on either the left or right side               |
| 5. _____ curette            | e. long-handled clamp                                   |
| 6. _____ aspirator          | f. explores tissue                                      |
| 7. _____ supine             | g. lying face up with hips and knees bent at 90° angles |
| 8. _____ probe              | h. grasps tissue  |
| 9. _____ scalpel            | i. suctions fluid                                       |
| 10. _____ lateral recumbent | j. lying face up on an incline, head lower than legs    |

**M. What Does it Stand For?**

1. MRI \_\_\_\_\_
2. Ba \_\_\_\_\_
3. AP \_\_\_\_\_
4. CT \_\_\_\_\_
5. RL \_\_\_\_\_
6. PA \_\_\_\_\_
7. LL \_\_\_\_\_
8. PET \_\_\_\_\_
9. UGI \_\_\_\_\_
10. KUB \_\_\_\_\_

## N. Terminology Matching


Match each term to its definition.

- |                              |   |
|------------------------------|---|
| 1. _____ oncogenic           | a. examine cells to determine their structure and origin    |
| 2. _____ benign              | b. the plan for care for any individual patient             |
| 3. _____ encapsulated        | c. biopsy   |
| 4. _____ relapse             | d. growth that is not recurrent or progressive              |
| 5. _____ primary site        | e. placing a radioactive substance directly into the tissue |
| 6. _____ protocol            | f. where the malignant tumor first appeared                 |
| 7. _____ staging laparotomy  | g. growth is enclosed in a tissue sheath                    |
| 8. _____ cytologic testing   | h. cancer causing   |
| 9. _____ radioactive implant | i. abdominal surgery to determine extent of tumor           |
| 10. _____ bx                 | j. return of disease symptoms                               |

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# Appendices

## Appendix I

### Word Parts Arranged Alphabetically and Defined

The word parts that have been presented in this textbook are summarized here with their definitions for quick reference. Prefixes are listed first, followed by combining forms and suffixes.

Prefix	Definition	Prefix	Definition
<b>a-</b>	without	<b>macro-</b>	large
<b>ab-</b>	away from	<b>meta-</b>	beyond
<b>ad-</b>	toward	<b>micro-</b>	small
<b>allo-</b>	other, different from usual	<b>mono-</b>	one
<b>an-</b>	without	<b>multi-</b>	many
<b>ante-</b>	before, in front of	<b>myo-</b>	to shut
<b>anti-</b>	against	<b>neo-</b>	new
<b>auto-</b>	self	<b>non-</b>	not
<b>bi-</b>	two	<b>nulli-</b>	none
<b>brady-</b>	slow	<b>pan-</b>	all
<b>circum-</b>	around	<b>para-</b>	beside; abnormal; two like parts of a pair
<b>contra-</b>	against	<b>per-</b>	through
<b>de-</b>	without	<b>peri-</b>	around
<b>di-</b>	two	<b>poly-</b>	many
<b>dis-</b>	apart	<b>post-</b>	after
<b>dys-</b>	painful; difficult; abnormal	<b>pre-</b>	before
<b>e-</b>	outward	<b>primi-</b>	first
<b>en-</b>	inward	<b>pro-</b>	before
<b>endo-</b>	within; inner	<b>pseudo-</b>	false
<b>epi-</b>	above	<b>quadri-</b>	four
<b>eso-</b>	inward	<b>re-</b>	again
<b>eu-</b>	normal	<b>retro-</b>	backward; behind
<b>ex-</b>	outward	<b>semi-</b>	partial
<b>exo-</b>	outward	<b>sub-</b>	under
<b>extra-</b>	outside of	<b>tachy-</b>	fast
<b>hemi-</b>	half	<b>tetra-</b>	four
<b>hetero-</b>	different	<b>trans-</b>	across
<b>homo-</b>	same	<b>tri-</b>	three
<b>hyper-</b>	excessive	<b>ultra-</b>	beyond
<b>hypo-</b>	below; insufficient	<b>un-</b>	not
<b>in-</b>	not; inward	<b>xeno-</b>	foreign
<b>inter-</b>	between		
<b>intra-</b>	within		
Combining Form	Definition	Combining Form	Definition
<b>abdomin/o</b>	abdomen	<b>adip/o</b>	fat
<b>acous/o</b>	hearing	<b>adren/o</b>	adrenal glands
<b>acr/o</b>	extremities	<b>adrenal/o</b>	adrenal glands
<b>aden/o</b>	gland	<b>aer/o</b>	air
<b>adenoid/o</b>	adenoids	<b>agglutin/o</b>	clumping



Combining Form	Definition
<b>albin/o</b>	white
<b>alges/o</b>	pain, sense of pain
<b>alveol/o</b>	alveolus
<b>ambly/o</b>	dull, dim
<b>amnes/o</b>	forgetfulness
<b>amni/o</b>	amnion
<b>an/o</b>	anus
<b>andr/o</b>	male
<b>angi/o</b>	vessel
<b>ankyl/o</b>	stiff joint
<b>anter/o</b>	front
<b>anthrac/o</b>	coal
<b>anxi/o</b>	fear, worry
<b>aort/o</b>	aorta
<b>append/o</b>	appendix
<b>appendic/o</b>	appendix
<b>aque/o</b>	water
<b>arteri/o</b>	artery
<b>arthr/o</b>	joint
<b>articul/o</b>	joint
<b>aspir/o</b>	to breathe in
<b>astr/o</b>	star
<b>atel/o</b>	incomplete
<b>ather/o</b>	fatty substance
<b>atri/o</b>	atrium
<b>audi/o</b>	hearing
<b>audit/o</b>	hearing
<b>aur/o</b>	ear
<b>auricul/o</b>	ear
<b>axill/o</b>	axilla, underarm
<b>azot/o</b>	nitrogenous waste
<b>bacteri/o</b>	bacteria
<b>balan/o</b>	glans penis
<b>bar/o</b>	weight
<b>bas/o</b>	base
<b>bi/o</b>	life
<b>blast/o</b>	immature
<b>blephar/o</b>	eyelid
<b>brachi/o</b>	arm
<b>bronch/o</b>	bronchus
<b>bronchi/o</b>	bronchus
<b>bronchiol/o</b>	bronchiole
<b>bucc/o</b>	cheek
<b>burs/o</b>	sac, bursa
<b>calc/o</b>	calcium
<b>capsul/o</b>	to box
<b>carcin/o</b>	cancer
<b>cardi/o</b>	heart
<b>carp/o</b>	carpus
<b>caud/o</b>	tail
<b>cauter/o</b>	to burn
<b>cec/o</b>	cecum
<b>centr/o</b>	center
<b>cephal/o</b>	head

Combining Form	Definition
<b>cerebell/o</b>	cerebellum
<b>cerebr/o</b>	cerebrum
<b>cerumin/o</b>	cerumen
<b>cervic/o</b>	neck, cervix
<b>chem/o</b>	chemical, drug
<b>chol/e</b>	bile, gall
<b>cholangi/o</b>	bile duct
<b>cholecyst/o</b>	gallbladder
<b>choledoch/o</b>	common bile duct
<b>chondr/o</b>	cartilage
<b>chori/o</b>	chorion
<b>chrom/o</b>	color
<b>chromat/o</b>	color
<b>cirrh/o</b>	yellow
<b>cis/o</b>	to cut
<b>clavicul/o</b>	clavicle
<b>cleid/o</b>	clavicle
<b>clon/o</b>	rapid contracting and relaxing
<b>coagul/o</b>	clotting
<b>coccyg/o</b>	coccyx
<b>cochle/o</b>	cochlea
<b>col/o</b>	colon
<b>colon/o</b>	colon
<b>colp/o</b>	vagina
<b>compuls/o</b>	drive, compel
<b>concuss/o</b>	to shake violently
<b>coni/o</b>	dust
<b>conjunctiv/o</b>	conjunctiva
<b>core/o</b>	pupil
<b>corne/o</b>	cornea
<b>coron/o</b>	heart
<b>corpor/o</b>	body
<b>cortic/o</b>	outer layer
<b>cost/o</b>	rib
<b>crani/o</b>	skull
<b>crin/o</b>	to secrete
<b>crur/o</b>	leg
<b>cry/o</b>	cold
<b>crypt/o</b>	hidden
<b>culd/o</b>	cul-de-sac
<b>cutane/o</b>	skin
<b>cyan/o</b>	blue
<b>cycl/o</b>	ciliary body
<b>cyst/o</b>	sac, urinary bladder, pouch
<b>cyt/o</b>	cell
<b>dacry/o</b>	tears
<b>delus/o</b>	false belief
<b>dent/o</b>	tooth
<b>depress/o</b>	to press down
<b>derm/o</b>	skin
<b>dermat/o</b>	skin
<b>diaphor/o</b>	profuse sweating
<b>diaphragmat/o</b>	diaphragm
<b>dilat/o</b>	to widen

Combining Form	Definition	Combining Form	Definition
<b>dipl/o</b>	double	<b>hist/o</b>	tissue
<b>dist/o</b>	away from	<b>home/o</b>	sameness
<b>diverticul/o</b>	pouch	<b>humer/o</b>	humerus
<b>dors/o</b>	back	<b>hydr/o</b>	water
<b>duct/o</b>	to bring	<b>hymen/o</b>	hymen
<b>duoden/o</b>	duodenum	<b>hyster/o</b>	uterus
<b>dur/o</b>	dura mater	<b>iatr/o</b>	physician, medicine, treatment
<b>electr/o</b>	electricity	<b>ichthy/o</b>	scaly, dry
<b>embol/o</b>	plug	<b>idi/o</b>	distinctive
<b>embryo/o</b>	embryo	<b>ile/o</b>	ileum
<b>emmetr/o</b>	correct, proper	<b>ili/o</b>	ilium
<b>encephal/o</b>	brain	<b>immun/o</b>	immunity, protection
<b>enter/o</b>	small intestine	<b>infer/o</b>	below
<b>eosin/o</b>	rosy red	<b>inguin/o</b>	groin region
<b>epididym/o</b>	epididymis	<b>iod/o</b>	iodine
<b>epiglott/o</b>	epiglottis	<b>ir/o</b>	iris
<b>episi/o</b>	vulva	<b>irid/o</b>	iris
<b>epitheli/o</b>	epithelium	<b>isch/o</b>	to hold back
<b>erg/o</b>	work	<b>ischi/o</b>	ischium
<b>erythr/o</b>	red	<b>jejun/o</b>	jejunum
<b>esophag/o</b>	esophagus	<b>kal/i</b>	potassium
<b>esthesi/o</b>	sensation, feeling	<b>kerat/o</b>	hard, horny, cornea
<b>estr/o</b>	female	<b>ket/o</b>	ketones
<b>extens/o</b>	to stretch out	<b>keton/o</b>	ketones
<b>fasci/o</b>	fibrous band	<b>kinesi/o</b>	movement
<b>femor/o</b>	femur	<b>klept/o</b>	to steal
<b>fet/o</b>	fetus	<b>kyph/o</b>	hump
<b>fibr/o</b>	fibers	<b>labi/o</b>	lip
<b>fibrin/o</b>	fibers	<b>labyrinth/o</b>	labyrinth (inner ear)
<b>fibul/o</b>	fibula	<b>lacrim/o</b>	tears
<b>flex/o</b>	to bend	<b>lact/o</b>	milk
<b>fluor/o</b>	fluorescence, luminous	<b>lamin/o</b>	lamina (part of vertebra)
<b>fus/o</b>	pouring	<b>lapar/o</b>	abdomen
<b>gastr/o</b>	stomach	<b>laps/o</b>	to slide back
<b>genit/o</b>	genital	<b>laryng/o</b>	larynx
<b>gingiv/o</b>	gums	<b>later/o</b>	side
<b>glauc/o</b>	gray	<b>leuk/o</b>	white
<b>gli/o</b>	glue	<b>lingu/o</b>	tongue
<b>glomerul/o</b>	glomerulus	<b>lip/o</b>	fat
<b>gloss/o</b>	tongue	<b>lith/o</b>	stone
<b>gluc/o</b>	glucose	<b>lob/o</b>	lobe
<b>glute/o</b>	buttock	<b>lord/o</b>	bent backward
<b>glyc/o</b>	sugar	<b>lumb/o</b>	loin (low back between ribs and pelvis)
<b>glycos/o</b>	sugar, glucose	<b>lymph/o</b>	lymph
<b>gonad/o</b>	sex glands	<b>lymphaden/o</b>	lymph node
<b>granul/o</b>	granules	<b>lymphangi/o</b>	lymph vessel
<b>gynec/o</b>	woman, female	<b>macul/o</b>	macula lutea
<b>habilitat/o</b>	ability	<b>mamm/o</b>	breast
<b>hal/o</b>	to breathe	<b>mandibul/o</b>	mandible
<b>hallucin/o</b>	imagined perception	<b>mast/o</b>	breast
<b>hem/o</b>	blood	<b>maxill/o</b>	maxilla
<b>hemat/o</b>	blood	<b>meat/o</b>	meatus
<b>hepat/o</b>	liver	<b>medi/o</b>	middle
<b>hidr/o</b>	sweat		

Combining Form	Definition	Combining Form	Definition
<b>medull/o</b>	inner region, medulla oblongata	<b>ot/o</b>	ear
<b>melan/o</b>	black	<b>ov/o, ov/i</b>	ovum
<b>men/o</b>	menses, menstruation	<b>ovari/o</b>	ovary
<b>mening/o</b>	meninges	<b>ox/o, ox/i</b>	oxygen
<b>meningi/o</b>	meninges	<b>palat/o</b>	palate
<b>ment/o</b>	mind	<b>pancreat/o</b>	pancreas
<b>metacarp/o</b>	metacarpus	<b>papill/o</b>	optic disk
<b>metatars/o</b>	metatarsus	<b>parathyroid/o</b>	parathyroid gland
<b>metr/o</b>	uterus	<b>pariet/o</b>	cavity wall
<b>mi/o</b>	lessening	<b>patell/o</b>	patella
<b>mineral/o</b>	minerals, electrolytes	<b>path/o</b>	disease
<b>miss/o</b>	to send back	<b>pector/o</b>	chest
<b>morbid/o</b>	ill	<b>ped/o</b>	child; foot
<b>morph/o</b>	shape	<b>pedicul/o</b>	lice
<b>mort/o</b>	death	<b>pelv/o</b>	pelvis
<b>muc/o</b>	mucus	<b>pen/o</b>	penis
<b>muscul/o</b>	muscle	<b>perine/o</b>	perineum
<b>mutat/o</b>	to change	<b>peripher/o</b>	away from center
<b>my/o</b>	muscle	<b>peritone/o</b>	peritoneum
<b>myc/o</b>	fungus	<b>phac/o</b>	lens
<b>mydr/i</b>	widening	<b>phag/o</b>	eat, swallow
<b>myel/o</b>	bone marrow, spinal cord	<b>phalang/o</b>	phalanges
<b>myocardi/o</b>	heart muscle	<b>pharmac/o</b>	drug
<b>myos/o</b>	muscle	<b>pharyng/o</b>	pharynx
<b>myring/o</b>	tympanic membrane	<b>phleb/o</b>	vein
<b>narc/o</b>	stupor, sleep	<b>phob/o</b>	irrational fear
<b>nas/o</b>	nose	<b>phon/o</b>	sound
<b>nat/o</b>	birth	<b>phot/o</b>	light
<b>natr/o</b>	sodium	<b>phren/o</b>	mind
<b>necr/o</b>	death	<b>physic/o</b>	body
<b>nephr/o</b>	kidney	<b>pineal/o</b>	pineal gland
<b>neur/o</b>	nerve	<b>pituitar/o</b>	pituitary gland
<b>neutr/o</b>	neutral	<b>plant/o</b>	sole of foot
<b>noct/i</b>	night	<b>pleur/o</b>	pleura
<b>nucle/o</b>	nucleus	<b>pneum/o</b>	lung, air
<b>nyctal/o</b>	night	<b>pneumon/o</b>	lung, air
<b>o/o</b>	egg	<b>pod/o</b>	foot
<b>obsess/o</b>	besieged by thoughts	<b>poli/o</b>	gray matter
<b>ocul/o</b>	eye	<b>polyp/o</b>	polyp
<b>odont/o</b>	tooth	<b>pont/o</b>	pons
<b>olig/o</b>	scanty	<b>poster/o</b>	back
<b>onc/o</b>	tumor	<b>presby/o</b>	old age
<b>onych/o</b>	nail	<b>proct/o</b>	rectum and anus
<b>oophor/o</b>	ovary	<b>prostat/o</b>	prostate gland
<b>ophthalm/o</b>	eye	<b>prosthet/o</b>	addition
<b>opt/o</b>	eye, vision	<b>protein/o</b>	protein
<b>optic/o</b>	eye, vision	<b>proxim/o</b>	near to
<b>or/o</b>	mouth	<b>psych/o</b>	mind
<b>orch/o</b>	testes	<b>pub/o</b>	genital region, pubis
<b>orchi/o</b>	testes	<b>pulmon/o</b>	lung
<b>orchid/o</b>	testes	<b>pupill/o</b>	pupil
<b>orth/o</b>	straight, upright, correct	<b>py/o</b>	pus
<b>oste/o</b>	bone	<b>pyel/o</b>	renal pelvis
		<b>pylor/o</b>	pylorus

Combining Form	Definition
<b>pyr/o</b>	fire
<b>radi/o</b>	radius; ray (X-ray), radiation
<b>radic/o</b>	root
<b>radicul/o</b>	nerve root
<b>rect/o</b>	rectum
<b>recumb/o</b>	to lie back
<b>ren/o</b>	kidney
<b>retin/o</b>	retina
<b>rhin/o</b>	nose
<b>rhytid/o</b>	wrinkle
<b>roentgen/o</b>	X-ray
<b>rotat/o</b>	to revolve
<b>sacr/o</b>	sacrum
<b>salping/o</b>	uterine (fallopian) tubes, auditory tube (eustachian tube)
<b>sanguin/o</b>	blood
<b>sarc/o</b>	flesh
<b>scapul/o</b>	scapula
<b>schiz/o</b>	split
<b>scler/o</b>	hard, sclera
<b>scoli/o</b>	crooked
<b>seb/o</b>	oil
<b>sect/o</b>	to cut
<b>sept/o</b>	wall
<b>septic/o</b>	infection
<b>sialaden/o</b>	salivary gland
<b>sigmoid/o</b>	sigmoid colon
<b>sinus/o</b>	sinus
<b>soci/o</b>	society
<b>somat/o</b>	body
<b>somn/o</b>	sleep
<b>son/o</b>	sound
<b>specul/o</b>	to look at
<b>spermat/o</b>	sperm
<b>sphygm/o</b>	pulse
<b>spin/o</b>	spine
<b>spir/o</b>	breathing
<b>splen/o</b>	spleen
<b>spondyl/o</b>	vertebrae
<b>staped/o</b>	stapes
<b>stern/o</b>	sternum
<b>steth/o</b>	chest
<b>stigmat/o</b>	point
<b>super/o</b>	above
<b>synov/o, synovi/o</b>	synovial membrane
<b>system/o</b>	system
<b>tars/o</b>	tarsus
<b>ten/o</b>	tendon

Suffix	Definition
<b>-ac</b>	pertaining to
<b>-al</b>	pertaining to
<b>-algia</b>	pain
<b>-an</b>	pertaining to

Combining Form	Definition
<b>tenacul/o</b>	to hold
<b>tend/o, tendin/o</b>	tendon
<b>testicul/o</b>	testicle
<b>thalam/o</b>	thalamus
<b>thec/o</b>	sheath (meninges)
<b>theli/o</b>	nipple
<b>therm/o</b>	heat
<b>thorac/o</b>	chest
<b>thromb/o</b>	clot
<b>thym/o</b>	thymus gland
<b>thyr/o</b>	thyroid gland
<b>thyroid/o</b>	thyroid gland
<b>tibi/o</b>	tibia
<b>tom/o</b>	to cut
<b>ton/o</b>	tone
<b>tonsill/o</b>	tonsils
<b>topic/o</b>	a specific area
<b>tox/o, toxic/o</b>	poison
<b>trache/o</b>	trachea
<b>trich/o</b>	hair
<b>tuss/o</b>	cough
<b>tympan/o</b>	tympanic membrane
<b>uln/o</b>	ulna
<b>ungu/o</b>	nail
<b>ur/o</b>	urine
<b>ureter/o</b>	ureter
<b>urethr/o</b>	urethra
<b>urin/o</b>	urine
<b>uter/o</b>	uterus
<b>uve/o</b>	choroid
<b>vagin/o</b>	vagina
<b>valv/o</b>	valve
<b>valvul/o</b>	valve
<b>varic/o</b>	dilated vein
<b>vas/o</b>	vessel, vas deferens
<b>vascul/o</b>	blood vessel
<b>ven/o</b>	vein
<b>ventr/o</b>	belly
<b>ventricul/o</b>	ventricle
<b>vers/o</b>	to turn
<b>vertebr/o</b>	vertebra
<b>vesic/o</b>	sac, bladder
<b>vesicul/o</b>	seminal vesicle
<b>vestibul/o</b>	vestibule
<b>viscer/o</b>	internal organ
<b>vitre/o</b>	glassy
<b>vulv/o</b>	vulva
<b>xer/o</b>	dry

Suffix	Definition
<b>-apheresis</b>	removal, carry away
<b>-ar</b>	pertaining to
<b>-arche</b>	beginning
<b>-ary</b>	pertaining to

Suffix	Definition
<b>-asthenia</b>	weakness
<b>-atic</b>	pertaining to
<b>-blast</b>	immature
<b>-capnia</b>	carbon dioxide
<b>-cardia</b>	heart condition
<b>-cele</b>	protrusion
<b>-centesis</b>	puncture to withdraw fluid
<b>-cide</b>	to kill
<b>-clasia</b>	to surgically break
<b>-crit</b>	separation of
<b>-cusis</b>	hearing
<b>-cysis</b>	state of pregnancy
<b>-cyte</b>	cell
<b>-cytic</b>	pertaining to cells
<b>-cytosis</b>	more than the normal number of cells
<b>-derma</b>	skin condition
<b>-desis</b>	to fuse
<b>-dipsia</b>	thirst
<b>-dynia</b>	pain
<b>-eal</b>	pertaining to
<b>-ectasis</b>	dilation
<b>-ectomy</b>	surgical removal
<b>-edema</b>	swelling
<b>-emesis</b>	vomit
<b>-emetic</b>	pertaining to vomiting
<b>-emia</b>	blood condition
<b>-emic</b>	pertaining to a blood condition
<b>-gen</b>	that which produces
<b>-genesis</b>	produces
<b>-genic</b>	producing
<b>-globin</b>	protein
<b>-globulin</b>	protein
<b>-gram</b>	record or picture
<b>-graphy</b>	process of recording
<b>-gravida</b>	pregnancy
<b>-ia</b>	state, condition
<b>-iac</b>	pertaining to
<b>-iasis</b>	abnormal condition
<b>-iatic</b>	pertaining to medical treatment
<b>-iatrist</b>	physician
<b>-iatry</b>	medical treatment
<b>-ic</b>	pertaining to
<b>-ical</b>	pertaining to
<b>-ician</b>	specialist
<b>-ile</b>	pertaining to
<b>-ine</b>	pertaining to
<b>-ion</b>	action
<b>-ior</b>	pertaining to
<b>-ism</b>	state of
<b>-ist</b>	specialist
<b>-istry</b>	specialty of
<b>-itis</b>	inflammation
<b>-kinesia</b>	movement

Suffix	Definition
<b>-lepsy</b>	seizure
<b>-listhesis</b>	slipping
<b>-lith</b>	stone
<b>-lithiasis</b>	condition of stones
<b>-logic</b>	pertaining to study of
<b>-logist</b>	one who studies
<b>-logy</b>	study of
<b>-lucent</b>	to shine through
<b>-lysis</b>	to destroy (to break down)
<b>-lytic</b>	destruction
<b>-malacia</b>	abnormal softening
<b>-mania</b>	frenzy
<b>-manometer</b>	instrument to measure pressure
<b>-megaly</b>	enlarged
<b>-meter</b>	instrument for measuring
<b>-metrist</b>	specialist in measuring
<b>-metry</b>	process of measuring
<b>-nic</b>	pertaining to
<b>-nomics</b>	pertaining to laws
<b>-oid</b>	resembling
<b>-ole</b>	small
<b>-oma</b>	tumor, mass
<b>-opaque</b>	nontransparent
<b>-opia</b>	vision condition
<b>-opsia</b>	vision condition
<b>-opsy</b>	view of
<b>-orexia</b>	appetite
<b>-ory</b>	pertaining to
<b>-ose</b>	pertaining to
<b>-osis</b>	abnormal condition
<b>-osmia</b>	smell
<b>-ostomy</b>	surgically create an opening
<b>-otia</b>	ear condition
<b>-otomy</b>	cutting into
<b>-ous</b>	pertaining to
<b>-para</b>	to bear (offspring)
<b>-paresis</b>	weakness
<b>-partum</b>	childbirth
<b>-pathy</b>	disease
<b>-penia</b>	abnormal decrease, too few
<b>-pepsia</b>	digestion
<b>-pexy</b>	surgical fixation
<b>-phage</b>	to eat
<b>-phagia</b>	eat, swallow
<b>-phasia</b>	speech
<b>-phil</b>	attracted to
<b>-philia</b>	condition of being attracted to
<b>-philic</b>	pertaining to being attracted to
<b>-phobia</b>	fear
<b>-phonia</b>	voice
<b>-phoresis</b>	carrying
<b>-phoria</b>	condition to bear
<b>-phylaxis</b>	protection

**Suffix**

**-plasia**  
**-plasm**  
**-plastic**  
**-plastin**  
**-plasty**  
**-plegia**  
**-pnea**  
**-poiesis**  
**-porosis**  
**-prandial**  
**-pressin**  
**-ptosis**  
**-ptysis**  
**-rrhage**  
**-rrhagia**  
**-rrhagic**  
**-rrhaphy**  
**-rrhea**  
**-rrhexis**  
**-salpinx**  
**-sclerosis**  
**-scope**  
**-scopic**

**Definition**

formation of cells  
 formation  
 pertaining to formation  
 formation  
 surgical repair  
 paralysis  
 breathing  
 formation  
 porous  
 pertaining to a meal  
 to press down  
 drooping  
 spitting  
 excessive, abnormal flow  
 abnormal flow condition  
 pertaining to abnormal flow  
 to suture  
 discharge  
 rupture  
 uterine tube  
 hardening  
 instrument for viewing  
 pertaining to visually  
 examining

**Suffix**

**-scopy**  
**-spasm**  
**-spermia**  
**-stasis**  
**-stat**  
**-stenosis**  
**-taxia**  
**-tension**  
**-therapy**  
**-thorax**  
**-tic**  
**-tocia**  
**-tome**  
**-tonia**  
**-tonic**  
**-toxic**  
**-tripsy**  
**-trophic**  
**-trophy**  
**-tropia**  
**-tropic**  
**-tropin**  
**-ule**  
**-uria**

**Definition**

process of visually examining  
 involuntary muscle contraction  
 condition of sperm  
 standing still  
 to keep from moving  
 narrowing  
 muscle coordination  
 pressure  
 treatment  
 chest  
 pertaining to  
 labor, childbirth  
 instrument to cut  
 tone  
 pertaining to tone  
 pertaining to poison  
 surgical crushing  
 pertaining to development  
 development  
 turned condition  
 pertaining to stimulating  
 to stimulate  
 small  
 condition of the urine



## Appendix II

### Word Parts Arranged Alphabetically by Definition

The definitions of the word parts that have been presented in this textbook are presented here and are arranged alphabetically. Prefixes are listed first, followed by combining forms and suffixes.

Definition	Prefix	Definition	Prefix
abnormal	<b>dys-, para-</b>	inward	<b>eso-</b>
above	<b>epi-</b>	large	<b>macro-</b>
across	<b>trans-</b>	many	<b>multi-, poly-</b>
after	<b>post-</b>	new	<b>neo-</b>
again	<b>re-</b>	none	<b>nulli-</b>
against	<b>anti-, contra-</b>	normal	<b>eu-</b>
all	<b>pan-</b>	not	<b>non-, un-</b>
apart	<b>dis-</b>	not; inward	<b>in-</b>
around	<b>circum-, peri-</b>	one	<b>mono-</b>
away from	<b>ab-</b>	other, different from usual	<b>allo-</b>
backward; behind	<b>retro-</b>	outside of	<b>extra-</b>
before	<b>pre-, pro-</b>	outward	<b>e-, ex-, exo-</b>
before, in front of	<b>ante-</b>	painful; difficult; abnormal	<b>dys-</b>
below; insufficient	<b>hypo-</b>	partial	<b>semi-</b>
beside; abnormal; two like parts of a pair	<b>para-</b>	same	<b>homo-</b>
between	<b>inter-</b>	self	<b>auto-</b>
beyond	<b>meta-, ultra-</b>	to shut	<b>myo-</b>
different	<b>hetero-</b>	slow	<b>brady-</b>
excessive	<b>hyper-</b>	small	<b>micro-</b>
false	<b>pseudo-</b>	three	<b>tri-</b>
fast	<b>tachy-</b>	through	<b>per-</b>
first	<b>primi-</b>	toward	<b>ad-</b>
foreign	<b>xeno-</b>	two	<b>bi-, di-</b>
four	<b>quadri-, tetra-</b>	under	<b>sub-</b>
half	<b>hemi-</b>	within	<b>intra-</b>
inward	<b>en-</b>	within; inner	<b>endo-</b>
		without	<b>a-, an-, de-</b>
Definition	Combining Form	Definition	Combining Form
ability	<b>habilitat/o</b>	away from center	<b>peripher/o</b>
above	<b>super/o</b>	axilla, underarm	<b>axill/o</b>
addition	<b>prosthet/o</b>	back	<b>dors/o, poster/o</b>
adenoids	<b>adenoid/o</b>	bacteria	<b>bacteri/o</b>
adrenal glands	<b>adren/o, adrenal/o</b>	base	<b>bas/o</b>
air	<b>aer/o</b>	belly	<b>ventr/o</b>
alveolus	<b>alveol/o</b>	below	<b>infer/o</b>
amnion	<b>amni/o</b>	to bend	<b>flex/o</b>
anus	<b>an/o</b>	bent backward	<b>lord/o</b>
aorta	<b>aort/o</b>	besieged by thoughts	<b>obsess/o</b>
appendix	<b>append/o, appendic/o</b>	bile duct	<b>cholangi/o</b>
arm	<b>brachi/o</b>	bile, gall	<b>chol/e</b>
artery	<b>arteri/o</b>	birth	<b>nat/o</b>
atrium	<b>atri/o</b>	black	<b>melan/o</b>
auditory tube (eustachian tube)	<b>salping/o</b>	blood	<b>hem/o, hemat/o, sanguin/o</b>
away from	<b>dist/o</b>	blood vessel	<b>vascul/o</b>

**Definition**

blue  
body

bone  
bone marrow, spinal cord  
to box  
brain  
breast  
to breathe  
to breathe in  
breathing  
to bring  
bronchiole  
bronchus  
to burn  
buttock  
calcium  
cancer  
carpus  
cartilage  
cavity wall  
cecum  
cell  
center  
cerebellum  
cerebrum  
cerumen  
to change  
cheek  
chemical, drug  
chest

child; foot  
chorion  
choroid  
ciliary body  
clavicle  
clot  
clotting  
clumping  
coal  
coccyx  
cochlea  
cold  
colon  
color  
common bile duct  
conjunctiva  
cornea  
correct, proper  
cough  
crooked  
cul-de-sac  
to cut

**Combining Form**

**cyan/o**  
**corpor/o, physic/o,**  
**somat/o**  
**oste/o**  
**myel/o**  
**capsul/o**  
**encephal/o**  
**mamm/o, mast/o**  
**hal/o**  
**aspir/o**  
**spir/o**  
**duct/o**  
**bronchiol/o**  
**bronch/o, bronchi/o**  
**cauter/o**  
**glute/o**  
**calc/o**  
**carcin/o**  
**carp/o**  
**chondr/o**  
**pariet/o**  
**cec/o**  
**cyt/o**  
**centr/o**  
**cerebell/o**  
**cerebr/o**  
**cerumin/o**  
**mutat/o**  
**bucc/o**  
**chem/o**  
**pector/o, steth/o,**  
**thorac/o**  
**ped/o**  
**chori/o**  
**uve/o**  
**cycl/o**  
**clavicul/o, cleid/o**  
**thromb/o**  
**coagul/o**  
**agglutin/o**  
**anthrac/o**  
**coccyg/o**  
**cochle/o**  
**cry/o**  
**col/o, colon/o**  
**chrom/o, chromat/o**  
**choledoch/o**  
**conjunctiv/o**  
**corne/o**  
**emmetr/o**  
**tuss/o**  
**scoli/o**  
**culd/o**  
**cis/o, sect/o, tom/o**

**Definition**

death  
diaphragm  
dilated vein  
disease  
distinctive  
double  
drive, compel  
drug  
dry  
dull, dim  
duodenum  
dura mater  
dust  
ear  
eat, swallow  
egg  
electricity  
embryo  
epididymis  
epiglottis  
epithelium  
esophagus  
extremities  
eye  
eye, vision  
eyelid  
false belief  
fat  
fatty substance  
fear, worry  
female  
femur  
fetus  
fibers  
fibrous band  
fibula  
fire  
flesh  
fluorescence, luminous  
foot  
forgetfulness  
front  
fungus  
gallbladder  
genital  
genital region, pubis  
gland  
glans penis  
glassy  
glomerulus  
glucose  
glue  
granules  
gray

**Combining Form**

**mort/o, necr/o**  
**diaphragmat/o**  
**varic/o**  
**path/o**  
**idi/o**  
**dipl/o**  
**compuls/o**  
**pharmac/o**  
**xer/o**  
**ambly/o**  
**duoden/o**  
**dur/o**  
**coni/o**  
**aur/o, auricul/o, ot/o**  
**phag/o**  
**o/o**  
**electr/o**  
**embryo/o**  
**epididym/o**  
**epiglott/o**  
**epitheli/o**  
**esophag/o**  
**acr/o**  
**ocul/o, ophthalm/o**  
**opt/o, optic/o**  
**blephar/o**  
**delus/o**  
**adip/o, lip/o**  
**ather/o**  
**anxi/o**  
**estr/o, gynec/o**  
**femor/o**  
**fet/o**  
**fibr/o, fibrin/o**  
**fasci/o**  
**fibul/o**  
**pyr/o**  
**sarc/o**  
**fluor/o**  
**pod/o**  
**amnes/o**  
**anter/o**  
**myc/o**  
**cholecyst/o**  
**genit/o**  
**pub/o**  
**aden/o**  
**balan/o**  
**vitre/o**  
**glomerul/o**  
**gluc/o**  
**gli/o**  
**granul/o**  
**glauc/o**

**Definition**

gray matter  
groin region  
gums  
hair  
hard, horny, cornea  
hard, sclera  
head  
hearing  
heart  
heart muscle  
heat  
hidden  
to hold  
to hold back  
humerus  
hump  
hymen  
ileum  
ilium  
ill  
imagined perception  
immature  
immunity, protection  
incomplete  
infection  
inner region, medulla oblongata  
internal organ  
iodine  
iris  
irrational fear  
ischium  
jejunum  
joint  
ketones  
kidney  
labyrinth (inner ear)  
lamina (part of vertebra)  
larynx  
leg  
lens  
lessening  
lice  
to lie back  
life  
light  
lip  
liver  
lobe  
loin (low back between ribs and pelvis)  
to look at  
lung  
lung, air

**Combining Form**

**poli/o**  
**inguin/o**  
**gingiv/o**  
**trich/o**  
**kerat/o**  
**scler/o**  
**cephal/o**  
**acous/o, audi/o, audit/o**  
**cardi/o, coron/o**  
**myocardi/o**  
**therm/o**  
**crypt/o**  
**tenacul/o**  
**isch/o**  
**humer/o**  
**kyph/o**  
**hymen/o**  
**ile/o**  
**ili/o**  
**morbid/o**  
**hallucin/o**  
**blast/o**  
**immun/o**  
**atel/o**  
**septic/o**  
**medull/o**  
  
**viscer/o**  
**iod/o**  
**ir/o, irid/o**  
**phob/o**  
**ischi/o**  
**jejun/o**  
**arthr/o, articul/o**  
**ket/o, keton/o**  
**nephr/o, ren/o**  
**labyrinth/o**  
**lamin/o**  
**laryng/o**  
**crur/o**  
**phac/o**  
**mi/o**  
**pedicul/o**  
**recumb/o**  
**bi/o**  
**phot/o**  
**labi/o**  
**hepat/o**  
**lob/o**  
**lumb/o**  
  
**specul/o**  
**pulmon/o**  
**pneum/o, pneumon/o**

**Definition**

lymph  
lymph node  
lymph vessel  
macula lutea  
male  
mandible  
maxilla  
meatus  
meninges  
menses, menstruation  
metacarpus  
metatarsus  
middle  
milk  
mind  
  
minerals, electrolytes  
mouth  
movement  
mucus  
muscle  
nail  
near to  
neck, cervix  
nerve  
nerve root  
neutral  
night  
nipple  
nitrogenous waste  
nose  
nucleus  
oil  
old age  
optic disk  
outer layer  
ovary  
ovum  
oxygen  
pain, sense of pain  
palate  
pancreas  
parathyroid gland  
patella  
pelvis  
penis  
perineum  
peritoneum  
phalanges  
pharynx  
physician, medicine, treatment  
pineal gland  
pituitary gland

**Combining Form**

**lymph/o**  
**lymphaden/o**  
**lymphangi/o**  
**macul/o**  
**andr/o**  
**mandibul/o**  
**maxill/o**  
**meat/o**  
**mening/o, meningi/o**  
**men/o**  
**metacarp/o**  
**metatars/o**  
**medi/o**  
**lact/o**  
**ment/o, phren/o,**  
**psych/o**  
**mineral/o**  
**or/o**  
**kinesi/o**  
**muc/o**  
**muscul/o, my/o, myos/o**  
**onych/o, ungu/o**  
**proxim/o**  
**cervic/o**  
**neur/o**  
**radicul/o**  
**neutr/o**  
**noct/i, nyctal/o**  
**theli/o**  
**azot/o**  
**nas/o, rhin/o**  
**nucle/o**  
**seb/o**  
**presby/o**  
**papill/o**  
**cortic/o**  
**oophor/o, ovari/o**  
**ov/o, ov/i**  
**ox/o, ox/i**  
**alges/o**  
**palat/o**  
**pancreat/o**  
**parathyroid/o**  
**patell/o**  
**pelv/o**  
**pen/o**  
**perine/o**  
**peritone/o**  
**phalang/o**  
**pharyng/o**  
**iatr/o**  
  
**pineal/o**  
**pituitar/o**

**Definition**

pleura  
 plug  
 point  
 poison  
 polyp  
 pons  
 potassium  
 pouch  
 pouring  
 to press down  
 profuse sweating  
 prostate gland  
 protein  
 pulse  
 pupil  
 pus  
 pylorus  
 radius; ray (X-ray), radiation  
 rapid contracting and  
   relaxing  
 rectum  
 rectum and anus  
 red  
 renal pelvis  
 retina  
 to revolve  
 rib  
 root  
 rosy red  
 sac, bladder  
 sac, bursa  
 sac, urinary bladder, pouch  
 sacrum  
 salivary gland  
 sameness  
 scaly, dry  
 scanty  
 scapula  
 to secrete  
 seminal vesicle  
 to send back  
 sensation, feeling  
 sex glands  
 to shake violently  
 shape  
 sheath (meninges)  
 side  
 sigmoid colon  
 sinus  
 skin  
  
 skull  
 sleep  
 to slide back

**Combining Form**

**pleur/o**  
**embol/o**  
**stigmat/o**  
**tox/o, toxic/o**  
**polyp/o**  
**pont/o**  
**kal/i**  
**diverticul/o**  
**fus/o**  
**depress/o**  
**diaphor/o**  
**prostat/o**  
**protein/o**  
**sphygm/o**  
**core/o, pupill/o**  
**py/o**  
**pylor/o**  
**radi/o**  
**clon/o**  
  
**rect/o**  
**proct/o**  
**erythr/o**  
**pyel/o**  
**retin/o**  
**rotat/o**  
**cost/o**  
**radic/o**  
**eosin/o**  
**vesic/o**  
**burs/o**  
**cyst/o**  
**sacr/o**  
**sialaden/o**  
**home/o**  
**ichthy/o**  
**olig/o**  
**scapul/o**  
**crin/o**  
**vesicul/o**  
**miss/o**  
**esthesi/o**  
**gonad/o**  
**concuss/o**  
**morph/o**  
**thec/o**  
**later/o**  
**sigmoid/o**  
**sinus/o**  
**cutane/o, dermat/o,**  
**dermat/o**  
**crani/o**  
**somn/o**  
**laps/o**

**Definition**

small intestine  
 society  
 sodium  
 sole of foot  
 sound  
 specific area  
 sperm  
 spine  
 spleen  
 split  
 stapes  
 star  
 to steal  
 sternum  
 stiff joint  
 stomach  
 stone  
 straight, upright, correct  
 to stretch out  
 stupor, sleep  
 sugar  
 sugar, glucose  
 sweat  
 synovial membrane  
 system  
 tail  
 tarsus  
 tears  
 tendon  
 testes  
  
 testicle  
 thalamus  
 thymus gland  
 thyroid gland  
 tibia  
 tissue  
 tone  
 tongue  
 tonsils  
 tooth  
 trachea  
 tumor  
 to turn  
 tympanic membrane  
 ulna  
 ureter  
 urethra  
 urine  
 uterine (fallopian) tubes  
 water  
 to widen  
 woman  
 yellow

**Combining Form**

**enter/o**  
**soci/o**  
**natr/o**  
**plant/o**  
**phon/o, son/o**  
**topic/o**  
**spermat/o**  
**spin/o**  
**splen/o**  
**schiz/o**  
**staped/o**  
**astr/o**  
**klept/o**  
**stern/o**  
**ankyl/o**  
**gastr/o**  
**lith/o**  
**orth/o**  
**extens/o**  
**narc/o**  
**glyc/o**  
**glycos/o**  
**hidr/o**  
**synov/o, synovi/o**  
**system/o**  
**caud/o**  
**tars/o**  
**dacry/o, lacrim/o**  
**ten/o, tend/o, tendin/o**  
**orch/o, orchi/o,**  
**orchid/o**  
**testicul/o**  
**thalam/o**  
**thym/o**  
**thyr/o, thyroid/o**  
**tibi/o**  
**hist/o**  
**ton/o**  
**gloss/o, lingu/o**  
**tonsill/o**  
**dent/o, odont/o**  
**trache/o**  
**onc/o**  
**vers/o**  
**myring/o, tympan/o**  
**uln/o**  
**ureter/o**  
**urethr/o**  
**ur/o, urin/o**  
**salping/o**  
**hydr/o**  
**dilat/o**  
**gynec/o**  
**cirrh/o**

**Definition**

abnormal condition  
 abnormal decrease, too few  
 abnormal flow (pertaining to)  
 abnormal flow condition  
 abnormal softening  
 action  
 appetite  
 attracted to  
 to bear (offspring)  
 beginning  
 being attracted to (condition of)  
 being attracted to (pertaining to)  
 blood condition  
 blood condition (pertaining to a)  
 breathing  
 carbon dioxide  
 carrying  
 cell  
 cells (pertaining to)  
 chest  
 childbirth  
 condition (abnormal)  
 condition of being attracted to  
 condition of sperm  
 condition of stones  
 condition of the urine  
 condition to bear  
 crushing (surgical)  
 cut (instrument to)  
 cutting into  
 decrease, too few (abnormal)  
 to destroy (to break down)  
 destruction  
 development  
 development (pertaining to)  
 digestion  
 dilation  
 discharge  
 disease  
 drooping  
 ear condition  
 to eat  
 eat, swallow  
 enlarged  
 excessive, abnormal flow  
 fear  
 fixation (surgical)  
 flow condition (abnormal)  
 formation

formation (pertaining to)  
 formation of cells  
 frenzy  
 to fuse

**Suffix**

**-iasis, -osis**  
**-penia**  
**-rrhagic**  
**-rrhagia**  
**-malacia**  
**-ion**  
**-orexia**  
**-phil**  
**-para**  
**-arche**  
**-philia**  
**-philic**  
**-emia**  
**-emic**  
**-pnea**  
**-capnia**  
**-phoresis**  
**-cyte**  
**-cytic**  
**-thorax**  
**-partum**  
**-iasis, -osis**  
**-philia**  
**-spermia**  
**-lithiasis**  
**-uria**  
**-phoria**  
**-tripsy**  
**-tome**  
**-otomy**  
**-penia**  
**-lysis**  
**-lytic**  
**-trophy**  
**-trophic**  
**-pepsia**  
**-ectasis**  
**-rrhea**  
**-pathy**  
**-ptosis**  
**-otia**  
**-phage**  
**-phagia**  
**-megaly**  
**-rrhage**  
**-phobia**  
**-pexy**  
**-rrhagia**  
**-plasm, -plastin,**  
**-poiesis**  
**-plastic**  
**-plasia**  
**-mania**  
**-desis**

**Definition**

hardening  
 hearing  
 heart condition  
 immature  
 inflammation  
 instrument for measuring  
 instrument for viewing  
 instrument to cut  
 instrument to measure  
   pressure  
 involuntary muscle contraction  
 to keep from moving  
 to kill  
 labor, childbirth  
 laws (pertaining to)  
 meal (pertaining to a)  
 measure pressure  
   (instrument to)  
 measuring (instrument for)  
 measuring (process of)  
 medical treatment  
 medical treatment (pertaining to)  
 more than the normal number  
   of cells  
 movement  
 muscle coordination  
 narrowing  
 nontransparent  
 one who studies  
 opening (surgically create an)  
 pain  
 pain  
 paralysis  
 pertaining to

pertaining to a blood condition  
 pertaining to a meal  
 pertaining to abnormal flow  
 pertaining to being attracted to  
 pertaining to cells  
 pertaining to development  
 pertaining to formation  
 pertaining to laws  
 pertaining to medical treatment  
 pertaining to poison  
 pertaining to stimulating  
 pertaining to study of  
 pertaining to tone  
 pertaining to visually examining  
 pertaining to vomiting  
 physician

**Suffix**

**-sclerosis**  
**-cusis**  
**-cardia**  
**-blast**  
**-itis**  
**-meter**  
**-scope**  
**-tome**  
**-manometer**  
  
**-spasm**  
**-stat**  
**-cide**  
**-tocia**  
**-nomics**  
**-prandial**  
**-manometer**  
  
**-meter**  
**-metry**  
**-iatry**  
**-iatric**  
**-cytosis**  
  
**-kinesia**  
**-taxia**  
**-stenosis**  
**-opaque**  
**-logist**  
**-ostomy**  
**-algia**  
**-dynia**  
**-plegia**  
**-ac, -al, -an, -ar,**  
**-ary, -atic, -eal, -ia,**  
**-iac, -ic, -ical, -ile,**  
**-ine, -ior, -nic, -ory,**  
**-ose, -ous, -tic**  
**-emic**  
**-prandial**  
**-rrhagic**  
**-philic**  
**-cytic**  
**-trophic**  
**-plastic**  
**-nomics**  
**-iatric**  
**-toxic**  
**-tropic**  
**-logic**  
**-tonic**  
**-scopic**  
**-emetic**  
**-iatrist**

**Definition**

poison (pertaining to)  
 porous  
 pregnancy  
 to press down  
 pressure  
 process of measuring  
 process of recording  
 process of visually examining  
 produces  
 producing  
 protection  
 protein  
 protrusion  
 puncture to withdraw fluid  
 recording (process of)  
 record or picture  
 removal, carry away  
 removal (surgical)  
 repair (surgical)  
 resembling  
 rupture  
 seizure  
 separation of  
 to shine through  
 skin condition  
 slipping  
 small  
 smell  
 softening (abnormal)  
 specialist  
 specialist in measuring  
 specialty of  
 speech  
 sperm (condition of)  
 spitting  
 standing still  
 state of  
 state of pregnancy  
 state, condition  
 to stimulate  
 stimulating (pertaining to)

**Suffix**

**-toxic**  
**-porosis**  
**-gravid**  
**-pressin**  
**-tension**  
**-metry**  
**-graphy**  
**-scopy**  
**-genesis**  
**-genic**  
**-phylaxis**  
**-globin, -globulin**  
**-cele**  
**-centesis**  
**-graphy**  
**-gram**  
**-apheresis**  
**-ectomy**  
**-plasty**  
**-oid**  
**-rrhexis**  
**-lepsy**  
**-crit**  
**-lucent**  
**-derma**  
**-listhesis**  
**-ole, -ule**  
**-osmia**  
**-malacia**  
**-ician, -ist**  
**-metrist**  
**-istry**  
**-phasia**  
**-spermia**  
**-ptysis**  
**-stasis**  
**-ism**  
**-cyesis**  
**-ia**  
**-tropin**  
**-tropic**

**Definition**

stone  
 stones (condition of)  
 study of  
 study of (pertaining to)  
 surgical crushing  
 surgical fixation  
 to surgically break  
 surgical removal  
 surgical repair  
 surgically create an opening  
 to suture  
 swelling  
 that which produces  
 thirst  
 to bear (offspring)  
 to destroy (to break down)  
 to eat  
 to fuse  
 to kill  
 to press down  
 to shine through  
 to stimulate  
 to surgically break  
 to suture  
 tone  
 tone (pertaining to)  
 treatment  
 tumor, mass  
 turned condition  
 the urine (condition of)  
 uterine tube  
 view of  
 viewing (instrument for)  
 vision condition  
 visually examining (pertaining to)  
 visually examining (process of)  
 voice  
 vomit  
 vomiting (pertaining to)  
 weakness

**Suffix**

**-lith**  
**-lithiasis**  
**-logy**  
**-logic**  
**-tripsy**  
**-pexy**  
**-clasia**  
**-ectomy**  
**-plasty**  
**-ostomy**  
**-rrhaphy**  
**-edema**  
**-gen**  
**-dipsia**  
**-para**  
**-lysis**  
**-phage**  
**-desis**  
**-cide**  
**-pressin**  
**-lucent**  
**-tropin**  
**-clasia**  
**-rrhaphy**  
**-tonia**  
**-tonic**  
**-therapy**  
**-oma**  
**-tropia**  
**-uria**  
**-salpinx**  
**-opsy**  
**-scope**  
**-opia, -opsia**  
**-scopic**  
**-scopy**  
**-phonia**  
**-emesis**  
**-emetic**  
**-asthenia, -paresis**



# Appendix III

## Abbreviations

Abbreviation	Meaning	Abbreviation	Meaning
$\dot{\text{I}}$	one	<b>ASA</b>	aspirin
$\ddot{\text{I}}$	two	<b>ASD</b>	atrial septal defect
$\text{I}\ddot{\text{I}}$	three	<b>ASHD</b>	arteriosclerotic heart disease
@	at	<b>ASL</b>	American Sign Language
5-FU	5-fluorouracil	<b>AST</b>	aspartate transaminase
$^{67}\text{Ga}$	radioactive gallium	<b>Astigm</b>	astigmatism
$^{99\text{m}}\text{Tc}$	radioactive technetium	<b>ATN</b>	acute tubular necrosis
$^{131}\text{I}$	radioactive iodine	<b>AU</b>	both ears
$^{133}\text{Xe}$	radioactive xenon	<b>AV, A-V</b>	atrioventricular
$^{201}\text{Tl}$	radioactive thallium	$\beta$	beta
$\alpha$	alpha	<b>Ba</b>	barium
$\bar{a}$	before	<b>BaE</b>	barium enema
<b>AAROM</b>	active assistive range of motion	<b>basos</b>	basophils
<b>AB</b>	abortion	<b>BBB</b>	bundle branch block (L for left; R for right)
<b>ABGs</b>	arterial blood gases	<b>BC</b>	bone conduction
<b>ac</b>	before meals	<b>BCC</b>	basal cell carcinoma
<b>ACTH</b>	adrenocorticotrophic hormone	<b>BDT</b>	bone density testing
<b>AD</b>	Alzheimer's disease, right ear	<b>BE</b>	barium enema, below elbow
<b>ad lib</b>	as desired	<b>bid</b>	twice a day
<b>ADD</b>	attention-deficit disorder	<b>BK</b>	below knee
<b>ADH</b>	antidiuretic hormone	<b>BM</b>	bowel movement
<b>ADHD</b>	attention-deficit/hyperactivity disorder	<b>BMR</b>	basal metabolic rate
<b>ADL</b>	activities of daily living	<b>BMT</b>	bone marrow transplant
<b>AE</b>	above elbow	<b>BNO</b>	bladder neck obstruction
<b>AED</b>	automated external defibrillator	<b>BP</b>	blood pressure
<b>AF</b>	atrial fibrillation	<b>BPD</b>	bipolar disorder
<b>AGN</b>	acute glomerulonephritis	<b>BPH</b>	benign prostatic hyperplasia
<b>AI</b>	artificial insemination	<b>bpm</b>	beats per minute
<b>AIDS</b>	acquired immunodeficiency syndrome	<b>Bronch</b>	bronchoscopy
<b>AK</b>	above knee	<b>BS</b>	bowel sounds
<b>ALL</b>	acute lymphocytic leukemia	<b>BSE</b>	breast self-examination
<b>ALS</b>	amyotrophic lateral sclerosis	<b>BUN</b>	blood urea nitrogen
<b>ALT</b>	alanine transaminase	<b>bx, BX</b>	biopsy
<b>AMI</b>	acute myocardial infarction	$\bar{c}$	with
<b>AML</b>	acute myelogenous leukemia	<b>C&amp;S</b>	culture and sensitivity
<b>Angio</b>	angiography	<b>c.gl.</b>	correction with glasses
<b>ANS</b>	autonomic nervous system	<b>C1, C2, etc.</b>	first cervical vertebra, second cervical vertebra, etc.
<b>ante</b>	before	<b>Ca</b>	calcium, cancer
<b>AP</b>	anteroposterior	<b>CA</b>	chronological age
<b>APAP</b>	acetaminophen (Tylenol™)	<b>CABG</b>	coronary artery bypass graft
<b>aq</b>	aqueous (water)	<b>CAD</b>	coronary artery disease
<b>ARC</b>	AIDS-related complex	<b>cap(s)</b>	capsule(s)
<b>ARDS</b>	adult (or acute) respiratory distress syndrome	<b>CAPD</b>	continuous ambulatory peritoneal dialysis
<b>ARF</b>	acute renal failure	<b>CAT</b>	computerized axial tomography
<b>ARMD</b>	age-related macular degeneration	<b>cath</b>	catheterization
<b>AROM</b>	active range of motion	<b>CBC</b>	complete blood count
<b>AS</b>	arteriosclerosis, left ear	<b>CBD</b>	common bile duct

Abbreviation	Meaning	Abbreviation	Meaning
<b>CC</b>	cardiac catheterization, chief complaint, clean catch urine specimen	<b>dtd</b>	give of such a dose
<b>CCU</b>	coronary care unit	<b>DTR</b>	deep tendon reflex
<b>CF</b>	cystic fibrosis	<b>DVA</b>	distance visual acuity
<b>chemo</b>	chemotherapy	<b>DVT</b>	deep vein thrombosis
<b>CHF</b>	congestive heart failure	<b>Dx</b>	diagnosis
<b>Ci</b>	curie	<b>DXA</b>	dual-energy absorptiometry
<b>CIS</b>	carcinoma in situ	<b>ECC</b>	extracorporeal circulation
<b>Cl<sup>-</sup></b>	chloride	<b>ECCE</b>	extracapsular cataract extraction
<b>CLL</b>	chronic lymphocytic leukemia	<b>ECG, EKG</b>	electrocardiogram
<b>CML</b>	chronic myelogenous leukemia	<b>ECHO</b>	echocardiogram
<b>CNS</b>	central nervous system	<b>ECT</b>	electroconvulsive therapy
<b>CO<sub>2</sub></b>	carbon dioxide	<b>ED</b>	erectile dysfunction
<b>CoA</b>	coarctation of the aorta	<b>EDC</b>	estimated date of confinement
<b>COPD</b>	chronic obstructive pulmonary disease	<b>EEG</b>	electroencephalogram, electroencephalography
<b>CP</b>	cerebral palsy, chest pain	<b>EENT</b>	eye, ear, nose, and throat
<b>CPK</b>	creatine phosphokinase	<b>EGD</b>	esophagogastroduodenoscopy
<b>CPR</b>	cardiopulmonary resuscitation	<b>ELISA</b>	enzyme-linked immunosorbent assay
<b>CRF</b>	chronic renal failure	<b>EM</b>	emmetropia
<b>CS, C-section</b>	cesarean section	<b>EMB</b>	endometrial biopsy
<b>CSD</b>	congenital septal defect	<b>EMG</b>	electromyogram
<b>CSF</b>	cerebrospinal fluid	<b>Endo</b>	endoscopy
<b>CT</b>	calcitonin, computerized tomography	<b>ENT</b>	ear, nose, and throat
<b>CTA</b>	clear to auscultation	<b>EOM</b>	extraocular movement
<b>CTS</b>	carpal tunnel syndrome	<b>eosins, eos</b>	eosinophils
<b>CV</b>	cardiovascular	<b>ERCP</b>	endoscopic retrograde cholangiopancreatography
<b>CVA</b>	cerebrovascular accident	<b>ERT</b>	estrogen replacement therapy
<b>CVD</b>	cerebrovascular disease	<b>ERV</b>	expiratory reserve volume
<b>CVS</b>	chorionic villus sampling	<b>ESR, SR, sed rate</b>	erythrocyte sedimentation rate
<b>Cx</b>	cervix	<b>ESRD</b>	end-stage renal disease
<b>CXR</b>	chest X-ray	<b>e-stim</b>	electrical stimulation
<b>cysto</b>	cystoscopy	<b>ESWL</b>	extracorporeal shockwave lithotripsy
<b>D</b>	diopter (lens strength)	<b>et</b>	and
<b>d</b>	day	<b>EU</b>	excretory urography
<b>D &amp; C</b>	dilation and curettage	<b>EUA</b>	exam under anesthesia
<b>Db</b>	decibel	<b>FBS</b>	fasting blood sugar
<b>d/c, DISC</b>	discontinue	<b>FDA</b>	Federal Drug Administration
<b>DC, disc</b>	discontinue	<b>FEKG</b>	fetal electrocardiogram
<b>DEA</b>	Drug Enforcement Agency	<b>FHR</b>	fetal heart rate
<b>decub</b>	decubitus ulcer, lying down	<b>FHT</b>	fetal heart tone
<b>Derm, dermat</b>	dermatology	<b>flu</b>	influenza
<b>DI</b>	diabetes insipidus, diagnostic imaging	<b>FOBT</b>	fecal occult blood test
<b>diff</b>	differential	<b>FRC</b>	functional residual capacity
<b>dil</b>	dilute	<b>FS</b>	frozen section
<b>disp</b>	dispense	<b>FSH</b>	follicle-stimulating hormone
<b>DJD</b>	degenerative joint disease	<b>FTM</b>	female to male
<b>DM</b>	diabetes mellitus	<b>FTND</b>	full-term normal delivery
<b>DOE</b>	dyspnea on exertion	<b>Fx, FX</b>	fracture
<b>DPT</b>	diphtheria, pertussis, tetanus injection	<b>GA</b>	general anesthesia, gallium
<b>DRE</b>	digital rectal exam	<b>GB</b>	gallbladder X-ray
<b>DSA</b>	digital subtraction angiography	<b>GC</b>	gonorrhea
<b>DSM</b>	<i>Diagnostic and Statistical Manual of Mental Disorders</i>	<b>GERD</b>	gastroesophageal reflux disease
		<b>GH</b>	growth hormone

Abbreviation	Meaning	Abbreviation	Meaning
GI	gastrointestinal	IRV	inspiratory reserve volume
GI, grav I	first pregnancy	IUD	intrauterine device
gm	gram	IV	intravenous
GOT	glutamic oxaloacetic transaminase	IVC	intravenous cholangiography
gr	grain	IVF	<i>in vitro</i> fertilization
gt	drop	IVP	intravenous pyelogram
GTT	glucose tolerance test	JRA	juvenile rheumatoid arthritis
gtt	drops	K <sup>+</sup>	potassium
GU	genitourinary	kg	kilogram
GVHD	graft versus host disease	KS	Kaposi's sarcoma
GYN	gynecology	KUB	kidneys, ureters, bladder
H <sub>2</sub> O	water	L	liter
HA	headache	L1, L2, etc.	first lumbar vertebra, second lumbar vertebra, etc.
HAV	hepatitis A virus	LASIK	laser-assisted in situ keratomileusis
HBV	hepatitis B virus	lat	lateral
HCG, hCG	human chorionic gonadotropin	LBW	low birth weight
HCl	hydrochloric acid	LE	lower extremity
HCO <sub>3</sub> <sup>-</sup>	bicarbonate	LGI	lower gastrointestinal series
HCT, Hct, crit	hematocrit	LH	luteinizing hormone
HCV	hepatitis C virus	LL	left lateral
HD	Hodgkin's disease, hemodialysis	LLE	left lower extremity
HDN	hemolytic disease of the newborn	LLL	left lower lobe
HDV	hepatitis D virus	LLQ	left lower quadrant
HEENT	head, ear, eye, nose, throat	LMP	last menstrual period
HEV	hepatitis E virus	LP	lumbar puncture
Hgb, Hb, HGB	hemoglobin	LUE	left upper extremity
HIV	human immunodeficiency virus	LUL	left upper lobe
HMD	hyaline membrane disease	LUQ	left upper quadrant
HNP	herniated nucleus pulposus	LVH	left ventricular hypertrophy
HPV	human papilloma virus	lymphs	lymphocytes
HRT	hormone replacement therapy	MA	mental age
hs	at bedtime	mA	milliampere
HSG	hysterosalpingography	mcg	microgram
HSV-1	herpes simplex virus type 1	mCi	millicurie
HTN	hypertension	MD	muscular dystrophy
Hz	hertz	MDI	metered-dose inhaler
I&D	incision and drainage	mEq	milliequivalent
I&O	intake and output	mets	metastases
IBD	inflammatory bowel disease	mg	milligram
IBS	irritable bowel syndrome	MI	myocardial infarction, mitral insufficiency
IC	inspiratory capacity	mL	milliliter
ICCE	intracapsular cataract extraction	MM	malignant melanoma
ICD	implantable cardioverter-defibrillator	mm Hg	millimeters of mercury
ICP	intracranial pressure	MMPI	Minnesota Multiphasic Personality Inventory
ICU	intensive care unit	mono	mononucleosis
ID	intradermal	monos	monocytes
IDDM	insulin-dependent diabetes mellitus	MR	mitral regurgitation
Ig	immunoglobulins (IgA, IgD, IgE, IgG, IgM)	MRA	magnetic resonance angiography
IM	intramuscular	MRI	magnetic resonance imaging
inj	injection	MS	musculoskeletal, mitral stenosis, multiple sclerosis
IOP	intraocular pressure	MSH	melanocyte-stimulating hormone
IPD	intermittent peritoneal dialysis	MTF	male to female
IPPB	intermittent positive pressure breathing		
IRDS	infant respiratory distress syndrome		

Abbreviation	Meaning	Abbreviation	Meaning
<b>MTX</b>	methotrexate	<b>per</b>	through
<b>MUA</b>	manipulation under anesthesia	<b>PERRLA</b>	pupils equal, round, react to light and accommodation
<b>MVP</b>	mitral valve prolapse	<b>PET</b>	positron emission tomography
<b>n&amp;v</b>	nausea and vomiting	<b>PFT</b>	pulmonary function test
<b>Na<sup>+</sup></b>	sodium	<b>pH</b>	acidity or alkalinity of urine
<b>NB</b>	newborn	<b>PI, para I</b>	first delivery
<b>NG</b>	nasogastric (tube)	<b>PID</b>	pelvic inflammatory disease
<b>NHL</b>	non-Hodgkin's lymphoma	<b>PIH</b>	pregnancy-induced hypertension
<b>NIDDM</b>	non-insulin-dependent diabetes mellitus	<b>PMN, polys</b>	polymorphonuclear neutrophil
<b>NK</b>	natural killer cells	<b>PMS</b>	premenstrual syndrome
<b>NMR</b>	nuclear magnetic resonance	<b>PNS</b>	peripheral nervous system
<b>no sub</b>	no substitute	<b>PO</b>	by mouth
<b>noc</b>	night	<b>PORP</b>	partial ossicular replacement prosthesis
<b>non rep</b>	do not repeat	<b>post-op</b>	postoperative
<b>NPH</b>	neutral protamine Hagedorn (insulin)	<b>pp</b>	postprandial
<b>NPO</b>	nothing by mouth	<b>PPD</b>	purified protein derivative
<b>NS</b>	nephrotic syndrome, normal saline	<b>preop, pre-op</b>	preoperative
<b>NSAID</b>	nonsteroidal anti-inflammatory drug	<b>prep</b>	preparation, prepare
<b>O&amp;P</b>	ova and parasites	<b>PRK</b>	photorefractive keratectomy
<b>O<sub>2</sub></b>	oxygen	<b>PRL</b>	prolactin
<b>OA</b>	osteoarthritis	<b>prn</b>	as needed
<b>OB</b>	obstetrics	<b>PROM</b>	passive range of motion
<b>OCD</b>	obsessive-compulsive disorder	<b>prot</b>	protocol
<b>OCPs</b>	oral contraceptive pills	<b>PSA</b>	prostate-specific antigen
<b>OD</b>	right eye	<b>pt</b>	patient
<b>od</b>	overdose	<b>PT</b>	physical therapy
<b>OE</b>	otitis externa	<b>PT, pro-time</b>	prothrombin time
<b>oint</b>	ointment	<b>PTC</b>	percutaneous transhepatic cholangiography
<b>OM</b>	otitis media	<b>PTCA</b>	percutaneous transluminal coronary angioplasty
<b>Ophth.</b>	ophthalmology	<b>PTH</b>	parathyroid hormone
<b>OR</b>	operating room	<b>PTSD</b>	posttraumatic stress disorder
<b>ORIF</b>	open reduction-internal fixation	<b>PUD</b>	peptic ulcer disease
<b>Orth, ortho</b>	orthopedics	<b>PVC</b>	premature ventricular contraction
<b>OS</b>	left eye	<b>q</b>	every
<b>OT</b>	occupational therapy	<b>qam</b>	every morning
<b>OTC</b>	over the counter	<b>qh</b>	every hour
<b>Oto</b>	otology	<b>qhs</b>	at bedtime
<b>OU</b>	each eye/both eyes	<b>qid</b>	four times a day
<b>oz</b>	ounce	<b>qs</b>	quantity sufficient
<b>p̄</b>	after	<b>R</b>	respiration, roentgen
<b>P</b>	phosphorus, pulse	<b>RA</b>	rheumatoid arthritis, room air
<b>PA</b>	posteroanterior, pernicious anemia	<b>Ra</b>	radium
<b>PAC</b>	premature atrial contraction	<b>rad</b>	radiation-absorbed dose
<b>Pap</b>	Papanicolaou test	<b>RAI</b>	radioactive iodine
<b>PARR</b>	postanesthetic recovery room	<b>RBC</b>	red blood cell
<b>PBI</b>	protein-bound iodine	<b>RDS</b>	respiratory distress syndrome
<b>pc</b>	after meals	<b>REM</b>	rapid eye movement
<b>PCA</b>	patient-controlled administration	<b>Rh+</b>	Rh-positive
<b>PCP</b>	pneumocystis pneumonia	<b>Rh-</b>	Rh-negative
<b>PCV</b>	packed cell volume	<b>RIA</b>	radioimmunoassay
<b>PDA</b>	patent ductus arteriosus	<b>RK</b>	radial keratotomy
<b>PDR</b>	<i>Physician's Desk Reference</i>		
<b>PE tube</b>	pressure equalizing tube		

Abbreviation	Meaning	Abbreviation	Meaning
<b>RL</b>	right lateral	<b>t, tsp</b>	teaspoon
<b>RLE</b>	right lower extremity	<b>T1, T2, etc.</b>	first thoracic vertebra, second thoracic vertebra, etc.
<b>RLL</b>	right lower lobe	<b>T<sub>3</sub></b>	triiodothyronine
<b>RLQ</b>	right lower quadrant	<b>T<sub>4</sub></b>	thyroxine
<b>RML</b>	right middle lobe	<b>tab</b>	tablet
<b>ROM</b>	range of motion	<b>TAH</b>	total abdominal hysterectomy
<b>RP</b>	retrograde pyelogram	<b>TAH-BSO</b>	total abdominal hysterectomy–bilateral salpingo-oophorectomy
<b>RPR</b>	rapid plasma reagin (test for syphilis)	<b>TB</b>	tuberculosis
<b>RRT</b>	registered respiratory therapist, registered radiologic technologist	<b>TBI</b>	traumatic brain injury
<b>RUE</b>	right upper extremity	<b>TENS</b>	transcutaneous electrical nerve stimulation
<b>RUL</b>	right upper lobe	<b>TFT</b>	thyroid function test
<b>RUQ</b>	right upper quadrant	<b>THA</b>	total hip arthroplasty
<b>RV</b>	reserve volume	<b>THR</b>	total hip replacement
<b>Rx</b>	take	<b>TIA</b>	transient ischemic attack
<b>̄</b>	without	<b>tid</b>	three times a day
<b>̄̄</b>	one-half	<b>TKA</b>	total knee arthroplasty
<b>s.gl.</b>	without correction or glasses	<b>TKR</b>	total knee replacement
<b>S1</b>	first heart sound	<b>TLC</b>	total lung capacity
<b>S2</b>	second heart sound	<b>TNM</b>	tumor, nodes, metastases
<b>SA, S-A</b>	sinoatrial	<b>TO</b>	telephone order
<b>SAD</b>	seasonal affective disorder	<b>top</b>	apply topically
<b>SARS</b>	severe acute respiratory syndrome	<b>TORP</b>	total ossicular replacement prosthesis
<b>SCC</b>	squamous cell carcinoma	<b>tPA</b>	tissue plasminogen activator
<b>SCI</b>	spinal cord injury	<b>TPN</b>	total parenteral nutrition
<b>SCIDS</b>	severe combined immunodeficiency syndrome	<b>TPR</b>	temperature, pulse, and respiration
<b>segs</b>	segmented neutrophils	<b>TSH</b>	thyroid-stimulating hormone
<b>SG</b>	skin graft	<b>TSS</b>	toxic shock syndrome
<b>SG, sp. gr.</b>	specific gravity	<b>TUR</b>	transurethral resection
<b>SIDS</b>	sudden infant death syndrome	<b>TURP</b>	transurethral resection of the prostate
<b>Sig</b>	label as follows/directions	<b>TV</b>	tidal volume
<b>SK</b>	streptokinase	<b>U/A, UA</b>	urinalysis
<b>sl</b>	under the tongue	<b>UC</b>	urine culture, uterine contractions
<b>SLE</b>	systemic lupus erythematosus	<b>UE</b>	upper extremity
<b>SMAC</b>	sequential multiple analyzer computer	<b>UGI</b>	upper gastrointestinal series
<b>SMD</b>	senile macular degeneration	<b>URI</b>	upper respiratory infection
<b>SOB</b>	shortness of breath	<b>US</b>	ultrasound
<b>sol</b>	solution	<b>UTI</b>	urinary tract infection
<b>SOM</b>	serous otitis media	<b>UV</b>	ultraviolet
<b>SPP</b>	suprapubic prostatectomy	<b>V fib</b>	ventricular fibrillation
<b>SSD</b>	somatic symptom disorder	<b>VA</b>	visual acuity
<b>ST</b>	esotropia	<b>VC</b>	vital capacity
<b>st</b>	stage	<b>VCUG</b>	voiding cystourethrography
<b>stat</b>	at once/immediately	<b>VD</b>	venereal disease
<b>STD</b>	sexually transmitted disease	<b>VF</b>	visual field
<b>STI</b>	sexually transmitted infection	<b>VO</b>	verbal order
<b>STSG</b>	split-thickness skin graft	<b>VSD</b>	ventricular septal defect
<b>Subc, Subq</b>	subcutaneous	<b>VT</b>	ventricular tachycardia
<b>suppos, supp</b>	suppository	<b>WBC</b>	white blood cell
<b>susp</b>	suspension	<b>wt</b>	weight
<b>syr</b>	syrup	<b>x</b>	times
<b>T &amp; A</b>	tonsillectomy and adenoidectomy	<b>XT</b>	exotropia
<b>T, tbsp</b>	tablespoon		





# Answer Keys

## Chapter 1 Answers

### Practice As You Go

- A. 1. word root, combining vowel, prefix, suffix  
2. combining form 3. o 4. suffix 5. prefix
- B. 1. cardiology 2. gastrology 3. dermatology  
4. ophthalmology 5. immunology 6. nephrology  
7. hematology 8. gynecology 9. neurology  
10. pathology
- C. 1. tachy-, fast 2. pseudo-, false 3. hypo-,  
insufficient 4. inter-, between 5. eu-, normal  
6. post-, after 7. mono-, one 8. sub-, under
- D. 1. pulmonology 2. rhinorrhea 3. nephromalacia  
4. cardiomegaly 5. gastrotomy 6. dermatitis  
7. laryngectomy 8. arthroplasty
- E. 1. metastases 2. ova 3. diverticula 4. atria  
5. diagnoses 6. vertebrae

### Practice Exercises

- A. 1. l 2. e 3. j 4. f 5. d 6. k 7. m 8. o 9. g 10. n 11. b  
12. h 13. a 14. c 15. i
- B. 1. surgical repair 2. narrowing 3. inflammation  
4. pertaining to 5. pain 6. cutting into 7. enlarged  
8. surgical removal 9. excessive, abnormal flow  
10. puncture to remove fluid 11. record or picture  
12. pertaining to 13. abnormal softening 14. state  
of 15. to suture 16. surgically create an opening  
17. surgical fixation 18. discharge 19. process of  
visually examining 20. tumor, mass
- C. 1. endo- 2. macro- 3. pre- 4. peri- 5. neo-  
6. a-/an-/de- 7. hemi-/semi- 8. dys- 9. hyper-  
10. epi- 11. poly-/multi- 12. brady- 13. auto-  
14. trans- 15. bi-
- D. 1. cardiomalacia 2. gastrostomy 3. rhinoplasty  
4. hypertrophy 5. pathology 6. neuroma 7. gastro-  
enterology 8. otitis 9. chemotherapy 10. carcinogen
- E. 1. life 2. cancer 3. heart 4. chemical 5. to cut 6. skin  
7. small intestine 8. stomach 9. female 10. blood  
11. immunity 12. voice box 13. disease 14. kidney  
15. nerve 16. eye 17. ear 18. lung 19. nose

## Chapter 2 Answers

### Practice As You Go

- A. 1. cells, tissues, organs, systems, body 2. cell  
membrane, cytoplasm, nucleus 3. epithelial 4. car-  
diac, skeletal, smooth 5. connective 6. neurons

- B. 1. integumentary, d 2. cardiovascular, i  
3. digestive, g 4. female reproductive, b  
5. musculoskeletal (skeletal), a 6. respiratory, j  
7. urinary, c 8. male reproductive, f 9. nervous, h  
10. musculoskeletal (muscular), e
- C. 1. c 2. a 3. b
- D. 1. cephalic 2. pubic 3. crural 4. gluteal 5. cervical  
6. brachial 7. dorsum 8. thoracic
- E. 1. anatomical 2. right lower 3. cranial, spinal  
4. nine 5. right inguinal 6. pleural, pericardial

### Practice Exercises

- A. 1. epi-; above 2. peri-; around or about 3. hypo-;  
under or below 4. retro-; behind or backward
- B. 1. n 2. f 3. k 4. d 5. a 6. e 7. m 8. i 9. b 10. j 11. h  
12. l 13. c 14. g
- C. 1. MS 2. lat 3. RUQ 4. CV 5. GI 6. AP 7. OB  
8. LLQ
- D. 1. dorsal 2. thoracic 3. superior 4. caudal  
5. visceral 6. lateral 7. distal 8. neural  
9. pulmonology 10. muscular 11. ventral  
12. anterior 13. cephalic 14. medial
- E. 1. internal organ 2. back 3. abdomen 4. chest  
5. middle 6. belly 7. front 8. tissues 9. epithelium  
10. skull 11. cell 12. near to 13. head
- F. 1. a 2. c 3. f 4. e 5. a 6. d 7. b 8. e 9. c 10. b
- G. 1. otorhinolaryngology 2. cardiology  
3. gynecology 4. orthopedics 5. ophthalmology  
6. urology 7. dermatology 8. gastroenterology

### Labeling Exercises

- A. 1. cephalic 2. cervical 3. thoracic 4. brachial  
5. abdominal 6. pelvic 7. pubic 8. crural 9. trunk  
10. vertebral 11. dorsum 12. gluteal
- B. 1. frontal or coronal plane 2. sagittal or median  
plane 3. transverse or horizontal plane

## Chapter 3 Answers

### Practice As You Go

- A. 1. epidermis, dermis 2. hypodermis or subcu-  
taneous layer 3. basal cell 4. adipose 5. dermis  
6. keratin 7. melanin 8. corium 9. nail bed  
10. sebaceous, sweat
- B. 1. ungual 2. dermal, cutaneous 3. epidermal  
4. hypodermic, subcutaneous 5. intradermal



- C. 1. e 2. f 3. i 4. j 5. a 6. c 7. l 8. g 9. k 10. h 11. d 12. b  
 D. 1. h 2. i 3. j 4. e 5. c 6. a 7. f 8. g 9. b 10. d  
 E. 1. FS 2. I & D 3. ID 4. Subq, Subc 5. UV 6. BX, bx 7. C&S 8. BCC 9. decub 10. Derm, derm

## Real-World Applications

### Medical Record Analysis

- basal cell carcinoma—Cancerous tumor of the basal cell layer of the epidermis. A frequent type of skin cancer that rarely metastasizes or spreads. These cancers can arise on sun-exposed skin.
- lesions—A general term for a wound, injury, or abnormality.
- biopsies—A piece of tissue is removed by syringe and needle, knife, punch, or brush to examine under a microscope. Used to aid in diagnosis.
- excised—To surgically cut out.
- pruritus—Severe itching.
- anterior—Pertaining to the front side of the body.
- erythema—Redness or flushing of the skin.
- depigmentation—Loss of normal skin color or pigment.
- epidermis—The superficial layer of the skin.
- dermis—The middle layer of the skin.
- dermatoplasty—Skin grafting; transplantation of skin.

### Chart Note Transcription

- ulcer 2. dermatologist 3. pruritus 4. erythema 5. pustules 6. dermis 7. necrosis 8. culture and sensitivity 9. cellulitis 10. debridement

### Case Study

- Systemic lupus erythematosus; another example is rheumatoid arthritis.
- Erythema—skin redness; photosensitivity—intolerance to strong light; alopecia—baldness; stiffness in joints.
- Exfoliative cytology and fungal scrapings—in both tests cells are scraped away from the skin and examined under a microscope in order to make a diagnosis; in order to make sure the rash was not caused by something else like a fungal infection.
- Internist—anti-inflammatory—to reduce pain, swelling, and stiffness in joints; dermatologist—corticosteroid cream to anti-inflammatory to reduce the red rash.
- Completing examinations and various diagnostic tests in order to collect information necessary for a diagnosis.

## Practice Exercises

- A. 1. cold 2. skin 3. profuse sweating 4. pus 5. to burn 6. nail 7. fat 8. sweat 9. wrinkles 10. oil 11. hair 12. death 13. skin condition 14. other, different from usual 15. foreign
- B. 1. redness involving superficial layer of skin 2. burn damage through epidermis and into dermis causing vesicles 3. burn damage to full thickness of epidermis and dermis
- C. 1. flat, discolored area 2. small, solid raised spot less than 0.5 cm 3. fluid-filled sac 4. cracklike lesion 5. raised spot containing pus 6. small, round swollen area 7. fluid-filled blister 8. open sore 9. firm, solid mass larger than 0.5 cm 10. torn or jagged wound
- D. 1. dermatitis 2. dermatosis 3. dermatome 4. dermatologist 5. dermatoplasty 6. dermatology 7. melanoma 8. melanocyte 9. ichthyoderma 10. leukoderma 11. erythroderma 12. onychomalacia 13. paronychia 14. onychophagia 15. onychectomy
- E. 1. culture and sensitivity 2. basal cell carcinoma 3. dermatology 4. skin graft 5. decubitus ulcer 6. malignant melanoma
- F. 1. xeroderma 2. petechiae 3. tinea 4. scabies 5. paronychia 6. Kaposi's sarcoma 7. impetigo 8. keloid 9. exfoliative cytology 10. frozen section
- G. 1. antifungal, e 2. antipruritic, c 3. antiparasitic, a 4. corticosteroid cream, b 5. anesthetic, f 6. antibiotic, d

## Labeling Exercise

- A. 1. epidermis 2. dermis 3. subcutaneous layer 4. sweat gland 5. sweat duct 6. hair shaft 7. sebaceous gland 8. arrector pili muscle 9. sensory receptors
- B. 1. epidermis 2. dermis 3. subcutaneous layer 4. sebaceous gland 5. arrector pili muscle 6. hair shaft 7. hair follicle 8. hair root 9. papilla
- C. 1. free edge 2. lateral nail groove 3. lunula 4. nail bed 5. nail body 6. cuticle 7. nail root

## Chapter 4 Answers

### Practice As You Go

- A. 1. axial, appendicular 2. frame, protect vital organs, work with muscles for movement, store minerals, red blood cell production 3. short 4. periosteum 5. cancellous 6. synovial 7. foramen 8. diaphysis
- B. 1. femoral 2. sternal 3. clavicular 4. coccygeal 5. maxillary 6. tibial 7. patellar 8. phalangeal 9. humeral 10. pubic

- C. 1. c 2. h 3. f 4. g 5. d 6. e 7. a 8. b  
 D. 1. TKR 2. HNP 3. UE 4. L5 5. AK 6. fx/FX 7. NSAID  
 E. 1. smooth 2. myoneural 3. skeletal, smooth, cardiac  
 F. 1. e 2. d 3. b 4. c 5. a 6. h 7. g 8. f  
 G. 1. IM 2. DTR 3. MD 4. EMG 5. CTS

## Real-World Applications

### Medical Record Analysis

1. osteoarthritis—Joint inflammation resulting in degeneration of the bones and joints, especially those bearing weight. Results in bone rubbing against bone.
2. bilateral—Pertaining to both sides.
3. TKA—Surgical reconstruction of a knee joint by implanting a prosthetic knee joint. Also called *total knee replacement (TKR)*.
4. orthopedic surgeon—Physician that specializes in the diagnosis and treatment of conditions of the musculoskeletal system using surgical means.
5. CT scan—Computed tomography scan; imaging technique that produces cross-sectional view of the body.
6. physical therapy—Treats disorders using physical means and methods; includes joint motion and muscle strength.
7. ROM—Range of movement of a joint, from maximum flexion through maximum extension; it is measured as degrees of a circle.
8. gait training—Learning how to walk.
9. occupational therapy—Assists patients to regain, develop, and improve skills that are important for independent functioning.
10. ADLs—Activities of daily living.

### Chart Note Transcription

1. Colles' fracture (fx) 2. cast 3. fracture 4. orthopedist
5. osteoporosis 6. computerized axial tomography (CT or CAT scan) 7. flexion 8. extension 9. comminuted fracture (fx) 10. femur 11. total hip arthroplasty (THA)

### Case Study

1. Rheumatoid arthritis.
2. Cartilage damage and crippling deformities.
3. Osteoarthritis.
4. Bone scan—Radioactive dye is used to visualize the body; erythrocyte sedimentation rate—A blood test that can determine if a person has an inflammatory disease.
5. Anti-inflammatory medication to reduce inflammation and provide some pain relief; physical

therapy—Treatment using warm water and exercises to maintain the flexibility of the joints.

6. Acute—Brief disease, also used to mean sudden and severe disease; chronic—Disease of a long duration.

## Practice Exercises

- A. 1. osteocyte 2. osteoblast 3. osteoporosis 4. osteopathy 5. osteotomy 6. osteotome 7. osteomyelitis 8. osteomalacia 9. osteochondroma 10. myopathy 11. myoplasty 12. myorrhaphy 13. electromyogram 14. myasthenia 15. tenodynia 16. tenorrhaphy 17. arthrodesis 18. arthroplasty 19. arthrotomy 20. arthritis 21. arthrocentesis 22. arthralgia 23. chondrectomy 24. chondroma 25. chondromalacia
- B. 1. -desis 2. -asthenia 3. -listhesis 4. -clasia 5. -kinesia 6. -porosis
- C. 1. cervical, 7 2. thoracic, 12 3. lumbar, 5 4. sacrum, 1 (5 fused) 5. coccyx, 1 (3–5 fused)
- D. 1. S = -scopy; visual examination of the inside of a joint 2. P = inter-, S = -al; pertaining to between vertebrae 3. S = -malacia; abnormal softening of cartilage 4. S = -ectomy; surgical removal of a disk 5. P = intra- S = -al; pertaining to within the skull 6. -osis = abnormal condition; abnormal condition of the vertebrae
- E. 1. lamina 2. stiff joint 3. cartilage 4. vertebrae 5. muscle 6. straight 7. hump 8. tendon 9. bone marrow 10. joint
- F. 1. osteoporosis 2. rickets 3. lateral epicondylitis 4. herniated nucleus pulposus 5. osteogenic sarcoma 6. scoliosis 7. pseudotrophic muscular dystrophy 8. systemic lupus erythematosus 9. spondylolisthesis 10. carpal tunnel syndrome
- G. 1. patella 2. tarsus 3. clavicle 4. femur 5. phalanges 6. carpus 7. tibia 8. scapula 9. phalanges
- H. 1. degenerative joint disease 2. electromyogram 3. first cervical vertebra 4. sixth thoracic vertebra 5. intramuscular 6. deep tendon reflexes 7. juvenile rheumatoid arthritis 8. left lower extremity 9. orthopedics 10. carpal tunnel syndrome
- I. 1. surgical repair of cartilage 2. slow movement 3. porous bone 4. abnormal increase in lumbar spine curve (swayback) 5. lack of development/nourishment 6. bone marrow tumor 7. artificial substitute for a body part 8. cutting into skull 9. puncture of a joint to withdraw fluid 10. bursa inflammation
- J. 1. nonsteroidal anti-inflammatory drugs, b 2. corticosteroids, e 3. skeletal muscle relaxants, a 4. bone reabsorption inhibitors, c 5. calcium supplements, d

## Labeling Exercise

- A.** 1. skull 2. cervical vertebrae 3. sternum 4. ribs  
5. thoracic vertebrae 6. lumbar vertebrae 7. ilium  
8. pubis 9. ischium 10. femur 11. patella 12. tibia  
13. fibula 14. tarsus 15. metatarsus 16. phalanges  
17. maxilla 18. mandible 19. scapula 20. humerus  
21. ulna 22. radius 23. sacrum 24. coccyx 25. carpus  
26. metacarpus 27. phalanges
- B.** 1. proximal epiphysis 2. diaphysis 3. distal epiphysis  
4. articular cartilage 5. epiphyseal line 6. spongy or cancellous bone 7. compact or cortical bone  
8. medullary cavity
- C.** 1. periosteum 2. synovial membrane 3. articular cartilage 4. joint cavity 5. joint capsule

## Chapter 5 Answers

### Practice As You Go

- A.** 1. cardiology 2. endocardium, myocardium, epicardium 3. sinoatrial node 4. away from 5. tricuspid, pulmonary, mitral (bicuspid), aortic 6. atria, ventricles 7. pulmonary 8. apex 9. septum  
10. systole, diastole
- B.** 1. cardiac or coronary 2. interventricular 3. arterial  
4. venule 5. myocardial 6. atrial
- C.** 1. f 2. h 3. d 4. g 5. b 6. i 7. a 8. c 9. e 10. j
- D.** 1. c 2. g 3. j 4. a 5. d 6. b 7. i 8. e 9. f 10. h
- E.** 1. MVP 2. VSD 3. PTCA 4. Vfib 5. DVT 6. LDH  
7. CoA 8. tPA 9. CV 10. ECC

## Real-World Applications

### Medical Record Analysis

- hypertension—Blood pressure above the normal range.
- tachycardia—The condition of having a fast heart rate, typically more than 100 beats/minute while at rest.
- congestive heart failure (CAD)—Pathological condition of the heart in which there is a reduced outflow of blood from the left side of the heart because the left ventricle myocardium has become too weak to efficiently pump blood. Results in weakness, breathlessness, and edema.
- mitral valve prolapse—Condition in which the cusps or flaps of the heart valve are too loose and fail to shut tightly, allowing blood to flow backward through the valve when the heart chamber contracts. Most commonly occurs in the mitral valve, but may affect any of the heart valves.
- palpitations—Pounding, racing heartbeats.
- electrocardiography (EKG)—Process of recording the electrical activity of the heart. Useful in the

diagnosis of abnormal cardiac rhythm and heart muscle (myocardium) damage.

- cardiac enzymes—Blood test to determine the level of enzymes specific to heart muscles in the blood. An increase in the enzymes may indicate heart muscle damage such as a myocardial infarction. These enzymes include creatine phosphokinase (CPK), lactate dehydrogenase (LDH), and glutamic oxaloacetic transaminase (GOT).
- echocardiography—Noninvasive diagnostic method using ultrasound to visualize internal cardiac structures. Cardiac valve activity can be evaluated using this method.
- stress test—Method for evaluating cardiovascular fitness. The patient is placed on a treadmill or a bicycle and then subjected to steadily increasing levels of work. An EKG and oxygen levels are taken while the patient exercises. The test is stopped if abnormalities occur on the EKG. Also called an *exercise test* or a *treadmill test*.
- angiocardiology—X-rays taken after the injection of an opaque material into a blood vessel. Can be performed on the aorta as an aortic angiogram, on the heart as an angiocardogram, and on the brain as a cerebral angiogram.
- coronary artery disease (CAD)—Insufficient blood supply to the heart muscle due to an obstruction of one or more coronary arteries. May be caused by atherosclerosis and may cause angina pectoris and myocardial infarction.
- myocardial infarction—Condition caused by the partial or complete occlusion or closing of one or more of the coronary arteries. Symptoms include a squeezing pain or heavy pressure in the middle of the chest (angina pectoris). A delay in treatment could result in death. Also referred to as a *heart attack*.
- mitral valve replacement—Removal of a diseased heart valve and replacement with an artificial valve.

### Chart Note Transcription

- angina pectoris 2. bradycardia 3. hypertension
- myocardial infarction (MI) 5. electrocardiogram (EKG, ECG) 6. cardiac enzymes 7. coronary artery disease (CAD) 8. cardiac catheterization 9. stress test (treadmill test) 10. percutaneous transluminal coronary angioplasty (PTCA) 11. coronary artery bypass graft (CABG)

### Case Study

- Heart attack; condition caused by the partial or complete occlusion or closing of one or more of the coronary arteries. Symptoms include a squeezing pain or heavy pressure in the middle of

the chest (angina pectoris). A delay in treatment could result in death.

2. The main complaint, the one the patient is most aware of or most anxious about.
3. Angina pectoris—Condition in which there is severe pain with a sensation of constriction around the heart; caused by a deficiency of oxygen to the heart muscle.
4. Nausea—Feeling of need to vomit; dyspnea—Difficulty breathing; diaphoresis—Profuse sweating.
5. Cardiac enzymes; angiocardiology; cardiac scan; electrocardiography; stress testing; cardiac catheterization; Holter monitor.
6. Smokes; overweight; family history; sedentary lifestyle. He can stop smoking, lose weight, and become more active.

## Practice Exercises

- A. 1. cardiac 2. cardiomyopathy 3. cardiomegaly 4. tachycardia 5. bradycardia 6. electrocardiogram 7. angiostenosis 8. angiitis 9. angiospasm 10. arterial 11. arteriosclerosis 12. arteriole 13. endocarditis 14. epicarditis 15. myocarditis
- B. 1. heart 2. valve 3. chest 4. artery 5. vein 6. vessel 7. ventricle 8. clot 9. atrium 10. fatty substance
- C. 1. venous 2. cardiology 3. venogram 4. electrocardiography 5. hypertension 6. hypotension 7. valvoplasty 8. interventricular 9. atherectomy 10. arteriostenosis
- D. 1. -tension 2. -stenosis 3. -manometer 4. -ule, -ole 5. -sclerosis
- E. 1. blood pressure 2. congestive heart failure 3. myocardial infarction 4. coronary care unit 5. premature ventricular contraction 6. cardiopulmonary resuscitation 7. coronary artery disease 8. chest pain 9. electrocardiogram 10. first heart sound
- F. 1. thin flexible tube 2. an area of dead tissue 3. a blood clot 4. pounding heartbeat 5. backflow 6. weakened and ballooning arterial wall 7. complete stoppage of heart activity 8. serious cardiac arrhythmia 9. heart attack 10. varicose veins in anal region
- G. 1. murmur 2. defibrillation 3. hypertension 4. pacemaker 5. varicose veins 6. angina pectoris 7. CCU 8. MI 9. angiography 10. echocardiogram 11. Holter monitor 12. CHF
- H. 1. antiarrhythmic, e 2. antilipidemic, g 3. cardio- tonic, f 4. diuretic, h 5. anticoagulant, b 6. throm- bolytic, a 7. vasodilator, d 8. calcium channel blocker, c

## Labeling Exercise

- A. 1. pulmonary arteries 2. vena cavae 3. right atrium 4. right ventricle 5. systemic veins

6. capillary bed lungs 7. pulmonary veins 8. aorta 9. left atrium 10. left ventricle 11. systemic arter- ies 12. systemic capillary beds

- B. 1. superior vena cava 2. aorta 3. pulmonary trunk 4. pulmonary valve 5. right atrium 6. tricuspid valve 7. right ventricle 8. inferior vena cava 9. pulmonary artery 10. pulmonary vein 11. left atrium 12. aortic valve 13. mitral or bicuspid valve 14. left ventricle 15. endocardium 16. myocar- dium 17. pericardium

## Chapter 6 Answers Practice As You Go

- A. 1. hematology 2. phagocytosis 3. erythrocytes (red blood cells), leukocytes (white blood cells), platelets (thrombocytes) 4. plasma 5. hemostasis
- B. 1. hematic or sanguinous 2. leukocytic 3. throm- bocytic 4. fibrinous 5. erythrocytic
- C. 1. d 2. e 3. c 4. b 5. a
- D. 1. c 2. e 3. a 4. b 5. d
- E. 1. ALL 2. BMT 3. eosins, eos 4. HCT, Hct, crit 5. PA 6. CBC 7. diff 8. WBC
- F. 1. spleen, tonsils, thymus 2. thoracic duct, right lymphatic duct 3. axillary, cervical, mediastinal, inguinal 4. active acquired 5. antibody-mediated
- G. 1. splenic 2. lymphatic 3. tonsillar 4. thymic 5. lymphangial
- H. 1. c 2. a 3. d 4. e 5. b
- I. 1. e 2. c 3. d 4. a 5. b
- J. 1. AIDS 2. ARC 3. HIV 4. mono 5. KS 6. Ig 7. SCIDS 8. PCP

## Real-World Applications

### Medical Record Analysis

1. splenomegaly—An enlarged spleen.
2. non-Hodgkin's lymphoma—Cancer of the lym- phatic tissues other than Hodgkin's lymphoma.
3. spleen—An organ located in the upper left quad- rant of the abdomen. Consists of lymphatic tissue that is highly infiltrated with blood vessels. It fil- ters out and destroys old red blood cells.
4. splenectomy—The surgical removal of the spleen.
5. Monospot—A blood test for infectious mononucleosis.
6. enzyme-linked immunosorbent assay (ELISA)— A blood test for an antibody to the AIDS virus. A positive test means that the person has been exposed to the virus. There may be a false- positive reading, and then the Western blot test would be used to verify the results.



7. Magnetic resonance imaging (MRI)—Medical imaging that uses radio-frequency radiation as its source of energy. It does not require the injection of contrast medium or exposure to ionizing radiation. The technique is useful for visualizing large blood vessels, the heart, the brain, and soft tissues.
8. tumor—Abnormal growth of tissue that may be benign or malignant.
9. biopsy—A piece of tissue is removed by syringe and needle, knife, punch, or brush to examine under a microscope. Used to aid in diagnosis.
10. oncologist—A physician who specializes in the treatment of cancer.
11. metastases—The spreading of a cancerous tumor from its original site to different locations of the body.

### Chart Note Transcription

1. hematologist 2. ELISA 3. prothrombin time 4. complete blood count (CBC) 5. erythropenia 6. thrombopenia 7. leukocytosis 8. bone marrow aspiration 9. leukemia 10. homologous transfusion

### Case Study

1. Acute lymphocytic leukemia.
2. High fever; thrombopenia—Too few platelets; epistaxis—Nosebleed; gingival bleeding—Gums bleeding; petechiae—Pinpoint bruises; ecchymoses—Large black and blue bruises.
3. Bone marrow aspiration—Sample of bone marrow is removed by aspiration with a needle and examined for diseases.
4. A diagnosis based on the results of the physician's direct examination rather than based on other tests like X-rays and labwork.
5. Chemotherapy—Treating disease by using chemicals that have a toxic effect upon the body, especially cancerous tissue.
6. Remission—A period during which the symptoms of a disease or disorder leave. Can be temporary.

### Practice Exercises

- A. 1. splenomegaly 2. splenectomy 3. splenotomy 4. lymphocytes 5. lymphoma 6. lymphadenopathy 7. lymphadenoma 8. lymphadenitis 9. immunologist 10. immunoglobulin 11. immunology 12. hematic 13. hematoma 14. hematopoiesis 15. hemolytic 16. hemoglobin 17. leukopenia 18. erythropenia 19. pancytopenia 20. leukocytosis 21. erythrocytosis 22. thrombocytosis 23. erythrocyte 24. leukocyte 25. lymphocyte

- B. 1. basophil 2. complete blood count 3. hemoglobin 4. prothrombin time 5. graft versus host disease 6. red blood count/red blood cell 7. packed cell volume 8. erythrocyte sedimentation rate 9. differential 10. lymphocyte
- C. 1. lymphaden/o 2. thromb/o 3. sanguin/o, hem/o, hemat/o 4. tonsill/o 5. tox/o 6. phag/o 7. lymphangi/o 8. path/o 9. splen/o 10. lymph/o
- D. 1. polycythemia vera 2. mononucleosis 3. anaphylactic shock 4. HIV 5. Kaposi's sarcoma 6. AIDS 7. Hodgkin's disease 8. Pneumocystis 9. aplastic 10. pernicious
- E. 1. reverse transcriptase inhibitor, e 2. anticoagulant, a 3. antihemorrhagic, d 4. antihistamine, h 5. immunosuppressant, f 6. thrombolytic, b 7. hematinic, g 8. corticosteroid, c 9. antiplatelet agent, i
- F. 1. d 2. f 3. b 4. g 5. a 6. e 7. c
- G. 1. treatment with an antibody injection 2. blood test for HIV in addition to ELISA 3. infections seen in immunocompromised patients 4. intense itching 5. tissue's response to injury 6. blood transfusion from another person 7. caused by vitamin B<sub>12</sub> deficiency 8. cancer of blood forming bone marrow 9. rapid flow of blood, bleeding 10. blood poisoning

### Labeling Exercise

- A. 1. plasma 2. red blood cells or erythrocytes 3. platelets or thrombocytes 4. white blood cells or leukocytes
- B. 1. cervical nodes 2. mediastinal nodes 3. axillary nodes 4. inguinal nodes
- C. 1. thymus gland 2. lymph node 3. tonsil 4. spleen 5. lymphatic vessels

## Chapter 7 Answers

### Practice As You Go

- A. 1. nasal cavity, pharynx, larynx, trachea, bronchial tubes, lungs 2. pharynx 3. epiglottis 4. diaphragm 5. 3; 2 6. alveoli 7. pleura 8. bronchioles, alveoli
- B. 1. laryngeal 2. pulmonary 3. paranasal 4. alveolar 5. nasal 6. diaphragmatic
- C. 1. e 2. i 3. h 4. a 5. j 6. d 7. b 8. g 9. f 10. c
- D. 1. f 2. c 3. e 4. a 5. d 6. b
- E. 1. URI 2. PFT 3. O<sub>2</sub> 4. CO<sub>2</sub> 5. COPD 6. Bronch 7. TB 8. IRDS

### Real-World Applications

#### Medical Record Analysis

1. asthma—Disease caused by various conditions, such as allergens, and resulting in constriction of the bronchial airways, dyspnea, coughing,

and wheezing. Can cause violent spasms of the bronchi (bronchospasms) but is generally not a life-threatening condition. Medication can be very effective.

2. dyspnea—Term describing difficult or labored breathing.
3. cyanosis—Refers to the bluish tint of skin that is receiving an insufficient amount of oxygen or circulation.
4. expiration—To breath out; exhale.
5. phlegm—Thick mucus secreted by the membranes that line the respiratory tract. When phlegm is coughed through the mouth, it is called *sputum*. Phlegm is examined for color, odor, and consistency.
6. auscultation—To listen to body sounds, usually using a stethoscope.
7. rhonchi—Somewhat musical sound during expiration, often found in asthma or infection. Caused by spasms of the bronchial tubes. Also called *wheezing*.
8. arterial blood gases (ABGs)—Testing for the gases present in the blood. Generally used to assist in determining the levels of oxygen ( $O_2$ ) and carbon dioxide ( $CO_2$ ) in the blood.
9. hypoxemia—The condition of having an insufficient amount of oxygen in the bloodstream.
10. spirometry—Procedure to measure lung capacity using a *spirometer*.
11. Proventil—Medication that relaxes muscle spasms in bronchial tubes. Used to treat asthma.
12. bronchospasms—An involuntary muscle spasm of the smooth muscle in the wall of the bronchus.

### Chart Note Transcription

1. dyspnea 2. tachypnea 3. arterial blood gases (ABGs) 4. hypoxemia 5. auscultation 6. crackles 7. purulent 8. sputum 9. CXR 10. pneumonia 11. endotracheal intubation

### Case Study

1. Pneumonia.
2. Dyspnea—Difficulty breathing; dizziness; orthopnea—comfortable breathing only while sitting up; elevated temperature, cough.
3. Auscultation (listening to the body sounds) revealed crackles (abnormal sound); chest X-ray revealed fluid in the upper lobe of the right lung.
4. A method of determining a patient's general health and heart and lung function by measuring pulse (100 BPM and rapid), respiratory rate (24 breaths/min and labored), temperature ( $102^{\circ}\text{F}$ ), and blood pressure (180/110).
5. IV antibiotics—medicine to kill bacteria given into a vein; intermittent positive pressure

breathing—method of assisting patients in breathing by using a machine that produces an increased pressure.

6. The IV antibiotics were changed to oral antibiotics—she started taking pills.

### Practice Exercises

- A. 1. exchange of  $O_2$  and  $CO_2$  2. ventilation 3. exchange of  $O_2$  and  $CO_2$  in the lungs 4. exchange of  $O_2$  and  $CO_2$  at cellular level
- B. 1. dilation 2. carbon dioxide 3. voice 4. chest 5. breathing 6. spitting 7. smell
- C. 1. rhinitis 2. rhinorrhea 3. rhinoplasty 4. laryngitis 5. laryngospasm 6. laryngoscopy 7. laryngeal 8. laryngectomy 9. laryngoplasty 10. laryngoplegia 11. bronchial 12. bronchitis 13. bronchoscopy 14. bronchogenic 15. bronchospasm 16. thoracotomy 17. thoracalgia 18. thoracic 19. tracheotomy 20. tracheostenosis 21. endotracheal 22. dyspnea 23. tachypnea 24. orthopnea 25. apnea
- D. 1. trachea or windpipe 2. larynx 3. bronchus 4. breathing 5. lung or air 6. nose 7. dust 8. pleura 9. epiglottis 10. alveolus or air sac 11. lung 12. oxygen 13. sinus 14. lobe 15. nose
- E. 1. inhalation or inspiration 2. hemoptysis 3. pulmonary emboli 4. sinusitis 5. pharyngitis 6. pneumothorax 7. pertussis 8. pleurotomy 9. pleurodynia 10. nasopharyngitis
- F. 1. chest X-ray 2. tidal volume 3. temperature, pulse, respirations 4. arterial blood gases 5. dyspnea on exertion 6. right upper lobe 7. sudden infant death syndrome 8. total lung capacity 9. adult respiratory distress syndrome 10. metered-dose inhaler 11. clear to auscultation 12. severe acute respiratory syndrome
- G. 1. volume of air in the lungs after a maximal inhalation or inspiration 2. amount of air entering lungs in a single inspiration or leaving air in single expiration of quiet breathing 3. air remaining in the lungs after a forced expiration
- H. 1. cardiopulmonary resuscitation 2. thoracentesis 3. respirator 4. supplemental oxygen 5. patent 6. ventilation-perfusion scan 7. sputum cytology 8. hyperventilation 9. rhonchi 10. anthracosis
- I. 1. decongestant, f 2. antitussive, a 3. antibiotic, c 4. expectorant, g 5. mucolytic, h 6. bronchodilator, d 7. antihistamine, e 8. corticosteroid, b

### Labeling Exercise

- A. 1. pharynx and larynx 2. trachea 3. nasal cavity 4. bronchial tubes 5. lungs
- B. 1. nares 2. paranasal sinuses 3. nasal cavity 4. hard palate 5. soft palate 6. palatine tonsil 7. epiglottis 8. vocal cords 9. esophagus 10. trachea



- C. 1. trachea 2. right upper lobe 3. right middle lobe 4. right lower lobe 5. apex of lung 6. left upper lobe 7. left lower lobe 8. diaphragm

## Chapter 8 Answers

### Practice As You Go

- A. 1. gastrointestinal 2. gut, alimentary canal, mouth, anus 3. salivary glands, liver, gallbladder, pancreas 4. digesting food, absorbing nutrients, eliminating waste 5. cutting, grinding 6. peristalsis 7. hydrochloric acid, chyme 8. duodenum, jejunum, ileum 9. sigmoid 10. bile, emulsification, gallbladder
- B. 1. duodenal 2. nasogastric 3. hepatic 4. pancreatic 5. cholecystic or cystic 6. sublingual 7. esophageal 8. sigmoidal
- C. 1. i 2. f 3. c 4. a 5. j 6. l 7. e 8. b 9. k 10. d 11. g 12. o 13. h 14. n 15. m
- D. 1. f 2. g 3. e 4. h 5. b 6. a 7. d 8. c
- E. 1. NG 2. GI 3. HBV 4. FOBT 5. IBD 6. HSV-1 7. AST 8. pc 9. PUD 10. GERD

### Real-World Applications

#### Medical Record Analysis

1. epigastric—Pertaining to the area above the stomach.
2. anemia—A large group of conditions characterized by a reduction in the number of red blood cells or the amount of hemoglobin in the blood; results in less oxygen reaching the tissues.
3. melena—Passage of dark tarry stools. Color is the result of digestive enzymes working on blood in the gastrointestinal tract.
4. dyspepsia—An “upset stomach.”
5. antacids—Medication to neutralize stomach acid.
6. complete blood count (CBC)—A combination of blood tests including red blood cell count, white blood cell count, hemoglobin, hematocrit, white blood cell differential, and platelet count.
7. fecal occult blood—Laboratory test on the feces to determine if microscopic amounts of blood are present. Also called *hemoccult* or *stool guaiac*.
8. *Helicobacter pylori*—A bacteria that may damage the lining of the stomach setting up the conditions for peptic ulcer disease to develop.
9. gastroscopy—Procedure in which a flexible *gastroscope* is passed through the mouth and down the esophagus in order to visualize inside the stomach. Used to diagnose peptic ulcers and gastric carcinoma.
10. ulcer—An open sore or lesion in the skin or mucous membrane.

11. peptic ulcer disease—Ulcer occurring in the lower portion of the esophagus, stomach, and/or duodenum; thought to be caused by the acid of gastric juices. Initial damage to the protective lining of the stomach may be caused by a *Helicobacter pylori* (*H. pylori*) bacterial infection. If the ulcer extends all the way through the wall of the stomach, it is called a *perforated ulcer*, which requires immediate surgery to repair.
12. gastrectomy—Surgical removal of the stomach.

### Chart Note Transcription

1. gastroenterologist 2. constipation 3. cholelithiasis 4. cholecystectomy 5. gastroesophageal reflux disease 6. ascites 7. lower gastrointestinal series 8. polyposis 9. colonoscopy 10. sigmoid colon 11. colectomy 12. colostomy

### Case Study

1. Severe RUQ pain—Severe pain is located in the upper right corner of the abdomen; nausea—Feeling the urge to vomit; emesis—Vomiting; scleral jaundice—The whites of the eye have a yellowish cast to them.
2. Gallbladder, right kidney, majority of the liver, a small portion of the pancreas, portion of colon and small intestine.
3. Gallstones blocking the common bile duct so bile can't drain into the small intestine.
4. Abdominal ultrasound—The use of high-frequency sound waves to produce an image of an organ, such as the uterus and ovaries or a fetus; percutaneous transhepatic cholangiography (PTC)—Procedure in which contrast medium is injected directly into the liver to visualize the bile ducts; used to detect obstructions such as gallstones in the common bile duct.
5. Cholelithiasis is the condition of having gallstones present in the gallbladder, they may not be causing any symptoms; cholecystitis is the inflammation of the gallbladder that occurs when gallstones block the flow of bile out of the gallbladder.
6. Laparoscopic cholecystectomy—The gallbladder was removed through a very small abdominal incision with the assistance of a laparoscope.

### Practice Exercises

- A. 1. gastritis 2. gastroenterology 3. gastrectomy 4. gastroscopy 5. gastralgia 6. gastromegaly 7. gastrotomy 8. esophagitis 9. esophagoscopy 10. esophagoplasty 11. esophageal 12. esophagectasis 13. proctopexy 14. proctoptosis 15. proctitis 16. proctologist 17. cholecystectomy 18. cholecystolithiasis 19. cholecystolithotripsy

20. cholecystitis 21. laparoscope 22. laparotomy 23. laparoscopy 24. hepatoma 25. hepatomegaly 26. hepatic 27. hepatitis 28. pancreatitis 29. pancreatic 30. colostomy 31. colitis
- B.** 1. esophagus 2. liver 3. ileum 4. anus and rectum 5. tongue 6. lip 7. jejunum 8. sigmoid colon 9. rectum 10. gum 11. gallbladder 12. duodenum 13. anus 14. small intestine 15. tooth
- C.** 1. postprandial 2. cholelithiasis 3. anorexia 4. dysphagia 5. hematemesis 6. bradypepsia
- D.** 1. bowel movement 2. upper gastrointestinal series 3. barium enema 4. bowel sounds 5. nausea and vomiting 6. ova and parasites 7. by mouth 8. common bile duct 9. nothing by mouth 10. postprandial
- E.** 1. visual exam of the colon 2. tooth X-ray 3. bright red blood in the stools 4. blood test to determine amount of waste product in the bloodstream 5. weight loss and wasting from a chronic illness 6. use NG tube to wash out stomach 7. surgical repair of hernia 8. pulling teeth 9. surgical crushing of common bile duct stone 10. surgically create a connection between two organs
- F.** 1. liver biopsy 2. colostomy 3. barium swallow 4. lower GI series 5. colectomy 6. fecal occult blood test 7. choledocholithotripsy 8. total parenteral nutrition 9. gastric stapling 10. intravenous cholecystography 11. colonoscopy 12. ileostomy
- G.** 1. d 2. g 3. h 4. e 5. f 6. b 7. c 8. a
- H.** 1. antidiarrheal, f 2. proton pump inhibitor, h 3. antiemetic, d 4. H<sub>2</sub>-receptor antagonist, a 5. anorexiant, b 6. laxative, c 7. antacid, e 8. antiviral, g

## Labeling Exercise

- A.** 1. salivary glands 2. esophagus 3. pancreas 4. small intestine 5. oral cavity 6. stomach 7. liver and gallbladder 8. colon
- B.** 1. esophagus 2. cardiac or lower esophageal sphincter 3. pyloric sphincter 4. duodenum 5. antrum 6. fundus of stomach 7. rugae 8. body of stomach
- C.** 1. cystic duct 2. common bile duct 3. gallbladder 4. duodenum 5. liver 6. hepatic duct 7. pancreas 8. pancreatic duct

## Chapter 9 Answers Practice As You Go

- A.** 1. nephrons 2. filtration, reabsorption, secretion 3. electrolytes 4. retroperitoneal 5. glomerulus 6. calyx 7. two, one 8. micturition, voiding
- B.** 1. ureteral 2. renal 3. glomerular 4. urinary 5. urethral
- C.** 1. c 2. g 3. h 4. i 5. f 6. e 7. d 8. b 9. a 10. j

- D.** 1. f 2. e 3. h 4. a 5. g 6. c 7. d 8. b
- E.** 1. kidneys, ureters, bladder 2. catheter/catheterization 3. cystoscopy 4. genitourinary 5. extracorporeal shockwave lithotripsy 6. urinary tract infection 7. urine culture 8. retrograde pyelogram 9. acute renal failure 10. blood urea nitrogen 11. chronic renal failure 12. water

## Real-World Applications

### Medical Record Analysis

1. hematuria—The presence of blood in the urine.
2. pyelonephritis—Inflammation of the renal pelvis and the kidney. One of the most common types of kidney disease. It may be the result of a lower urinary tract infection that moved up to the kidney by way of the ureters. There may be large quantities of white blood cells and bacteria in the urine. Blood (hematuria) may even be present in the urine in this condition. Can occur with any untreated or persistent case of cystitis.
3. chronic cystitis—Urinary bladder inflammation.
4. dysuria—Difficult or painful urination.
5. clean catch urinalysis—Laboratory test that consists of the physical, chemical, and microscopic examination of urine.
6. pyuria—The presence of pus in the urine.
7. culture and sensitivity—Laboratory test of urine for bacterial infection. Attempt to grow bacteria on a culture medium in order to identify it and determine which antibiotics it is sensitive to.
8. pathogen—Anything, such as bacteria, viruses, fungi, or toxins, that may cause disease.
9. antibiotic—Medication used to treat bacterial infections of the urinary tract.
10. cystoscopy—Visual examination of the urinary bladder using an instrument called a *cystoscope*.
11. bladder neck obstruction—Blockage of the bladder outlet. Often caused by an enlarged prostate gland in males.
12. congenital—Present from birth.
13. catheterized—Insertion of a tube through the urethra and into the urinary bladder for the purpose of withdrawing urine or inserting dye.

### Chart Note Transcription

1. urologist 2. hematuria 3. cystitis 4. clean-catch specimen 5. urinalysis (U/A, UA) 6. pyuria 7. retrograde pyelogram 8. ureter 9. ureterolith 10. extracorporeal shockwave lithotripsy (ESWL) 11. calculi

### Case Study

1. Cystitis—Inflammation of the urinary bladder; pyelonephritis—Inflammation of the renal pelvis and the kidney. One of the most common types

of kidney disease. It may be the result of a lower urinary tract infection that moved up to the kidney by way of the ureters. There may be large quantities of white blood cells and bacteria in the urine. Blood (hematuria) may even be present in the urine in this condition. Can occur with any untreated or persistent case of cystitis.

2. Fever; chills; fatigue; urgency—Feeling the need to urinate immediately; frequency—Urge to urinate more often than normal; dysuria—Difficult or painful urination; hematuria—Blood in the urine; cloudy urine with a fishy smell—Urine was not clear and smelled bad.
3. Clean catch specimen—Urine sample obtained after cleaning off the urinary opening and catching or collecting a urine sample in midstream (halfway through the urination process) to minimize contamination from the genitalia; U/A (urinalysis)—A physical, chemical, and microscopic examination of the urine; urine C&S (culture & sensitivity)—Test for the presence and identification of bacteria in the urine; KUB (kidney, ureters, and bladder)—An X-ray of the urinary organs.
4. Pyuria—Pus in the urine; bacteriuria—Bacteria in the urine; acidic pH—Indicates a urinary tract infection; culture and sensitivity—Revealed a common type of bacteria; KUB—Pyelonephritis.
5. Antibiotic—To kill the bacteria; push fluids—To flush out the bladder.
6. Clear yellow to deep gold color, aromatic odor, specific gravity between 1.010–1.030, pH between 5.0–8.0, very little protein, no glucose, ketones, or blood.

## Practice Exercises

- A. 1. nephropexy 2. nephrogram 3. nephrolithiasis 4. nephrectomy 5. nephritis 6. nephropathy 7. nephrosclerosis 8. cystitis 9. cystorrhagia 10. cystoplasty 11. cystoscope 12. cystalgia 13. pyeloplasty 14. pyelitis 15. pyelogram 16. ureterolith 17. ureterectasis 18. ureterostenosis 19. urethritis 20. urethroscope
- B. 1. urine 2. meatus 3. urinary bladder 4. kidney 5. renal pelvis 6. sugar 7. night 8. scanty 9. ureter 10. glomerulus
- C. 1. antispasmodic, b 2. antibiotic, c 3. diuretic, a
- D. 1. urination, voiding 2. increases urine production 3. pain associated with kidney stone 4. inserting a tube through urethra into the bladder 5. inflammation of renal pelvis 6. inflammation of glomeruli in the kidney 7. cutting into an organ to remove stone 8. bedwetting 9. enlargement of urethral opening 10. damage to glomerulus secondary to diabetes mellitus 11. lab test of chemical composition of urine 12. decrease in force of urine stream
- E. 1. anuria 2. hematuria 3. calculus/nephrolith 4. lithotripsy 5. urethritis 6. pyuria 7. bacteriuria 8. dysuria 9. ketonuria 10. proteinuria 11. polyuria
- F. 1.  $K^+$  2.  $Na^+$  3. UA 4. BUN 5. SG, sp.gr. 6. IVP 7. BNO 8. I & O 9. ATN 10. ESRD
- G. 1. drooping 2. condition of the urine 3. stone 4. surgical crushing 5. condition of stones
- H. 1. renal transplant 2. nephropexy 3. urinary tract infection 4. pyelolithectomy 5. renal biopsy 6. ureterectomy 7. cystostomy 8. cystoscopy 9. IVP

## Labeling Exercise

- A. 1. kidney 2. urinary bladder 3. ureter 4. male urethra 5. female urethra
- B. 1. cortex 2. medulla 3. calyx 4. renal pelvis 5. renal papilla 6. renal pyramid 7. ureter
- C. 1. efferent arteriole 2. glomerular (Bowman's) capsule 3. glomerulus 4. afferent arteriole 5. proximal convoluted tubule 6. descending nephron loop 7. distal convoluted tubule 8. collecting tubule 9. ascending nephron loop 10. peritubular capillaries

## Chapter 10 Answers

### Practice As You Go

- A. 1. uterine tubes 2. gestation 3. dilation, expulsion, placental 4. menopause 5. ovum 6. endometrium 7. uterus
- B. 1. embryonic 2. fetal 3. uterine 4. ovarian 5. mammary 6. vaginal
- C. 1. b 2. h 3. g 4. c 5. a 6. i 7. j 8. d 9. e 10. f
- D. 1. e 2. g 3. d 4. a 5. h 6. c 7. b 8. f
- E. 1. GI, grav I 2. AI 3. UC 4. FTND 5. IUD 6. D & C 7. HRT 8. gyn/GYN 9. AB 10. OCPs
- F. 1. urinary, reproductive 2. testes, epididymis, penis 3. foreskin 4. testes 5. bulbourethral glands 6. testosterone 7. perineum
- G. 1. testicular 2. spermatic 3. vesicular 4. penile 5. prostatic
- H. 1. b 2. e 3. a 4. c 5. f 6. d
- I. 1. c 2. a 3. d 4. b 5. e
- J. 1. ED 2. GC 3. DRE 4. TURP 5. STI

## Real-World Applications

### Medical Chart Analysis

1. gestation—The length of time of pregnancy, normally about 40 weeks.
2. amniocentesis—Puncturing of the amniotic sac using a needle and syringe for the purpose of withdrawing amniotic fluid for testing. Can assist in determining fetal maturity, development, and genetic disorders.

3. fetus—The unborn infant from approximately week 9 until birth.
4. obstetrician—Branch of medicine specializing in the diagnosis and treatment of women during pregnancy and childbirth, and immediately after childbirth. Physician is called an *obstetrician*.
5. multigravida—A woman who has been pregnant two or more times.
6. nullipara—A woman who has not given birth to a live infant.
7. miscarriage—Unplanned loss of a pregnancy due to the death of the embryo or fetus before the time it is viable, also referred to as a *spontaneous abortion*.
8. pelvic ultrasound—Use of high-frequency sound waves to produce an image or photograph of an organ, such as the uterus, ovaries, or fetus.
9. placenta previa—A placenta that is implanted in the lower portion of the uterus and, in turn, blocks the birth canal.
10. abruptio placentae—Emergency condition in which the placenta tears away from the uterine wall prior to delivery of the infant. Requires immediate delivery of the baby.
11. placenta—The organ that connects the fetus to the mother's uterus, supplies fetus with oxygen and nutrients.
12. C-section—Surgical delivery of a baby through an incision into the abdominal and uterine walls.

### Chart Note Transcription

1. ejaculation 2. cryptorchidism 3. orchidopexy
4. vasectomy 5. ejaculation 6. digital rectal exam (DRE) 7. prostate cancer 8. prostate-specific antigen (PSA) 9. benign prostatic hyperplasia (BPH) 10. transurethral resection (TUR)

### Case Study

1. Genital herpes.
2. Fever—She has a temperature; malaise—A feeling of general discomfort; dysuria—Painful urination; vaginal leukorrhea—A white discharge or flow from the vagina.
3. Vesicles—Small fluid-filled blisters; ulcers—Craterlike erosions of the skin; erythema—redness; edema—Swelling.
4. An abnormality located on the body in some area outside of the genital region.
5. To feel with your hands.
6. There is a risk of passing the virus to the baby as it passes through the birth canal.

### Practice Exercises

- A. 1. suprapubic prostatectomy 2. transurethral resection 3. genitourinary 4. benign prostatic

- hyperplasia 5. prostate-specific antigen 6. cervix 7. last menstrual period 8. fetal heart rate 9. pelvic inflammatory disease 10. gynecology 11. cesarean section 12. newborn 13. premenstrual syndrome 14. toxic shock syndrome 15. low birth weight
- B. 1. the formation of mature sperm 2. accumulation of fluid within the testes 3. surgical removal of the prostate gland by inserting a device through the urethra and removing prostate tissue 4. inability to father children due to a problem with spermatogenesis 5. surgical removal of the testes 6. surgical removal of part or all of the vas deferens 7. removal of the testicles in the male or the ovaries in the female 8. the normal length of time of pregnancy, about 37 weeks 9. first bowel movement of newborn 10. a woman who has never been pregnant 11. difficult labor and childbirth 12. discharge from the uterus other than the menstrual flow 13. a benign fibrous growth 14. benign cysts forming in the breast 15. placenta implants in lower uterus and blocks birth canal
- C. 1. colposcopy 2. colposcope 3. cervicectomy 4. cervicitis 5. hysteropexy 6. hysterectomy 7. hysterorrhexis 8. oophoritis 9. oophorectomy 10. mammogram 11. mammoplasty 12. amniotomy 13. amniorrhea 14. prostatectomy 15. prostatitis 16. orchiectomy 17. orchioplasty 18. orchiotomy 19. aspermia 20. oligospermia 21. spermatogenesis 22. spermatolysis
- D. 1. uterus 2. uterus 3. female 4. vulva 5. ovary 6. ovary 7. uterine tube 8. menstruation or menses 9. vagina 10. breast 11. sperm 12. testes 13. male 14. penis 15. prostate
- E. 1. labor, childbirth 2. pregnancy 3. beginning 4. pregnancy 5. childbirth 6. to bear (offspring) 7. uterine tube 8. sperm condition
- F. 1. conization 2. stillbirth 3. puberty 4. premenstrual syndrome 5. laparoscopy 6. fibroid tumor 7. D & C 8. eclampsia 9. endometriosis 10. cesarean section
- G. 1. e 2. i 3. h 4. c 5. a 6. d 7. g 8. b 9. f
- H. 1. androgen therapy, f 2. oxytocin, a 3. antiprostatic agent, b 4. birth control pills, g 5. spermatocide, d 6. erectile dysfunction agent, h 7. hormone replacement therapy, i 8. abortifacient, e 9. fertility drug, c

### Labeling Exercise

- A. 1. uterine tube 2. ovary 3. fundus of uterus 4. corpus (body) of uterus 5. cervix 6. vagina 7. clitoris 8. labium majora 9. labium minora
- B. 1. seminal vesicle 2. vas deferens 3. prostate gland 4. bulbourethral gland 5. urethra 6. epididymis 7. glans penis 8. testis
- C. 1. areola 2. nipple 3. lactiferous gland 4. lactiferous duct 5. fat



## Chapter 11 Answers

### Practice As You Go

- A. 1. endocrinology 2. pituitary 3. gonads 4. corticosteroids 5. testosterone 6. estrogen, progesterone 7. antidiuretic hormone (ADH) 8. thymus gland
- B. 1. thymic 2. pancreatic 3. thyroidal 4. ovarian 5. testicular
- C. 1. b 2. a 3. e 4. h 5. j 6. i 7. f 8. g 9. c 10. d
- D. 1. e 2. d 3. a 4. f 5. c 6. b 7. h 8. g
- E. 1. NIDDM 2. IDDM 3. ACTH 4. PTH 5.  $T_3$  6. TSH 7. FBS 8. PRL

### Real-World Applications

#### Medical Record Analysis

- hyperglycemia—The condition of having a high level of sugar in the blood; associated with diabetes mellitus.
- ketoacidosis—Acidosis due to an excess of acidic ketone bodies (waste products). A serious condition requiring immediate treatment that can result in death for the diabetic patient if not reversed. Also called *diabetic acidosis*.
- glycosuria—Having a high level of sugar excreted in the urine.
- type 1 diabetes mellitus—Also called *insulin-dependent diabetes mellitus*. It develops early in life when the pancreas stops insulin production. Patient must take daily insulin injections.
- polyuria—The condition of producing an excessive amount of urine.
- polydipsia—Excessive feeling of thirst.
- fasting blood sugar—Blood test to measure the amount of sugar circulating throughout the body after a 12-hour fast.
- insulin—Medication administered to replace insulin for type 1 diabetics or to treat severe type 2 diabetics.
- glucose tolerance test—Test to determine the blood sugar level. A measured dose of glucose is given to a patient either orally or intravenously. Blood samples are then drawn at certain intervals to determine the ability of the patient to use glucose. Used for diabetic patients to determine their insulin response to glucose.
- glucometer—A device designed for a diabetic to use at home to measure the level of glucose in the bloodstream.

#### Chart Note Transcription

1. endocrinologist 2. obesity 3. hirsutism 4. radio immunoassay (RIA) 5. cortisol 6. adenoma 7. adrenal cortex 8. Cushing's syndrome 9. adenoma 10. adrenal cortex 11. adrenalectomy

### Case Study

- Diabetes mellitus.
- Diaphoresis—Profuse sweating; rapid respirations—Breathing fast; rapid pulse—Fast heart rate; disorientation—Confused about his surroundings.
- Blood serum test—Lab test to measure the levels of different substances in the blood, used to determine the function of endocrine glands.
- Hyperglycemia—Blood level of glucose is too high; ketoacidosis—an excessive amount of acidic ketone bodies in the body.
- Type 1, insulin-dependent, or juvenile diabetes mellitus because he has had it since childhood and he is taking insulin shots.
- Type 2, non-insulin-dependent diabetes mellitus typically develops later in life. The pancreas produces normal to high levels of insulin, but the cells fail to respond to it. Patients may take oral hypoglycemic agents to improve insulin function, or may eventually have to take insulin.

### Practice Exercises

- A. 1. thyroidectomy 2. thyroidal 3. hyperthyroidism 4. pancreatic 5. pancreatitis 6. pancreatectomy 7. pancreatotomy 8. adrenal 9. adrenomegaly 10. adrenopathy 11. thymoma 12. thymectomy 13. thymic 14. thymitis
- B. 1. sodium 2. female 3. pineal gland 4. pituitary gland 5. potassium 6. calcium 7. parathyroid glands 8. extremities 9. sugar 10. sex glands
- C. 1. protein-bound iodine 2. potassium 3. thyroxine 4. glucose tolerance test 5. diabetes mellitus 6. basal metabolic rate 7. sodium 8. antidiuretic hormone
- D. 1. glycosuria 2. vasopressin 3. polyuria 4. hypercalcemia 5. polydipsia 6. gonadotropin 7. postprandial
- E. 1. hormone obtained from cortex of adrenal gland 2. having excessive hair 3. a nerve condition characterized with spasms of extremities; can occur from imbalance of pH and calcium or disorder of parathyroid gland 4. disorder of the retina occurring with diabetes mellitus 5. increase in blood sugar level 6. decrease in blood sugar level 7. another term for epinephrine; produced by inner portion of adrenal gland 8. hormone produced by pancreas; essential for metabolism of blood sugar 9. toxic condition due to hyperactivity of thyroid gland 10. a condition resulting when the endocrine gland secretes more hormone than is needed by the body
- F. 1. insulinoma 2. ketoacidosis 3. panhypopituitarism 4. pheochromocytoma 5. Hashimoto's thyroiditis 6. gynecomastia

- G. 1. corticosteroids, e 2. human growth hormone therapy, a 3. oral hypoglycemic agent, d 4. anti-thyroid agent, c 5. insulin, f 6. vasopressin, b

## Labeling Exercise

- A. 1. pineal gland 2. thyroid and parathyroid glands 3. adrenal glands 4. pancreas 5. pituitary gland 6. thymus gland 7. ovary 8. testis  
 B. 1. pituitary gland 2. bone and soft tissue 3. GH 4. testes 5. FSH, LH 6. ovary 7. FSH, LH 8. thyroid gland 9. TSH 10. adrenal cortex 11. ACTH 12. breast 13. PRL  
 C. 1. liver 2. stomach 3. pancreas 4. beta cell 5. alpha cell 6. islets of Langerhans

## Chapter 12 Answers

### Practice As You Go

- A. 1. brain, spinal cord, nerves 2. peripheral nervous system, central nervous system 3. efferent or motor; afferent or sensory 4. cerebrum 5. cerebellum 6. eyesight 7. hearing, smell 8. parasympathetic, sympathetic  
 B. 1. cerebrospinal 2. meningeal 3. subdural 4. encephalic 5. neural 6. intracranial  
 C. 1. b 2. f 3. g 4. h 5. i 6. j 7. e 8. c 9. d 10. a  
 D. 1. e 2. c 3. g 4. b 5. a 6. d 7. d 8. f  
 E. 1. CSF 2. CVD 3. EEG 4. ICP 5. PET 6. CVA 7. ANS

## Real World Applications

### Medical Chart Analysis

1. paraplegia—Paralysis of the lower portion of the body and both legs.
2. comminuted fracture—Fracture in which the bone is shattered, splintered, or crushed into many small pieces or fragments.
3. epidural hematoma—Mass of blood in the space outside the dura mater of the brain and spinal cord.
4. spinal cord injury—Damage to the spinal cord as a result of trauma. Spinal cord may be bruised or completely severed.
5. unconscious—State of being unaware of surroundings, with the inability to respond to stimuli.
6. anesthesia—The lack of feeling or sensation.
7. paralysis—Temporary or permanent loss of function or voluntary movement.
8. computed tomography scan (CT scan)—An imaging technique that is able to produce a cross-sectional view of the body.
9. laminectomy—Removal of a portion of a vertebra, called the *lamina*, in order to relieve pressure on the spinal nerve.

10. spinal fusion—Surgical immobilization of adjacent vertebrae. This may be done for several reasons, including correction for a herniated disk.
11. physical therapy (PT)—Treats disorders using physical means and methods; includes joint motion and muscle strength.
12. occupational therapy (OT)—Assists patients to regain, develop, and improve skills that are important for independent functioning.

### Chart Note Transcription

1. neurologist 2. dysphasia 3. hemiplegia 4. convulsions 5. electroencephalography (EEG) 6. lumbar puncture (LP) 7. brain scan 8. cerebral cortex 9. astrocytoma 10. craniotomy 11. cryosurgery

### Case Study

1. Cerebrovascular accident (CVA or stroke).
2. aphasia—Inability to speak; hemiparesis—Weakness on one side of the body; syncope—Fainting; delirium—Abnormal mental state with confusion, disorientation, and agitation.
3. hypertension—High blood pressure; atherosclerosis—Hardening of arteries due to buildup of yellow fatty substances; diabetes mellitus—Inability to make or use insulin properly to control blood sugar levels.
4. brain scan—An image of the brain after injection of radioactive isotopes into the circulation; revealed an infarct in the right cerebral hemisphere.
5. infarct—An area of tissue within an organ that undergoes necrosis (death) following the loss of its blood supply.
6. hemorrhage—Ruptured blood vessel; thrombus—Stationary clot; embolus—Floating clot; compression—Pinching off a blood vessel.

### Practice Exercises

- A. 1. h 2. k 3. d 4. g 5. a 6. b 7. f 8. j 9. e 10. l 11. i 12. c  
 B. 1. neuritis 2. neurologist 3. neuralgia 4. polyneuritis 5. neurectomy 6. neuroplasty 7. neuroma 8. neurorrhaphy 9. meningitis 10. meningocele 11. myelomeningocele 12. encephalogram 13. encephalopathy 14. encephalitis 15. encephalocoele 16. cerebrospinal 17. cerebral  
 C. 1. transient ischemic attack 2. multiple sclerosis 3. spinal cord injury 4. central nervous system 5. peripheral nervous system 6. headache 7. cerebral palsy 8. lumbar puncture 9. amyotrophic lateral sclerosis  
 D. 1. injecting radiopaque dye into spinal canal to examine under X-ray the outlines made by the dye 2. X-ray of the blood vessels of the brain after the injection of radiopaque dye 3. reflex test on



bottom of foot to detect lesion and abnormalities of nervous system 4. test that measures how fast an impulse travels along a nerve to pinpoint an area of nerve damage 5. laboratory examination of fluid taken from the brain and spinal cord 6. positron emission tomography to measure cerebral blood flow, blood volume, oxygen, and glucose uptake 7. recording the ultrasonic echoes of the brain 8. needle puncture into the spinal cavity to withdraw fluid

- E. 1. paralysis 2. muscular coordination 3. pertaining to development 4. weakness 5. speech  
 F. 1. meninges 2. brain 3. cerebellum 4. spinal cord 5. head 6. thalamus 7. nerve 8. nerve root 9. cerebrum 10. pons  
 G. 1. tumor of astrocyte cells 2. seizure 3. without sensation 4. weakness of one-half of body 5. physician that treats nervous system with surgery 6. without sense of pain 7. localized seizure of one limb 8. paralysis of all four limbs 9. accumulation of blood in the subdural space 10. within the meninges  
 H. 1. d 2. e 3. f 4. g 5. b 6. a 7. c 8. j 9. h 10. i  
 I. 1. delirium 2. amyotrophic lateral sclerosis 3. Bell's palsy 4. cerebral aneurysm 5. Parkinson's disease 6. cerebrospinal fluid shunt 7. transient ischemic attack 8. subdural hematoma 9. cerebral palsy 10. nerve conduction velocity  
 J. 1. anesthetic, e 2. dopaminergic drugs, a 3. hypnotic, d 4. analgesic, g 5. sedative, b 6. narcotic analgesic, c 7. anticonvulsant, f

## Labeling Exercise

- A. 1. brain 2. spinal nerves 3. spinal cord  
 B. 1. dendrites 2. nerve cell body 3. unmyelinated region 4. myelinated axon 5. nucleus 6. axon 7. terminal end fibers  
 C. 1. cerebrum 2. diencephalon 3. thalamus 4. hypothalamus 5. brain stem 6. midbrain 7. cerebellum 8. pons 9. medulla oblongata

## Chapter 13 Answers

### Practice As You Go

- A. 1. ophthalmology 2. cilia 3. lacrimal 4. cornea 5. retina 6. iris  
 B. 1. pupillary 2. optic or optical 3. retinal 4. lacrimal 5. intraocular 6. extraocular  
 C. 1. h 2. g 3. a 4. d 5. b 6. i 7. c 8. f 9. e 10. j  
 D. 1. d 2. a 3. f 4. e 5. b 6. c  
 E. 1. PE tube 2. EM 3. XT 4. OS 5. EOM 6. VA  
 F. 1. malleus, incus, stapes 2. otology 3. tympanic membrane 4. cerumen 5. eustachian or auditory 6. vestibulocochlear nerve

- G. 1. cochlear 2. otic, aural, or auricular 3. vestibular 4. acoustic or auditory 5. monaural  
 H. 1. e 2. h 3. a 4. g 5. j 6. c 7. i 8. b 9. d 10. f  
 I. 1. c 2. b 3. d 4. a 5. g 6. h 7. e 8. f  
 J. 1. OE 2. EENT 3. BC 4. AU 5. OM

## Real-World Applications

### Medical Record Analysis

1. photophobia—Although the term translates into *fear of light*, it actually means a strong sensitivity to bright light.
2. hyperopia—With this condition a person can see things in the distance but has trouble reading material at close range. Also known as *farsightedness*. This condition is corrected with converging or biconvex lenses.
3. visual acuity test—Measurement of the sharpness of a patient's vision. Usually, a Snellen chart is used for this test in which the patient identifies letters from a distance of 20 feet.
4. intraocular—Pertaining to inside the eye.
5. ophthalmoscopy—Examination of the interior of the eyes using an instrument called an *ophthalmoscope*. The physician dilates the pupil in order to see the cornea, lens, and retina. Used to identify abnormalities in the blood vessels of the eye and some systemic diseases.
6. mydriatic drops—Any substance that causes the pupil to dilate by paralyzing the iris and/or ciliary body muscles. Particularly useful during eye examinations and eye surgery.
7. cataract—Damage to the lens causing it to become opaque or cloudy, resulting in diminished vision. Treatment is usually surgical removal of the cataract or replacement of the lens.
8. retinopathy—A general term for disease affecting the retina.
9. macular degeneration—Deterioration of the macular area of the retina of the eye. May be treated with laser surgery to destroy the blood vessels beneath the macula.
10. phacoemulsification—Use of high-frequency sound waves to emulsify (liquefy) a lens with a cataract, which is then aspirated (removed by suction) with a needle.
11. prosthetic lens implant—The use of an artificial lens to replace the lens removed during cataract surgery.

### Chart Note Transcription

1. otorhinolaryngologist (ENT) 2. otitis media (OM) 3. AU, binaural 4. otoscopy 5. tympanic membrane 6. cerumen 7. tympanometry 8. audiometric test 9. conductive hearing loss 10. myringotomy

## Case Study

1. Conductive hearing loss results from disease or malformation of the outer or middle ear; all sound is weaker because it is not conducted correctly to the inner ear.
2. Sensorineural hearing loss as a result of damage or malformation of the inner ear or the cochlear nerve.
3. Otoscopy examination of the auditory canal and middle ear; tympanometry measurement of the movement of the tympanic membrane; audiometry test for hearing ability; Rinne and Weber tuning-fork tests assess both the nerve and bone conduction of sound.
4. Hearing aids or amplification devices amplify sound and will work best for conductive hearing loss; cochlear implant is a device that converts sound signals into magnetic impulses to stimulate the auditory nerve and is used to treat profound sensorineural hearing loss.
5. Protect his ears better during playing music by wearing earplugs.

## Practice Exercises

1. artificial tears, h 2. antiglaucoma medication, c 3. antibiotic otic solution, i 4. mydriatic, a 5. antiemetic, g 6. antibiotic ophthalmic solution, j 7. anti-inflammatory otic solution, b 8. miotic, f 9. wax emulsifier, e 10. anesthetic ophthalmic solution, d
1. blepharitis 2. blepharoplasty 3. blepharoptosis 4. retinopathy 5. retinopexy 6. ophthalmology 7. ophthalmic 8. ophthalmoscopy 9. iridoplegia 10. iridectomy 11. otoplasty 12. otopyorrhea 13. otalgia 14. otitis 15. tympanorrhhexis 16. tympanotomy 17. tympanitis 18. audiogram 19. audiometer 20. audiology
1. -tropia 2. -opia 3. -itis 4. -logy 5. -otomy 6. -plasty 7. -pey 8. -algia 9. -otia 10. -cusis
1. tear or tear duct 2. choroid 3. water 4. light 5. cornea 6. glassy 7. double 8. gray 9. old age 10. dull or dim 11. ear 12. stapes 13. hearing 14. eustachian or auditory tube 15. eardrum or tympanic membrane
1. conductive—problem with outer or middle ear, muffles sound; sensorineural—damage of inner ear or nerve 2. cornea, pupil, lens, retina 3. mucous membrane that covers and protects front of eyeball 4. incus, malleus, stapes, vibrate to amplify and conduct sound waves from outer ear to inner ear
1. otology 2. both eyes 3. rapid eye movement 4. hertz 5. senile macular degeneration 6. pupils equal, round, react to light and accommodation 7. intraocular pressure 8. decibel 9. right eye 10. visual field

1. tonometry 2. emmetropia 3. conjunctivitis 4. myopia 5. cataract 6. hordeolum 7. strabismus 8. hyperopia 9. presbycusis 10. otorhinolaryngologist 11. inner ear 12. Ménière's disease 13. acoustic neuroma
1. dull/dim vision 2. double vision 3. enlarge or widen pupil 4. constrict pupil 5. diminished vision of old age 6. ringing in the ears 7. middle ear bone 8. measure movement in eardrum 9. auditory tube 10. inner ear 11. results of hearing test 12. middle ear infection

## Labeling Exercise

1. iris 2. lens 3. conjunctiva 4. pupil 5. cornea 6. suspensory ligaments 7. ciliary body 8. fovea centralis 9. optic nerve 10. retina 11. choroid 12. sclera
1. pinna 2. external auditory meatus 3. auditory canal 4. tympanic membrane 5. malleus 6. incus 7. semicircular canals 8. vestibular nerve 9. cochlear nerve 10. cochlea 11. round window 12. stapes 13. Eustachian tube

## Chapter 14 Answers Real-World Applications

### Chart Note Transcription

1. oncologist 2. exploratory surgery 3. biopsies 4. malignant 5. neoplasm 6. Grade II 7. encapsulated 8. metastases 9. nephrocarcinoma 10. protocol 11. chemotherapy

## Case Study

1. Bronchogenic carcinoma—lung cancer that begins in the bronchial tubes.
2. Dyspnea—difficulty breathing; cough producing thick sputum—coughing up thick mucus material; hemoptysis—coughing up blood.
3. Computed tomography scan (CT scan)—An imaging technique that is able to produce a cross-sectional view of the body. X-ray pictures are taken at multiple angles through the body. A computer then uses all these images to construct a composite cross-section, scan revealed a mass in the right lung.
4. Sputum culture and sensitivity—testing sputum by placing it on a culture medium and observing any bacterial growth. The specimen is then tested to determine antibiotic effectiveness, there was no bacterial growth; sputum cytology examining sputum for malignant cells, cells were found

that confirmed the presence of bronchogenic carcinoma.

5. Lobectomy—removal of a lobe of the lung.
6. The tumor has spread to other areas of the body.

## Practice Exercises

- A. 1. *Physician's Desk Reference* (PDR) 2. pharmacist 3. generic or nonproprietary 4. brand or proprietary 5. the chemical formula 6. Drug Enforcement Agency
- B. 1. sublingual 2. rectal 3. topical 4. intradermal 5. intramuscular 6. intravenous 7. oral
- C. 1. unusual or abnormal response to a drug 2. administration of a drug through a needle and syringe under the skin, or into a muscle, vein, or body cavity 3. harmless substance to satisfy patient's desire for medication 4. extent to which a substance is poisonous 5. response to drug other than the expected response 6. prepackaged and prelabeled method of medication distribution 7. emotional dependence on a drug 8. substance that neutralizes poisons 9. condition under which a particular drug should not be used 10. prevention of disease
- D. 1. grain 2. two times a day 3. three times a day 4. as desired 5. as needed 6. before 7. over the counter 8. drop 9. label as follows/directions 10. immediately 11. milligram 12. aqueous 13. night 14. nothing by mouth 15. at bedtime 16. intravenous 17. telephone order 18. drops 19. after meals 20. discontinue
- E. 1. Pravachol, 20 milligrams each, take one every day at bedtime, supply with 30, refill three times with no substitutions 2. Lanoxin, 0.125 milligram each, take three now and then 2 every morning, supply with 100 and may refill as needed 3. Synthroid, 0.075 milligram each, take 1 every day, supply with 100 and may refill four times 4. Norvasc, 5 milligrams each, take 1 every morning, supply with 60 and may refill
- F. 1. i 2. k 3. h 4. j 5. e 6. f 7. b 8. a 9. d 10. c 11. g
- G. 1. minor tranquilizers 2. humanistic psychotherapy 3. lithium 4. antipsychotic drugs 5. psychoanalysis 6. antidepressant drugs
- H. 1. general anesthesia 2. local anesthesia 3. topical anesthesia 4. regional anesthesia
- I. 1. h 2. c 3. b 4. g 5. f 6. a 7. d 8. e 9. i
- J. 1. range of motion 2. occupational therapy 3. activities of daily living 4. lower extremity 5. electromyogram 6. transcutaneous electrical nerve stimulation 7. physical therapy 8. passive range of motion 9. electrical stimulation 10. ultrasound
- K. 1. massage 2. debridement 3. hydrotherapy 4. postural drainage with clapping 5. active exercises 6. phonophoresis 7. cryotherapy 8. traction
- L. 1. h 2. e 3. j 4. g 5. a 6. i 7. c 8. f 9. b 10. d
- M. 1. magnetic resonance imaging 2. barium 3. anteroposterior 4. computerized tomography 5. right lateral 6. posteroanterior 7. left lateral 8. positron emission tomography 9. upper gastrointestinal series 10. kidneys, ureters, bladder
- N. 1. h 2. d 3. g 4. j 5. f 6. b 7. i 8. a 9. e 10. c



# Glossary/Index

Note: Headings in **bold** indicate definitions. Page numbers with *t* indicate tables; those with *f* indicate figures.

## A

Abbreviations, 13. *See also* individual subject headings

Abdomen

anatomical divisions of, 37*t*

clinical divisions of, 38*t*

**Abdominal**, pertaining to abdomen, 34*t*, 37–38*t*

Abdominal aorta, 148*f*, 159*f*, 390*f*

**Abdominal cavity**, superior portion of abdominopelvic cavity, 36, 36*f*, 37*t*

Abdominal region, 34*t*, 35*f*

**Abdominopelvic**, pertaining to the abdomen and pelvis, 36

**Abdominopelvic cavity**, ventral cavity consisting of abdominal and pelvic cavities; contains digestive, urinary, and reproductive organs, 36, 37*t*

Abducens nerve, 426*t*

**Abduction**, directional term meaning to move away from median or middle line of body, 11, 118*t*, 118*f*

**Abnormal psychology**, study and treatment of behaviors outside of normal and detrimental to person or society; these maladaptive behaviors range from occasional difficulty coping with stress, to bizarre actions and beliefs, to total withdrawal, 510

**ABO system**, major system of blood typing, 184

**Abortifacient**, medication that terminates a pregnancy, 359

**Abrasion**, scraping away a portion of skin surface, 57

**Abruption placentae**, emergency condition in which placenta tears away from uterine wall prior to delivery of infant; requires immediate delivery of baby, 352

**Abscess**, a collection of pus in skin, 61

**Absence seizure**, type of epileptic seizure that lasts only a few seconds to half a minute, characterized by loss of awareness and absence of activity; also called *petit mal seizure*, 430

Accessory nerve, 426*t*

**Accessory organs**, accessory organs to digestive system consist of those that are part of system, but not part of continuous tube from mouth to anus; include liver, pancreas, gallbladder, and salivary glands, 264, 271–72, 284

**ACE inhibitor drugs**, medication that produces vasodilation and decreases blood pressure, 166

**Achromatopsia**, condition of color blindness; more common in males, 464

Acidosis, *See* diabetic acidosis, ketoacidosis

**Acne**, inflammatory disease of sebaceous glands and hair follicles resulting in papules and pustules, 61

**Acne rosacea**, chronic form of acne seen in adults involving redness, tiny pimples, and broken blood vessels, primarily on the nose and cheeks, 62

**Acne vulgaris**, common form of acne occurring in adolescence from oversecretion of oil glands; characterized by comedos, papules, and pustules, 62

**Acoustic**, pertaining to hearing, 481

**Acoustic neuroma**, benign tumor of eighth cranial nerve sheath; can cause symptoms from pressure being exerted on tissues, 483

**Acquired immunity**, protective response of body to a specific pathogen, 199, 200

**Acquired immunodeficiency syndrome (AIDS)**, disease involving a defect in cell-mediated immunity system; syndrome of opportunistic infections occurring in final stages of infection with human immunodeficiency virus (HIV); virus attacks T<sub>4</sub> lymphocytes and destroys them, reducing person's ability to fight infection, 205

**Acromegaly**, chronic disease of adults resulting in elongation and enlargement of bones of head and extremities, 402, 402*f*

**Action**, type of movement a muscle produces, 117, 117*f*

**Active acquired immunity**, immunity developing after direct exposure to a pathogen, 200

**Active exercises**, exercises a patient performs without assistance, 525

**Active range of motion (AROM)**, range of motion for joints that patient is able to perform without assistance of someone else, 525

**Active-resistive exercises**, exercises in which patient works against resistance applied to a muscle, such as a weight; used to increase strength, 525

**Activities of daily living (ADL)**, activities usually performed in course of a normal day, such as eating, dressing, and washing, 523, 523*f*

**Acute care hospitals**, hospitals that typically provide services to diagnose (laboratory, diagnostic imaging) and treat (surgery, medications, therapy) diseases for a short period of time; in addition, they usually provide emergency and obstetrical care; also called *general hospital*, 15

Acute respiratory distress syndrome. *See* Adult respiratory distress syndrome

**Acute tubular necrosis (ATN)**, damage to renal tubules due to presence of toxins in urine or to ischemia; results in oliguria, 317

**Adaptive equipment**, equipment that has been structured to aid in mobility, eating, and managing other activities of daily living; equipment includes special walkers and spoons for stroke patient, 524, 524*f*

**Addiction**, acquired dependence on a drug, 506

**Addison's disease**, disease resulting from a deficiency in adrenocortical hormones; may be increased pigmentation of skin, generalized weakness, and weight loss, 400



- Additive**, sum of action of two (or more) drugs given; in this case, total strength of medications is equal to sum of strength of each individual drug, 506
- Adduction**, directional term meaning to move toward median or middle line of body, 11, 118t, 118f
- Adenocarcinoma**, malignant adenoma in a glandular organ, 404
- Adenoidectomy**, surgical removal of adenoids, 208
- Adenoiditis**, inflammation of adenoids, 204
- Adenoids**, another term for pharyngeal tonsils; tonsils are a collection of lymphatic tissue found in nasopharynx to combat microorganisms entering body through nose or mouth, 199, 206
- Adhesion**, scar tissue forming in fascia surrounding a muscle making it difficult to stretch muscle, 121
- Adipose**, type of connective tissue; also called *fat*; stores energy and provides protective padding for underlying structures, 25
- Adjective suffixes, 9
- Adrenal**, pertaining to adrenal glands, 398
- Adrenal cortex**, outer layer of adrenal glands; secretes several families of hormones: mineralocorticoids, glucocorticoids, and steroid sex hormones, 388t, 390
- Adrenal feminization**, development of female secondary sexual characteristics (such as breasts) in a male; often as a result of increased estrogen secretion by adrenal cortex, 400
- Adrenal glands**, pair of glands in endocrine system located just above each kidney; composed of two sections, cortex and medulla, that function independently of each other; cortex secretes steroids, such as aldosterone, cortisol, and androgens, estrogens, and progestins; medulla secretes epinephrine and norepinephrine; regulated by adrenocorticotrophic hormone, which is secreted by pituitary gland, 31, 387, 390, 390f, 400
- Adrenal medulla**, inner portion of adrenal gland; secretes epinephrine and norepinephrine, 388t, 390
- Adrenal virilism**, development of male secondary sexual characteristics (such as deeper voice and facial hair) in a female; often as a result of increased androgen secretion by adrenal cortex, 400
- Adrenalectomy**, surgical removal of one or both adrenal glands, 406
- Adrenaline**, hormone produced by adrenal medulla; also known as epinephrine; some of its actions include increasing heart rate and force of contraction, bronchodilation, and relaxation of intestinal muscles, 390
- Adrenalitis**, inflammation of adrenal gland, 400
- Adrenocorticotrophic hormone (ACTH)**, hormone secreted by anterior pituitary; regulates function of adrenal gland cortex, 389t, 393
- Adrenomegaly**, enlarged adrenal gland, 398
- Adrenopathy**, adrenal gland disease, 399
- Adult respiratory distress syndrome (ARDS)**, acute respiratory failure in adults characterized by tachypnea, dyspnea, cyanosis, tachycardia, and hypoxemia, 239
- Adverse reaction. *See* Side effect
- Aerosol**, drugs inhaled directly into nose and mouth, 505t
- Aerosol therapy**, medication suspended in mist intended to be inhaled; delivered by a *nebulizer*, which delivers mist for period of time while patient breathes, or a *metered-dose inhaler* (MDI), which delivers a single puff of mist, 246
- Afferent**, moving toward, 307
- Afferent arteriole**, arteriole that carries blood into glomerulus, 307, 308f, 310f
- Afferent neurons**, neurons that carry impulses to brain and spinal cord from skin and sense organs; also called *sensory neurons*, 426
- Agglutinate**, clumping together to form small clusters; platelets agglutinate to start clotting process, 184
- Agranulocytes**, nongranular leukocyte; one of two types of leukocytes found in plasma that are classified as either monocytes or lymphocytes, 183, 183t
- AIDS-related complex (ARC)**, early stage of AIDS; there is a positive test for virus but only mild symptoms of weight loss, fatigue, skin rash, and anorexia, 206
- Alanine transaminase (ALT)**, enzyme normally present in blood; levels are increased in persons with liver disease, 285
- Albinism**, genetic condition in which person is not able to produce melanin; an albino has white hair and skin and pupils of eyes are red, 62
- Albumin**, protein normally found circulating in bloodstream; it is abnormal for albumin to be in urine, 183, 311
- Aldosterone**, hormone produced by adrenal cortex; regulates levels of sodium and potassium in body and as a side effect volume of water lost in urine, 390
- Alimentary canal**, also known as gastrointestinal system or digestive system; covers area between mouth and anus and includes 30 feet of intestinal tubing; has a wide range of functions; serves to store and digest food, absorb nutrients, and eliminate waste; major organs include mouth, pharynx, esophagus, stomach, small intestine, colon, rectum, and anus, 264
- Allergen**, antigen capable of causing a hypersensitivity or allergy in body, 204
- Allergist**, physician who specializes in testing for and treating allergies, 203
- Allergy**, hypersensitivity to a substance in environment or medication, 204
- Allograft**, skin graft from one person to another; donor is usually a cadaver, 69
- Alopecia**, absence or loss of hair, especially of head, 67
- Alveolar**, pertaining to alveoli, 233
- Alveoli**, tiny air sacs at end of each bronchiole; surrounded by capillary network; gas exchange takes place as oxygen and carbon dioxide diffuse across alveolar and capillary walls, 227, 228f
- Alzheimer's disease (AD)**, chronic, organic mental disorder consisting of dementia, which is more prevalent in adults after 65 years of age; involves progressive disorientation, apathy, speech and gait disturbances, and loss of memory, 432, 511

- Amblyopia**, loss of vision not as a result of eye pathology; usually occurs in patients who see two images; in order to see only one image, brain will no longer recognize image being sent to it by one of eyes; may occur if strabismus is not corrected; commonly referred to as *lazy eye*, 464
- Ambulatory care center**, facility that provides services that do not require overnight hospitalization; services range from simple surgeries, to diagnostic testing, to therapy; also called a *surgical center* or *outpatient clinic*, 15
- Amenorrhea**, absence of menstruation, which can be result of many factors, including pregnancy, menopause, and dieting, 349
- American Sign Language (ASL)**, nonverbal method of communicating in which hands and fingers are used to indicate words and concepts; used by people who are deaf or speech impaired, 486, 486f
- Amino acids**, organic substances found in plasma, used by cells to build proteins, 182
- Amniocentesis**, puncturing of amniotic sac using a needle and syringe for purpose of withdrawing amniotic fluid for testing; can assist in determining fetal maturity, development, and genetic disorders, 355
- Amnion**, innermost of two membranous sacs surrounding fetus; amniotic sac contains amniotic fluid in which baby floats, 344
- Amniorrhea**, discharge of amniotic fluid, 349
- Amniotic**, pertaining to amnion, 347
- Amniotic fluid**, fluid inside amniotic sac, 343f, 344
- Amniotomy**, incision into amniotic sac, 357
- Amplification device**. See *Hearing aid*
- Amputation**, partial or complete removal of a limb for a variety of reasons, including tumors, gangrene, intractable pain, crushing injury, or uncontrollable infection, 108
- Amylase**, digestive enzyme found in saliva that begins digestion of carbohydrates, 271
- Amyotrophic lateral sclerosis (ALS)**, disease with muscular weakness and atrophy due to degeneration of motor neurons of spinal cord; also called *Lou Gehrig's disease*, after New York Yankees' baseball player who died from this disease, 435
- Anacusis**, total absence of hearing; unable to perceive sound; also called *deafness*, 482
- Anal**, pertaining to anus, 274
- Anal fistula**, abnormal tube-like passage from surface around anal opening directly into rectum, 281
- Anal sphincter**, rings of muscles that control defecation, 270
- Analgesia**, reduction in perception of pain or sensation due to neurological condition or medication, 430
- Analgesic**, substance that relieves pain without loss of consciousness; may be either narcotic or non-narcotic; narcotic drugs are derived from opium poppy and act on brain to cause pain relief and drowsiness, 441, 532
- Anaphylactic shock**, life-threatening condition resulting from ingestion of food or medications that produce severe allergic response; circulatory and respiratory problems occur, including respiratory distress, hypotension, edema, tachycardia, and convulsions, 204
- Anaphylaxis**. See *Anaphylactic shock*
- Anastomosis**, to surgically create a connection between two organs or vessels, 288
- Anatomical position**, used to describe positions and relationships of a structure in human body; for descriptive purposes assumption is always that person is in anatomical position; body standing erect with arms at sides of body, palms of hands facing forward, and eyes looking straight ahead; legs are parallel with feet and toes pointing forward, 32, 33f
- Ancillary reports**, report in patient's medical record from various treatments and therapies patient has received, such as rehabilitation, social services, or respiratory therapy, 14
- Androgen**, class of steroid hormones secreted by adrenal cortex and testes; these hormones, such as testosterone, produce a masculinizing effect, 364, 390
- Androgen therapy**, replacement male hormones to treat patients who produce insufficient hormone naturally, 373
- Anemia**, reduction in number of red blood cells (RBCs) or amount of hemoglobin in blood; results in less oxygen reaching tissues, 188
- Anesthesia**, partial or complete loss of sensation with or without loss of consciousness as a result of drug, disease, or injury, 431, 529, 530t
- Anesthesiologist**, physician who has specialization in practice of administering anesthetics, 430, 529
- Anesthesiologist's report**, medical record document that relates details regarding drugs given to patient and patient's response to anesthesia and vital signs during surgery, 14
- Anesthesiology**, branch of medicine specializing in all aspects of anesthesia, including for surgical procedures, resuscitation measures, and management of acute and chronic pain; physician is *anesthesiologist*, 430
- Anesthetic**, substance that produces a lack of feeling that may be of local or general effect, depending on type of administration, 71, 441, 532
- Anesthetic ophthalmic solution**, eyedrops for pain relief associated with eye infections, corneal abrasions, or surgery, 473
- Aneurysm**, weakness in wall of artery that results in localized widening of artery, 158, 159f
- Aneurysmectomy**, surgical removal of aneurysm, 164
- Angiitis**, inflammation of vessels, 154
- Angina pectoris**, severe chest pain with sensation of constriction around heart; caused by a deficiency of oxygen to heart muscle, 155
- Angiogram**, X-ray record of a vessel, 162
- Angiography**, process of taking X-ray of blood or lymphatic vessels after injection of a radiopaque substance, 162
- Angioplasty**, surgical repair of blood vessels, 165, 165f



- Angiospasm**, involuntary muscle contraction of a vessel, 154
- Angiostenosis**, narrowing of a vessel, 154
- Anhidrosis**, abnormal condition of no sweat, 57
- Ankylosing spondylitis**, inflammatory spinal condition that resembles rheumatoid arthritis; results in gradual stiffening and fusion of vertebrae; more common in men than in women, 103
- Anorchism**, absence of one or both testes; may be congenital or result of accident or surgery, 368
- Anorexia**, loss of appetite that can accompany other conditions such as gastrointestinal (GI) upset, 277
- Anorexia nervosa**, type of eating disorder characterized by distorted body image, a pathological fear of becoming fat, and severe weight loss due to excessive dieting, 277, 511, 511f
- Anorexiant**, substance that treats obesity by suppressing appetite, 290
- Anosmia**, loss of sense of smell, 235
- Anoxia**, lack of oxygen, 235
- Antacid**, substance that neutralizes acid in stomach, 290
- Antagonistic pairs**, pair of muscles arranged around a joint that produce opposite actions, 117, 118–19t
- Anteflexion**, while uterus is normally in this position, exaggeration of forward bend of uterus is abnormal; forward bend is near neck of uterus; position of cervix, or opening of uterus, remains normal, 340
- Antepartum**, before birth, 348
- Anterior**, directional term meaning more toward the front or belly side of body, 39f, 39t
- Anterior lobe**, anterior portion of pituitary gland; secretes adrenocorticotrophic hormone, follicle-stimulating hormone, growth hormone, luteinizing hormone, melanocyte-stimulating hormone, prolactin, and thyroid-stimulating hormone, 393
- Anterior pituitary gland, 393–94f
- Anterior tibial artery, 148f
- Anterior tibial vein, 150f
- Anteroposterior view (AP)**, positioning patient so that X-rays pass through body from anterior side to posterior side, 517
- Anthraxis**, type of pneumoconiosis that develops from collection of coal dust in lung; also called *black lung* or *miner's lung*, 240
- Anti-inflammatory otic solution**, reduces inflammation, itching, and edema associated with otitis externa, 488
- Antiarrhythmic**, controls cardiac arrhythmias by altering nerve impulses within heart, 166
- Antibiotic**, substance that destroys or prohibits growth of microorganisms; used to treat bacterial infections; not found effective in treating viral infections; to be effective, it must be taken regularly for specified period, 71, 249, 324
- Antibiotic ophthalmic solution**, eyedrops for treatment of bacterial eye infections, 473
- Antibiotic otic solution**, eardrops to treat otitis externa, 488
- Antibody**, protein material produced in body as a response to invasion of foreign substance, 200
- Antibody-mediated immunity**, production of antibodies by B cells in response to an antigen; also called *humoral immunity*, 200
- Anticoagulant**, substance that prevents or delays clotting or coagulation of blood, 166, 192
- Anticonvulsant**, prevents or relieves convulsions; drugs such as phenobarbital reduce excessive stimulation in brain to control seizures and other symptoms of epilepsy, 411
- Antidepressant drugs**, medications classified as stimulants that alter patient's mood by affecting levels of neurotransmitters in brain, 514
- Antidiarrheal**, prevents or relieves diarrhea, 290
- Antidiuretic hormone (ADH)**, hormone secreted by posterior pituitary; promotes water reabsorption by kidney tubules, 389t, 393
- Antidote**, substance that will neutralize poisons or their side effects, 506
- Antiemetic**, substance that treats nausea, vomiting, and motion sickness, 291, 488
- Antifungal**, substance that kills fungi, 71
- Antigen**, substance capable of inducing formation of antibody; antibody then interacts with antigen in antigen–antibody reaction, 200
- Antigen–antibody complex**, combination of antigen with its specific antibody; increases susceptibility to phagocytosis and immunity, 201
- Antiglaucoma medications**, group of drugs that reduce intraocular pressure by lowering amount of aqueous humor in eyeball; may achieve this by either reducing production of aqueous humor or increasing its outflow, 473
- Antihemorrhagic**, substance that prevents or stops hemorrhaging, 192
- Antihistamine**, substance that acts to control allergic symptoms by counteracting histamine, which exists naturally in body, and is released in allergic reactions, 209, 249
- Antilipidemic**, substance that reduces amount of cholesterol and lipids in bloodstream; treats hyperlipidemia, 166
- Antiparasitic**, substance that kills mites or lice, 71
- Antiplatelet agent**, substance that interferes with action of platelets; prolongs bleeding time; used to prevent heart attacks and strokes, 166, 192
- Antiprostatic agent**, medication to treat early cases of benign prostatic hyperplasia; may prevent surgery for mild cases, 373
- Antipruritic**, substance that reduces severe itching, 71
- Antipsychotic drugs**, major tranquilizer drugs that have transformed treatment of patients with psychoses and schizophrenia by reducing patient agitation and panic and shortening schizophrenic episodes, 514
- Antiseptic**, substance used to kill bacteria in skin cuts and wounds or at a surgical site, 71
- Antisocial personality disorder**, personality disorder in which patient engages in behaviors that are illegal or outside of social norms, 512
- Antispasmodic**, medication to prevent or reduce bladder muscle spasms, 324

- Antithyroid agents**, medication given to block production of thyroid hormones in patients with hypersecretion disorders, 407
- Antitussive**, substance that controls or relieves coughing; codeine is an ingredient in many prescription cough medicines that acts upon the brain to control coughing, 249
- Antrum**, tapered distal end of the stomach, 268, 268f
- Anuria**, complete suppression of urine formed by kidneys and complete lack of urine excretion, 314
- Anus**, terminal opening of digestive tube, 264, 270, 270f
- Anvil. See Incus
- Antiviral**, substance that weakens viral infection in body, often by interfering with virus's ability to replicate, 291
- Anxiety disorders**, a classification of psychiatric disorders in the DSM-5 characterized by persistent worry and apprehension; includes panic disorder, general anxiety disorder, and phobias, 510
- Aorta**, largest artery in body; located in mediastinum and carries oxygenated blood away from left side of heart, 141f, 142f, 144, 145f, 146f, 198f
- Aortic**, pertaining to aorta, 152
- Aortic arch, 148f
- Aortic semilunar valve, 143f
- Aortic valve**, semilunar valve between left ventricle of heart and aorta in heart; prevents blood from flowing backward into ventricle, 142f, 143f, 144, 145f
- Apex**, directional term meaning tip or summit; an area of lungs and heart, 39, 141, 141f, 145f, 228, 229f
- Apgar score**, evaluation of neonate's adjustment to outside world; observes color, heart rate, muscle tone, respiratory rate, and response to stimulus, 355
- Aphagia**, being unable to swallow or eat, 277
- Aphasia**, inability to communicate due to brain damage, 431
- Aphonia**, no voice, 235
- Aphthous ulcers**, painful ulcers in mouth of unknown cause; commonly called *canker sores*, 279
- Aplastic anemia**, severe form of anemia that develops as consequence of loss of functioning red bone marrow; results in decrease in number of all formed elements; treatment may eventually require bone marrow transplant, 188
- Apnea**, condition of not breathing, 235
- Apocrine gland**, type of sweat gland that opens into hair follicles located in pubic and underarm areas; glands secrete substance that can produce odor when it comes into contact with bacteria on skin causing what is commonly referred to as body odor, 54
- Appendectomy**, surgical removal of appendix, 281, 288
- Appendicitis**, inflammation of appendix, 281
- Appendicular skeleton**, consists of bones of upper and lower extremities, shoulder, and pelvis, 86, 90–94, 91f
- Appendix, 270f
- Aqueous humor**, watery fluid filling spaces between cornea and lens, 456f, 457
- Arachnoid layer**, delicate middle layer of meninges, 425, 425f
- Areola**, pigmented area around nipple of breast, 342, 342f
- Arrector pili**, small slip of smooth muscle attached to hairs; when this muscle contracts hair shaft stands up and results in “goose bumps,” 52, 53f
- Arrhythmia**, irregularity in heartbeat or action, 155
- Arterial**, pertaining to artery, 152
- Arterial anastomosis**, surgical joining together of two arteries; performed if artery is severed or if damaged section of artery is removed, 164
- Arterial blood gases (ABG)**, lab test that measures amount of oxygen and carbon dioxide in blood, 244
- Arteriole**, smallest branch of an artery; carries blood to capillaries, 147, 152, 196f
- Arteriorrhexis**, ruptured artery, 159
- Arteriosclerosis (AS)**, condition with thickening, hardening, and loss of elasticity of walls of arteries, 159
- Artery**, blood vessel that carries blood away from heart, 139, 140, 147, 147f, 148f, 196f
- Arthralgia**, pain in a joint, 99
- Arthrocentesis**, removal of synovial fluid with needle from joint space, such as in knee, for examination, 108
- Arthroclasia**, surgically breaking loose a fused joint, 108
- Arthrodesis**, surgical fusion or stiffening of a joint to provide stability, 108
- Arthrograph**, record of a joint, 107
- Arthrography**, visualization of joint by radiographic study after injection of contrast medium into joint space, 107
- Arthroscope**, instrument to view inside joint, 107
- Arthroscopic surgery**, use of arthroscope to facilitate performing surgery on joint, 108
- Arthroscopy**, examination of interior of joint by entering joint with arthroscope; arthroscope contains small television camera allowing physician to view interior of joint on monitor during procedure, 107
- Arthrotomy**, surgically cutting into a joint, 108
- Articular**, pertaining to a joint, 96
- Articular cartilage**, layer of cartilage covering ends of bones forming synovial joint, 85, 86f, 94f
- Articulation**, another term for a joint, point where two bones meet, 94
- Artificial tears**, medications, many of them over-the-counter, to treat dry eyes, 473
- Asbestosis**, type of pneumoconiosis developing from collection of asbestos fibers in lungs; may lead to development of lung cancer, 240
- Ascending colon**, section of colon following cecum; ascends right side of abdomen, 269f, 270, 270f
- Ascending tracts**, nerve tracts carrying sensory information up spinal cord to brain, 425
- Ascites**, collection or accumulation of fluid in peritoneal cavity, 277
- Aspartate transaminase (AST)**, enzyme normally present in blood; blood levels are increased in persons with liver disease, 285
- Aspermia**, lack of sperm or failure to ejaculate sperm, 367

- Asphyxia**, lack of oxygen that can lead to unconsciousness and death if not corrected immediately; some common causes are drowning, foreign body in respiratory tract, poisoning, and electric shock, 235
- Asphyxiation**. See **Asphyxia**
- Aspiration**, for respiratory system, refers to inhaling food, liquid, or a foreign object into airways; term also refers to withdrawing fluid from body cavity using suction, 235
- Aspirator**, surgical instrument used to suction fluids, 530t
- Asthma**, disease caused by various conditions, such as allergens, and resulting in constriction of bronchial airways and labored respirations; can cause violent spasms of the bronchi (bronchospasms) but is generally not a life-threatening condition; medication can be very effective, 239
- Astigmatism** (Astigm), condition in which light rays are focused unevenly on eye, which causes distorted image due to abnormal curvature of cornea, 464
- Astrocytoma**, tumor of brain or spinal cord composed of astrocytes, 432
- Ataxia**, having lack of muscle coordination as a result of disorder or disease, 431
- Atelectasis**, condition in which lung tissue collapses, preventing respiratory exchange of oxygen and carbon dioxide; can be caused by a variety of conditions, including pressure upon lung from tumor or other object, 240
- Atherectomy**, surgical removal of fatty substance from an artery", 164
- Atheroma**, a deposit of fatty substance in an artery wall, 155, 159
- Atherosclerosis**, most common form of arteriosclerosis; caused by formation of yellowish plaques of cholesterol buildup on inner walls of arteries, 159
- Atherosclerotic plaque**, 155, 155f
- Atonia**, lack of tone, 121
- Atria**, two upper chambers of heart; left atrium receives blood returning from lungs, and right atrium receives blood returning from body, 143
- Atrial**, pertaining to atrium, 152
- Atrial septal defect (ASD)**, a congenital septal defect between the atria, 156
- Atrioventricular**, pertaining to the atrium and ventricle, 152
- Atrioventricular bundle**, located in interventricular septum; receives electrical impulse from atrioventricular node and distributes it through ventricular walls, causing them to contract simultaneously, 145, 146f
- Atrioventricular node**, this area at junction of right atrium and ventricle receives stimulus from sinoatrial node and sends impulse to ventricles through bundle of His, 145, 146f
- Atrioventricular valve** (AV, A-V), heart valves located between atrium and ventricle; includes tricuspid valve in right side of heart and bicuspid or mitral valve in left side of heart, 144
- Atrophy**, lack or loss of normal development, 121
- Attention-deficit/hyperactivity disorder (ADHD)**, type of mental disorder diagnosed in childhood characterized by poor attention and inability to control behavior; child may or may not be hyperactive, 511
- Audiogram**, chart that shows faintest sounds patient can hear during audiometry testing, 484
- Audiologist**, provides comprehensive array of services related to prevention, diagnosis, and treatment of hearing impairment and its associated communication disorders, 482
- Audiology**, study of hearing, 477, 482
- Audiometer**, instrument to measure hearing, 484
- Audiometry**, process of measuring hearing, 484, 484f
- Auditory**, pertaining to hearing, 481
- Auditory canal**, canal that leads from external opening of ear to eardrum, 477, 477f
- Auditory tube**, another name for eustachian tube connecting middle ear and nasopharynx, 226, 478
- Aura**, sensations, such as seeing colors or smelling unusual odor, that occur just prior to an epileptic seizure or a migraine headache, 431
- Aural**, pertaining to ear, 481
- Auricle**, also called pinna; external ear; functions to capture sound waves as they go past outer ear, 476, 477
- Auricular**, pertaining to ear, 481
- Auscultation**, listening to sounds within body by using stethoscope, 161
- Autism spectrum disorder**, range of conditions in which child exhibits deficits in social interaction, communication skills, and restricted patterns of behavior, 511
- Autograft**, skin graft from person's own body, 69, 69f
- Autoimmune disease**, disease resulting from the body's immune system attacking its own cells as if they were pathogens; examples include systemic lupus erythematosus, rheumatoid arthritis, and multiple sclerosis, 204
- Autologous transfusion**, procedure for collecting and storing patient's own blood several weeks prior to actual need; can then be used to replace blood lost during surgical procedure, 192
- Autonomic nervous system (ANS)**, portion of nervous system consisting of nerves to internal organs that function involuntarily; regulates functions of glands (especially salivary, gastric, and sweat glands), adrenal medulla, heart, and smooth muscle tissue; system is divided into two parts: sympathetic and parasympathetic, 145, 426–27
- Axial skeleton**, axial skeleton includes bones in head, spine, chest, and trunk, 86, 87–90, 88f
- Axillary**, pertaining to armpit, 197t, 198f, 203
- Axillary nodes**, 197t
- Axon**, single projection of a neuron that conducts impulse away from nerve cell body, 420, 421f
- Azotemia**, accumulation of nitrogenous waste in bloodstream; occurs when kidney fails to filter these wastes from blood, 314

**B**

- B cells**, common name for B lymphocytes, responds to foreign antigens by producing protective antibodies, 200
- B lymphocytes**, humoral immunity cells, which respond to foreign antigens by producing protective antibodies; simply referred to as *B cells*, 200
- Babinski's reflex**, reflex test to determine lesions and abnormalities in nervous system; Babinski reflex is present if great toe extends instead of flexes when lateral sole of foot is stroked; normal response to this stimulation would be flexion, or upward movement, of toe, 439
- Bacteria**, primitive, single-celled microorganisms that are present everywhere; some are capable of causing disease in humans, 199
- Bacteriuria**, bacteria in urine, 314
- Balanic**, pertaining to glans penis, 366
- Balanitis**, inflammation of skin covering glans penis, 368
- Balanoplasty**, surgical repair of glans penis, 371
- Balanorrhea**, discharge from glans penis, 367
- Balloon angioplasty. See Percutaneous transluminal coronary angioplasty
- Bariatric surgery**, group of surgical procedures such as stomach stapling and restrictive banding to reduce size of stomach; treatment for morbid (extreme) obesity, 288
- Barium** (Ba), soft metallic element from earth used as radiopaque X-ray dye, 517
- Barium enema (BE). See Lower gastrointestinal series
- Barium swallow. See Upper gastrointestinal series
- Barrier contraception**, prevention of pregnancy using a device to prevent sperm from meeting ovum; includes condoms, diaphragms, and cervical caps, 356
- Bartholin's glands**, glands located on either side of vaginal opening that secrete mucus for vaginal lubrication, 341
- Basal cell carcinoma** (BCC), tumor of basal cell layer of epidermis; frequent type of skin cancer that rarely metastasizes or spreads; these cancers can arise on sun-exposed skin, 62, 62f
- Basal layer**, deepest layer of epidermis; this living layer constantly multiplies and divides to supply cells to replace cells that are sloughed off skin surface, 52
- Base**, directional term meaning bottom or lower part, 40t, 228
- Basilic vein, 150f
- Basophil** (Basos), granulocyte white blood cell that releases histamine and heparin in damaged tissues, 181, 183f, 183t
- Basophilic**, pertaining to basophils, 186
- Bell jar apparatus, 230f
- Bell's palsy**, one-sided facial paralysis due to inflammation of facial nerve, 436
- Benign**, not cancerous; benign tumor is generally not progressive or recurring, 535
- Benign prostatic hyperplasia** (BPH), enlargement of prostate gland commonly seen in males over age 50, 368
- Beta-blocker drugs**, medication that treats hypertension and angina pectoris by lowering heart rate, 166
- Biceps**, arm muscle named for number of attachment points; *bi-* means "two" and biceps have two heads attached to bone, 116
- Bicuspid valve**, valve between left atrium and ventricle; prevents blood from flowing backward into atrium; has two cusps or flaps; also called *mitral valve*, 144, 145f
- Bicuspid**, premolar permanent teeth having two cusps or projections that assist in grinding food; humans have eight bicuspid, 265f, 266, 267f
- Bilateral, pertaining to two sides, 5
- Bile**, substance produced by liver and stored in gallbladder; added to chyme in duodenum and functions to emulsify fats so they can be digested and absorbed, 271
- Bile duct, 272f, 284f
- Bilirubin**, waste product produced from destruction of worn-out red blood cells; disposed of by liver, 183
- Binaural**, referring to both ears, 481
- Biopsy** (Bx, bx), piece of tissue is removed by syringe and needle, knife, punch, or brush to examine under a microscope; used to aid in diagnosis, 69, 538
- Bipolar disorder** (BPD), mental disorder in which patient has alternating periods of depression and mania, 512
- Bite-wing X-ray**, X-ray taken with part of film holder held between teeth, and film held parallel to teeth, 285
- Black lung. See Anthracosis
- Bladder cancer**, cancerous tumor that arises from cells lining bladder; major symptom is hematuria, 308f
- Bladder neck obstruction** (BNO), blockage of bladder outlet into urethra, 318
- Blepharectomy**, surgical removal of eyelid, 471
- Blepharitis**, inflammatory condition of eyelash follicles and glands of eyelids that results in swelling, redness, and crusts of dried mucus on lids; can be result of allergy or infection, 467
- Blepharoplasty**, surgical repair of eyelid, 471
- Blepharoptosis**, drooping eyelid, 463
- Blood**, major component of hematic system; consists of watery plasma, red blood cells, and white blood cells, 179–93
- abbreviations, 193
- ABO system, 184
- adjective forms of anatomical terms, 186
- anatomy and physiology, 182–85
- diagnostic procedures, 190–91
- erythrocytes, 182–83, 183f
- leukocytes, 183, 183f, 183t
- pathology, 187–90
- pharmacology, 192
- plasma, 182
- platelets, 184, 184f
- Rh factor, 185
- terminology, 185–90
- therapeutic procedures, 192
- typing, 184–85



**Blood clot**, hard collection of fibrin, blood cells, and tissue debris that is end result of hemostasis or blood clotting process, 187

**Blood culture and sensitivity** (C&S), sample of blood is incubated in laboratory to check for bacterial growth; if bacteria are present, they are identified and tested to determine which antibiotics they are sensitive to, 190

Blood poisoning. See Septicemia

**Blood pressure** (BP), measurement of pressure exerted by blood against walls of a blood vessel, 149

**Blood serum test**, blood test to measure level of substances such as calcium, electrolytes, testosterone, insulin, and glucose; used to assist in determining function of various endocrine glands, 404

**Blood sinuses**, spread-out blood vessels within spleen resulting in slow-moving blood flow, 199

Blood thinners. See Anticoagulant

**Blood transfusion**, artificial transfer of blood into bloodstream, 192

**Blood typing**, blood differs from person to person due to presence of antigens on surface of erythrocytes; major method of typing blood is ABO system and includes types A, B, O, and AB; other major method of typing blood is Rh factor, consisting of two types, Rh+ and Rh–, 184–85

**Blood urea nitrogen** (BUN), blood test to measure kidney function by level of nitrogenous waste, or urea, that is in blood, 319

**Blood vessels**, closed system of tubes that conducts blood throughout body; consists of arteries, veins, and capillaries, 140, 146–50, 158–60

**Body**, (1) whole, living individual; sum of all cells, tissues, organs, and systems working together to sustain life; (2) main portion of organ such as stomach or uterus, 24, 32–40, 268, 268f

Body cavities, 35–37, 36f, 37–38t

**Body mechanics**, use of good posture and position while performing activities of daily living to prevent injury and stress on body parts, 524

Body organization

abbreviations, 40

body, 32–40

body cavities, 35–37, 36f, 37–38t

body planes, 32–33, 33f

body regions, 34, 34f, 34t

cells, 24

directional/positional terms, 38, 39–40t, 39f

levels of, 24–32

organs and systems, 27, 27–31t

terminology, 39–40

tissues, 25, 26f

Body planes, 32–33, 33f

Body regions, 34, 34f, 34t

**Bolus**, chewed-up morsel of food ready to be swallowed, 271

**Bone**, type of connective tissue and organ of musculoskeletal system; provide support for body and serve as sites of muscle attachments, 25, 28t, 84–86, 102–03

marrow, 84

projections and depressions, 85–86

structure, 84–85, 85f, 86f

**Bone graft**, piece of bone taken from patient and used to replace removed bone or bony defect at another site, 108

**Bone marrow**, soft tissue found inside cavities in bones; produces blood cells, 84

**Bone marrow aspiration**, removing a sample of bone marrow by syringe for microscopic examination; useful for diagnosing such diseases as leukemia; for example, a proliferation (massive increase) of white blood cells could confirm diagnosis of acute leukemia, 191

**Bone marrow transplant** (BMT), patient receives red bone marrow from donor after patient's own bone marrow has been destroyed by radiation or chemotherapy, 192

**Bone reabsorption inhibitors**, conditions resulting in weak and fragile bones, such as osteoporosis and Paget's disease, are improved by medications that reduce reabsorption of bones, 110

**Bone scan**, patient is given radioactive dye and then scanning equipment is used to visualize bones; especially useful in observing progress of treatment for osteomyelitis and cancer metastases to bone, 107

**Bowel incontinence**, inability to control defecation, 281

**Bowman's capsule**, also called *glomerular capsule*; part of renal corpuscle; is a double-walled cuplike structure that encircles glomerulus; in filtration stage of urine production, waste products filtered from blood enter Bowman's capsule as glomerular filtrate, 307, 308f

**Brachial**, pertaining to the arm, 34t, 35f

Brachial artery, 148f

Brachial plexus, 427f

**Brachial region**, arm regions of the body, 34t, 35f

Brachial vein, 150f

Brachiocephalic veins, 150f

Brachytherapy. See Radioactive implant

**Bradycardia**, abnormally slow heart rate, below 60 bpm, 154

**Bradykinesia**, slow movement, commonly seen with rigidity of Parkinson's disease, 121

**Bradypepsia**, slow digestion rate, 277

**Bradypnea**, slow breathing, 235

**Brain**, one of the largest organs in body and coordinates most body activities; center for all thought, memory, judgment, and emotion; each part of brain is responsible for controlling different body functions, such as temperature regulation and breathing; four sections include cerebrum, cerebellum, diencephalon, and brain stem, 25, 31t, 37t, 419, 420, 422–24, 422f, 432–35

Brain metastases, 537f

**Brain scan**, injection of radioactive isotopes into circulation to determine function and abnormality of brain, 439

**Brain stem**, area of brain with three components: medulla oblongata, pons, and midbrain; pathway for

- impulses to be conducted between brain and spinal cord; also contains centers that control respiration, heart rate, and blood pressure; in addition, 12 pairs of cranial nerves begin in brain stem, 422, 422f
- Brain tumor**, intracranial mass, either benign or malignant; benign tumor of brain can be fatal since it will grow and cause pressure on normal brain tissue, 432, 432f
- Brand name**, name a pharmaceutical company chooses as trademark or market name for its drug; also called *proprietary* or *trade name*, 501
- Breast cancer**, malignant tumor of breast; usually forms in milk-producing gland tissue or lining of milk ducts, 352, 352f
- Breasts**, milk-producing glands to provide nutrition for newborn; also called *mammary glands*, 337, 338, 342, 342f, 352, 352f
- Breech presentation**, placement of fetus in which buttocks or feet are presented first for delivery rather than head, 344, 345f
- Bridge**, dental appliance attached to adjacent teeth for support to replace missing teeth, 287
- Broad spectrum**, ability of drug to be effective against a wide range of microorganisms, 506
- Bronchial**, pertaining to the bronchi, 233
- Bronchial tree, 227, 227f
- Bronchial tube**, organ of respiratory system that carries air into each lung, 223, 224, 227, 227–28f
- Bronchiectasis**, results from dilation of bronchus or bronchi that can result from infection; this abnormal stretching can be irreversible and result in destruction of bronchial walls; major symptom is large amount of purulent (pus-filled) sputum; rales (bubbling chest sound) and hemoptysis may be present, 235, 239
- Bronchiolar**, pertaining to a bronchiole, 233
- Bronchioles**, narrowest air tubes in lungs; each bronchiole terminates in tiny air sacs called alveoli, 227, 227–28f
- Bronchitis**, acute or chronic inflammation of lower respiratory tract that often occurs after other childhood infections such as measles, 239
- Bronchodilator**, medication that dilates or opens bronchi (airways in lungs) to improve breathing, 249
- Bronchogenic carcinoma**, malignant lung tumor that originates in bronchi; usually associated with history of cigarette smoking, 239, 239f
- Bronchogram**, X-ray record of lungs and bronchial tubes, 244
- Bronchography**, process of taking X-ray of lung after radiopaque substance has been placed into trachea or bronchial tube, 244
- Bronchoplasty**, surgical repair of a bronchial defect, 246
- Bronchoscope**, instrument to view inside a bronchus, 244
- Bronchoscopy** (Bronch), using bronchoscope to visualize bronchi; instrument can also be used to obtain tissue for biopsy and to remove foreign objects, 244, 245f
- Bronchospasm**, involuntary muscle spasm in bronchi, 235
- Bronchus**, distal end of trachea splits into left and right main bronchi as it enters each lung; each main bronchus is subdivided into smaller branches; smallest bronchi are bronchioles; each bronchiole ends in tiny air sacs called alveoli, 226f, 227, 227f
- Buccal**, (1) pertaining to cheeks; (2) drugs that are placed under lip or between cheek and gum, 274, 506t
- Buccolabial**, pertaining to cheeks and lips, 274
- Buffers**, chemicals that neutralize acid, particularly stomach acid, 272
- Bulbourethral gland**, also called *Cowper's gland*; these two small male reproductive system glands are located on either side of urethra just distal to prostate; secretion from these glands neutralizes acidity in urethra and vagina, 362 363, 363f, 365
- Bulimia**, eating disorder characterized by recurrent binge eating and then purging of food with laxatives and vomiting, 512
- Bundle branch block** (BBB), occurs when electrical impulse is blocked from travelling down bundle of His or bundle branches; results in ventricles beating at a different rate than atria; also called a *heart block*, 155
- Bundle branches**, part of conduction system of heart; electrical signal travels down interventricular septum, 145, 146f
- Bundle of His**. See Atrioventricular bundle
- Bunion**, inflammation of bursa of the great toe, 105
- Bunionectomy**, removal of bursa at joint of great toe, 108
- Burn**, full-thickness burn exists when all layers are burned, called *third-degree burn*; partial-thickness burn exists when first layer of skin, epidermis, is burned, and second layer of skin, dermis, is damaged, called *second-degree burn*; *first-degree burn* damages only epidermis, 62, 63f
- Bursa**, saclike connective tissue structure found in some joints; protects moving parts from friction; some common bursa locations are elbow, knee, and shoulder joints, 94
- Bursectomy**, surgical removal of a bursa, 108
- Bursitis**, inflammation of bursa between bony prominences and muscles or tendons; common in shoulder and knee, 94, 99
- ## C
- Cachexia**, loss of weight and generalized wasting that occurs during a chronic disease, 277
- Calcitonin** (CT), hormone secreted by thyroid gland; stimulates deposition of calcium into bone, 389t, 396
- Calcium** (Ca<sup>+</sup>), inorganic substance found in plasma; is important for bones, muscles, and nerves, 182, 392
- Calcium channel blocker drugs**, medication that treats hypertension, angina pectoris, and congestive heart failure by causing heart to beat less forcefully and less often, 166
- Calcium supplements**, maintaining high blood levels of calcium in association with vitamin D helps maintain bone density and treats osteomalacia, osteoporosis, and rickets, 110
- Calculus**, stone formed within organ by accumulation of mineral salts; found in kidney, renal pelvis, ureters, bladder, or urethra; plural is *calculi*, 314, 314f



- Callus**, mass of bone tissue that forms at fracture site during its healing, 99
- Calyx**, duct that connects renal papilla to renal pelvis; urine flows from collecting tubule through calyx and into renal pelvis, 306, 307f
- Cancellous bone**, bony tissue found inside a bone; contains cavities that hold red bone marrow; also called *spongy bone*, 85, 86f
- Cancerous tumors**, malignant growths in the body, 199
- Candidiasis**, yeastlike infection of skin and mucous membranes that can result in white plaques on tongue and vagina, 351
- Canines**, also called *cuspid teeth* or *eyeteeth*; permanent teeth located between incisors and bicuspids that assist in biting and cutting food; humans have four canine teeth, 266, 267f
- Canker sores. See Aphthous ulcers
- Capillaries**, smallest blood or lymphatic vessels; blood capillaries are very thin to allow gas, nutrient, and waste exchange between blood and tissues; lymph capillaries collect lymph fluid from tissues and carry it to larger lymph vessels, 139, 140, 147f, 149
- Capillary bed**, network of capillaries found in a given tissue or organ, 149
- Carbon dioxide** (CO<sub>2</sub>), waste product of cellular energy production; removed from cells by blood and eliminated from body by lungs, 141, 224
- Carbuncle**, inflammation and infection of skin and hair follicle that may result from several untreated boils; most commonly found on neck, upper back, or head, 67
- Carcinogen**, substance or chemical agent that produces or increases risk of developing cancer; for example, cigarette smoke and insecticides are considered to be carcinogens, 536
- Carcinoma**, new growth or malignant tumor that occurs in epithelial tissue; can spread to other organs through blood or direct extension from organ, 535
- Carcinoma in situ** (CIS), malignant tumor that has not extended beyond original site, 536
- Cardiac**, pertaining to the heart, 152
- Cardiac arrest**, when heart stops beating and circulation ceases, 156
- Cardiac catheterization** (CC), passage of thin tube (catheter) through arm vein and blood vessel leading into heart; used to detect abnormalities, to collect cardiac blood samples, and to determine pressure within cardiac area, 162
- Cardiac enzymes**, complex protein molecules found only in heart muscle; taken by blood sample to determine amount of heart disease or damage, 161
- Cardiac muscle**, involuntary muscle found in heart, 25, 26f, 114, 114f, 115, 115f, 141
- Cardiac scan**, patient is given radioactive thallium intravenously and then scanning equipment is used to visualize heart; especially useful in determining myocardial damage, 162
- Cardiac sphincter**, also called *lower esophageal sphincter*; prevents food and gastric juices from backing up into esophagus, 269
- Cardiologist**, physician specializing in treating diseases and conditions of cardiovascular system, 153
- Cardiology**, branch of medicine specializing in conditions of cardiovascular system, 153
- Cardiomegaly**, abnormally enlarged heart, 156
- Cardiomyopathy**, general term for disease of myocardium that may be caused by alcohol abuse, parasites, viral infection, and congestive heart failure, 156
- Cardiopulmonary resuscitation** (CPR), emergency treatment provided by trained persons and given to patients when their respirations and heart stop; provides oxygen to brain, heart, and other vital organs until medical treatment can restore normal heart and pulmonary function, 163, 248
- Cardiotonic**, substance that strengthens the heart muscle, 166
- Cardiovascular**, pertaining to the heart and blood vessels, 28t
- Cardiovascular system** (CV), system that transports blood to all areas of body; organs include heart and blood vessels (arteries, veins, and capillaries); also called *circulatory system*, 137–68
- abbreviations, 167–68
- adjective forms of anatomical terms, 152–53
- anatomy and physiology, 140–50
- diagnostic procedures, 161–63
- pathology, 153–60
- pharmacology, 166
- terminology, 151–60
- therapeutic procedures, 163–66
- Cardioversion. See Defibrillation
- Carotid artery, 148f
- Cardiovascular technician**, healthcare professional trained to perform a variety of diagnostic and therapeutic procedures including electrocardiography, echocardiography, and exercise stress tests, 154
- Carotid endarterectomy**, surgical procedure for removing obstruction within carotid artery, major artery in neck that carries oxygenated blood to brain; developed to prevent strokes but found to be useful only in severe stenosis with TIA, 440
- Carpal**, pertaining to the wrist, 92, 92t, 96
- Carpal tunnel release**, surgical cutting of ligament in wrist to relieve nerve pressure caused by carpal tunnel syndrome, which can be caused by repetitive motion such as typing, 124
- Carpal tunnel syndrome** (CTS), painful disorder of wrist and hand, induced by compression of median nerve as it passes under ligaments on palm side of wrist; symptoms include weakness, pain, burning, tingling, and aching in forearm, wrist, and hand, 123
- Carpals**, wrist bones in upper extremity, 96
- Carpus**, collective name for the eight wrist bones in each upper extremity, 91f, 92, 92f, 92t
- Cartilage**, strong, flexible connective tissue found in several locations in body, such as covering ends of bones in synovial joint, nasal septum, external ear, eustachian tube, larynx, trachea, bronchi, and intervertebral disks, 25, 84, 477f

- Cartilaginous joints**, joint that allows slight movement but holds bones firmly in place by solid piece of cartilage; example is pubic symphysis; fetal skeleton is composed of cartilaginous tissue, 94, 94f
- Cast**, application of solid material to immobilize extremity or portion of body as a result of fracture, dislocation, or severe injury; most often made of plaster of Paris or fiberglass, 109
- Castration**, surgical removal of testicles in male or ovaries in female, 371
- Cataract**, diminished vision resulting from lens of eye becoming opaque or cloudy; treatment is usually surgical removal of cataract, 465, 465f
- Catheter** (cath), flexible tube inserted into body for purpose of moving fluids into or out of body; used in cardiovascular system to place dye into blood vessels so they may be visualized on X-rays; used in urinary system to drain urine from bladder, 162, 321
- Catheterization**, insertion of a tube through urethra and into urinary bladder for purpose of withdrawing urine or inserting dye, 321
- Caudal**, directional term meaning toward feet or tail, or below, 39f, 39t
- Cauterization**, destruction of tissue by using caustic chemicals, electric currents, or by heating or freezing, 70, 352
- Cecal**, pertaining to the cecum, 274
- Cecum**, first portion of colon; a blind pouch off beginning of large intestine; appendix originates at end, 269f, 270f
- Cell**, basic unit of all living things; composes all tissues and organs in body; performs survival functions such as reproduction, respiration, metabolism, and excretion; some also able to carry on specialized functions, such as contraction by muscle cells and electrical impulse transmission by nerve cells, 24
- Cell membrane**, outermost boundary of the cell, 24
- Cell-mediated immunity**, immunity resulting from activation of sensitized T lymphocytes; immune response causes antigens to be destroyed by direct action of cells; also called *cellular immunity*, 200
- Cellular immunity**, also called *cell-mediated immunity*; process results in production of T cells and natural killer (NK) cells that directly attach to foreign cells; immune response fights invasion by viruses, bacteria, fungi, and cancer, 200
- Cellulitis**, inflammation of cellular or connective tissues, 64
- Cementum**, anchors root of a tooth into socket of jaw, 266, 267f
- Central canal**, canal that extends down length of spinal cord; contains cerebrospinal fluid, 425
- Central fissure, 423f
- Central nervous system** (CNS), portion of nervous system consisting of brain and spinal cord; receives impulses from all over body, processes information, and then responds with action; consists of both gray and white matter, 420, 421–25  
brain, 422–24, 422f, 423f  
meninges, 425, 425f  
spinal cord, 424–25, 424f
- Cephalalgia**, a headache, 431
- Cephalic**, directional term meaning toward the head, or above, 39f, 39t
- Cephalic region**, head region of the body, 34t, 35f
- Cephalic vein, 150f
- Cerebellar**, pertaining to cerebellum, 429
- Cerebellitis**, inflammation of cerebellum, 433
- Cerebellum**, second largest portion of brain, located beneath posterior portion of cerebrum; part of brain that aids in coordinating voluntary body movements and maintaining balance and equilibrium; attached to brain stem by pons; refined muscular movement is initiated in cerebrum, 422, 422f, 423f
- Cerebral**, pertaining to the cerebrum, 429
- Cerebral aneurysm**, localized abnormal dilatation of blood vessel, usually artery; result of congenital defect or weakness in wall of vessel; ruptured aneurysm is a common cause for hemorrhagic CVA, 433, 433f
- Cerebral angiography**, X-ray of blood vessels of brain after injection of radiopaque dye, 439
- Cerebral contusion**, bruising of brain from blow or impact; symptoms last longer than 24 hours and include unconsciousness, dizziness, vomiting, unequal pupil size, and shock, 433
- Cerebral cortex**, outer layer of cerebrum; composed of folds of gray matter called gyri, which are separated by sulci, 422–23
- Cerebral hemispheres**, division of cerebrum into right and left halves, 423
- Cerebral palsy** (CP), brain damage resulting from a defect, trauma, infection, or lack of oxygen before, during, or shortly after birth, 433
- Cerebrospinal**, pertaining to cerebrum and spine, 429
- Cerebrospinal fluid** (CSF), watery, clear fluid found in ventricles of brain; provides protection from shock or sudden motion to brain, 424
- Cerebrospinal fluid analysis**, laboratory examination of clear, watery, colorless fluid from within brain and spinal cord; can detect infections and abnormal presence of blood, 439
- Cerebrospinal fluid shunts**, surgical procedure in which bypass is created to drain cerebrospinal fluid; used to treat hydrocephalus by draining excess cerebrospinal fluid from brain and diverting it to abdominal cavity, 440
- Cerebrovascular accident** (CVA), also called a *stroke*; development of infarct due to loss in blood supply to area of brain; blood flow can be interrupted by ruptured blood vessel (hemorrhage), floating clot (embolus), stationary clot (thrombosis), or compression; extent of damage depends on size and location of infarct and often includes speech problems and muscle paralysis, 433, 433f
- Cerebrum**, largest section of brain; located in upper portion, and possesses thoughts, judgment, memory, association skills, and ability to discriminate between items; outer layer is cerebral cortex, which is composed of folds of gray matter; elevated portions, or *convolutions*, are called gyri and are separated by fissures or sulci; has both a left

and right division or hemisphere, each with its own four lobes: frontal, parietal, occipital, and temporal, 422, 422f, 423f

**Cerumen**, also called earwax; thick, waxy substance produced by oil glands in auditory canal; helps to protect and lubricate ear, 478

**Ceruminoma**, hard accumulation of earwax in ear canal, 482

**Cervical**, (1) pertaining to the neck; (2) pertaining to cervix, 96, 197t, 198f, 347

**Cervical biopsy**, taking a sample of tissue from cervix to test for presence of cancer cells, 356

**Cervical cancer**, malignant growth in cervix; especially difficult type of cancer to treat, it causes 5% of cancer deaths in women; Pap tests have helped with early detection, 350

Cervical nerve, 427f

Cervical nodes, 197t, 198f

**Cervical region**, neck region of body, 34t, 35f

**Cervical vertebrae** (C1, C2, etc.), seven vertebrae in neck region, 89, 90f, 90t

**Cervicectomy**, surgical removal of cervix, 357

**Cervix** (Cx), narrow, distal portion of uterus that joins to vagina, 338f, 340, 340f, 341f, 343f

**Cesarean section** (CS, C-section), surgical delivery of baby through incision into abdominal and uterine walls; legend has it that Roman emperor Julius Caesar was first person born by this method, 357

**Chancroid**, highly infectious nonsyphilitic venereal ulcer, 369, 369f

**Cheeks**, form lateral walls of oral cavity, 265

**Chemabrasion**, abrasion using chemicals; also called a *chemical peel*, 70

**Chemical name**, name for a drug based on its chemical formula or molecular structure, 501

**Chemical thyroidectomy**, large dose of radioactive iodine is given in order to kill thyroid gland cells without having to actually do surgery, 405

**Chemotherapy** (chemo), treating disease by using chemicals that have a toxic effect on body, especially cancerous tissue, 538

Chest tube. See Thoracostomy

**Chest X-ray** (CXR), taking radiographic picture of lungs and heart from back and sides, 244

**Cheyne-Stokes respiration**, abnormal breathing pattern in which there are long periods (10–60 seconds) of apnea followed by deeper, more rapid breathing, 235

Chickenpox. See Varicella

**Chiropractic**, healthcare profession concerned with diagnosis and treatment of spine and musculoskeletal system with intention of affecting nervous system and improving health; healthcare practitioner is a *chiropractor*, 98

Chiropractor, 98

**Chlamydia**, parasitic microorganism causing genital infections in males and females; can lead to pelvic inflammatory disease in females and eventual infertility, 369

Choked disk. See Papilledema

**Cholecystalgia**, gallbladder pain, 277

**Cholecystectomy**, surgical removal of gallbladder; removal of gallbladder through laparoscope is newer procedure with fewer complications than more invasive abdominal surgery; laparoscope requires a small incision into abdominal cavity, 288

**Cholecystic**, pertaining to gallbladder, 274

**Cholecystitis**, inflammation of gallbladder, 284

**Cholecystogram**, dye given orally to patient is absorbed and enters gallbladder, and then X-ray is taken, 285

**Choledocholithotripsy**, crushing of a gallstone in common bile duct, 288

**Cholelithiasis**, formation or presence of stones or calculi in gallbladder or common bile duct, 284, 284f

**Chondrectomy**, surgical removal of cartilage, 108

**Chondroma**, cartilage tumor, 102

**Chondromalacia**, softening of cartilage, 99

**Chondroplasty**, surgical repair of cartilage, 108

**Chorion**, outer of two membranous sacs surrounding fetus; helps to form placenta, 344

**Chorionic**, pertaining to chorion, 347

**Chorionic villus sampling** (CVS), removal of small piece of chorion for genetic analysis; may be done at earlier stage of pregnancy than amniocentesis, 355

**Choroid**, middle layer of eyeball; provides blood supply for eye, 456, 456f, 457

Choroid layer, 455

**Chronic obstructive pulmonary disease** (COPD), progressive, chronic, and usually irreversible condition in which lungs have diminished capacity for inspiration (inhalation) and expiration (exhalation); person may have difficulty breathing on exertion (dyspnea) and a cough; also called *chronic obstructive lung disease* (COLD), 240

**Chyme**, semisoft mixture of food and digestive fluids that pass from stomach into small intestine, 269

**Cicatrix**, a scar, 64

**Cilia**, term for eyelashes that protect eye from foreign particles or for nasal hairs that help filter dust and bacteria out of inhaled air, 225, 458

**Ciliary body**, intraocular eye muscles that change shape of the lens, 456f, 457

**Circadian rhythm**, 24-hour clock that governs periods of wakefulness and sleepiness, 392

**Circulating nurse**, nurse who assists surgeon and scrub nurse by providing needed materials during procedure and by handling surgical specimen; person does not wear sterile clothing and may enter and leave operating room during procedure, 532

**Circulatory system**, system that transports blood to all areas of body; organs include heart and blood vessels (arteries, veins, and capillaries); also called *cardiovascular system*, 140, 140f

**Circumcision**, surgical removal of end of prepuce or foreskin of penis; generally performed on newborn male at request of parents; primary reason is for ease of hygiene; also a ritual practice in some religions, 364, 371

**Circumduction**, movement in a circular direction from a central point, 119t

**Cirrhosis**, chronic disease of the liver, 284

- Clamp**, surgical instrument used to grasp tissue and control bleeding, 530t
- Clavicle**, also called *collar bone*; bone of pectoral girdle, 92, 92f, 92t
- Clavicular**, pertaining to clavicle or collar bone, 96
- Clean catch specimen (CC)**, urine sample obtained after cleaning off urinary opening and catching or collecting a sample in midstream (halfway through urination process) to minimize contamination from genitalia, 319
- Cleft lip**, congenital anomaly in which upper lip fails to come together; often seen along with cleft palate; corrected with surgery, 279
- Cleft palate**, congenital anomaly in which roof of mouth has split or fissure; corrected with surgery, 279
- Clinical psychologist**, diagnoses and treats mental disorders; specializes in using individual and group counseling to treat patients with mental and emotional disorders, 510
- Clitoris**, small organ containing erectile tissue covered by labia minora; contains sensitive tissue aroused during sexual stimulation and is similar to penis in male, 338f, 341, 341f
- Closed fracture**, simple fracture with no open skin wound, 100, 100f
- Clubbing**, abnormal widening and thickening of ends of fingers and toes associated with chronic oxygen deficiency; seen in patients with chronic respiratory conditions or circulatory problems, 235
- Coagulate**, convert liquid to gel or solid, as in blood coagulation, 187
- Coarctation of the aorta (CoA)**, severe congenital narrowing of aorta, 159
- Coccygeal**, pertaining to coccyx or tailbone, 96
- Coccyx**, tailbone, three to five very small vertebrae attached to sacrum; often become fused, 88f, 89, 90f, 90t
- Cochlea**, portion of labyrinth associated with hearing; rolled in shape of snail shell; lined by organs of Corti, 478
- Cochlear**, pertaining to cochlea, 481
- Cochlear implant**, mechanical device surgically placed under skin behind outer ear (pinna); converts sound signals into magnetic impulses to stimulate auditory nerve; can be beneficial for those with profound sensorineural hearing loss, 486, 486f
- Cochlear nerve**, branch of vestibulocochlear nerve that carries hearing information to brain, 477, 477f
- Coitus, sexual intercourse, 364
- Cold sores. See Herpes labialis
- Colectomy**, surgical removal of colon, 288
- Collagen fibers**, fibers made up of insoluble fibrous protein present in connective tissue that forms flexible mat to protect skin and other parts of body, 52
- Collecting tubule**, portion of renal tubule, 307, 308f, 310f
- Colles' fracture**, specific type of wrist fracture, 100, 100f
- Colon**, also called *large intestine*; functions to reabsorb most of fluid in digested food; material that remains after water reabsorption is feces; sections include cecum, ascending colon, transverse colon, descending colon, and sigmoid colon, 264, 270
- Colonic**, pertaining to colon, 275
- Colonoscope**, instrument to view inside colon, 286
- Colonoscopy**, flexible fiberscope passed through anus, rectum, and colon used to examine upper portion of colon; polyps and small growths can be removed during procedure, 286
- Color vision tests**, use of polychromatic (multicolored) charts to determine ability of patient to recognize color, 469
- Colorectal**, pertaining to colon and rectum, 275
- Colorectal carcinoma**, cancerous tumor originating in the colon or rectum, 281
- Colostomy**, surgical creation of opening in some portion of colon through abdominal wall to outside surface; fecal material (stool) drains into bag worn on abdomen, 289, 289f
- Colostrum**, thin fluid first secreted by breast after delivery; does not contain much protein, but is rich in antibodies, 348
- Colposcope**, instrument to view inside vagina, 355
- Colposcopy**, visual examination of cervix and vagina using colposcope, 355
- Coma**, profound unconsciousness resulting from illness or injury, 431
- Combining form**, word root plus combining vowel; always written with a “/” between word root and combining vowel; for example, *cardi* is word root and *o* is combining vowel, 3–4
- Combining vowel**, vowel inserted between word parts that makes it possible to pronounce long medical terms; usually the vowel *o*, 2, 3–4
- Comedo**, medical term for blackhead; an accumulation of sebum in sebaceous gland that has become blackened, 57
- Comminuted fracture**, fracture in which bone is shattered, splintered, or crushed into many pieces or fragments; fracture is completely through bone, 100
- Common bile duct (CBD)**, duct that carries bile from gallbladder to duodenum, 272, 272f
- Common iliac artery, 148f
- Common iliac vein, 150f
- Compact bone**, hard exterior surface bone; also called *cortical bone*, 85, 86f, 94f
- Complemental air. See Inspiratory reserve volume
- Complete blood count (CBC)**, a combination of blood tests; includes red blood cell count, white blood cell count, hemoglobin, hematocrit, white blood cell differential, and platelet count, 190
- Compound fracture**, fracture in which the bone has broken through the skin, 100
- Compression fracture**, fracture involving loss of height of vertebral body, 101
- Computed tomography scan (CT scan)**, imaging technique able to produce cross-sectional view of body; X-ray pictures are taken at multiple angles through body and computer constructs composite cross-section from images, 518
- Conception**, fertilization of ovum by a sperm, 340
- Concussion**, injury to brain resulting from blow or impact; symptoms may include headache, blurred vision, nausea or vomiting, dizziness, and balance problems, 434



- Conductive hearing loss**, loss of hearing as a result of blocking of sound transmission in middle ear and outer ear, 479
- Condyle**, refers to rounded portion at end of a bone, 86, 87f
- Cones**, sensory receptors of retina that are active in bright light and see in color, 457
- Confidentiality, 16
- Congenital anomalies, birth defects, 343
- Congenital hypothyroidism**, congenital condition due to lack of thyroid secretion that may result in arrested physical and mental development; formerly called *cretinism*, 403
- Congenital septal defect (CSD)**, defect, present at birth, in wall separating two chambers of heart; results in a mixture of oxygenated and deoxygenated blood being carried to surrounding tissues; there can be atrial septal defect (ASD) and ventricular septal defect (VSD), 156
- Congestive heart failure (CHF)**, pathological condition of heart in which there is reduced outflow of blood from left side of heart; results in weakness, breathlessness, and edema, 156
- Conization**, surgical removal of core of cervical tissue; also refers to partial removal of cervix, 357
- Conjunctiva**, protective mucous membrane lining on underside of each eyelid and across anterior surface of each eyeball, 456, 456f, 459, 467
- Conjunctival**, pertaining to conjunctiva, 462
- Conjunctivitis**, also referred to as *pinkeye* or inflammation of conjunctiva, 467
- Conjunctivoplasty**, surgical repair of conjunctiva, 471
- Connective tissue**, supporting and protecting tissue in body structures; examples are fat or adipose tissue, cartilage, and bone, 25, 26f
- Conscious**, condition of being awake and aware of surroundings, 431
- Constipation**, experiencing difficulty in defecation or infrequent defecation, 277
- Consultation reports**, document in patient's medical record; reports given by specialists who physician has requested to evaluate patient, 14
- Contracture**, abnormal shortening of muscle, making it difficult to stretch muscle, 122
- Contraindication**, condition in which particular drug should not be used, 506
- Contrast studies**, radiopaque substance is injected or swallowed; X-rays are then taken that outline body structure containing radiopaque substance, 519, 519f
- Controlled substances**, drugs that have potential for being addictive (habit forming) or can be abused, 502, 502t
- Contusion**, injury caused by blow to body; causes swelling, pain, and bruising; skin is not broken, 57
- Conversion disorder**, disorder in which patient unconsciously substitutes physical signs or symptoms for anxiety; most common physical signs or symptoms are blindness, heart palpitations, and paralysis, 513
- Convulsion**, severe involuntary muscle contractions and relaxations; caused by a variety of things, such as epilepsy, fever, and toxic conditions, 431
- Corium**, living layer of skin located between epidermis and subcutaneous layer; also referred to as *dermis*, contains hair follicles, sweat glands, sebaceous glands, blood vessels, lymph vessels, sensory receptors, nerve fibers, and muscle fibers, 52
- Cornea**, portion of sclera that is clear and transparent and allows light to enter interior of eye; also plays role in bending light rays, 455, 456, 456f
- Corneal**, pertaining to cornea, 462
- Corneal abrasion**, scraping injury to cornea; if not allowed to heal, may develop into ulcer, 465
- Coronal plane**, vertical plane that divides body into front (anterior or ventral) and back (posterior or dorsal) sections; also called *frontal plane*, 33, 33f
- Coronal section**, sectional view of body produced by cut along frontal plane; also called *frontal section*, 33
- Coronary**, pertaining to heart, 147, 152
- Coronary arteries**, group of three arteries that branch off aorta and carry blood to myocardium, 147, 147f
- Coronary artery bypass graft (CABG)**, open-heart surgery in which blood vessel is grafted to route blood around point of constriction in diseased coronary artery, 164
- Coronary artery disease (CAD)**, insufficient blood supply to heart muscle due to obstruction of one or more coronary arteries; may be caused by atherosclerosis and may cause angina pectoris and myocardial infarction, 156, 156f
- Corpus**, body or central portion of uterus, 338f, 340
- Corpus albicans, 339f
- Corpus luteum, 339f
- Cortex**, outer layer of organ; within endocrine system, refers to outer layer of adrenal glands; within urinary system, refers to outer layer of kidney, 306, 307f, 390, 390f
- Cortical**, pertaining to cortex, 85
- Cortical bone**, hard exterior surface bone; also called *compact bone*, 85, 86f
- Corticosteroid cream**, powerful anti-inflammatory cream, 71
- Corticosteroids**, general term for group of hormones secreted by adrenal cortex; include mineralocorticoid hormones, glucocorticoid hormones, and steroid sex hormones; used as medication for its strong anti-inflammatory properties, 110, 209, 249, 390, 407
- Cortisol**, glucocorticoid hormone secreted by adrenal cortex; regulates carbohydrate metabolism, 390
- Costal**, pertaining to ribs, 96
- Cowper's glands**, also called *bulbourethral glands*; these two small male reproductive system glands are located on either side of urethra just distal to prostate; secretion from these glands neutralizes acidity in urethra and vagina, 365
- Crackles**, abnormal crackling or bubbling sound made during aspiration usually indicates presence of fluid or mucus in small airways; also called *rales*, 235
- Cranial**, pertaining to skull, 97, 429
- Cranial bones, 89t
- Cranial cavity**, dorsal body cavity; within skull and contains brain, 36, 36f, 37t
- Cranial nerves**, nerves that arise from brain, 420, 426t

- Craniotomy**, incision into skull, 108
- Cranium**, skull; bones that form protective covering over brain, 87, 88f
- Creatine phosphokinase (CPK)**, muscle enzyme found in skeletal muscle and cardiac muscle; blood levels become elevated in disorders such as heart attack, muscular dystrophy, and other skeletal muscle pathologies, 123
- Creatinine**, waste product of muscle metabolism, 182
- Creatinine clearance**, test of kidney function; creatinine is waste product cleared from bloodstream by kidneys; for test, urine is collected for 24 hours and amount of creatinine in urine is compared to amount of creatinine that remains in bloodstream, 319
- Crepitation**, noise produced by bones or cartilage rubbing together, 99
- Crick in the neck, 123
- Cricoid cartilage, 225f
- Crohn's disease**, form of chronic inflammatory bowel disease affecting ileum and/or colon; also called *regional ileitis*, 281
- Cross infection**, occurs when person, either patient or healthcare worker, acquires pathogen from another patient or healthcare worker, 201
- Cross-eyed. See Esotropia
- Cross-section**, internal view of body produced by slice perpendicular to long axis of structure, 23
- Croup**, acute viral respiratory infection common in infants and young children and characterized by hoarse cough, 238
- Crown**, portion of tooth covered by enamel; also artificial covering for tooth created to replace original enamel, 266, 267f, 287
- Crowning**, when head of baby is visible through vaginal opening; a sign that birth is imminent, 344
- Crural**, pertaining to leg, 35f
- Crural region**, lower extremity region of body, 34t
- Cryoextraction**, procedure in which cataract is lifted from lens with extremely cold probe, 471
- Cryoretinopexy**, surgical fixation of retina by using extreme cold, 471
- Cryosurgery**, exposing tissues to extreme cold in order to destroy them; used in treating malignant tumors and to control pain and bleeding, 70, 532
- Cryotherapy**, using cold for therapeutic purposes, 525
- Cryptorchidism**, failure of testes to descend into scrotal sac before birth; usually the testes will descend before birth; surgical procedure called orchidopexy may be required to bring testes down into scrotum permanently; failure of testes to descend could result in sterility in male, 368
- Culdoscopy**, examination of female pelvic cavity by introducing endoscope through wall of vagina, 355
- Culture and sensitivity (C&S)**, laboratory test in which colony of pathogens that have been removed from infected area are grown to identify pathogen and then determine its sensitivity to a variety of antibiotics, 69
- Cumulative action**, action that occurs in body when drug is allowed to accumulate or stay in body, 506
- Curettage**, removal of superficial skin lesions with curette (surgical instrument shaped like spoon) or scraper, 70
- Curette**, surgical instrument used to scrape and remove tissue, 530t
- Cushing's syndrome**, set of symptoms that result from hypersecretion of adrenal cortex; may be result of tumor of adrenal glands; symptoms include weakness, edema, excess hair growth, skin discoloration, and osteoporosis, 400, 400f
- Cuspids**, permanent teeth located between incisors and bicuspids that assist in biting and cutting food; humans have four cuspids; also called *canine teeth* or *eyeteeth*, 265f, 266, 267f
- Cusps**, leaflets or flaps of heart valve, 144
- Cutaneous**, pertaining to skin, 56
- Cutaneous membrane**, another term for skin, 50
- Cuticle**, thin skinlike layer overlapping base of nail, 53, 53f
- Cyanosis**, slightly bluish color of skin due to deficiency of oxygen and excess of carbon dioxide in blood; caused by a variety of disorders, ranging from chronic lung disease to congenital and chronic heart problems, 53, 236, 236f
- Cycloplegia**, paralysis of ciliary body, 463
- Cyst**, fluid-filled sac under skin, 57, 57f
- Cystalgia**, bladder pain, 315
- Cystectomy**, surgical removal of bladder, 323
- Cystic**, (1) pertaining to urinary bladder; (2) pertaining to gallbladder, 275, 313
- Cystic duct**, duct leading from gallbladder to common bile duct; carries bile, 271, 272f
- Cystic fibrosis (CF)**, hereditary condition causing exocrine glands to malfunction; patient produces very thick mucus that causes severe congestion within lungs and digestive system; through more advanced treatment, many children are now living into adulthood with this disease, 240
- Cystitis**, inflammation of bladder, 309, 318
- Cystocele**, protrusion (or herniation) of urinary bladder into wall of vagina; may cause urinary frequency and urgency, 318, 351
- Cystogram**, record of bladder, 320
- Cystography**, process of instilling contrast material or dye into bladder by catheter to visualize urinary bladder on X-ray, 320
- Cystolith**, bladder stone, 315
- Cystopexy**, surgical fixation of bladder, 323
- Cystoplasty**, surgical repair of bladder, 323
- Cystorrhagia**, profuse bleeding from bladder, 315
- Cystoscope**, instrument used to visually examine bladder, 321
- Cystoscopy** (cysto), visual examination of urinary bladder using instrument called cystoscope, 321
- Cystostomy**, creation of opening through abdominal wall and into bladder, 323
- Cystotomy**, incision into bladder, 323
- Cytologic testing**, examination of cells to determine structure and origin; example includes Pap smears, 538
- Cytology**, study of cells, 24
- Cytoplasm**, watery internal environment of a cell, 24
- Cytotoxic**, pertaining to poisoning cells, 201



**D**

- Dacryoadenitis**, inflammation of lacrimal gland, 467
- Dacryocystitis**, inflammation of tear sac, 467
- Day surgery**, type of outpatient surgery in which patient is discharged on same day as being admitted; also called *ambulatory surgery*, 532
- Deafness**, inability to hear or having some degree of hearing impairment, 482
- Debridement**, removal of foreign material and dead or damaged tissue from wound, 70, 525
- Decibel (dB)**, measures intensity or loudness of sound; zero decibels is quietest sound measured and 120 dB is loudest sound commonly measured, 485
- Deciduous teeth**, 20 teeth that begin to erupt around six months of age; eventually pushed out by permanent teeth, 266
- Decongestant**, substance that reduces nasal congestion and swelling, 249
- Decubitus ulcer** (decub), bedsore or pressure sore formed from pressure over bony prominences on body; caused by lack of blood flow, 64
- Deep**, directional term meaning away from surface of body, 40t
- Deep tendon reflex (DTR)**, muscle contraction in response to stretch caused by striking muscle tendon with reflex hammer; test used to determine if muscles are responding properly, 124
- Deep vein thrombosis**, formation of blood clots in a vein deep in the body, usually in the legs, 159
- Defecation**, evacuation of feces from rectum, 270
- Defibrillation**, procedure that converts serious irregular heartbeats, such as fibrillation, by giving electric shocks to heart, 163, 163f
- Delirium**, state of mental confusion with lack of orientation to time and place, 431
- Delivery**, emergence of baby from birth canal, 344
- Delusional disorder**, false belief held with conviction even in face of strong evidence to contrary, 512
- Dementia**, progressive impairment of intellectual function that interferes with performing activities of daily living; patients have little awareness of their condition; found in disorders such as Alzheimer's, 431, 511
- Dendrite**, branched process off a neuron that receives impulses and carries them to cell body, 420, 421f
- Dental**, pertaining to teeth, 275
- Dental caries**, gradual decay and disintegration of teeth caused by bacteria that can result in inflamed tissue and abscessed teeth; commonly called a *tooth cavity*, 279
- Dentalgia**, tooth pain, 277
- Dentin**, main bulk of tooth; covered by enamel, 266, 267f
- Dentist**, practitioner of dentistry, 277
- Dentistry**, branch of healthcare involved with prevention, diagnosis, and treatment of conditions involving teeth, jaw, and mouth; practitioner is *dentist* or *oral surgeon*, 277
- Denture**, partial or complete set of artificial teeth that are set in plastic materials; substitute for natural teeth and related structures, 288
- Deoxygenated**, blood in veins that is low in oxygen content, 140
- Depigmentation**, loss of normal skin color or pigment, 57
- Depression**, downward movement, as in dropping shoulders, 119t
- Depressive disorders**, a classification of psychiatric disorders in the DSM-5 characterized by instability in mood; includes major depressive disorder and mania, 512
- Dermabrasion**, abrasion or rubbing using wire brushes or sandpaper, 70
- Dermal**, pertaining to skin, 56
- Dermatitis**, inflammation of skin, 64
- Dermatologist**, physician specialized in diagnosis and treatment of diseases of integumentary system, 57
- Dermatology** (Derm, dermat), branch of medicine specializing in conditions of integumentary system, 57
- Dermatome**, instrument for cutting skin or thin transplants of skin, 69
- Dermatoplasty**, surgical repair of skin, 69
- Dermatosis**, abnormal condition of skin, 64
- Dermis**, living layer of skin located between epidermis and subcutaneous layer; also referred to as *corium* or *true skin*; contains hair follicles, sweat glands, sebaceous glands, blood vessels, lymph vessels, sensory receptors, nerve fibers, and muscle fibers, 50, 51f, 52
- Descending aorta, 145f
- Descending colon**, section of colon that descends left side of abdomen, 269f, 270, 270f
- Descending tracts**, nerve tracts carrying motor signals down spinal cord to muscles, 425
- Diabetes insipidus (DI)**, disorder caused by inadequate secretion of hormone by posterior lobe of pituitary gland; there may be polyuria and polydipsia, 393, 402
- Diabetes mellitus (DM)**, serious disease in which pancreas fails to produce insulin or insulin does not work properly; consequently, patient has very high blood sugar; kidney will attempt to lower high blood sugar level by excreting excess sugar in urine, 401
- Diabetic acidosis. See Ketoacidosis
- Diabetic nephropathy**, accumulation of damage to glomerulus capillaries due to chronic high blood sugars of diabetes mellitus, 317
- Diabetic retinopathy**, secondary complication of diabetes affecting blood vessels of retina, resulting in visual changes and even blindness, 401
- Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5)*, 510
- Diagnostic imaging (DI), 516–21
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- procedures, 518–21
- vocabulary, 517–18
- Diagnostic reports**, found in patient's medical record; consists of results of all diagnostic tests performed on patient, principally from lab and medical imaging (e.g., X-ray and ultrasound), 14
- Diaphoresis**, excessive or profuse sweating, 57
- Diaphragm**, major muscle of inspiration; separates thoracic from abdominal cavity, 36, 36f, 141f, 229, 229f

- Diaphragmatic**, pertaining to diaphragm, 233  
**Diaphragmatocele**. See Hiatal hernia  
**Diaphysis**, shaft portion of long bone, 85, 86f  
**Diarrhea**, passing of frequent, watery bowel movements; usually accompanies gastrointestinal (GI) disorders, 278  
**Diastole**, period of time during which heart chamber is relaxed, 144  
**Diastolic pressure**, lower pressure within blood vessels during relaxation phase of heartbeat, 149  
**Diencephalon**, portion of brain that contains two most critical areas of brain, thalamus and hypothalamus, 422, 422f  
**Digestive system**, system that digests food and absorbs nutrients; organs include mouth, pharynx, esophagus, stomach, small and large intestines, liver, gallbladder, and anus; also called *gastrointestinal system*, 261–91  
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 stomach, 268–69  
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**Digital rectal exam (DRE)**, manual examination for enlarged prostate gland performed by palpating (feeling) prostate gland through wall of rectum, 371  
**Digital veins**, 150f  
**Dilation and curettage (D&C)**, surgical procedure in which opening of cervix is dilated and uterus is scraped or suctioned of its lining or tissue; often performed after spontaneous abortion and to stop excessive bleeding from other causes, 357  
**Dilation stage**, first stage of labor; begins with uterine contractions that press fetus against cervix causing it to dilate to 10 cm and become thin; thinning of cervix is called effacement, 344, 344f  
**Dilator**, surgical instrument used to enlarge opening by stretching, 530t  
**Diphtheria**, bacterial upper respiratory infection characterized by thick membranous film across throat and high mortality rate in unvaccinated patients, 238  
**Diplopia**, double vision, 463  
**Directional/positional terms**, 38, 39–40t, 39f  
**Discharge summary**, part of patient's medical record; comprehensive outline of patient's entire hospital stay; includes condition at time of admission, admitting diagnosis, test results, treatments and patient's response, final diagnosis, and follow-up plans, 14  
**Dislocation**, occurs when bones in joint are displaced from their normal alignment, 105  
**Disruptive, impulse control, and conduct disorders**, a classification of psychiatric disorders in the DSM-5 characterized by the inability to resist impulses to perform some act harmful to individual or others; includes kleptomania, pyromania, and explosive disorder, 512  
**Dissection**, surgical cutting of parts for separation and study, 532  
**Dissociative amnesia**, loss of memory, 511  
**Dissociative disorders**, a classification of psychiatric disorders in the DSM-5 in which severe emotional conflict is so repressed that split in personality or memory loss occurs; includes dissociative amnesia and dissociative identity disorder, 511  
**Dissociative identity disorder**, having two or more distinct personalities, 511  
**Distal**, directional term meaning located farthest from point of attachment to body, 39f, 39t  
**Distal convoluted tubule**, portion of renal tubule, 307, 308f, 310f  
**Diuresis**, abnormal secretion of large amounts of urine, 315  
**Diuretic**, substance that increases excretion of urine, which promotes loss of water and salt from body; can assist in lowering blood pressure; therefore, these drugs are used to treat hypertension; potassium in body may be depleted with continued use; potassium-rich foods such as bananas, kiwi, and orange juice can help correct deficiency, 166, 324  
**Diverticulectomy**, surgical removal of diverticulum, 289  
**Diverticulitis**, inflammation of diverticulum or sac in intestinal tract, especially in colon, 281, 281f  
**Diverticulosis**, abnormal condition of having diverticula (outpouches off gut), 281  
**Diverticulum**, an outpouching off the gut, 281  
**Dopaminergic drugs**, group of medications to treat Parkinson's disease by either replacing dopamine that is lacking or increasing strength of dopamine that is present, 441  
**Doppler ultrasonography**, measurement of sound-wave echoes as they bounce off tissues and organs to produce image; within cardiovascular system, used to measure velocity of blood moving through blood vessels to look for blood clots, 162, 519  
**Dorsal**, directional term meaning more toward the back or spinal cord side of the body, 36f, 39f, 39t  
**Dorsal cavities**, 36, 36f, 37t  
**Dorsiflexion**, backward bending, as of hand or foot, 118f, 118t  
**Dorsum**, refers to posterior region of trunk; back 34t, 35f  
**Draping**, process of covering patient with sterile cloths that allow only operative site to be exposed to surgeon, 532  
**Drug**, 501  
 administration, 504, 504–06t  
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 names, 501, 501t

**Drug Enforcement Agency (DEA)**, government agency that enforces regulation of controlled substances, 502

**Drug interaction**, occurs when effect of one drug is altered because it was taken at same time as another drug, 507

**Drug tolerance**, decrease in susceptibility to drug after continued use of drug, 507

**Dry gangrene**, late stages of gangrene characterized by affected area becoming black and leathery, 64

**Dual-energy absorptiometry (DXA)**, measurement of bone density using low-dose X-ray for purpose of detecting osteoporosis, 107

Duchenne's muscular dystrophy. See Pseudohypertrophic muscular dystrophy

**Duodenal**, pertaining to duodenum, 275

**Duodenum**, first section of small intestine; location where digestion is completed after chyme mixes with digestive juices from pancreas and gallbladder, 268f, 269, 269f, 270f, 272f

**Dura mater**, term means "tough mother"; fibrous outermost meninges layer that forms a tough protective layer, 425, 425f

**Dwarfism**, condition of being abnormally small; may be hereditary condition or endocrine dysfunction, 402

**Dyscrasia**, general term indicating presence of disease affecting blood, 187

**Dysentery**, disease characterized by diarrhea, often with mucus and blood, severe abdominal pain, fever, and dehydration, 281

**Dyskinesia**, difficult or painful movement, 122

**Dysmenorrhea**, painful cramping associated with menstruation, 349

**Dysorexia**, abnormal appetite, 278

**Dyspepsia**, indigestion, 278

**Dysphagia**, having difficulty eating, 278

**Dysphasia**, impairment of speech as a result of brain lesion, 431

**Dysphonia**, abnormal voice, 236

**Dyspnea**, difficult, labored breathing, 236, 238

**Dystocia**, abnormal or difficult labor and childbirth, 349

**Dystonia**, abnormal tone, 122

**Dysuria**, painful or difficult urination; symptom in many disorders, such as cystitis, urethritis, enlarged prostate in male, and prolapsed uterus in female, 315

## E

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- hearing, 479, 479f
- inner, 478
- middle, 478, 478f
- pathology, 482–83
- pharmacology, 488
- terminology, 480–81
- therapeutic procedures, 486–87

**Eardrops**, substance placed directly into ear canal for purpose of relieving pain or treating infection, 506t

**Ecchymosis**, skin discoloration or bruise caused by blood collecting under skin, 57, 57f

**Echocardiography (ECHO)**, noninvasive diagnostic method using ultrasound to visualize internal cardiac structures; cardiac valve activity can be evaluated using this method, 162

**Echoencephalography**, recording of ultrasonic echoes of brain; useful in determining abnormal patterns of shifting in brain, 439

**Eclampsia**, convulsive seizures and coma that can occur in woman between 20th week of pregnancy and up to six weeks postpartum; often associated with hypertension, 352

Ectopic pregnancy. See Salpingocyesis

**Eczema**, superficial dermatitis accompanied by papules, vesicles, and crusting, 64

**Edema**, condition in which body tissues contain excessive amounts of fluid, 399

**Effacement**, thinning of cervix during labor, 344

**Efferent**, moving away from, 307

**Efferent arteriole**, arteriole that carries blood away from glomerulus, 308f, 310f

**Efferent neurons**, carry impulses away from brain and spinal cord to muscles and glands; also called *motor neurons*, 426

Egg cell, 339f, 340f

**Ejaculation**, impulse of forcing seminal fluid from male urethra, 364

Elastin fibers, 228f

**Elective abortion**, legal termination of pregnancy for nonmedical reasons, 357

**Electrocardiogram (ECG, EKG)**, record of electrical activity of heart; useful in diagnosis of abnormal cardiac rhythm and heart muscle (myocardium) damage, 146f, 162

**Electrocardiography**, process of recording electrical activity of heart, 162

**Electrocautery**, to destroy tissue with electric current, 70, 533

**Electroconvulsive therapy (ECT)**, procedure occasionally used for cases of prolonged major depression in which electrode is placed on one or both sides of patient's head and current is turned on briefly causing convulsive seizure; low level of voltage used in modern ECT, and patient is administered muscle relaxant and anesthesia; advocates feel it is a more effective way to treat severe depression than with use of drugs; not effective with disorders other than depression, such as schizophrenia and alcoholism, 514

**Electroencephalogram (EEG)**, record of brain's electrical activity, 439

**Electroencephalography (EEG)**, recording electrical activity of brain by placing electrodes at various positions on scalp; also used in sleep studies to determine if there is a normal pattern of activity during sleep, 439

- Electrolyte**, chemical compound that separates into charged particles, or ionizes, in solution; sodium (Na<sup>+</sup>, chloride (Cl<sup>-</sup>), and potassium (K<sup>+</sup>) are examples of electrolytes, 309
- Electromyogram (EMG)**, record of muscle electricity, 124, 525
- Electromyography**, recording of electrical patterns of muscle in order to diagnose diseases, 124, 525
- Elephantiasis**, inflammation, obstruction, and destruction of lymph vessels that results in enlarged tissues due to edema, 205
- Elevation**, muscle action that raises body part, as in shrugging the shoulders, 119t
- Elimination disorders**, a classification of psychiatric disorders in the DSM-5 involving inappropriate voiding of urine or feces; includes enuresis and encopresis, 514
- Embolectomy**, surgical removal of embolus or clot from a blood vessel, 164
- Embolus**, obstruction of blood vessel by blood clot that moves from another area, 154, 154f
- Embryo**, term to describe developing infant from fertilization until end of eighth week, 343, 343f
- Embryonic**, pertaining to embryo, 347
- Emesis**, vomiting, usually with some force, 278
- Emmetropia (EM)**, state of normal vision, 463
- Emphysema**, pulmonary condition that can occur as result of long-term heavy smoking; air pollution also worsens this disease; patient may not be able to breathe except in sitting or standing position, 240
- Empyema**, pus within pleural space, usually result of infection, 242
- Emulsification**, to make fats and lipids more soluble in water, 271
- Enamel**, hardest substance in body; covers outer surface of teeth, 266, 267f
- Encapsulated**, growth enclosed in sheath of tissue that prevents tumor cells from invading surrounding tissue, 536
- Encephalic**, pertaining to brain, 429
- Encephalitis**, inflammation of brain due to disease factors such as rabies, influenza, measles, or smallpox, 434
- Encopresis**, elimination disorder characterized by voiding feces in inappropriate places after toilet training, 514
- Endarterectomy**, removal of inside layer of an artery, 165
- Endings**  
plural, 12  
singular, 12
- Endocarditis**, inflammation of inner lining layer of heart; may be due to microorganisms or to abnormal immunological response, 157
- Endocardium**, inner layer of heart, which is very smooth and lines chambers of heart, 142, 142f
- Endocervicitis**, inflammation of inner aspect of cervix, 350
- Endocrine glands**, glandular system that secretes hormones directly into bloodstream rather than into duct; endocrine glands are frequently referred to as ductless glands; endocrine system includes thyroid gland, adrenal glands, parathyroid glands, pituitary gland, pancreas (islets of Langerhans), testes, ovaries, and thymus gland, 388, 388–89t
- Endocrine system**, body system consisting of glands that secrete hormones directly into bloodstream; endocrine glands include adrenal glands, parathyroid glands, pancreas, pituitary gland, testes, ovaries, thymus gland, and thyroid gland, 385–407
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- pituitary gland, 392–93, 393f, 394f
- terminology, 397–98
- testes, 394, 394f
- therapeutic procedures, 405–06
- thymus gland, 395, 395f
- thyroid gland, 395–96, 396f
- Endocrinologist**, physician who specializes in treatment of endocrine glands, 398
- Endocrinology**, branch of medicine specializing in conditions of endocrine system, 398
- Endocrinopathy**, disease of endocrine system, 399
- Endometrial**, pertaining to the endometrium, 347
- Endometrial biopsy (EMB)**, taking sample of tissue from lining of uterus to test for abnormalities, 356
- Endometrial cancer**, cancer of endometrial lining of uterus, 350
- Endometriosis**, abnormal condition of endometrium tissue appearing throughout pelvis or on abdominal wall; this tissue is usually found within uterus, 351
- Endometritis**, inflammation of endometrial lining of uterus, 350
- Endometrium**, inner lining of uterus; contains rich blood supply and reacts to hormonal changes every month, which results in menstruation; during pregnancy, lining of uterus does not leave body but remains to nourish unborn child, 340, 340f
- Endoscopic retrograde cholangiopancreatography (ERCP)**, using endoscope to X-ray bile and pancreatic ducts, 287
- Endoscopic surgery**, use of lighted instrument to examine interior of cavity, 533
- Endothelium, 147f
- Endotracheal intubation**, placing tube through mouth to create airway, 246, 246f
- Enteric**, pertaining to small intestine, 275
- Enteritis**, inflammation of only small intestine, 281
- Enucleated**, loss of cell's nucleus, 182
- Enucleation**, surgical removal of an eyeball, 471
- Enuresis**, elimination disorder characterized by the involuntary discharge of urine after age by which bladder control should have been established; usually occurs by age 5; also called *bed-wetting* at night, 315, 514



**Enzyme-linked immunosorbent assay (ELISA)**, blood test for antibody to AIDS virus; positive test means that person has been exposed to virus; in case of false-positive reading, Western blot test would be used to verify results, 207

**Eosinophil** (eosins, eos), granulocyte white blood cells that destroy parasites and increase during allergic reactions, 181, 183f, 183t

**Eosinophilic**, pertaining to eosinophils, 186

**Epicardium**, outer layer of heart; forms part of pericardium, 142

**Epicondyle**, projection located above or on condyle, 86, 87f

**Epidermal**, pertaining to above the skin, 56

**Epidermis**, superficial layer of skin; is composed of squamous epithelium cells; these are flat scalelike cells that are arranged in layers, called stratified squamous epithelium; many layers of epidermis create a barrier to infection; epidermis does not have a blood supply, so is dependent on deeper layers of skin for nourishment; however, deepest epidermis layer is called basal layer; these cells are alive and constantly dividing; older cells are pushed out toward surface by new cells forming beneath; during this process, they shrink and die, becoming filled with a protein called keratin; keratin-filled cells are sloughed off as dead cells, 50–52, 51f

**Epididymal**, pertaining to epididymis, 366

**Epididymectomy**, surgical removal of epididymis, 371

**Epididymis**, coiled tubule that lies on top of testes within scrotum; stores sperm as they are produced and turns into vas deferens, 362, 363, 364, 368, 394f

**Epididymitis**, inflammation of epididymis causing pain and swelling in inguinal area, 368

**Epidural hematoma**, mass of blood in space outside dura mater of brain and spinal cord, 437

Epidural space, 425f

**Epigastric**, pertaining to above stomach; anatomical division of abdomen, middle section of upper row, 37t

Epigastric region, 37t

**Epiglottic**, pertaining to epiglottis, 233

**Epiglottis**, flap of cartilage that covers larynx when swallowing; prevents food and drink from entering larynx and trachea, 225f, 226, 266f, 268

**Epilepsy**, recurrent disorder of brain in which convulsive seizures and loss of consciousness occur, 434

**Epinephrine**, hormone produced by adrenal medulla; also known as *adrenaline*; actions include increased heart rate and force of contraction, bronchodilation, and relaxation of intestinal muscles, 388t, 390

Epiphyseal line, 86f

**Epiphysis**, wide ends of a long bone, 85, 86f

**Episiorrhaphy**, suture vulva, 357

**Episiotomy**, surgical incision of perineum to facilitate delivery process; can prevent irregular tearing of tissue during birth, 357

**Epispadias**, congenital opening of urethra on dorsal surface of penis, 369

**Epistaxis**, nosebleed, 225, 236

**Epithelial**, pertaining to epithelium, 25

**Epithelial tissue**, tissue found throughout body as skin, outer covering of organs, and inner lining for tubular or hollow structures, 25, 26f

**Epithelium**, epithelial tissue composed of close-packed cells that form covering for and lining of body structures, 25

**Equilibrium**, sense of balance, 477

**Erectile dysfunction (ED)**, inability to copulate due to inability to maintain erection; also called *impotence*, 369, 514

**Erectile dysfunction agents**, medications that temporarily produce erection in patients with erectile dysfunction, 373

**Erectile tissue**, tissue with numerous blood vessels and nerve endings; becomes filled with blood and enlarges in size in response to sexual stimulation, 341, 364

**Ergonomics**, study of human work including how requirements for performing work and work environment affect musculoskeletal and nervous system, 524

**Erythema**, redness or flushing of skin, 58

Erythroblastosis fetalis. See Hemolytic disease of the newborn

**Erythrocyte**, also called *red blood cells (RBCs)*; cells that contain hemoglobin, an iron-containing pigment that binds oxygen in order to transport it to cells of body, 182–83, 183f, 188–89

**Erythrocyte sedimentation rate (ESR, sed rate)**, blood test to determine rate at which mature red blood cells settle out of blood after addition of anticoagulant; indicator of presence of inflammatory disease, 190

**Erythrocytic**, pertaining to red blood cells, 186

**Erythrocytosis**, too many red cells, 188

**Erythroderma**, red skin, 58

**Erythropenia**, too few red cells, 188

**Eschar**, thick layer of dead tissue and tissue fluid that develops over deep burn area, 58

**Esophageal**, pertaining to esophagus, 275

**Esophageal varices**, enlarged and swollen varicose veins in lower end of esophagus; they can rupture and result in serious hemorrhage, 279

**Esophagogastroduodenoscopy (EGD)**, use of flexible fiber-optic scope to visually examine esophagus, stomach, and beginning of duodenum, 287

**Esophagus**, tube that carries food from pharynx to stomach, 225f, 263, 264, 266f, 268, 268f, 279

**Esotropia**, inward turning of eye; example of a form of strabismus (muscle weakness of eye), 467

**Estrogen**, one of hormones produced by ovaries; works with progesterone to control menstrual cycle and is responsible for producing secondary sexual characteristics, 339, 389t, 390

**Ethmoid bone**, cranial bone, 87, 89t

**Eupnea**, normal breathing, 236

**Eustachian tube**, tube or canal that connects middle ear with nasopharynx and allows for balance of pressure between outer and middle ear; infection can travel via mucous membranes of eustachian tube, resulting in middle ear infections, 477f, 478

**Eversion**, directional term meaning turning outward, 119f, 119t

**Ewing's sarcoma**, malignant growth found in shaft of long bones that spreads through periosteum; removal is treatment of choice, as tumor will metastasize or spread to other organs, 102

**Excision**, to cut out; surgical removal of part or all of an organ or structure, 533

**Excretory urography** (EU), injection of dye into bloodstream followed by taking X-ray to trace action of kidney as it excretes dye, 320

**Exfoliative cytology**, scraping cells from tissue and then examining them under microscope, 69

**Exhalation**, to breathe air out of lungs; also called *expiration*, 224

Exocrine, 388, 391

**Exocrine glands**, glands that secrete substances into a duct; examples include tears and tear ducts, 388, 391f

**Exophthalmos**, condition in which eyeballs protrude, such as in Graves' disease; generally caused by overproduction of thyroid hormone, 399, 399f

**Exostosis**, bone spur, 102

**Exotropia**, outward turning of eye; an example of strabismus (muscle weakness of eye), 467

**Expectorant**, substance that assists in removal of secretions from bronchopulmonary membranes, 249

Expiration. See Exhalation

**Expiratory reserve volume** (ERV), amount of air that can be forcibly exhaled after normal quiet respiration; also called *supplemental air*, 229t

**Exploratory laparotomy**, abdominal operation for purpose of examining abdominal organs and tissues for signs of disease or other abnormalities, 289

**Exploratory surgery**, surgery performed for purpose of determining if cancer is present or if known cancer has spread; biopsies are generally performed, 538

**Explosive disorder**, impulse control disorder in which patient is unable to control violent rages, 512

**Expulsion stage**, stage of labor and delivery during which baby is delivered, 344, 344f

**Extension**, movement that brings limb into or toward a straight condition, 118f, 118t

**Extensor carpi**, muscle named for its action, extension, 116

**External auditory meatus**, opening into external ear canal, 477, 477f

**External ear**, outermost portion of ear; consists of auricle, auditory canal, and eardrum, 476, 477–78, 477f, 479f, 482–83

External iliac artery, 148f

External iliac vein, 150f

**External oblique**, muscle named for direction of its fibers, on an oblique angle, 116

**External respiration**, exchange of oxygen and carbon dioxide that takes place in lungs, 224

**External sphincter**, ring of voluntary muscle that controls emptying of urine from bladder, 308–09

**Extracorporeal circulation** (ECC), during open heart surgery, routing of blood to heart-lung machine so it can be oxygenated and pumped to rest of body, 164

**Extracorporeal shockwave lithotripsy** (ESWL), use of ultrasound waves to break up stones; process does not require surgery, 321, 321f

**Extraction**, removing or pulling teeth, 299

**Extraocular**, pertaining to being outside eyeball, for example extraocular eye muscles, 462

Eye, 454–74

- abbreviations, 473–74
- adjective forms of anatomical terms, 462
- anatomy and physiology, 456–60
- conjunctiva, 456f, 459
- diagnostic procedures, 469–70
- eyeball, 456–57
- eyelids, 456f, 458
- lacrimal apparatus, 459, 459f
- muscles, 458, 458f
- pathology, 463–68
- pharmacology, 473
- retina, 456f, 457, 457f
- terminology, 461–62
- therapeutic procedures, 471–72
- vision, 459, 460f

**Eye muscles**, six muscles that connect eyeball to orbit cavity; allow for rotation of eyeball, 456, 458, 458f, 467–68

**Eyeball**, eye by itself, without any appendages such as eye muscles or tear ducts, 456–57, 464–67

**Eyedrops**, substance placed into eye to control eye pressure in glaucoma; also used during eye examinations to dilate pupil of eye for better examination of interior of eye, 506t

**Eyelashes**, along upper and lower edges of eyelids; protect eye from foreign particles; also called *cilia*, 458

**Eyelids**, upper and lower folds of skin that provide protection from foreign particles, injury from sun and intense light, and trauma; both upper and lower edges have small hairs or cilia; in addition, sebaceous or oil glands are located in eyelids, which secrete lubricating oil, 456, 456f, 458, 467

## F

**Facial bones**, skull bones that surround mouth, nose, and eyes; location where muscles for chewing are attached, 87, 89t

Facial nerve, 426t

**Falling test**, test used to observe balance and equilibrium; patient is observed balancing on one foot, then with one foot in front of the other, and then walking forward with eyes open; same test is conducted with patient's eyes closed; swaying and falling with eyes closed can indicate ear and equilibrium malfunction, 486

**Fallopian tubes**, organs in female reproductive system that transport eggs from ovary to uterus, 391f

**Family and group psychotherapy**, form of psychological counseling in which therapist places minimal emphasis on patient's past history and strong emphasis on having patient state and discuss goals and then find a way to achieve them, 515



Farsightedness. See Hyperopia

**Fascia**, connective tissue that wraps muscles; tapers at each end of a skeletal muscle to form tendons, 115

**Fascial**, pertaining to fascia, 121

**Fasciitis**, inflammation of fascia, 122

**Fasciotomy**, incision into fascia, 124

**Fasting blood sugar (FBS)**, blood test to measure amount of sugar circulating throughout body after 12-hour fast, 404

**Fats**, lipid molecules transported throughout body dissolved in blood, 182, 342*f*

**Fecal occult blood test (FOBT)**, laboratory test on feces to determine if microscopic amounts of blood are present; also called *hemocult* or *stool guaiac*, 285

**Feces**, waste product from food that cannot be digested and is expelled or defecated, 270

Federal Drug Administration (FDA), 508

**Feeding and eating disorders**, a classification of psychiatric disorders in the DSM-5 characterized by abnormal behaviors related to eating; include anorexia nervosa and bulimia, 511–12

**Female reproductive system**, responsible for producing eggs for reproduction and provides place for growing baby; organs include ovaries, fallopian tubes, uterus, vagina, and mammary glands, 336–60, 338*f*

abbreviations, 360

adjective forms of anatomical terms, 347

anatomy and physiology, 338–45

breast, 342, 342*f*

diagnostic procedures, 354–56

internal genitalia, 338–41

pathology, 349–53

pharmacology, 359

terminology, 346–47

therapeutic procedures, 356–58

vulva, 341

Female urethra, 305, 309

**Femoral**, pertaining to femur or thigh bone, 97

Femoral artery, 148*f*

Femoral vein, 150*f*

**Femur**, also called *thigh bone*; a lower extremity bone, 92, 93*f*, 93*t*

**Fertility drug**, medication that triggers ovulation; also called *ovulation stimulant*, 359

**Fertilization**, also called *impregnation*; fusion of ova and sperm to produce embryo, 338, 340

**Fetal**, pertaining to fetus, 347

**Fetal monitoring**, using electronic equipment placed on mother's abdomen to check baby's heart rate and strength during labor, 356

**Fetus**, term to describe developing newborn from end of eighth week until birth, 343, 343*f*

Fever blisters. See Herpes labialis

**Fibrillation**, abnormal quivering or contractions of heart fibers; when this occurs within fibers of ventricle of heart, arrest and death can occur; emergency equipment to defibrillate, or convert heart to a normal beat, is necessary, 157

**Fibrin**, whitish protein formed by action of thrombin and fibrinogen, which is basis for clotting of blood, 184

**Fibrinogen**, blood protein essential for clotting to take place, 182

**Fibrinous**, pertaining to being fibrous, 186

**Fibrocystic breast disease**, benign cysts forming in breast, 352

**Fibroid tumor**, benign tumor or growth that contains fiberlike tissue; uterine fibroid tumors are most common tumors in women, 350, 350*f*

**Fibromyalgia**, condition with widespread aching and pain in muscles and soft tissue, 122

**Fibrous joints**, joint that has almost no movement because ends of bones are joined together by thick fibrous tissue; sutures of skull are example, 94, 94*f*

**Fibula**, one of the lower leg bones in lower extremity, 92, 93*f*, 93*t*

**Fibular**, pertaining to fibula, 97

Fibular vein, 150*f*

**Film**, thin sheet of cellulose material coated with light-sensitive substance used in taking photographs; there is a special photographic film that is sensitive to X-rays, 517

**Film badge**, badge containing film that is sensitive to X-rays; worn by all personnel in radiology to measure amount of X-rays to which they are exposed, 517

**Filtration**, first stage of urine production during which waste products are filtered from blood, 310, 310*f*

**Fimbriae**, fingerlike extensions on end of fallopian tubes; drape over each ovary in order to direct ovum into fallopian tube after being expelled by ovary, 339*f*, 340, 340*f*, 391*f*

**Fine motor skills**, use of precise and coordinated movements in such activities as writing, buttoning, and cutting, 524

First-degree burn. See Burns

**Fissure**, deep groove or slit-type opening, 58, 58*f*, 86

**Fistulectomy**, surgical removal of an anal fistula, 289

**Fixation**, procedure to stabilize fractured bone while it heals; *external fixation* includes casts, splints, and pins inserted through skin; *internal fixation* includes pins, plates, rods, screws, and wires that are applied during an *open reduction*, 109

**Flat bone**, type of bone with thin flattened shape; examples include scapula, ribs, and pelvic bones, 85, 85*f*

**Flexion**, act of bending or being bent, 118*f*, 118*t*

**Flexor carpi**, muscle named for its action, flexion, 116

Floating kidney. See Nephroptosis

**Fluorescein angiography**, process of injecting dye (fluorescein) to observe movement of blood for detecting lesions in macular area of retina; used to determine if there is detachment of retina, 469

**Fluorescein staining**, applying dye eyedrops of bright green fluorescent color; used to look for corneal abrasions or ulcers, 469

**Fluoroscopy**, X-rays strike glowing screen that can change from minute to minute, therefore able to show movement such as digestive tract moving, 519

**Flutter**, arrhythmia in which atria beat too rapidly, but in regular pattern, 157

**Focal seizure**, localized epileptic seizure often affecting one limb, 431

**Follicle-stimulating hormone (FSH)**, hormone secreted by anterior pituitary gland; stimulates growth of eggs in females and sperm in males, 339, 389t, 393

**Foramen**, passage or opening through bone for nerves and blood vessels, 86

**Forceps**, surgical instrument used to grasp tissues, 530t

**Formed elements**, solid, cellular portion of blood; consists of erythrocytes, leukocytes, and platelets, 182

**Fossa**, shallow cavity or depression within or on surface of a bone, 86

**Fovea capitis**, 87f

**Fovea centralis**, area of retina that has sharpest vision, 456f, 457

**Fowler position**, surgical position in which patient is sitting with back positioned at 45° angle, 531f, 532t

**Fracture (FX, Fx)**, injury to bone that causes it to break; named to describe type of damage to bone, 100–102

**Fraternal twins**, twins that develop from two different ova fertilized by two different sperm; although twins, these siblings do not have identical DNA, 348

**Free edge**, exposed edge of a nail that is trimmed when nails become too long, 53, 53f

**Frequency**, greater than normal occurrence in urge to urinate, without increase in total daily volume of urine; frequency is indication of inflammation of bladder or urethra, 315

**Frontal bone**, forehead bone of skull, 87, 89f, 89t

**Frontal lobe**, one of four cerebral hemisphere lobes; controls motor functions, 423, 423f

**Frontal plane**, vertical plane that divides body into front (anterior or ventral) and back (posterior or dorsal) sections; also called *coronal plane*, 33, 33f

**Frontal section**, sectional view of body produced by cut along frontal plane; also called *coronal section*, 33

**Frozen section (FS)**, thin piece of tissue is cut from frozen specimen for rapid examination under a microscope, 69

Full-term pregnancy, 343f

Functional bowel syndrome. See Irritable bowel syndrome

**Functional residual capacity (FRC)**, air that remains in lungs after normal exhalation has taken place, 229t

**Fundus**, domed upper portion of organ such as stomach or uterus, 268, 268f, 338f, 340, 340f, 343f

**Fungal scrapings**, scrapings, taken with curette or scraper, of tissue from lesions are placed on a growth medium and examined under a microscope to identify fungal growth, 69

**Fungi**, organisms found in Kingdom Fungi; some are capable of causing disease in humans, such as yeast infections or histoplasmosis, 199

**Furuncle**, staphylococcal skin abscess with redness, pain, and swelling; also called a *boil*, 67

## G

**Gait**, manner of walking, 524

**Gait training**, assisting person to learn to walk again or how to use assistive device to walk, 525, 525f

**Gallbladder (GB)**, small organ located just under liver; functions to store bile produced by liver; releases bile into duodenum through common bile duct, 263, 264, 271–72, 272f

**Gambling disorder**, addictive disorder in which patient is unable to control urge to gamble, 513

**Gametes**, reproductive sex cells—ova and sperm, 390

**Gamma globulin**, protein component of blood containing antibodies that help to resist infection, 182

**Ganglion**, knotlike mass of nerve tissue located outside brain and spinal cord, 426

**Ganglion cyst**, cyst that forms on tendon sheath, usually on hand, wrist, or ankle, 123

**Gangrene**, necrosis of skin usually due to deficient blood supply, 64

**Gastralgia**, stomach pain, 278

**Gastrectomy**, surgical removal of stomach, 289

**Gastric**, pertaining to stomach, 275

**Gastric carcinoma**, cancerous tumor of stomach, 279

**Gastric stapling**, procedure that closes off large section of stomach with rows of staples; results in a much smaller stomach to assist very obese patients to lose weight, 289

**Gastritis**, inflammation of stomach that can result in pain, tenderness, nausea, and vomiting, 279

**Gastroenteritis**, inflammation of stomach and small intestine, 279

**Gastroenterologist**, physician specialized in treating diseases and conditions of gastrointestinal tract, 277

**Gastroenterology**, branch of medicine specializing in conditions of gastrointestinal system, 277

**Gastroesophageal reflux disease (GERD)**, acid from stomach backs up into esophagus, causing inflammation and pain, 279

**Gastrointestinal system (GI)**, digests food and absorbs nutrients; organs include mouth, pharynx, esophagus, stomach, small and large intestines, liver, gallbladder, and anus; also called *digestive system*, 264, 275

**Gastrointestinal tract**, continuous tube that extends from mouth to anus; also called *gut* or *alimentary canal*, 264

**Gastroscope**, instrument to view inside stomach, 287

**Gastroscoy**, flexible gastroscope is passed through mouth and down esophagus in order to visualize inside stomach; used to diagnose peptic ulcers and gastric carcinoma, 287

**Gastrostomy**, surgical creation of gastric fistula or opening through abdominal wall; opening is used to place food into stomach when esophagus is not entirely open (esophageal stricture), 289

**Gavage**, using nasogastric tube to place liquid nourishment directly into stomach, 288

**Gender dysphoria**, person identifies as gender contrary to the gender of his or her birth, 513

**General anesthesia (GA)**, produces a loss of consciousness including absence of pain sensation; administered to patient by either intravenous or inhalation method; patient's vital signs must be carefully monitored when in use, 530t

**General anxiety disorder**, feeling dread in absence of clearly identifiable stress trigger, 510

**General hospital**, hospitals that typically provide services to diagnose (laboratory, diagnostic imaging) and treat (surgery, medications, therapy) diseases for a short period of time; in addition, usually provide emergency and obstetrical care; also called *acute care hospital*, 15

**Generic name**, recognized and accepted official name for a drug; each drug has only one generic name; this name is not subject to trademark, so may be used by any pharmaceutical manufacturer; also called *nonproprietary name*, 501

**Genital herpes**, creeping skin disease that can appear like a blister or vesicle, caused by sexually transmitted virus, 369

**Genital warts**, growths and elevations of warts on genitalia of both males and females that can lead to cancer of cervix in females, 370

**Genitalia**, male and female reproductive organs, 338

**Genitourinary system** (GU), organs of the urinary system and female or male sexual organs, 306, 363

**Gestation**, length of time from conception to birth, generally nine months; calculated from first day of last menstrual period, with a range of from 259 days to 280 days, 342

**Gigantism**, excessive development of body due to overproduction of growth hormone by pituitary gland; opposite of dwarfism, 402

**Gingiva**, tissue around teeth; also called *gums*, 265, 265f–266f, 267f

**Gingival**, pertaining to gums, 275

**Gingivitis**, inflammation of gums characterized by swelling, redness, and tendency to bleed, 279

**Glands**, organs of body that release secretions; exocrine glands, like sweat glands, release their secretions into ducts; endocrine glands, such as thyroid gland, release their hormones directly into bloodstream, 420

adrenal, 387, 390, 390f, 400

apocrine, 54

bulbourethral, 362, 363, 363f, 365

lymph, 197

parathyroid, 387, 389t, 392, 392f, 401

pineal, 387, 389t, 392, 392f

pituitary, 387, 392–93, 393f, 394f, 402, 422f

prostate, 308f, 309f, 362, 363, 363f, 365, 368

salivary, 263, 264, 271

sebaceous, 51f, 54, 458

sudoriferous, 54

sweat, 51f, 54

thymus, 195, 196, 199, 199f, 387, 389t, 395, 395f, 403

thyroid, 225f, 387, 389t, 395–96, 396f, 403–04

**Glans penis**, larger and softer tip of penis; is protected by covering called prepuce or foreskin, 363f, 364

**Glaucoma**, increase in intraocular pressure that, if untreated, may result in atrophy (wasting away) of optic nerve and blindness; treated with medication and surgery; increased risk of developing in persons over 60 years of age, people of African ancestry, persons who have sustained serious eye injury, and anyone with family history of diabetes or glaucoma, 465

**Globulins**, one type of protein found dissolved in plasma, 182

**Glomerular**, pertaining to a glomerulus, 313

**Glomerular capsule**, also called Bowman's capsule; part of renal corpuscle; a double-walled cuplike structure that encircles glomerulus; within filtration stage of urine production, waste products filtered from blood enter Bowman's capsule as glomerular filtrate, 307, 308f

**Glomerular filtrate**, product of filtration stage of urine production; water, electrolytes, nutrients, wastes, and toxins that are filtered from blood passing through glomerulus; filtrate enters Bowman's capsule, 310

**Glomerulonephritis**, inflammation of kidney (primarily of glomerulus); since glomerular membrane is inflamed, it becomes more permeable and will allow protein and blood cells to enter filtrate; results in protein in urine (proteinuria) and hematuria, 317

**Glomerulus**, ball of capillaries encased by Bowman's capsule; within filtration stage of urine production, wastes filtered from blood leave glomerulus capillaries and enter Bowman's capsule, 307, 310f

**Glossal**, pertaining to tongue, 275

Glossopharyngeal nerve, 426t

**Glottis**, opening between vocal cords; air passes through glottis as it moves through larynx; changing tension of vocal cords changes size of opening, 226

**Glucagon**, hormone secreted by pancreas; stimulates liver to release glucose into blood, 389t, 391, 391f

**Glucocorticoids**, group of hormones secreted by adrenal cortex; regulate carbohydrate levels in body; cortisol is an example, 388t, 390

**Glucose**, form of sugar used by cells of body to make energy; transported to cells in blood, 182

**Glucose tolerance test** (GTT), test to determine blood sugar level; a measured dose of glucose is given to patient either orally or intravenously; blood samples are then drawn at certain intervals to determine ability of patient to utilize glucose; used for diabetic patients to determine their insulin response to glucose, 405

Glutamic oxaloacetic transaminase (GOT). See Cardiac enzymes

**Gluteal**, pertaining to buttocks, 35f

**Gluteal region**, refers to buttock region of body, 34t, 35f

**Gluteus maximus**, muscle named for its size and location; gluteus means "rump area" and maximus means "large," 116

**Glycosuria**, presence of sugar in the urine, 315, 399

**Goiter**, enlargement of thyroid gland, 403, 403f

**Gonadotropins**, general name for two anterior pituitary hormones, follicle-stimulating hormone and luteinizing hormone, 389t, 393

**Gonads**, organs responsible for producing sex cells; female gonads are ovaries, and they produce ova; male gonads are testes, and they produce sperm, 390

**Gonorrhea**, sexually transmitted inflammation of mucous membranes of either sex; can be passed on to infant during birth process, 370

**Grade**, tumor can be graded from grade I through grade IV; based on microscopic appearance of tumor cells; grade I tumor is well differentiated and is easier to treat than more advanced grades, 536, 536t

**Graft versus host disease** (GVHD), serious complication of bone marrow transplant; immune cells from donor bone marrow (graft) attack recipient's (host's) tissues, 206

Grand mal seizure. See Tonic-clonic seizure

**Granulocytes**, granular polymorphonuclear leukocytes; three types: neutrophil, eosinophil, and basophil, 183, 183t

**Graves' disease**, condition resulting in overactivity of thyroid gland and can result in crisis situation; also called *hyperthyroidism*, 403

**Gray matter**, tissue within central nervous system; consists of unsheathed or uncovered nerve cell bodies and dendrites, 421

Great saphenous vein, 150f

**Greenstick fracture**, fracture in which there is incomplete break; one side of bone is broken and other side is bent; commonly found in children due to their softer and more pliable bone structure, 101

**Gross motor skills**, use of large muscle groups that coordinate body movements such as walking, running, jumping, and balance, 524

**Growth hormone** (GH), hormone secreted by anterior pituitary that stimulates growth of body, 389t, 393

**Guillain-Barré syndrome**, disease of nervous system in which nerves lose their myelin covering; may be caused by autoimmune reaction; characterized by loss of sensation and/or muscle control in arms and legs; symptoms then move toward trunk and may even result in paralysis of diaphragm, 436

**Gums**, tissue around teeth; also called *gingival*, 265

**Gut**, name for continuous muscular tube that stretches between mouth and anus; also called *alimentary canal*, 264

**Gynecologist**, physician specialized in treating conditions and diseases of female reproductive system, 349

**Gynecology** (GYN, gyn), branch of medicine specializing in conditions of female reproductive system, 349

**Gynecomastia**, development of breast tissue in males; may be symptom of adrenal feminization, 399

**Gyri**, convoluted, elevated portions of cerebral cortex; separated by fissures or sulci; singular is *gyrus*, 423

## H

**H<sub>2</sub>-receptor antagonist**, blocks production of stomach acids, 291

**Habituation**, development of emotional dependence on drug due to repeated use, 507

**Hair**, structure in integumentary system, 52, 53f, 67

**Hair follicle**, cavities in dermis that contain hair root; hair grows longer from root, 52, 53f

**Hair root**, deeper cells that divide to grow hair longer, 52, 53f

**Hair shaft**, older keratinized cells that form most of length of a hair, 52, 53f

**Hallucination**, perception of something that is not there; may be visual, auditory, gustatory, or tactile, 512

Hammer. See Malleus

Hard palate, 265f–266f

**Hashimoto's thyroiditis**, chronic form of thyroiditis, 403

**Head**, large ball-shaped end of a bone; may be separated from shaft of bone by area called neck, 86, 87f

Health Insurance Portability and Accountability Act (HIPAA), 16

**Health Maintenance Organization** (HMO), organization that contracts with group of physicians and other healthcare workers to provide care exclusively for its members, 15

Healthcare settings, 15

**Hearing**, one of special senses; sound waves detected by ear, 477, 479, 479f, 482

**Hearing aid**, apparatus or mechanical device used by persons with impaired hearing to amplify sound; same as amplification device, 486

Hearing impairment, 479

**Heart**, organ of cardiovascular system that contracts to pump blood through blood vessels, 139, 140, 141–46, 155–58, 196f, 229f, 395f  
chambers, 143–44  
conduction system of, 145, 146f  
layers, 142, 142f  
valves, 143f, 144

Heart attack. See Myocardial infarction

**Heart transplantation**, replacement of diseased or malfunctioning heart with donor's heart, 165

**Heart valve prolapse**, cusps or flaps of heart valve are too loose and fail to shut tightly, allowing blood to flow backward through valve when heart chamber contracts; most commonly occurs in mitral valve, but may affect any of heart valves, 157

**Heart valve stenosis**, cusps or flaps of heart valve are too stiff; therefore, they are unable to open fully, making it difficult for blood to flow through, or to shut tightly, allowing blood to flow backward; condition may affect any of heart valves, 157

Heartburn. See Pyrosis

**Heimlich maneuver**, technique for removing foreign body or food from trachea or pharynx when it is choking a person; maneuver consists of applying pressure just under diaphragm to pop obstruction out, 248

**Helicobacter pylori** (*H. pylori*), bacteria responsible for causing some cases of peptic ulcer disease, 280

**Hematemesis**, to vomit blood from gastrointestinal tract, 278

**Hematic**, pertaining to blood, 186

**Hematic system**, consists of plasma and blood cells—erythrocytes, leukocytes, and platelets; responsible for transporting oxygen, protecting against pathogens, and controlling bleeding, 28t

**Hematinic**, substance that increases number of erythrocytes or amount of hemoglobin in blood, 192

**Hematochezia**, passing bright red blood in stool, 278



**Hematocrit** (HCT, Hct, crit), blood test to measure volume of red blood cells (erythrocytes) within total volume of blood, 190

**Hematologist**, physician who specializes in treating diseases and conditions of blood, 187

**Hematology**, branch of medicine specializing in conditions of hematic system, 187

**Hematoma**, swelling or mass of blood caused by break in vessel in organ or tissue, or beneath skin, 187

**Hematopoiesis**, process of forming blood, 182

**Hematosalpinx**, condition of having blood in fallopian tubes, 349

**Hematuria**, condition of blood in urine, 315

**Hemianopia**, loss of vision in half of visual field; stroke patient may suffer from this disorder, 468

**Hemiparesis**, weakness or loss of motion on one side of body, 431

**Hemiplegia**, paralysis on only one side of body, 431

**Hemoccult**. See **Fecal occult blood test**

**Hemodialysis** (HD), use of artificial kidney machine that filters blood of a person to remove waste products; use of this technique in patients who have defective kidneys is lifesaving, 322, 322f

**Hemoglobin** (Hgb, Hb, HGB), iron-containing pigment of red blood cells that carries oxygen from lungs to tissue, 182, 190

**Hemolytic anemia**, anemia that develops as result of excessive loss of erythrocytes, 188

**Hemolytic disease of the newborn** (HDN), condition in which antibodies in mother's blood enter fetus's blood and cause anemia, jaundice and enlargement of liver and spleen also called *erythroblastosis fetalis*, 352

**Hemolytic reaction**, destruction of patient's erythrocytes that occurs when receiving transfusion of incompatible blood type; also called a *transfusion reaction*, 188

**Hemophilia**, hereditary blood disease in which there is a prolonged blood clotting time; transmitted by sex-linked trait from females to males; appears almost exclusively in males, 188

**Hemoptysis**, coughing up blood or blood-stained sputum, 236

**Hemorrhage**, blood flowing out of a blood vessel (i.e., bleeding), 188

**Hemorrhoid**, varicose veins in rectum, 159, 281

**Hemorrhoidectomy**, surgical removal of hemorrhoids from anorectal area, 289

**Hemostasis**, term for blood clotting process; also stopping of blood flow using instruments, pressure, and/or medication, 184, 533

**Hemostat**, surgical instrument used to grasp blood vessels to control bleeding, 530t

Hemostatic agent. See **Antihemorrhagic**

**Hemothorax**, condition of having blood in chest cavity, 236

**Hepatic**, pertaining to liver, 275

**Hepatic duct**, duct that leads from liver to common bile duct; transports bile, 271, 272f

Hepatic portal vein, 150f

**Hepatitis**, infectious, inflammatory disease of liver; hepatitis B and C types are spread by contact with blood and bodily fluids of infected person, 284

**Hepatoma**, liver tumor, 284

**Herniated nucleus pulposus** (HNP), herniation or protrusion of an intervertebral disk; also called *herniated disk* or *ruptured disk*, 103, 103f

**Hernioplasty**, surgical repair of a hernia; also called *herniorrhaphy*, 289

Herniorrhaphy. See **Hernioplasty**

**Herpes labialis**, infection of lip by herpes simplex virus type 1 (HSV-1); also called *fever blisters* or *cold sores*, 279

**Herpes zoster virus**, virus responsible for causing shingles, 437

**Hertz** (Hz), measurement of frequency or pitch of sound; lowest pitch on audiogram is 250 Hz; measurement can go as high as 8000 Hz, which is highest pitch measured, 485

**Hesitancy**, decrease in force of urine stream, often with difficulty initiating flow; often a symptom of blockage along urethra, such as enlarged prostate gland, 315

**Heterograft**, skin graft from animal of another species (usually a pig) to a human; also called a *xenograft*, 70

**Hiatal hernia**, protrusion of stomach through diaphragm and extending into thoracic cavity; gastroesophageal reflux disease is a common symptom, 280, 280f

**Hilum**, controlled entry/exit point of an organ such as kidney or lung, 228, 306, 307f

Hipbone, 91f, 92, 93t

**Hirsutism**, excessive hair growth over body, 58, 399

**Histology**, study of tissues, 25

**Histoplasma capsulatum**, fungus responsible for causing histoplasmosis, 240

**Histoplasmosis**, pulmonary infection caused by fungus found in dust and droppings of pigeons and chickens, 240

**History and physical**, medical record document written by admitting physician; details patient's history, results of physician's examination, initial diagnoses, and physician's plan of treatment, 13

**Hives**, appearance of wheals as part of allergic reaction, 204

**Hodgkin's disease** (HD), also called *Hodgkin's lymphoma*; cancer of lymphatic cells found in concentration in lymph nodes, 205

Hodgkin's lymphoma. See **Hodgkin's disease**

**Holter monitor**, portable ECG monitor worn by patient for a period of a few hours to a few days to assess heart and pulse activity as person goes through activities of daily living, 162

**Home health care**, agencies that provide nursing, therapy, personal care, or housekeeping services in patient's own home, 15

**Homeostasis**, steady state or state of balance within body; kidneys assist in maintaining homeostasis, 309

**Homologous transfusion**, replacement of blood by transfusion of blood received from another person, 192

**Hordeolum**, a *stye* (or *sty*), a small purulent inflammatory infection of a sebaceous gland of eye, treated with hot compresses and surgical incision, 467

- Horizontal plane**, horizontal plane that divides body into upper (superior) and lower (inferior) sections; also called *transverse plane*, 33, 33f
- Hormonal contraception**, use of hormones to block ovulation and prevent conception; may be in pill form, patch or implant under skin, or injection, 356
- Hormone**, chemical substance secreted by endocrine gland; enters bloodstream and is carried to target tissue; hormones work to control functioning of target tissue; given to replace loss of natural hormones or to treat disease by stimulating hormonal effects, 338
- Hormone replacement therapy (HRT)**, artificial replacement of hormones in patient unable to produce sufficient hormones; example is estrogen replacement in menopausal women, 359, 405
- Hormone therapy**, treatment of cancer with natural hormones or with chemicals that produce hormone-like effects, 538
- Hospice**, organized group of healthcare workers who provide supportive treatment to dying patients and their families, 15
- Human growth hormone therapy**, therapy with human growth hormone in order to stimulate skeletal growth; used to treat children with abnormally short stature, 407
- Human immunodeficiency virus (HIV)**, virus that causes AIDS; also known as a *retrovirus*, 206, 206f, 370
- Human papilloma virus (HPV)**, responsible for causing some cases of cervical cancer, 350, 370
- Humanistic psychotherapy**, form of psychological counseling in which therapist does not delve into patients' past; it is believed that patients can learn how to use their own internal resources to deal with their problems, 515
- Humeral**, pertaining to humerus or upper arm bone, 97
- Humerus**, upper arm bone, 92, 92f, 92t
- Humoral immunity**, responds to antigens, such as bacteria and foreign agents, by producing antibodies; also called *antibody-mediated immunity*, 200
- Humpback. *See* Kyphosis
- Hunchback. *See* Kyphosis
- Hyaline membrane disease (HMD). *See* Infant respiratory distress syndrome
- Hydrocele**, accumulation of fluid within testes, 368
- Hydrocephalus**, accumulation of cerebrospinal fluid within ventricles of brain, causing head to be enlarged; treated by creating artificial shunt for fluid to leave brain, 434, 434f
- Hydrochloric acid (HCl)**, acid secreted by stomach lining; aids in digestion, 268
- Hydronephrosis**, distention of pelvis due to urine collecting in kidney resulting from obstruction, 317
- Hydrotherapy**, using water for treatment purposes, 526
- Hymen**, thin membranous tissue that covers external vaginal opening or orifice; broken during first sexual encounter of female; can also be broken prematurely by use of tampons or during some sports activities, 341
- Hymenectomy**, surgical removal of hymen, 357
- Hyoid bone**, single, U-shaped bone suspended in neck between mandible and larynx; a point of attachment for swallowing and speech muscles, 89, 225f
- Hypercalcemia**, condition of having excessive amount of calcium in blood, 399
- Hypercapnia**, having an excessive carbon dioxide level in the blood, 236
- Hyperemesis**, excessive vomiting, 278
- Hyperemia**, redness of skin caused by increased blood flow to skin, 58
- Hyperesthesia**, abnormally heightened sense of feeling, sense of pain, or sensitivity to touch, 431
- Hyperglycemia**, having excessive amount of glucose (sugar) in blood, 399
- Hyperhidrosis**, abnormal condition of excessive sweat, 58
- Hyperkalemia**, condition of having excessive amount of potassium in blood, 399
- Hyperkinesia**, excessive amount of movement, 122
- Hyperlipidemia**, condition of having too high a level of lipids such as cholesterol in bloodstream; risk factor for developing atherosclerosis and coronary artery disease, 188
- Hyperopia**, condition where person can see things in the distance but has trouble reading material at close range; also known as *farsightedness*, 465, 465f
- Hyperparathyroidism**, excessive secretion of parathyroid hormone, 401
- Hyperpigmentation**, abnormal amount of pigmentation in skin, which is seen in diseases such as acromegaly and adrenal insufficiency, 58
- Hyperpituitarism**, excessive secretion of one or more pituitary gland hormone, 402
- Hyperplasia**, excessive development of normal cells within an organ, 536
- Hyperpnea**, excessive deep breathing, 236
- Hypersecretion**, excessive hormone production by endocrine gland, 399
- Hypertension (HTN)**, high blood pressure, 159
- Hyperthyroidism**, condition resulting from overactivity of thyroid gland that can result in a crisis situation, 403
- Hypertonia**, excessive tone, 122
- Hypertrophy**, increase in bulk or size of a tissue or structure, 122
- Hyperventilation**, to breathe both fast (tachypnea) and deep (hyperpnea), 236
- Hypnotic**, substance used to produce sleep or hypnosis, 442
- Hypocalcemia**, condition of having a low calcium level in blood, 399
- Hypochondriac**, term meaning "pertaining to under the cartilage;" also one of the anatomical divisions of the abdomen, the left and right side of the upper row, 37t
- Hypochromic anemia**, resulting from having insufficient hemoglobin in erythrocytes; named because hemoglobin molecule is responsible for dark red color of erythrocytes, 189
- Hypodermic**, pertaining to below the skin, 11
- Hypodermis**, deepest layer of skin; composed primarily of adipose, 50
- Hypogastric**, pertaining to below stomach; anatomical division of abdomen, middle section of bottom row, 37t



Hypogastric region, 37t  
**Hypoglossal**, pertaining to under tongue, 275  
 Hypoglossal nerve, 426t  
**Hypoglycemia**, condition of having low sugar level in blood, 399  
**Hypokinesia**, insufficient movement, 122  
**Hyponatremia**, condition of having low sodium level in blood, 400  
**Hypoparathyroidism**, state of insufficient parathyroid hormone, 401  
**Hypopituitarism**, state of insufficient pituitary gland hormones, 402  
**Hypopnea**, insufficient or shallow breathing, 236  
**Hyposecretion**, deficient hormone production by an endocrine gland, 400  
**Hypospadias**, congenital opening of male urethra on underside of penis, 369  
**Hypotension**, low blood pressure, 160  
**Hypothalamus**, portion of diencephalon that lies just below thalamus; controls body temperature, appetite, sleep, sexual desire, and emotions such as fear; also regulates release of hormones from pituitary gland and regulates parasympathetic and sympathetic nervous systems, 393, 393f, 422f, 423  
**Hypothyroidism**, result of deficiency in secretion by thyroid gland, 403  
**Hypotonia**, insufficient tone, 122  
**Hypoventilation**, to breathe both slow (bradypnea) and shallow (hypopnea), 237  
**Hypoxemia**, deficiency of oxygen in blood, 237  
**Hypoxia**, absence of oxygen in tissues, 237  
**Hysterectomy**, removal of uterus, 357  
**Hysteropexy**, surgical fixation of uterus, 357  
**Hysterorrhexis**, rupture of uterus, 351  
**Hysterosalpingography** (HSG), process of taking X-ray of uterus and oviducts after radiopaque material is injected into organs, 354

## I

**Iatrogenic**, usually unfavorable response that results from taking medication, 507  
**Ichthyoderma**, dry and scaly skin condition, 58  
**Ichthyosis**, condition in which skin becomes dry, scaly, and keratinized, 64  
**Identical twins**, twins that develop from splitting of one fertilized ovum; these siblings have identical DNA, 348  
**Idiosyncrasy**, unusual or abnormal response to drug or food, 507  
**Ileal**, pertaining to ileum, 275  
**Ileocecal**, pertaining to the ileum and cecum, 275  
**Ileocecal valve**, sphincter between ileum and cecum, 270, 270f  
**Ileostomy**, surgical creation of passage through abdominal wall into ileum, 289  
**Ileum**, third portion of small intestine; joins colon at cecum; ileum and cecum are separated by ileocecal valve, 11, 269, 269f  
**Ileus**, severe abdominal pain, inability to pass stool, vomiting, and abdominal distention as a result of intestinal blockage; may require surgery to reverse blockage, 282  
**Iliac**, pertaining to ilium, one of pelvic bones, 97  
**Ilium**, one of three bones that form the os coxae or innominate bone of the pelvis, 11, 92, 93f, 93t  
**Immune response**, ability of lymphocytes to respond to specific antigens, 200–201  
**Immunity**, body's ability to defend itself against pathogens, 199–201  
 immune response, 200–201  
 standard precautions, 201  
**Immunization**, providing protection against communicable diseases by stimulating immune system to produce antibodies against that disease; also called *vaccination*, 200, 208  
**Immunocompromised**, having immune system unable to respond properly to pathogens, 206  
 Immunodeficiency disorder. See Immunocompromised  
**Immunoglobulin** (Ig), antibodies secreted by B cells; all antibodies are immunoglobulins; assist in protecting body and its surfaces from invasion of bacteria; for example, immunoglobulin IgA in colostrum, first milk from mother, helps to protect newborn from infection, 200  
**Immunologist**, physician who specializes in treating infectious diseases and other disorders of immune system, 203  
**Immunology**, branch of medicine specializing in conditions of lymphatic and immune systems, 203  
**Immunosuppressants**, substances that block certain actions of immune system; required to prevent rejection of transplanted organ, 209  
**Immunotherapy**, boosting or strengthening of patient's immune system in order to treat disease, 208, 538  
**Impacted fracture**, fracture in which bone fragments are pushed into each other, 101  
**Impetigo**, highly contagious staphylococcal skin infection, most commonly occurring on faces of children; begins as blisters that then rupture and dry into thick, yellow crust, 65, 65f  
**Implant**, prosthetic device placed in jaw to which a tooth or denture may be anchored, 288  
**Implantable cardioverter-defibrillator**, device implanted in heart that delivers electrical shock to restore normal heart rhythm; particularly useful for persons who experience ventricular fibrillation, 164  
**Incision**, to cut into or to cut open an organ, 533  
**Incision and drainage** (I&D), making incision to create opening for drainage of material such as pus, 70  
**Incisors**, biting teeth in very front of mouth that function to cut food into smaller pieces; humans have eight incisors, 265f, 266, 267f  
**Incus**, one of three ossicles of middle ear; also called *anvil*, 477f, 478, 478f  
**Infant respiratory distress syndrome** (IRDS), lung condition most commonly found in premature infants characterized by tachypnea and respiratory grunting;

- also called *hyaline membrane disease (HMD)* and *respiratory distress syndrome of the newborn*, 241
- Infarct**, area of tissue within organ that undergoes necrosis (death) following loss of blood supply, 154
- Inferior**, directional term meaning toward feet or tail, or below, 39f, 39t
- Inferior vena cava**, branch of vena cava that drains blood from abdomen and lower body, 142f, 144, 145f, 150f, 390f
- Infertility**, inability to produce children; generally defined as no pregnancy after properly timed intercourse for one year, 353
- Inflammation**, tissue response to injury from pathogens or physical agents; characterized by redness, pain, swelling, and feeling hot to touch, 204, 204f
- Inflammatory bowel disease (IBD). See *Ulcerative colitis*
- Influenza**, viral infection of respiratory system characterized by chills, fever, body aches, and fatigue; commonly called the *flu*, 241
- Informed consent**, medical record document, voluntarily signed by patient or responsible party, that clearly describes purpose, methods, procedures, benefits, and risks of diagnostic or treatment procedure, 14
- Inguinal**, pertaining to groin area; there is a collection of lymph nodes in this region that drain each leg, 197t, 198f, 203
- Inguinal hernia**, hernia or protrusion of intestine into inguinal region of body, 282, 282f
- Inguinal nodes, 198f
- Inhalation**, (1) to breathe air into lungs; also called *inspiration*; (2) to introduce drugs into body by inhaling them, 224, 505f, 505t, 530t
- Innate immunity, 200
- Inner ear**, innermost section of ear; contains cochlea, semicircular canals, saccule, and utricle, 476, 477, 478, 479f, 483
- Inner ear infection. See *Labyrinthitis*
- Innominate bone**, also called *os coxae* or *hipbone*; pelvis portion of lower extremity; consists of ilium, ischium, and pubis and unites with sacrum and coccyx to form pelvis, 92
- Insertion**, attachment of skeletal muscle to more movable bone in joint, 117, 117f
- Insomnia disorder**, sleeping disorder characterized by marked inability to fall asleep, 513
- Inspiration. See *Inhalation*
- Inspiratory capacity (IC)**, volume of air inhaled after normal exhale, 229t
- Inspiratory reserve volume (IRV)**, air that can be forcibly inhaled after normal respiration has taken place; also called *complemental air*, 229t
- Insulin**, hormone secreted by pancreas; regulates level of sugar in bloodstream; the more insulin present in blood, the lower blood sugar will be, 389t, 391, 391f, 407
- Insulin-dependent diabetes mellitus (IDDM)**, also called *type 1 diabetes mellitus*; develops early in life when pancreas stops insulin production; people with IDDM must take daily insulin injections, 401
- Insulinoma**, tumor of islets of Langerhans cells of pancreas that secretes excessive amount of insulin, 401
- Integument**, another term for skin, 50
- Integumentary system**, skin and its appendages including sweat glands, oil glands, hair, and nails; sense organs that allow humans to respond to changes in temperature, pain, touch, and pressure are located in skin; largest organ in body, 47–80, 49f
- abbreviations, 72
- accessory organs, 52–54
- adjective forms of anatomical terms, 56
- anatomy and physiology of, 50–54
- diagnostic procedures, 69
- pathology, 57–68
- pharmacology, 71
- skin, 50–52
- terminology, 55–56
- therapeutic procedures, 69–70
- Intellectual development disorder**, disorder characterized by below average intellectual functions, 511
- Interatrial**, pertaining to between atria, 153
- Interatrial septum**, wall or septum that divides left and right atria, 143
- Intercostal muscles**, muscles between ribs; when contracted, they raise ribs, which helps to enlarge thoracic cavity, 299
- Intercostal nerve, 427f
- Intermittent claudication**, attacks of severe pain and lameness caused by ischemia of muscles, typically calf muscles; brought on by walking even very short distances, 122
- Intermittent positive pressure breathing (IPPB)**, method for assisting patients to breathe using mask connected to a machine that produces increased pressure, 246
- Internal genitalia, 338–41
- Internal iliac artery, 148f
- Internal iliac vein, 150f
- Internal medicine**, branch of medicine involving diagnosis and treatment of diseases and conditions of internal organs such as respiratory system; physician is *internist*, 234
- Internal respiration**, process of oxygen and carbon dioxide exchange at cellular level when oxygen leaves bloodstream and is delivered to tissues, 224
- Internal sphincter**, ring of involuntary muscle that keeps urine within bladder, 308
- Internist**, physician specialized in treating diseases and conditions of internal organs such as respiratory system, 234
- Internodal pathway, 146f
- Interstitial cystitis**, disease of unknown cause in which there is inflammation and irritation of bladder; most commonly seen in middle-aged women, 318
- Interventricular**, pertaining to between ventricles, 153
- Interventricular septum**, wall or septum that divides left and right ventricles, 145f, 146f
- Intervertebral**, pertaining to between vertebrae, 97

**Intervertebral disk**, fibrous cartilage cushion between vertebrae, 89

**Intracavitary**, injection into body cavity such as peritoneal and chest cavity, 505t

**Intracoronary artery stent**, placing a stent within coronary artery to treat coronary ischemia due to atherosclerosis, 165, 165f

**Intracranial**, pertaining to inside skull, 97, 429

**Intradermal (ID)**, (1) pertaining to within skin; (2) injection of medication into skin, 505f, 505t

**Intramuscular (IM)**, injection of medication into muscle, 505f, 505t

**Intraocular**, pertaining to within eye, 462

**Intraoperative**, period of time during operation, 533

**Intrathecal**, (1) pertaining to within meninges; (2) injection into meninges space surrounding brain and spinal cord, 429, 505t

**Intrauterine device (IUD)**, device inserted into uterus by physician for purpose of contraception, 356, 357f

**Intravenous (IV)**, injection into veins; this route can be set up so that there is continuous administration of medication, 505f, 506t, 530t

**Intravenous cholecystography**, dye is administered intravenously to patient that allows for X-ray visualization of gallbladder, 286

**Intravenous pyelogram (IVP)**, injecting contrast medium into vein and then taking X-ray to visualize renal pelvis, 320

**Intussusception**, intestinal condition in which one portion of intestine telescopes into adjacent portion, causing obstruction and gangrene if untreated, 282, 282f

**Invasive disease**, tendency of malignant tumor to spread to immediately surrounding tissue and organs, 536

**Inversion**, directional term meaning turning inward, 119f, 119t

**Involuntary muscles**, muscles under control of subconscious regions of brain; smooth muscles found in internal organs and cardiac muscles are examples of involuntary muscle tissue, 114

**Iodine**, mineral required by thyroid to produce its hormones, 395–96

**Iridal**, pertaining to iris, 462

**Iridectomy**, surgical removal of a small portion of the iris, 471

**Iridoplegia**, paralysis of iris, 463

**Iridosclerotomy**, incision into iris and sclera, 471

**Iris**, colored portion of eye; can dilate or constrict to change size of pupil and control amount of light entering interior of eye, 455, 456f, 457

**Iritis**, inflammation of iris, 466

**Iron-deficiency anemia**, anemia resulting from having insufficient iron to manufacture hemoglobin, 189

**Irregular bones**, type of bone having irregular shape; vertebrae are irregular bones, 85, 85f

**Irritable bowel syndrome (IBS)**, disturbance in functions of intestine from unknown causes; symptoms generally include abdominal discomfort and alteration in bowel activity; also called *functional bowel syndrome* or *spastic colon*, 282

**Ischemia**, localized and temporary deficiency of blood supply due to obstruction of circulation, 154

**Ischial**, pertaining to ischium, one of pelvic bones, 97

**Ischium**, one of three bones forming os coxae or innominate bone of pelvis, 92, 93f, 93t

**Islets of Langerhans**, regions within pancreas that secrete insulin and glucagon; also called *pancreatic islets*, 391, 391f

Isthmus, 396

## J

**Jaundice**, yellow cast to skin, mucous membranes, and whites of eyes caused by deposit of bile pigment from too much bilirubin in blood; bilirubin is a waste product produced when worn-out red blood cells are broken down; may be symptom of disorders such as gallstones blocking common bile duct or carcinoma of liver, 278

**Jejunal**, pertaining to jejunum, 275

Jejunostomy, 270

**Jejunum**, middle portion of small intestine; site of nutrient absorption, 269, 269f

**Joint**, point at which two bones meet; provides flexibility, 84, 93–94, 105–6

**Joint capsule**, elastic capsule that encloses synovial joints, 94, 94f

Jugular vein, 150f

## K

**Kaposi's sarcoma (KS)**, form of skin cancer frequently seen in acquired immunodeficiency syndrome (AIDS) patients; consists of brownish-purple papules that spread from skin and metastasize to internal organs, 65, 206

**Keloid**, formation of scar after injury or surgery resulting in raised, thickened red area, 65, 65f

**Keratin**, hard protein substance produced by body; found in hair and nails, and filling inside of epidermal cells, 52

**Keratitis**, inflammation of cornea, 466

**Keratometer**, instrument to measure cornea, 469

**Keratometry**, measurement of curvature of cornea using instrument called a keratometer, 469

**Keratoplasty**, surgical repair of cornea (corneal transplant), 471

**Keratosis**, overgrowth and thickening of epithelium, 65

**Ketoacidosis**, acidosis due to excess of ketone bodies (waste products); serious condition requiring immediate treatment and can result in death for diabetic patient if not reversed, 401

**Ketones**, waste products in the bloodstream, 311t

**Ketonuria**, ketones in urine, 315

**Kidneys**, two organs located in lumbar region of back behind parietal peritoneum; under muscles of back, just a little above waist; have concave or depressed area that gives them bean-shaped appearance; center of this concavity is called hilum, 305, 306–07, 307f, 308f, 317–18, 390f

**Kidneys, ureters, bladder (KUB)**, X-ray taken of abdomen demonstrating kidneys, ureters, and bladder

without using any contrast dye; also called *flat-plate abdomen*, 320

**Kinesiology**, study of movement, 121

**Kleptomania**, impulse control disorder in which patient is unable to refrain from stealing; items are often trivial and unneeded, 512

**Kyphosis**, abnormal increase in outward curvature of thoracic spine; also known as *hunchback* or *humpback*, 103, 104f

## L

**Labia majora**, outer folds of skin that serve as protection for female external genitalia and urethral meatus, 338f, 341, 341f

**Labia minora**, inner folds of skin that serve as protection for female external genitalia and urethral meatus, 338f, 341

**Labor**, period of time beginning with uterine contractions and ending with birth of baby; there are three stages: dilation, expulsion, and placental stage, 344

Labor and delivery, 344

**Labyrinth**, refers to inner ear; several fluid-filled cavities within temporal bone; labyrinth consists of cochlea, vestibule, and three semicircular canals; hair cells called organs of Corti line inner ear; hair cells change sound vibrations to electrical impulses and send impulses to brain via vestibulocochlear nerve, 478

**Labyrinthectomy**, surgical removal of labyrinth, 487

**Labyrinthitis**, labyrinth inflammation, 483

**Labyrinthotomy**, incision in labyrinth, 487

**Laceration**, torn or jagged wound; incorrectly used to describe a cut, 65

**Lacrimal**, pertaining to tears, 462

**Lacrimal apparatus**, consists of lacrimal gland, lacrimal ducts, and nasolacrimal duct, 456, 459, 459f, 467

**Lacrimal bone**, facial bone, 89, 89f, 89t

**Lacrimal ducts**, tear ducts located in inner corner of eye socket; collect tears and drain them into lacrimal sac, 459f

**Lacrimal gland**, gland located in outer corner of each eyelid; washes anterior surface of eye with fluid called tears, 459, 459f

Lactate dehydrogenase (LDH). See Cardiac enzymes

**Lactation**, function of secreting milk after childbirth from breasts or mammary glands, 342

**Lacteals**, lymphatic vessels in intestines that serve to absorb fats from diet, 196

**Lactic**, pertaining to milk, 347

**Lactiferous ducts**, carry milk from milk-producing glands to nipple, 342, 342f

**Lactiferous glands**, milk-producing glands in breast, 342, 342f

**Lactorrhea**, discharge of milk, 352

**Laminectomy**, removal of portion of a vertebra in order to relieve pressure on spinal nerve, 108, 440

**Laparoscope**, instrument to view inside abdomen, 287, 355

**Laparoscopic adrenalectomy**, surgical removal of adrenal gland through small incision in abdomen and using endoscopic instruments, 406

**Laparoscopic cholecystectomy**, surgical removal of gallbladder using laparoscope, 289

**Laparoscopy**, instrument or scope is passed into abdominal wall through small incision; abdominal cavity is then examined for tumors and other conditions with this lighted instrument; also called *peritoneoscopy*, 287, 355, 355f

**Laparotomy**, incision into abdomen, 290, 358

**Laryngeal**, pertaining to larynx, 233

**Laryngectomy**, surgical removal of larynx; procedure is most frequently performed for surgical removal of cancer, 246

**Laryngitis**, inflammation of larynx causing difficulty in speaking, 238

**Laryngopharynx**, inferior section of pharynx; lies at same level in neck as larynx, 225f, 226, 268

**Laryngoplasty**, surgical repair of larynx, 246

**Laryngoplegia**, paralysis of voice box, 237

**Laryngoscope**, instrument to view larynx, 244

**Laryngoscopy**, examination of interior of larynx with lighted instrument called *laryngoscope*, 244

**Larynx**, also called *voice box*; respiratory system organ responsible for producing speech; located just below pharynx, 223, 224, 226, 226f, 227f

**Laser photocoagulation**, use of laser beam to destroy very small precise areas of the retina; may be used to treat retinal detachment or macular degeneration, 471

**Laser surgery**, use of controlled beam of light for cutting, hemostasis, or tissue destruction, 533

**Laser therapy**, removal of skin lesions and birthmarks using laser beam that emits intense heat and power at a close range; laser converts frequencies of light into one small, powerful beam, 70

**Laser-assisted in situ keratomileusis (LASIK)**, correction of myopia using laser surgery to remove corneal tissue, 471, 471f

**Lateral (lat)**, directional term meaning to the side, 39f, 39t

**Lateral epicondylitis**, inflammation of muscle attachment to lateral epicondyle of elbow; often caused by strongly gripping; commonly called *tennis elbow*, 122

Lateral fissure, 423f

**Lateral recumbent position**, lying on either left or right side, 531f, 532t

**Lateral view**, positioning patient so that side of body faces X-ray machine, 517

**Lavage**, using NG tube to wash out stomach, 288

**Laxative**, treats constipation by stimulating a bowel movement, 291

Lazy eye. See Amblyopia

Left atrium, 140f, 142f, 145f, 146f

Left coronary artery, 147f

**Left hypochondriac**, anatomical division of abdomen, left side of upper row, 37t

**Left inguinal**, anatomical division of abdomen, left side of lower row, 37t

**Left lower quadrant (LLQ)**, clinical division of abdomen; contains portions of small and large intestines, left ovary and fallopian tube, and left ureter, 38t

**Left lumbar**, anatomical division of abdomen, left side of middle row, 37t



- Left upper quadrant (LUQ)**, clinical division of abdomen; contains left lobe of liver, spleen, stomach, portion of pancreas, and portion of small and large intestines, 38t
- Left ventricle, 140f, 142f, 145f
- Legally blind**, describes person who has severely impaired vision; usually defined as having visual acuity of 20/200, 466
- Legionnaires' disease**, severe, often fatal bacterial infection characterized by pneumonia and liver and kidney damage; named after people who came down with it at American Legion convention in 1976, 241
- Lens**, transparent structure behind pupil and iris; functions to bend light rays so they land on retina, 455, 456f, 457
- Lesion**, general term for wound, injury, or abnormality, 58
- Leukemia**, cancer of WBC-forming bone marrow; results in large number of abnormal WBCs circulating in blood, 189
- Leukocytes**, also called *white blood cells (WBCs)*; group of several different types of cells that provide protection against invasion of bacteria and other foreign material; able to leave bloodstream and search out foreign invaders (bacteria, viruses, and toxins), where they perform phagocytosis, 182, 183, 183f, 183t, 189, 198f
- Leukocytic**, pertaining to white blood cells, 186
- Leukocytosis**, too many white blood cells, 189
- Leukoderma**, disappearance of pigment from skin in patches, causing milk-white appearance; also called *vitiligo*, 58
- Leukopenia**, too few white (cells), 189
- Leukorrhea**, whitish or yellowish vaginal discharge, 349
- Ligaments**, very strong bands of connective tissue that bind bones together at a joint, 84, 94
- Ligation and stripping**, surgical treatment for varicose veins; damaged vein is tied off (ligation) and removed (stripping), 165
- Lingual tonsils**, tonsils located on very posterior section of tongue as it joins with pharynx, 166f
- Lipocytes**, medical term for cells that contain fat molecules, 52
- Lipoma**, fatty tumor that generally does not metastasize, 58
- Liposuction**, removal of fat beneath skin by means of suction, 70
- Lips**, anterior opening of oral cavity, 265, 265f, 266f
- Lithium**, special category of drug used successfully to calm patients who suffer from bipolar disorder, 514
- Lithotomy**, surgical incision to remove kidney stones, 323
- Lithotomy position**, lying face up with hips and knees bent at 90° angles, 531f, 532t
- Lithotripsy**, destroying or crushing kidney stones in bladder or urethra with device called lithotripter, 323
- Liver**, large organ located in right upper quadrant of abdomen; serves many functions in body; digestive system role includes producing bile, processing absorbed nutrients, and detoxifying harmful substances, 263, 264, 271, 272f
- Liver transplant**, transplant of a liver from a donor, 290
- Lobe, ear, 477f
- Lobectomy**, surgical removal of a lobe from an organ, such as a lung; often treatment of choice for lung cancer; may also be removal of one lobe of thyroid gland, 247, 406
- Lobes**, subdivisions of organ such as lungs or brain, 228, 229f
- Local anesthesia**, substance that produces a loss of sensation in one localized part of body; patient remains conscious when using this type of anesthetic; administered either topically or via subcutaneous route, 530t
- Long bone**, type of bone longer than it is wide; examples include femur, humerus, and phalanges, 85, 85f, 86f
- Long-term care facility**, facility that provides long-term care for patients who need extra time to recover from illness or accident before they return home or for persons who can no longer care for themselves; also called a *nursing home*, 15
- Longitudinal section**, internal view of body produced by lengthwise slice along long axis of structure, 33
- Loop of Henle**, portion of renal tubule, 307
- Lordosis**, abnormal increase in forward curvature of lumbar spine; also known as *swayback*, 104, 104f
- Lower esophageal sphincter**, also called *cardiac sphincter*; prevents food and gastric juices from backing up into esophagus, 269
- Lower extremity (LE)**, the leg, 90, 91f, 93t, 524
- Lower gastrointestinal series** (lower GI series), X-ray image of colon and rectum is taken after administration of barium by enema; also called *barium enema*, 286, 286f
- Lumbar**, pertaining to five low back vertebrae, 97
- Lumbar puncture (LP)**, puncture with needle into lumbar area (usually fourth intervertebral space) to withdraw fluid for examination and for injection of anesthesia; also called *spinal puncture* or *spinal tap*, 440, 440f
- Lumbar vertebrae**, five vertebrae in low back region, 89, 90f, 90t
- Lumbosacral plexus, 427f
- Lumen**, space, cavity, or channel within tube or tubular organ or structure in body, 146, 147f
- Lumpectomy**, surgical removal of only a breast tumor and tissue immediately surrounding it, 358
- Lung metastases, 537f
- Lung volumes/capacities, 228, 229f
- Lungs**, major organs of respiration; consist of air passageways, bronchi and bronchioles, and air sacs, or alveoli; gas exchange takes place within alveoli, 141f, 223, 224, 228, 229f, 239–42, 395f
- Lunula**, lighter-colored, half-moon region at base of a nail, 53, 53f
- Luteinizing hormone (LH)**, secreted by anterior pituitary; regulates function of male and female gonads and plays a role in releasing ova in females, 339, 389t, 393
- Lymph**, clear, transparent, colorless fluid found in lymphatic vessels, 196
- Lymph glands**, another name for *lymph nodes*; small organs composed of lymphatic tissue located along route of lymphatic vessels; remove impurities from

lymph and manufacture lymphocytes and antibodies, 197

**Lymph nodes**, small organs in lymphatic system that filter bacteria and other foreign organisms from body fluids, 195, 196, 197, 197*t*, 198*f*

**Lymphadenectomy**, removal of a lymph node; this is usually done to test for malignancy, 208

**Lymphadenitis**, inflammation of lymph glands; referred to as swollen glands, 205

**Lymphadenopathy**, disease of lymph nodes, 205

**Lymphangial**, pertaining to lymph vessels, 203

**Lymphangiogram**, X-ray taken of lymph vessels after injection of dye; lymph flow through chest is traced, 207

**Lymphangiography**, process of taking X-ray of lymph vessels after injection of dye, 207

**Lymphangioma**, lymph vessel tumor, 205

**Lymphatic**, pertaining to lymph, 203

**Lymphatic and immune system**, 194–209  
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 adjective forms of anatomical terms, 203  
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 pathology, 203–06  
 pharmacology, 209  
 spleen, 199  
 terminology, 202–08  
 therapeutic procedures, 208  
 thymus gland, 199  
 tonsils, 199

**Lymphatic capillaries**, smallest lymph vessels; collect excessive tissue fluid, 196

**Lymphatic ducts**, two largest vessels in lymphatic system, right lymphatic duct and thoracic duct, 197, 198*f*

**Lymphatic system**, helps body fight infection; organs include spleen, lymph vessels, and lymph nodes, 29*t*, 195

**Lymphatic vessels**, extensive network of vessels throughout entire body; conduct lymph from tissue toward thoracic cavity, 195, 196–197, 196*f*, 197*f*, 198*f*

**Lymphedema**, edema appearing in extremities due to obstruction of lymph flow through lymphatic vessels, 204

**Lymphocyte** (lymphs), agranulocyte white blood cell that provides protection through immune response, 181, 183*f*, 183*t*

**Lymphocytic**, pertaining to lymphocytes, 186

**Lymphoma**, tumor of lymphatic tissue, 205

## M

**Macrophage**, phagocytic cells found in large quantities in lymph nodes; engulf foreign particles, 199

**Macrotia**, abnormally large ears, 482

**Macula lutea**, area of retina onto which straight-ahead images are projected, 457

**Macular**, pertaining to macula lutea, 462

**Macular degeneration**, deterioration of macular area of retina of eye; may be treated with laser surgery to destroy blood vessels beneath macula, 466

**Macule**, flat, discolored area flush with skin surface; example would be freckle or birthmark, 58, 58*f*

**Magnetic resonance imaging (MRI)**, medical imaging that uses radio-frequency radiation as its source of energy; does not require injection of contrast medium or exposure to ionizing radiation; useful for visualizing large blood vessels, heart, brain, and soft tissues, 519, 519*f*

**Major depressive disorder**, mood disorder characterized by marked loss of interest in usually enjoyable activities, disturbances in sleep and eating patterns, fatigue, suicidal thoughts, and feelings of hopelessness, helplessness, and worthlessness, 512

**Male reproductive system**, responsible for producing sperm for reproduction; organs include penis, testes, epididymis, vas deferens, seminal vesicles, prostate gland, and bulbourethral glands, 361–73, 363*f*  
 abbreviations, 373  
 adjective forms of anatomical terms, 366–67  
 anatomy and physiology, 363–65  
 bulbourethral glands, 365  
 diagnostic procedures, 371  
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 internal organs of, 365  
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 penis, 364  
 pharmacology, 373  
 prostate gland, 365  
 seminal vesicles, 365  
 terminology, 366–70  
 testes, 363–64  
 therapeutic procedures, 371–72  
 vas deferens, 365

Male urethra, 305, 309*f*

**Malignant**, cancerous tumor; generally progressive and recurring, 535

**Malignant melanoma (MM)**, cancerous, darkly pigmented tumor or mole on skin, 65, 65*f*

**Malleus**, one of three ossicles of middle ear; also called *hammer*, 477*f*, 478, 478*f*

**Mammary**, pertaining to breast, 347

**Mammary glands**, breasts; milk-producing glands to provide nutrition for newborn, 342

**Mammogram**, X-ray record of breast, 354

**Mammography**, process of X-raying breast, 354

**Mamoplasty**, surgical repair of breast, 358

**Mandible**, lower jawbone, 87, 89*f*, 89*t*, 225*f*

**Mandibular**, pertaining to mandible or lower jaw, 97

**Mania**, depressive disorder characterized by extreme elation and euphoria; patient displays rapid speech, flight of ideas, decreased sleep, distractibility, grandiosity, and poor judgment, 512

**Massage**, kneading or applying pressure by hands to a part of patient's body to promote muscle relaxation and reduce tension, 526

**Mastalgia**, breast pain, 349

**Mastectomy**, surgical removal of breast, 358



**Mastitis**, inflammation of breast, common during lactation but can occur at any age, 352

Mastoid process, 477f

**Maxilla**, upper jawbone, 87, 89f, 89t

**Maxillary**, pertaining to maxilla or upper jaw, 97

**Meatal**, pertaining to meatus, 313

**Meatotomy**, surgical enlargement of urinary opening (meatus), 323

**Meconium**, substance that collects in intestines of fetus and becomes first stool of newborn, 348

**Medial**, directional term meaning to middle or near middle of body or structure, 39f, 39t

Median cubital vein, 150f

Median nerve, 427f

**Median plane**, when sagittal plane passes through middle of body, dividing it into equal right and left halves; also called *midsagittal plane*, 33, 33f

**Mediastinal nodes**, collection of lymph nodes located in mediastinum (central chest area) that drain chest, 197t, 198f

**Mediastinum**, central region of chest cavity; contains organs between lungs, including heart, aorta, esophagus, and trachea, 36, 36f, 141f, 228

**Medical record**, documents details of patient's hospital stay; each healthcare professional that has contact with patient in any capacity completes appropriate report of that contact and adds it to medical chart; permanent physical record of patient's day-to-day condition, when and what services received, and response to treatment; also called a *chart*, 13–14

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**Medulla**, middle area of an organ; in endocrine system refers to adrenal medulla; in urinary system, refers to inner portion of kidney, 306, 307f, 390, 390f

**Medulla oblongata**, portion of brain stem that connects spinal cord with brain; contains respiratory, cardiac, and blood pressure control centers, 422f, 423, 423f

**Medullary**, pertaining to medulla of organ like kidney or to medulla oblongata, 429

**Medullary cavity**, large open cavity that extends length of shaft of long bone; contains yellow bone marrow, 85, 86f, 94f

**Melanin**, black color pigment in skin; helps to prevent sun's ultraviolet rays from entering body, 52

**Melanocyte-stimulating hormone (MSH)**, hormone secreted by anterior pituitary; stimulates pigment production in skin, 389t, 393

**Melanocytes**, special cells in basal layer of epidermis; they contain black pigment melanin that gives skin its color and protects against ultraviolet rays of sun, 52

**Melanoma**, also called *malignant melanoma*; dangerous form of skin cancer caused by overgrowth of melanin in melanocyte; may metastasize or spread; exposure to ultraviolet light is a risk factor for developing melanoma, 65, 65f

**Melatonin**, hormone secreted by pineal gland; plays a role in regulating body's circadian rhythm, 389t, 392

**Melena**, passage of dark tarry stool; color is result of digestive enzymes working on blood in gastrointestinal tract, 278

**Menarche**, first menstrual period, 341

**Ménière's disease**, abnormal condition within labyrinth of inner ear that can lead to progressive loss of hearing; symptoms are vertigo, hearing loss, and tinnitus (ringing in ears), 483

**Meningeal**, pertaining to meninges, 429

**Meninges**, three connective tissue membrane layers that surround brain and spinal cord; layers are dura mater, arachnoid layer, and pia mater; dura mater and arachnoid layer are separated by subdural space; arachnoid layer and pia mater are separated by subarachnoid space, 421, 425, 425f, 437–38

**Meningioma**, slow-growing tumor in meninges of brain, 437

**Meningitis**, inflammation of membranes of spinal cord and brain caused by microorganism, 437

**Meningocele**, congenital hernia in which meninges, or membranes, protrude through opening in spinal column or brain, 435, 436f

**Menometrorrhagia**, excessive bleeding during menstrual period and at intervals between menstrual periods, 351

**Menopause**, cessation or ending of menstrual activity; generally between ages of 40 and 55, 341

**Menorrhagia**, excessive bleeding during menstrual period, 349

**Menstrual cycle**, fertility cycle in women regulated by estrogen; includes ovulation and sloughing off endometrium if pregnancy does not occur, 390

**Menstrual period**, another name for menstrual cycle, 341

**Menstruation**, loss of blood and tissue as endometrium is shed by uterus; flow exits body through cervix and vagina; flow occurs approximately every 28 days, 341

Mental health, 509–15

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pathology, 510–14

psychiatry, 510

psychology, 510

therapeutic procedures, 514–15

**Metacarpal**, pertaining to hand bones, 97

**Metacarpus**, collective name for the five hand bones in each upper extremity, 91f, 92, 92f, 92t

**Metastases (mets)**, spreading of cancerous tumor from original site to different locations of body; singular is *metastasis*, 535, 535f

**Metastasis (mets)**, movement and spread of cancer cells from one part of body to another; *metastases* is plural, 537, 537f

**Metastasis**, when cancerous cells migrate away from tumor site; commonly move through lymphatic system and become trapped in lymph nodes, 197

**Metatarsal**, pertaining to foot bones, 97

**Metatarsus**, collective name for the five forefoot bones in each lower extremity, 91f, 92, 93f, 93t

Metered-dose inhaler (MDI). See Aerosol therapy

**Metrorrhagia**, uterine bleeding between menstrual periods, 349

**Metrorrhea**, discharge from uterus, such as mucus or pus, 349

- Microtia**, abnormally small ears, 482
- Micturition**, another term for urination, 308
- Midbrain**, portion of brain stem, 393f, 422f, 423
- Middle ear**, middle section of ear; contains ossicles, 476, 477, 478, 478f, 479f, 483
- Middle ear infection. See Otitis media
- Midline organs, 38t
- Midsagittal plane**, when sagittal plane passes through middle of body, dividing it into equal right and left halves; also called *median plane*, 33
- Migraine**, specific type of headache characterized by severe head pain, photophobia, vertigo, and nausea, 434
- Miner's lung. See Anthracosis
- Mineralocorticoids**, group of hormones secreted by adrenal cortex; regulate electrolytes and fluid volume in body; aldosterone is an example, 388t, 390
- Minnesota Multiphasic Personality Inventory (MMPI), 515
- Minor tranquilizers**, medications that are central nervous system depressants and are prescribed for anxiety, 514
- Miotic drops**, substance that causes pupil to constrict, 473
- Miscarriage. See Spontaneous abortion
- Mitral valve**, valve between left atrium and ventricle in heart; prevents blood from flowing backward into atrium; also called *bicuspid valve* because it has two cusps or flaps, 142f, 143f, 144, 145f
- Mobility**, state of having normal movement of all body parts, 524
- Mobilization**, treatments such as exercise and massage to restore movement to joints and soft tissue, 526
- Moist hot packs**, applying moist warmth to body part to produce slight dilation of blood vessels in skin; causes muscle relaxation in deeper regions of body and increases circulation, which aids healing, 526
- Molars**, large somewhat flat-topped back teeth; function to grind food; humans have up to 12 molars, 265f, 266, 267f
- Monaural**, referring to one ear, 481
- Monochromatism**, unable to perceive one color, 466
- Monocyte** (monos), agranulocyte white blood cell important for phagocytosis, 181, 183f, 183t
- Monocytic**, pertaining to monocytes, 186
- Mononucleosis** (Mono), acute infectious disease with large number of atypical lymphocytes; caused by Epstein-Barr virus; there may be abnormal liver function, 205
- Monoparesis**, weakness of one extremity, 431
- Monoplegia**, paralysis of one extremity, 431
- Monospot**, test of infectious mononucleosis in which there is nonspecific antibody called heterophile antibody, 207
- Morbid obesity. See Obesity
- Morbidity**, number that represents number of sick persons in particular population, 537
- Mortality**, number that represents number of deaths in particular population, 537
- Motor neurons**, nerves that carry activity instruction from CNS to muscles or glands out in body; also called *efferent neurons*, 115, 426
- Mucolytic**, substance that liquefies mucus so it is easier to cough and clear it from respiratory tract, 249
- Mucous membrane**, membrane that lines body passages that open directly to exterior of body, such as mouth and reproductive tract, and secretes thick substance, or mucus, 224, 459
- Mucus**, sticky fluid secreted by mucous membrane lining of respiratory tract; assists in cleansing air by trapping dust and bacteria, 224
- Multigravida**, woman who has had more than one pregnancy, 348
- Multipara**, woman who has given birth to more than one child, 348
- Multiple sclerosis** (MS), inflammatory disease of central nervous system; rare in children; generally strikes adults between ages of 20 and 40; there is progressive weakness and numbness, 436
- Murmur**, extra heart sound as soft blowing sound or harsh click; may be soft and heard only with a stethoscope, or so loud it can be heard several feet away, 154
- Muscle actions, 116–17, 117f, 118–19t
- Muscle biopsy**, removal of muscle tissue for pathological examination, 124
- Muscle cells, 24f
- Muscle tissue fibers**, bundles of muscle tissue that form muscle, 114
- Muscle wasting. See Atrophy
- Muscles**, bundles of parallel muscle tissue fibers; as fibers contract (shorten in length) they pull whatever they are attached to closer together; may move two bones closer together or make opening narrower; muscle contraction occurs when message is transmitted from brain through nervous system to muscles, 114, 420
- Muscular**, pertaining to muscles, 121
- Muscular dystrophy** (MD), inherited disease causing progressive muscle weakness and atrophy, 122
- Muscular system, 112–35, 113f
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  - combining forms, 120
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  - pharmacology, 125
  - suffixes, 120–21
  - terminology, 120–21
  - terminology for muscle actions, 116–17, 117f, 118f, 118t, 119f, 119t
  - therapeutic procedures, 124
- Muscular tissue**, able to contract and shorten its length, thereby producing movement; may be under voluntary control (attached to bones) or involuntary control (heart and digestive organs), 25
- Musculoskeletal**, pertaining to muscles and the skeleton, 121
- Musculoskeletal system** (MS), system providing support for body and produces movement; organs include muscles, tendons, bones, joints, and cartilage. See also Muscular system; Skeletal system
- Mutation**, change or transformation from original, 537

**Myalgia**, muscle pain, 122

**Myasthenia**, lack of muscle strength, 122

**Myasthenia gravis**, disorder causing loss of muscle strength and paralysis; autoimmune disease, 437

**Mycobacterium tuberculosis**, bacteria responsible for causing tuberculosis, 242

**Mycoplasma pneumonia**, less severe but longer-lasting form of pneumonia caused by *Mycoplasma pneumoniae* bacteria; also called *walking pneumonia*, 241

**Mydriatic drops**, substance that causes pupil to dilate, 473

**Myelin**, tissue that wraps around many nerve fibers; composed of fatty material and functions as insulator, 420

**Myelinated**, nerve fibers covered with layer of myelin, 421, 421f

**Myelitis**, inflammation of spinal cord, 435

**Myelogram**, X-ray record of spinal cord following injection of meninges with radiopaque dye, 439

**Myelography**, injection of radiopaque dye into spinal canal; X-ray is taken to examine normal and abnormal outlines made by dye, 107, 439

**Myeloma**, tumor that forms in bone marrow tissue, 102

**Myelomeningocele**, congenital condition in which meninges and spinal cord protrude through spinal cord, 435, 436f

**Myelonic**, pertaining to spinal cord, 429

**Myocardial**, pertaining to heart muscle, 153

**Myocardial infarction (MI)**, condition caused by partial or complete occlusion or closing of one or more of coronary arteries; symptoms include severe chest pain or heavy pressure in middle of chest; delay in treatment could result in death; also referred to as *MI* or *heart attack*, 157, 158f

**Myocarditis**, inflammation of heart muscle, 158

**Myocardium**, middle layer of muscle; thick and composed of cardiac muscle; layer produces heart contraction, 115, 142, 142f, 145f

**Myometrium**, middle muscle layer of uterus, 340, 340f

**Myoneural junction**, point at which nerve contacts muscle fiber, 115

**Myopathy**, any disease of muscles, 122

**Myopia**, condition in which person can see things that are close up but distance vision is blurred; also known as *nearsightedness*, 466, 466f

**Myoplasty**, surgical repair of muscle, 124

**Myorrhaphy**, suture a muscle, 124

**Myorrhexis**, tearing a muscle, 123

**Myotonia**, muscle tone, 122

**Myringectomy**, surgical removal of eardrum, 487

**Myringitis**, eardrum inflammation, 483

**Myringoplasty**, surgical reconstruction of eardrum; also called *tympanoplasty*, 487

**Myringotomy**, surgical puncture of eardrum with removal of fluid and pus from middle ear, to eliminate persistent ear infection and excessive pressure on tympanic membrane; polyethylene tube is placed in tympanic membrane to allow for drainage of middle ear cavity, 487

**Myxedema**, condition resulting from hypofunction of thyroid gland; symptoms can include anemia,

slow speech, enlarged tongue and facial features, edematous skin, drowsiness, and mental apathy, 403

## N

**Nail bed**, connects nail body to connective tissue underneath, 53, 53f

**Nail body**, flat plate of keratin that forms most of nails, 53, 53f

**Nail root**, base of nail; nails grow longer from root, 53, 53f

**Nails**, structure in integumentary system, 53, 53f, 68

**Narcissistic personality**, personality disorder characterized by abnormal sense of self-importance, 512

**Narcolepsy**, sleep-wake disorder with recurring episodes of sleeping during the daytime, 513

**Narcotic analgesic**, drug used to treat severe pain; has potential to be habit forming if taken for prolonged time; also called *opiates*, 442

**Nares**, external openings of nose that open into nasal cavity, 224, 225f

**Nasal**, pertaining to nose, 233

**Nasal bone**, facial bone, 89, 89f, 89t

**Nasal cannula**, two-pronged plastic device for delivering oxygen into nose; one prong is inserted into each naris, 246

**Nasal cavity**, large cavity just behind external nose that receives outside air; covered with mucous membrane to cleanse air; nasal septum divides nasal cavity into left and right halves, 223, 224–25, 225f, 266f, 459

**Nasal septum**, flexible cartilage wall that divides nasal cavity into left and right halves; covered by mucous membrane, 224

**Nasogastric (NG)**, pertaining to nose and stomach, 275

**Nasogastric intubation (NG tube)**, flexible catheter is inserted into nose and down esophagus to stomach; may be used for feeding or to suction out stomach fluids, 288

**Nasolacrimal duct**, collects tears from inner corner of eye socket and drains them into nasal cavity, 459, 459f

**Nasopharyngeal**, pertaining to the nasopharynx, 233

**Nasopharyngitis**, inflammation of nasal cavity and throat, 238

**Nasopharynx**, superior section of pharynx that receives air from nose, 225f, 226

**Natural immunity**, immunity not specific to particular disease and does not require prior exposure to pathogen; also called *innate immunity*, 199–200

**Natural killer (NK) cells**, T cells that can kill by entrapping foreign cells, tumor cells, and bacteria; also called *T8 cells*, 201

**Nausea**, urge to vomit, 278

**Nearsightedness**. See *Myopia*

**Nebulizer**. See *Aerosol therapy*

**Neck**, narrow length of bone that connects ball of ball-and-socket joint to diaphysis of long bone, 86, 87f

**Necrosis**, dead tissue, 59

**Neonate**, term to describe newborn infant during first four weeks of life, 348

- Neonatologist**, specialist in treatment of newborn, 349
- Neonatology**, study of newborn, 349
- Neoplasm**, abnormal growth of tissue that may be benign or malignant; also called a *tumor*, 537
- Nephrectomy**, surgical removal of a kidney, 323
- Nephritis**, inflammation of kidney, 317
- Nephrogram**, X-ray of kidney, 320
- Nephrolith**, kidney stone, 315
- Nephrolithiasis**, presence of calculi in kidney, 317
- Nephrolithotomy**, incision into kidney to remove a stone, 323
- Nephrologist**, specialist in treatment of kidney disorders, 314
- Nephrology**, branch of medicine specializing in conditions of urinary system, 314
- Nephroma**, kidney tumor, 317
- Nephromalacia**, softening of kidney, 315
- Nephromegaly**, enlarged kidney, 315
- Nephron**, functional or working unit of kidney that filters blood and produces urine; more than 1 million in adult kidney; each consists of renal corpuscle and renal tubules, 306, 307, 308f
- Nephropathy**, kidney disease, 317
- Nephropexy**, surgical fixation of kidney, 323
- Nephroptosis**, drooping kidney, 317
- Nephrosclerosis**, hardening of kidney, 315
- Nephrosis. See Nephrotic syndrome
- Nephrostomy**, creating new opening across body wall into kidney, 323
- Nephrotic syndrome (NS)**, damage to glomerulus resulting in protein appearing in urine, proteinuria, and corresponding decrease in protein in bloodstream, 317
- Nephrotomy**, incision into kidney, 323
- Nerve block**, also referred to as *regional anesthesia*; anesthetic interrupts patient's pain sensation in particular region of body; anesthetic injected near nerve that will be blocked from sensation; patient usually remains conscious, 440, 530t
- Nerve cell body**, portion of nerve cell that includes nucleus, 420, 421f
- Nerve cells. See Neuron
- Nerve conduction velocity**, test to determine if nerves have been damaged by recording rate at which electrical impulse travels along nerve; if nerve is damaged, velocity will be decreased, 440, 526
- Nerve root**, point where spinal or cranial nerve is attached to CNS, 426
- Nerves**, structures in nervous system that conduct electrical impulses from brain and spinal cord to muscles and other organs, 25, 31t, 419, 420, 436–37
- Nervous system**, coordinates all conscious and subconscious activities of body; organs include brain, spinal cord, and nerves, 417–42
- abbreviations, 442
  - adjective forms of anatomical terms, 429–30
  - anatomy and physiology, 420–27
  - central, 421–25
  - diagnostic procedures, 439–40
  - nervous tissue, 420, 421f
  - pathology, 430–38
  - peripheral, 426–27
  - pharmacology, 441–42
  - terminology, 428–30
  - therapeutic procedures, 440–41
- Nervous tissue**, conducts electrical impulses to and from brain and rest of body, 25, 26f, 420, 421f
- Neural**, pertaining to nerves, 429
- Neuralgia**, nerve pain, 431
- Neurectomy**, surgical removal of a nerve, 440
- Neurocognitive disorders**, a classification of psychiatric disorders in the DSM-5 characterized by deterioration of mental functions due to temporary brain or permanent brain dysfunction; includes dementia and Alzheimer's disease, 511
- Neurodevelopmental disorders**, a classification of psychiatric disorders in the DSM-5 associated with impairment in the growth or development of the CNS; includes intellectual development disorder, attention-deficit/hyperactivity disorder, and autism spectrum disorder, 511
- Neurogenic bladder**, loss of nervous control that leads to retention; may be caused by spinal cord injury or multiple sclerosis, 318
- Neuroglial**, pertaining to glial cells, 429
- Neuroglial cells**, nervous tissue cells that perform support functions for neurons, 420
- Neurologist**, physician who specializes in disorders of nervous system, 430
- Neurology**, branch of medicine specializing in conditions of nervous system, 430
- Neuroma**, nerve tumor, 437
- Neuron**, name for individual nerve cell; neurons group together to form nerves and other nervous tissue, 420, 421f
- Neuropathy**, disease of nerves, 437
- Neuroplasty**, surgical repair of nerves, 440
- Neurorrhaphy**, suture a nerve, 441
- Neurosurgery**, branch of medicine specializing in surgery on nervous system, 430
- Neurotransmitter**, chemical messenger that carries electrical impulse across gap between two neurons, 420
- Neutrophil**, granulocyte white blood cells that are important for phagocytosis; also most numerous of leukocytes, 181, 183f, 183t
- Neutrophilic**, pertaining to neutrophils, 186
- Nevus**, pigmented (colored) congenital skin blemish, birthmark, or mole; usually benign but may become cancerous, 59
- Night blindness. See Nyctalopia
- Nipple**, point at which milk is released from breast, 342, 342f
- Nitrogenous wastes**, waste products that contain nitrogen; products, such as ammonia and urea, are produced during protein metabolism, 311
- Nocturia**, excessive urination during night; may or may not be abnormal, 315
- Nocturnal enuresis. See Enuresis
- Nodule**, solid, raised group of cells, 59, 59f
- Non-Hodgkin's lymphoma (NHL)**, cancer of lymphatic tissues other than Hodgkin's lymphoma, 205, 205f



**Non-insulin-dependent diabetes mellitus (NIDDM)**, also called *type 2 diabetes mellitus*; develops later in life when pancreas produces insufficient insulin; persons may take oral hypoglycemics to stimulate insulin secretion, or may eventually have to take insulin, 401

**Nonproprietary name**, recognized and accepted official name for drug; each drug has only one generic name, which is not subject to trademark, so any pharmaceutical manufacturer may use it; also called *generic name*, 501

**Nonsteroidal anti-inflammatory drugs (NSAIDs)**, large group of drugs including aspirin and ibuprofen that provide mild pain relief and anti-inflammatory benefits for conditions such as arthritis, 110

**Norepinephrine**, hormone secreted by adrenal medulla; a strong vasoconstrictor, 388t, 390

**Normal psychology**, behaviors that include how personality develops, how people handle stress, and stages of mental development, 510

**Nosocomial infection**, infection acquired as a result of hospital exposure, 201

**Nuclear medicine scan**, use of radioactive substances to diagnose diseases; radioactive substance known to accumulate in certain body tissues is injected or inhaled; after waiting for substance to travel to body area of interest, radioactivity level is recorded; commonly referred to as a *scan*, 520, 520t

**Nucleus**, structure within a cell that contains DNA, 421f

**Nulligravida**, woman who has never been pregnant, 348

**Nullipara**, woman who has never produced a viable baby, 348

Number prefixes, 7

**Nurse**, to breastfeed a baby, 342

**Nurse anesthetist**, registered nurse who has received additional training and education in administration of anesthetic medications, 529

**Nurse's notes**, medical record document that records patient's care throughout day; includes vital signs, treatment specifics, patient's response to treatment, and patient's condition, 14

**Nursing home**, facility that provides long-term care for patients who need extra time to recover from illness or accident before they return home or for persons who can no longer care for themselves; also called *long-term care facility*, 15

**Nyctalopia**, difficulty seeing in dim light; usually due to damaged rods, 464

**Nystagmus**, jerky-appearing involuntary eye movement, 468

## O

**Obesity**, having abnormal amount of fat in body, 278, 400

**Oblique fracture**, fracture at angle to bone, 101, 101f

**Oblique muscles**, oblique means "slanted"; two eye muscles are oblique muscles, 458

**Oblique view**, positioning patient so that X-rays pass through body on angle, 517

**Obsessive-compulsive disorder (OCD)**, a mental disorder in which person performs repetitive rituals in order to reduce anxiety, 510

**Obsessive-compulsive and related disorders**, a classification of psychiatric disorders in the DSM-5

characterized by obsessive preoccupations and repetitive behaviors, 510

Obstetrician, 439

**Obstetrics (OB)**, branch of medicine that treats women during pregnancy and childbirth, and immediately after childbirth, 349

**Occipital bone**, cranial bone, 87, 89f, 89t

**Occipital lobe**, one of four cerebral hemisphere lobes; controls eyesight, 423, 423f

**Occupational Safety and Health Administration (OSHA)**, federal agency that issued mandatory guidelines to ensure that all employees at risk of exposure to body fluids are provided with personal protective equipment, 201

**Occupational therapy (OT)**, assists patients to regain, develop, and improve skills important for independent functioning; occupational therapy personnel work with people who, because of illness, injury, developmental, or psychological impairments, require specialized training in skills that will enable them to lead independent, productive, and satisfying lives; occupational therapists instruct patients in use of adaptive equipment and techniques, body mechanics, and energy conservation; also employ modalities such as heat, cold, and therapeutic exercise, 523

**Ocular**, pertaining to eye, 462

Oculomotor nerve, 426t

**Oculomycosis**, condition of eye fungus, 466

Olfactory nerve, 426t

**Oligomenorrhea**, scanty menstrual flow, 349

**Oligospermia**, condition of having few sperm, 367

**Oliguria**, condition of scanty amount of urine, 316

**Oncogenic**, cancer causing, 537

**Oncology**, branch of medicine dealing with tumors, 534–38  
abbreviations, 538  
diagnostic procedures, 538  
staging tumors, 535–36, 536t  
therapeutic procedures, 538  
vocabulary, 536–37

**Onychectomy**, surgical removal of a nail, 70

**Onychia**, infected nailbed, 68

**Onychomalacia**, softening of nails, 59

**Onychomycosis**, abnormal condition of nail fungus, 68

**Onychophagia**, nail biting, 68

**Oocyte**, female sex cells or gametes produced in ovary; oocyte fuses with sperm to produce embryo; also called *ovum*, 339, 339f

**Oophorectomy**, removal of an ovary, 358

**Oophoritis**, inflammation of an ovary, 349

Open fracture. See Compound fracture

**Operative report**, medical record report from surgeon detailing operation; includes details of surgical procedure itself, and how patient tolerated procedure, 14, 529

**Ophthalmalgia**, eye pain, 464

**Ophthalmic**, pertaining to eyes, 462

**Ophthalmic decongestants**, over-the-counter medications that constrict arterioles of eye, reduce redness and itching of conjunctiva, 473

**Ophthalmologist**, physician specialized in treating conditions and diseases of eye, 463

- Ophthalmology** (Ophth), branch of medicine specializing in condition of eye, 456, 463
- Ophthalmoplegia**, paralysis of eye, 464
- Ophthalmorrhagia**, bleeding from the eye, 464
- Ophthalmoscope**, instrument to view inside eye, 469, 470f
- Ophthalmoscopy**, examination of interior of eyes using instrument called ophthalmoscope; physician dilates pupil in order to see cornea, lens, and retina; identifies abnormalities in blood vessels of eye and some systemic diseases, 469
- Opiates. See Narcotic analgesic
- Opportunistic infections**, infectious diseases associated with patients who have compromised immune systems and lowered resistance to infections and parasites, 206
- Opposition**, moves thumb away from palm; ability to move thumb into contact with other fingers, 119t
- Optic**, pertaining to eye, 462
- Optic disk**, area of retina associated with optic nerve; also called *blind spot*, 457
- Optic nerve**, second cranial nerve that carries impulses from retinas to brain, 426t, 456, 456f
- Optical**, pertaining to eye or vision, 462
- Optician**, grinds and fits prescription lenses and contacts as prescribed by physician or optometrist, 463
- Optometer**, instrument to measure vision, 470
- Optometrist** (OD), doctor of optometry; provides care for eyes including examining eyes for diseases, assessing visual acuity, prescribing corrective lenses and eye treatments, and educating patients, 463
- Optometry**, process of measuring vision, 463
- Oral**, (1) pertaining to mouth; (2) administration of medication through mouth, 275, 504t
- Oral cavity**, the mouth, 263, 264–66, 265f–266f
- Oral contraceptive pills** (OCPs), birth control medication that uses low doses of female hormones to prevent conception by blocking ovulation, 359
- Oral hypoglycemic agents**, medication taken by mouth that causes decrease in blood sugar; not used for insulin-dependent patients; no proof that medication will prevent long-term complications of diabetes mellitus, 407
- Oral surgeon**, practitioner of oral surgery, 277
- Oral surgery**, branch of dentistry that uses surgical means to treat dental conditions; specialist is *oral surgeon*, 277
- Orbit, 89f
- Orchidectomy**, surgical removal of one or both testes, 371
- Orchidopexy**, surgical fixation to move undescended testes into scrotum and attaching to prevent retraction, 368, 371
- Orchiectomy**, surgical removal of one or both testes, 371
- Orchioplasty**, surgical repair of testes, 371
- Orchiotomy**, to cut into testes, 371
- Orchitis**, inflammation of a testis, 368
- Organs**, group of different types of tissue coming together to perform special functions; for example, heart contains muscular fibers, nerve tissue, and blood vessels, 27, 27–31t
- Organs of Corti**, sensory receptor hair cells lining cochlea; these cells change sound vibrations to electrical impulses and send impulses to brain via vestibulocochlear nerve, 478
- Origin**, attachment of skeletal muscle to less movable bone in joint, 116, 117f
- Oropharynx**, middle section of pharynx that receives food and drink from mouth, 225f, 226, 268
- Orthodontic**, pertaining to straight teeth, 266
- Orthodontics**, dental specialty concerned with straightening teeth, 277
- Orthodontist**, dental specialist in straightening teeth, 277
- Orthopedic surgeon, 99
- Orthopedic surgery**, branch of medicine specializing in surgical treatments of musculoskeletal system, 28t, 99
- Orthopedics** (Ortho), branch of medicine specializing in diagnosis and treatment of conditions of musculoskeletal system, 28t, 99
- Orthopedist, 99
- Orthopnea**, term to describe patient who needs to sit up straight in order to breathe comfortably, 237
- Orthostatic hypotension**, sudden drop in blood pressure person experiences when standing up suddenly, 154
- Orthotics**, use of equipment, such as splints and braces, to support paralyzed muscle, promote specific motion, or correct musculoskeletal deformities, 99, 108, 524
- Os coxae**, also called *innominate bone* or *hipbone*; pelvis portion of lower extremity; consists of ilium, ischium, and pubis and unites with sacrum and coccyx to form pelvis, 92, 93t
- Osseous tissue**, bony tissue; one of hardest materials in body, 84
- Ossicles**, three small bones in middle ear; bones are incus, malleus, and stapes; ossicles amplify and conduct sound waves to inner ear, 478
- Ossification**, process of bone formation, 84
- Ostealgia**, bone pain, 99
- Osteoarthritis** (OA), noninflammatory type of arthritis resulting in degeneration of bones and joints, especially those bearing weight, 3, 105
- Osteoblast**, immature bone cell, 84
- Osteochondroma**, tumor composed of both cartilage and bony substance, 102
- Osteoclasia**, intentional breaking of bone in order to correct deformity, 108
- Osteocyte**, mature bone cell, 84
- Osteogenic sarcoma**, most common type of bone cancer; usually begins in osteocytes found at ends of long bones, 102
- Osteomalacia**, softening of bones caused by deficiency of calcium; thought to be caused by insufficient sunlight and vitamin D in children, 102
- Osteomyelitis**, inflammation of bone and bone marrow due to infection; can be difficult to treat, 99
- Osteopathy**, form of medicine that places great emphasis on musculoskeletal system and body system as a whole; manipulation is also used as part of treatment, 102
- Osteoporosis**, decrease in bone mass that results in thinning and weakening of bone with resulting fractures; bone becomes more porous, especially in spine and pelvis, 103



**Osteotome**, instrument to cut bone, 108  
**Osteotomy**, surgical procedure that cuts into a bone, 109  
**Otalgia**, ear pain, 482  
**Otic**, pertaining to ear, 481  
**Otitis externa** (OE), external ear infection; most commonly caused by fungus; also called *otomycosis* and commonly referred to as *swimmer's ear*, 483  
**Otitis media** (OM), commonly referred to as middle ear infection; seen frequently in children; often preceded by upper respiratory infection, 483  
 Otolaryngology. See Otorhinolaryngology  
**Otology** (Oto), study of ear, 477  
**Otomycosis**, fungal infection of ear, usually in auditory canal, 483  
**Otoplasty**, surgical repair of external ear, 487  
**Otopyorrhea**, pus discharge from ear, 482  
 Otorhinolaryngologist, 234, 482  
**Otorhinolaryngology** (ENT), branch of medicine that treats conditions and diseases of ear, nose, and throat; also referred to as *ENT*, 234, 482  
**Otorrhagia**, bleeding from ear, 482  
**Otosclerosis**, progressive hearing loss caused by immobility of stapes bone, 483  
**Otoscope**, instrument to view inside ear, 485, 485f  
**Otосcopy**, examination of ear canal, eardrum, and outer ear using otoscope; foreign material can be removed from ear canal with this procedure, 485  
 Outer ear, 479f  
**Outpatient clinic**, facility that provides services not requiring overnight hospitalization; services range from simple surgeries to diagnostic testing to therapy; also called *ambulatory care center* or *surgical center*, 15  
**Ova**, female sex cells or gametes produced in ovary; ovum fuses with sperm to produce embryo; singular is *ovum*; also called *oocyte*, 338, 390  
**Ova and parasites** (O&P), laboratory examination of feces with microscope for presence of parasites or their eggs, 285  
**Oval window**, division between middle and inner ear, 477f, 478, 478f  
**Ovarian**, pertaining to ovaries, 347, 398  
**Ovarian carcinoma**, cancer of ovary, 350  
**Ovarian cyst**, sac that develops within ovary, 350  
**Ovaries**, female gonads; two glands located on either side of lower abdominopelvic region of female; responsible for production of sex cells, ova, and hormones estrogen and progesterone, 337, 338–39, 338f, 339f, 340f, 387, 389t, 390, 391f  
**Over-the-counter** (OTC), drugs accessible in drugstores without prescription; also called *nonprescription drugs*, 502  
**Oviducts**, tubes that carry ovum from ovary to uterus; also called *fallopian tubes* or *uterine tubes*, 339  
**Ovulation**, release of an ovum from ovary, 339  
 Ovulation stimulant. See Fertility drug  
**Oximeter**, instrument to measure oxygen, 245  
**Oximetry**, process of measuring oxygen, 245

**Oxygen** (O<sub>2</sub>), gaseous element absorbed by blood from air sacs in lungs; necessary for cells to make energy, 141, 224

**Oxygenated**, term for blood with a high oxygen level, 140

**Oxytocin**, hormone secreted by posterior pituitary; stimulates uterine contractions during labor and delivery, 359, 389t, 393

## P

**Pacemaker**, another name for sinoatrial node of heart, 145, 146f

**Pacemaker implantation**, electrical device that substitutes for natural pacemaker of heart; controls beating of heart by series of rhythmic electrical impulses; external pacemaker has electrodes on outside of body; internal pacemaker has electrodes surgically implanted within chest wall, 164, 164f

**Packed red cells**, transfusion of only formed elements and without plasma, 192

**Paget's disease**, fairly common metabolic disease of bone from unknown causes; usually attacks middle-aged and older adults and is characterized by bone destruction and deformity, 103

**Pain control**, managing pain through use of a variety of means, including medications, biofeedback, and mechanical devices, 526

**Palate**, roof of mouth; anterior portion is hard or bony, posterior portion is soft or flexible, 224, 265

**Palatine bone**, facial bone, 89, 89t

**Palatine tonsils**, tonsils located in lateral wall of pharynx close to mouth, 199, 226, 265–266f

**Palatoplasty**, surgical repair of palate, 290

**Palliative therapy**, treatment designed to reduce intensity of painful symptoms, but not to produce a cure, 538

**Pallor**, abnormal paleness of skin, 59

**Palpitations**, pounding, racing heartbeat, 154

**Palsy**, temporary or permanent loss of ability to control movement, 431

**Pancreas**, digestive system organ that produces digestive enzymes; within endocrine system produces two hormones, insulin and glucagon, 263, 264, 272, 272f, 387, 389t, 391–92, 391f, 401

**Pancreatic**, pertaining to pancreas, 275, 398

**Pancreatic duct**, carries pancreatic juices from pancreas to duodenum, 272, 272f

**Pancreatic enzymes**, digestive enzymes produced by pancreas and added to chyme in duodenum, 272

**Pancreatic islets**, regions within pancreas that secrete insulin and glucagon; also called *islets of Langerhans*, 391

**Pancreatitis**, inflammation of pancreas, 284

**Pancytopenia**, too few of all types of blood cells, 188

**Panhypopituitarism**, deficiency in all hormones secreted by pituitary gland; often recognized because of problems with glands regulated by pituitary—adrenal cortex, thyroid, ovaries, and testes, 402

**Panic disorder**, feeling of intense apprehension, terror, or sense of impending danger, 510

**Pansinusitis**, inflammation of all sinuses, 237

**Pap** (Papanicolaou) **smear**, test for early detection of cancer of cervix named after developer of test, George Papanicolaou, a Greek physician; a scraping of cells is removed from cervix for examination under a microscope, 354

Papilla, 53f

**Papilledema**, swelling of optic disk, often a result of increased intraocular pressure; also called *choked disk*, 464

**Papule**, small, solid, circular raised spot on surface of skin, often a result of inflammation in oil gland, 59, 59f

**Paracentesis**, insertion of needle into abdominal cavity to withdraw fluid; tests to diagnose disease may be conducted on fluid, 287

**Paralysis**, temporary or permanent loss of function or voluntary movement, 432

**Paranasal**, pertaining to the sinuses beside the nose, 233

**Paranasal sinuses**, air-filled cavities within facial bones that open into nasal cavity; act as echo chamber during sound production, 225, 225f

**Paranoid personality disorder**, personality disorder characterized by exaggerated feelings of persecution, 512

**Paraphilic disorders**, a classification of psychiatric disorders in the DSM-5 involving aberrant sexual activity; includes pedophilic disorder, sexual masochism disorder, and voyeuristic disorder, 513

**Paraplegia**, paralysis of lower portion of body and both legs, 432

**Parasympathetic branch**, branch of autonomic nervous system; serves as counterbalance for sympathetic nerves; causes heart rate to slow down, lowers blood pressure, constricts eye pupils, and increases digestion, 427

**Parathyroid glands**, four small glands located on back surface of thyroid gland; regulate amount of calcium in blood by secreting parathyroid hormone, 387, 389t, 392, 392f, 401

**Parathyroid hormone (PTH)**, secreted by parathyroid glands; the more hormone, the higher the calcium level in blood and the lower the level stored in bone; low hormone level will cause tetany, 389t, 392

**Parenteral**, route for introducing medication into body through needle with syringe inserted either under the skin or into a muscle, vein, or body cavity, 505f, 505t

**Parathyroidal**, pertaining to parathyroid glands, 398

**Parathyroidectomy**, surgical removal of one or more of parathyroid glands; performed to halt progress of hyperparathyroidism, 406

Parenteral administration of drugs, 505t

**Paresthesia**, abnormal sensation such as burning or tingling, 432

**Parietal bone**, cranial bone, 87, 89f, 89t

**Parietal layer**, outer pleural layer around lungs; lines inside of chest cavity, 36

**Parietal lobe**, one of four cerebral hemisphere lobes; receives and interprets nerve impulses from sensory receptors, 423, 423f

**Parietal pericardium**, outer layer of pericardium surrounding heart, 142

**Parietal peritoneum**, outer layer of serous membrane sac lining abdominopelvic cavity, 36

**Parietal pleura**, outer layer of serous membrane sac lining thoracic cavity, 228

**Parkinson's disease**, chronic disorder of nervous system with fine tremors, muscular weakness, rigidity, and shuffling gait, 434

**Paronychia**, infection around nail, 68, 68f

Parotid duct, 271f

**Parotid glands**, pair of salivary glands located in front of ears, 271, 271f

**Passive acquired immunity**, results when person receives protective substances produced by another human or animal; may take form of maternal antibodies crossing placenta to baby or antitoxin injection, 200

**Passive range of motion (PROM)**, therapist putting patient's joints through full range of motion without assistance from patient, 526

**Patella**, also called *kneecap*; lower extremity bone, 92, 93f, 93t

**Patellar**, pertaining to patella or kneecap, 97

**Patent**, open or unblocked, such as patent airway, 237

**Patent ductus arteriosus (PDA)**, congenital heart anomaly in which opening between pulmonary artery and aorta fails to close at birth; condition requires surgery, 160

**Pathogenic**, pertaining to microscopic organisms, such as bacteria, capable of causing disease, 200

**Pathogens**, disease-bearing organisms, 50, 183

**Pathologic fracture**, caused by diseased or weakened bone, 101

**Pathologist**, physician who specializes in evaluating specimens removed from living or dead patients, 203, 536

**Pathologist's report**, medical record report given by pathologist who studies tissue removed from patient (e.g., bone marrow, blood, or tissue biopsy), 14

**Pathology**, branch of medicine specializing in studying how disease affects body, 203

**Pectoral girdle**, consists of clavicle and scapula; functions to attach upper extremity to axial skeleton, 90, 91f, 92t

**Pediculosis**, infestation with lice, 66

**Pedophilic disorder**, paraphilic disorder characterized by having sexual interest in children, 513

**Pelvic**, pertaining to pelvis, 34

**Pelvic cavity**, inferior portion of abdominopelvic cavity, 36, 36f, 37t, 351

**Pelvic examination**, physical examination of vagina and adjacent organs performed by physician placing fingers of one hand into vagina; visual examination is performed using speculum, 356

**Pelvic girdle**, consists of ilium, ischium, and pubis; functions to attach lower extremity to axial skeleton, 90, 91f, 93t

**Pelvic inflammatory disease (PID)**, any inflammation of female reproductive organs, generally bacterial in nature, 351

**Pelvic region**, lowest anterior region of trunk, 34t, 35f

**Pelvic ultrasonography**, use of ultrasound waves to produce image or photograph of organ, such as uterus, ovaries, or fetus, 355

Pelvis, 94f

**Penile**, pertaining to penis, 366

**Penis**, male sex organ; composed of erectile tissue that becomes erect during sexual stimulation, allowing it to be placed within female vagina for ejaculation of semen; larger, soft tip is referred to as glans penis, 362, 363, 363f, 364, 368–69

**Peptic ulcer disease (PUD)**, ulcer occurring in lower portion of esophagus, stomach, and duodenum and thought to be caused by acid of gastric juices, 280, 280f

**Percussion**, use of fingertips to tap body lightly and sharply; aids in determining size, position, and consistency of underlying body part, 248

**Percutaneous diskectomy**, thin catheter tube is inserted into intervertebral disk through skin and herniated or ruptured disk material is sucked out or a laser is used to vaporize it, 109

**Percutaneous transhepatic cholangiography (PTC)**, contrast medium is injected directly into liver to visualize bile ducts; used to detect obstructions, 286

**Percutaneous transluminal coronary angioplasty (PTCA)**, method for treating localized coronary artery narrowing; balloon catheter is inserted through skin into coronary artery and inflated to dilate narrow blood vessel, 165, 165f

Perforated ulcer. *See* Peptic ulcer disease

**Pericardial**, pertaining to around the heart, 36, 37t

**Pericardial cavity**, formed by serous membrane sac surrounding heart, 36, 36f

**Pericarditis**, inflammatory process or disease of pericardium, 11, 158

**Pericardium**, double-walled outer sac around heart; inner layer is called epicardium, outer layer is heart itself; sac contains pericardial fluid that reduces friction caused by heart beating, 141f, 142, 142f

**Perimetritis**, inflammation around uterus, 351

**Perimetrium**, outer layer of uterus, 340, 340f

**Perineal**, pertaining to perineum, 347

**Perineum**, in male, external region between scrotum and anus; in female, external region between vagina and anus, 341, 343f, 364

**Periodontal**, pertaining to around the teeth, 276

**Periodontal disease**, disease of supporting structures of teeth, including gums and bones, 279

**Periodontal ligaments**, small ligaments that anchor root of tooth in socket of jaw, 266, 267f

**Periodontics**, branch of dentistry concerned with treating conditions involving gums and tissues surrounding teeth; specialist is a *periodontist*, 277

**Periodontist**, dental specialist in treating conditions involving gums and tissues surrounding teeth, 277

**Perioperative**, period of time that includes before, during, and after surgical procedure, 533

**Periosteum**, membrane that covers most bones; contains numerous nerves and lymphatic vessels, 85, 86f, 94f

**Peripheral nervous system (PNS)**, portion of nervous system that contains cranial nerves and spinal

nerves; mainly responsible for voluntary muscle movement, smell, taste, sight, and hearing, 420, 426–27, 427f

**Peripheral neuropathy**, damage to nerves in lower legs and hands as a result of diabetes mellitus; symptoms include either extreme sensitivity or numbness and tingling, 401

**Peripheral vascular disease (PVD)**, any abnormal condition affecting blood vessels outside heart; symptoms may include pain, pallor, numbness, and loss of circulation and pulses, 160

**Peristalsis**, wavelike muscular movements in wall of digestive system tube (esophagus, stomach, small intestine, and colon) that function to move food along tube, 268

**Peritoneal**, pertaining to peritoneum, 36

**Peritoneal dialysis**, removal of toxic waste substances from body by placing warm chemically balanced solutions into peritoneal cavity; used in treating renal failure and certain poisonings, 322, 322f

Peritoneoscopy. *See* Laparoscopy

**Peritoneum**, membranous sac that lines abdominal cavity and encases abdominopelvic organs; kidneys are exception since they lie outside peritoneum and alongside vertebral column, 36

**Peritubular capillaries**, capillary bed surrounding renal tubules, 308f, 310, 310f

**Permanent teeth**, 32 begin to erupt at about age six; generally complete by age 16, 266

**Pernicious anemia (PA)**, anemia associated with insufficient absorption of vitamin B<sub>12</sub> by digestive system, 189

Peroneal artery, 148f

Peroneal nerve, 427

**Personality disorders**, a classification of psychiatric disorders in the DSM-5 characterized by inflexible or maladaptive behavior patterns that affect person's ability to function in society; includes paranoid personality disorder, narcissistic personality disorder, and antisocial personality disorder, 512

**Perspiration**, another term for sweating, 54

**Pertussis**, contagious bacterial infection of larynx, trachea, and bronchi characterized by coughing attacks that end with whooping sound; also called *whooping cough*, 238

**Petechiae**, flat, pinpoint, purplish spots from bleeding under skin, 59, 59f

Petit mal seizure. *See* Absence seizure

pH, 311t

**Phacoemulsification**, use of high-frequency sound waves to emulsify (liquefy) lens with cataract, which is then aspirated (removed by suction) with needle, 472

**Phagocyte**, neutrophil component of blood; has ability to ingest and destroy bacteria, 183

**Phagocytosis**, process of engulfing or ingesting material; several types of white blood cells function by engulfing bacteria, 183

**Phalangeal**, pertaining to phalanges or finger and toe bones, 97

**Phalanges**, finger bones in upper extremities and toe bones in lower extremities, 92, 92t, 93t

- Pharmaceutical**, related to medications or pharmacies, 501
- Pharmacist** (RPh or PharmD), receives drug requests made by physicians, and gathers pertinent information that would affect dispensing of certain drugs, reviews patients' medications for drug interactions, provides healthcare workers with information regarding drugs, and educates public, 501
- Pharmacology**, study of origin, characteristics, and effects of drugs, 500–508  
 abbreviations, 508  
 drug administration routes and methods, 504, 504–06t  
 drug names, 501, 501t  
 legal classification of drugs, 502, 502t  
 prescription reading, 503–04, 503f  
 vocabulary, 506–07
- Pharyngeal**, pertaining to pharynx, 233, 276
- Pharyngeal tonsils**, another term for *adenoids*; tonsils are collection of lymphatic tissue found in nasopharynx to combat microorganisms entering body through nose, 199, 226
- Pharyngitis**, inflammation of mucous membrane of pharynx, usually caused by viral or bacterial infection; commonly called *sore throat*, 238
- Pharyngoplasty**, surgical repair of pharynx, 290
- Pharyngoplegia**, paralysis of pharynx, 279
- Pharynx**, medical term for throat; passageway that conducts air from nasal cavity to trachea and also carries food and drink from mouth to esophagus; divided into three sections: nasopharynx, oropharynx, and laryngopharynx, 199, 223, 224, 226, 264, 266f, 268, 279
- Pheochromocytoma**, usually benign tumor of adrenal medulla that secretes epinephrine; symptoms include anxiety, heart palpitations, dyspnea, profuse sweating, headache, and nausea, 400
- Phimosis**, narrowing of foreskin over glans penis that results in difficulty with hygiene; condition can lead to infection or difficulty with urination; treated with circumcision, surgical removal of foreskin, 369
- Phlebitis**, inflammation of a vein, 160
- Phlebotomist, 191f
- Phlebotomy**, creating opening into vein to withdraw blood, 191, 191f
- Phlegm**, thick mucus secreted by membranes that line respiratory tract; called *sputum* when coughed through mouth; examined for color, odor, and consistency, 237
- Phobias**, type of anxiety disorder in which person has irrational fears; example is arachnophobia, fear of spiders, 510
- Phonophoresis**, use of ultrasound waves to introduce medication across skin into subcutaneous tissues, 526
- Photophobia**, strong sensitivity to bright light, 464
- Photorefractive keratectomy** (PRK), use of laser to reshape cornea to correct errors of refraction, 472
- Photosensitivity**, condition in which skin reacts abnormally when exposed to light such as ultraviolet rays of sun, 60
- Physical medicine**, use of natural methods, including physical therapy, to cure diseases and disorders, 524
- Physical therapy** (PT), treating disorders using physical means and methods; physical therapy personnel assess joint motion, muscle strength and endurance, function of heart and lungs, and performance of activities required in daily living, along with other responsibilities; treatment includes gait training, therapeutic exercise, massage, joint and soft tissue mobilization, thermal and cryotherapy, electrical stimulation, ultrasound, and hydrotherapy; methods strengthen muscles, improve motion and circulation, reduce pain, and increase function, 523
- Physician's offices**, individual or groups of physicians providing diagnostic and treatment services in a private office setting rather than in a hospital, 15
- Physician's orders**, medical record document that contains complete list of care, medications, tests, and treatments physician orders for patient, 14
- Physician's progress notes**, part of patient's medical record; physician's daily record of patient's condition, results of physician's examinations, summary of test results, updated assessment and diagnoses, and further plans for patient's care, 14
- Physician's Desk Reference* (PDR), 502
- Pia mater**, term means "soft mother"; this thin innermost meninges layer is applied directly to surface of brain, 425, 425f
- Pineal**, pertaining to pineal gland, 398
- Pineal gland**, gland in endocrine system that produces hormone called melatonin, 387, 389t, 392, 392f
- Pinelectomy**, surgical removal of pineal gland, 406
- Pinna**, also called *auricle*; external ear, which functions to capture sound waves as they go past outer ear, 477, 477f
- Pisse prophets, 306
- Pituitary**, pertaining to pituitary gland, 398
- Pituitary anterior lobe, 389t
- Pituitary gland**, endocrine gland located behind optic nerve in brain; also called master gland since it controls functions of many other endocrine glands; is divided into two lobes: anterior and posterior; anterior pituitary gland secretes hormones that aid in controlling growth and stimulating thyroid gland, sexual glands, and adrenal cortex; posterior pituitary is responsible for antidiuretic hormone and oxytocin, 387, 392–93, 393f, 394f, 402, 422f
- Pituitary posterior lobe, 389t
- Placebo**, inactive, harmless substance used to satisfy patient's desire for medication; also given to control groups of patients in research studies in which another group receives drug; effect of placebo versus drug is then observed, 507
- Placenta**, also called afterbirth; organ attached to uterine wall composed of maternal and fetal tissues; oxygen, nutrients, carbon dioxide, and wastes are exchanged between mother and baby through placenta; baby is attached to placenta by way of umbilical cord, 343, 343f, 344



**Placenta previa**, occurs when placenta is in lower portion of uterus and thus blocks birth canal, 353, 353f

**Placental stage**, third stage of labor, which takes place after delivery of infant; uterus resumes strong contractions and placenta detaches from uterine wall and is delivered through vagina, 344, 344f

**Plantar flexion**, bending sole of foot; pointing toes downward, 118f, 118t

**Plaque**, yellow, fatty deposit of lipids in artery, 155, 159

**Plasma**, liquid portion of blood containing 90% water; remaining 10% consists of plasma proteins (serum albumin, serum globulin, fibrinogen, and prothrombin), inorganic substances (calcium, potassium, and sodium), organic components (glucose, amino acids, cholesterol), and waste products (urea, uric acid, ammonia, and creatinine), 181, 182

**Plasma proteins**, found in plasma; includes serum albumin, serum globulin, fibrinogen, and prothrombin, 182

**Plasmapheresis**, method of removing plasma from body without depleting formed elements; whole blood is removed and cells and plasma are separated; cells are returned to patient along with donor plasma transfusion, 192

**Plastic surgery**, surgical specialty involved in repair, reconstruction, or improvement of body structures such as skin that are damaged, missing, or misshapen; physician is *plastic surgeon*, 57

**Platelet count**, blood test to determine number of platelets in given volume of blood, 191

**Platelets**, cells responsible for coagulation of blood; also called *thrombocytes* and contain no hemoglobin, 181, 182, 184, 184f, 190

**Pleura**, protective double layer of serous membrane around lungs; parietal membrane is outer layer and visceral layer is inner membrane; secretes thin, watery fluid to reduce friction associated with lung movement, 36, 228

**Pleural**, pertaining to pleura, 233

**Pleural cavity**, cavity formed by serous membrane sac surrounding lungs, 36, 36f, 37t, 228, 242–43

**Pleural effusion**, abnormal presence of fluid or gas in pleural cavity; physicians can detect presence of fluid by tapping chest (percussion) or listening with stethoscope (auscultation), 242

**Pleural rub**, grating sound made when two surfaces, such as pleural surfaces, rub together during respiration; caused when one of surfaces becomes thicker as a result of inflammation or other disease conditions; rub can be felt through fingertips when placed on chest wall or heard through stethoscope, 237

**Pleurectomy**, surgical removal of pleura, 247

**Pleurisy**, inflammation of pleura, 242

Pleuritis. See Pleurisy

**Pleurocentesis**, puncture of pleura to withdraw fluid from thoracic cavity in order to diagnose disease, 247

**Pleurodynia**, pleural pain, 237

Plural endings, 12

**Pneumoconiosis**, condition resulting from inhaling environmental particles that become toxic, such as coal dust (anthracosis) or asbestos (asbestosis), 241

**Pneumocystis pneumonia (PCP)**, pneumonia caused by fungus *Pneumocystis jiroveci*; opportunistic infection often seen in those with weakened immune systems, such as AIDS patients, 206

**Pneumonia**, inflammatory condition of lung, which can be caused by bacterial and viral infections, diseases, and chemicals, 241

**Pneumonectomy**, surgical removal of an entire lung, 247

**Pneumothorax**, collection of air or gas in pleural cavity, which can result in collapse of lung, 243, 243f

Podiatrist, 99

**Podiatry**, healthcare profession specializing in diagnosis and treatment of disorders of feet and lower legs; healthcare professional is *podiatrist*, 99

**Poliomyelitis**, acute viral disease that causes inflammation of gray matter of spinal cord, resulting in paralysis in some cases; has been brought under almost total control through vaccinations, 435

**Polyarteritis**, inflammation of many arteries, 160

**Polycystic kidneys**, formation of multiple cysts within kidney tissue; results in destruction of normal kidney tissue and uremia, 317, 317f

**Polycythemia vera**, production of too many red blood cells in bone marrow, 189

**Polydipsia**, condition of having excessive amount of thirst, such as in diabetes, 400

**Polymyositis**, disease involving muscle inflammation and weakness from unknown cause, 123

**Polyneuritis**, inflammation of many nerves, 437

**Polyp**, small tumor with pedicle or stem attachment; commonly found in vascular organs such as nose, uterus, and rectum, 283, 283f

**Polyphagia**, to eat excessively, 278

**Polyposis**, small tumors that contain pedicle or footlike attachment in mucous membranes of large intestine (colon), 283, 283f

**Polysomnography**, monitoring a patient while sleeping to identify sleep apnea; also called *sleep apnea study*, 245

**Polyuria**, condition of having excessive urine production; can be a symptom of disease conditions such as diabetes, 316, 400

**Pons**, portion of brain stem that forms bridge between cerebellum and cerebrum, 422f, 423–24, 423f

**Pontine**, pertaining to pons, 429

Popliteal artery, 148f

Popliteal vein, 150f

**Positron emission tomography (PET)**, use of positive radionuclides to reconstruct brain sections; measurements can be taken of oxygen and glucose uptake, cerebral blood flow, and blood volume, 439, 520, 520f

**Posterior**, directional term meaning near or on back or spinal cord side of body, 39f, 39t

**Posterior lobe**, posterior portion of pituitary gland; secretes antidiuretic hormone and oxytocin, 393

Posterior pituitary gland, 393f

- Posterior tibial artery, 148f  
 Posterior tibial vein, 150f  
**Posteroanterior (PA) view**, positioning patient so that X-rays pass through body from back to front, 517  
**Postoperative**, period of time immediately following surgery, 533  
**Postpartum**, period immediately after delivery or childbirth, 348  
**Postprandial (PP)**, pertaining to after a meal, 278  
**Posttraumatic stress disorder (PTSD)**, results from exposure to actual or implied death, serious injury, or sexual violence, 513  
**Postural drainage**, draining secretions from bronchi by placing patient in position that uses gravity to promote drainage; used for treatment of cystic fibrosis and bronchiectasis, and before lobectomy surgery, 246  
**Postural drainage with clapping**, drainage of secretions from bronchi or a lung cavity by having patient lie so that gravity allows drainage to occur; clapping is using hand in cupped position to perform percussion on chest; assists in loosening secretions and mucus, 526  
**Potassium**, inorganic substance found in plasma; important for bones and muscles, 182  
**Potentiation**, giving patient second drug to boost (potentiate) effect of another drug; total strength of drugs is greater than sum of strength of individual drugs, 507  
**Preeclampsia**, toxemia of pregnancy that, if untreated, can result in true eclampsia; symptoms include hypertension, headaches, albumin in urine, and edema, 353  
**Prefix**, word part added in front of word root; frequently gives information about location of organ, number of parts or time (frequency); not all medical terms have prefix, 2, 3, 5–7  
 number, 7  
**Pregnancy**, time from fertilization of ovum to birth of newborn, 340, 341, 342–45, 343f  
 labor and delivery, 344–345, 344f, 345f, 352–353  
 Pregnancy-induced hypertension. See Preeclampsia  
**Pregnancy test**, chemical test that can determine pregnancy during first few weeks; can be performed in physician's office or with home-testing kit, 354  
**Premature**, infant born prior to 37 weeks of gestation, 342  
**Premature ejaculation**, release of semen before or shortly after penetration, 514  
**Premenstrual syndrome (PMS)**, symptoms that develop just prior to onset of menstrual period; can include irritability, headache, tender breasts, and anxiety, 351  
**Premolar**, another term for bicuspid teeth, 266, 267f  
**Preoperative** (preop, pre-op), period of time preceding surgery, 533  
 Prepatellar bursitis, 94  
**Prepuce**, also called foreskin; protective covering over glans penis; this covering of skin is removed during circumcision, 364  
**Presbycusis**, loss of hearing that can accompany aging process, 482  
**Presbyopia**, visual loss due to old age, resulting in difficulty in focusing for near vision (such as reading), 464  
**Prescription**, written explanation to pharmacist regarding name of medication, dosage, and times of administration, 502, 503f  
**Prescription drug**, can only be ordered by licensed physician, dentist, or veterinarian, 502  
**Pressure equalizing tube (PE tube)**, small tube surgically placed in child's ear to assist in drainage of trapped fluid, 487  
**Priapism**, persistent and painful erection due to pathological causes, not sexual arousal, 369  
**Primary site**, designates where malignant tumor first appeared, 537  
**Primigravida**, woman who has been pregnant once, 348  
**Primipara**, woman who has given birth once, 348  
**Probe**, surgical instrument used to explore tissue, 530t  
 Procedural suffixes, 10  
**Process**, projection from surface of a bone, 85–86  
**Proctologist**, specialist in anus and rectum, 277  
**Proctology**, branch of medicine involved in diagnosis and treatment of diseases and disorders of anus and rectum, 277  
**Proctopexy**, surgical fixation of rectum, 290  
**Proctoptosis**, drooping rectum, 283  
**Progesterone**, one of hormones produced by ovaries; works with estrogen to control menstrual cycle, 339, 389t, 390  
**Prolactin (PRL)**, hormone secreted by anterior pituitary; stimulates milk production, 389t, 393  
**Prolapsed umbilical cord**, when umbilical cord of baby is expelled first during delivery and is squeezed between baby's head and vaginal wall; presents emergency situation since baby's circulation is compromised, 353  
**Prolapsed uterus**, fallen uterus that can cause cervix to protrude through vaginal opening; generally caused by weakened muscles from vaginal delivery or as a result of pelvic tumors pressing down, 351  
**Pronation**, to turn downward or backward, as with hand or foot, 119f, 119t  
**Prone**, directional term meaning lying horizontally facing downward, 40f, 40t, 531f, 532t  
 Pronunciation, of medical terms, 11  
**Prophylaxis**, prevention of disease; for example, antibiotic can be used to prevent occurrence of disease, 507  
**Proprietary name**, name a pharmaceutical company chooses as trademark or market name for its drug; also called *brand* or *trade name*, 501  
**Prostate cancer**, slow-growing cancer that affects large number of males after age 50; PSA (prostate-specific antigen) test is used to assist in early detection of this disease, 368  
**Prostate gland**, within male reproductive system produces fluids that nourish sperm, 308f, 309f, 362, 363, 363f, 365, 368  
**Prostate-specific antigen (PSA)**, blood test to screen for prostate cancer; elevated blood levels associated with prostate cancer, 371  
**Prostatectomy**, surgical removal of prostate gland, 372  
**Prostatic**, pertaining to prostate gland, 366  
**Prostatitis**, inflamed condition of prostate gland that may be result of infection, 368



**Prosthesis**, artificial device used as substitute for body part either congenitally missing or absent as result of accident or disease; for instance, artificial leg or hip prosthesis, 108

Prosthetic hip joint, 109f

**Prosthetic lens implant**, use of artificial lens to replace lens removed during cataract surgery, 472

**Prosthetics**, artificial devices, such as limbs and joints, that replace missing body part, 99, 524

Prosthetist, 99

**Protease inhibitor drugs**, medications that inhibit protease, enzyme viruses need to reproduce, 209

**Protein-bound iodine test (PBI)**, blood test to measure concentration of thyroxine ( $T_4$ ) circulating in bloodstream; iodine becomes bound to protein in blood and can be measured; useful in establishing thyroid function, 405

**Proteinuria**, protein in urine, 316

**Prothrombin**, protein element within blood that interacts with calcium salts to form thrombin, 184

**Prothrombin time** (pro-time), measurement of time it takes for sample of blood to coagulate, 191

**Protocol** (prot), actual plan of care, including medications, surgeries, and treatments for care of patient; often, entire healthcare team—including physician, oncologist, radiologist, nurse, and patient—will assist in designing treatment plan, 535

**Proton pump inhibitor**, blocks stomach's ability to secrete acid; used to treat peptic ulcers and gastroesophageal reflux disease, 291

**Protozoans**, single-celled organisms that can infect body, 199

**Proximal**, directional term meaning located closest to point of attachment to body, 39f, 39t

**Proximal convoluted tubule**, portion of renal tubule, 307, 308f, 310f

**Pruritus**, severe itching, 60

**Pseudocyesis**, false pregnancy, 353

**Pseudohypertrophic muscular dystrophy**, one type of inherited muscular dystrophy in which muscle tissue is gradually replaced by fatty tissue, giving the appearance of a strong and healthy muscle, 123

**Psoriasis**, chronic inflammatory condition consisting of crusty papules forming patches with circular borders, 66, 66f

**Psychiatric nurse**, nurse with additional training in care of patients with mental, emotional, and behavioral disorders, 510

**Psychiatric social work**, social worker with additional training in care of patients with mental, emotional, or behavioral disorders, 510

**Psychiatrist**, physician with specialized training in diagnosing and treating mental disorders; prescribes medication and conducts counseling, 510

**Psychiatry**, branch of medicine that deals with the diagnosis, treatment, and prevention of mental disorders, 510

**Psychoanalysis**, method of obtaining a detailed account of past and present emotional and mental experiences from patient to determine source of problem and eliminate effects, 515

**Psychology**, study of human behavior and thought process; behavioral science is primarily concerned with understanding how human beings interact with their physical environment and with each other, 510

**Psychopharmacology**, study of effects of drugs on mind and particularly use of drugs in treating mental disorders; main classes of drugs for treatment of mental disorders are antipsychotic drugs, antidepressant drugs, minor tranquilizers, and lithium, 514

**Psychotherapy**, method of treating mental disorders by mental rather than chemical or physical means; includes psychoanalysis, humanistic therapies, and family and group therapy, 515

**Pterygium**, hypertrophied conjunctival tissue in inner corner of eye, 467

**Puberty**, series of events leading up to a child becoming capable of reproduction, 341

**Pubic**, pertaining to pubis; one of pelvic bones, 97

**Pubic region**, genital region of body, 34t

**Pubis**, one of three bones that form os coxae or innominate bone, 92, 93f, 93t

**Pulmonary**, pertaining to lung, 233

**Pulmonary angiography**, injecting dye into blood vessel for purpose of taking X-ray of arteries and veins of lungs, 244

**Pulmonary artery**, large artery that carries deoxygenated blood from right ventricle to lung, 144, 145f

**Pulmonary capillaries**, network of capillaries in lungs that tightly encase each alveolus; site of gas exchange, 227

**Pulmonary circulation**, transports deoxygenated blood from right side of heart to lungs where oxygen and carbon dioxide are exchanged; then carries oxygenated blood back to left side of heart, 140, 140f

**Pulmonary edema**, condition in which lung tissue retains excessive amount of fluid; results in labored breathing, 241

**Pulmonary embolism**, blood clot or air bubble in pulmonary artery or one of its branches, 241

**Pulmonary fibrosis**, formation of fibrous scar tissue in lungs, which leads to decreased ability to expand lungs; may be caused by infections, pneumoconiosis, autoimmune diseases, and toxin exposure, 241

**Pulmonary function test (PFT)**, group of diagnostic tests that give information regarding air flow in and out of the lungs, lung volumes, and gas exchange between the lungs and bloodstream, 245

Pulmonary semilunar valve, 143f, 144

Pulmonary trunk, 141f, 142f

**Pulmonary valve**, semilunar valve between right ventricle and pulmonary artery in heart; prevents blood from flowing backward into ventricle, 142f, 143f, 144

**Pulmonary vein**, large vein that returns oxygenated blood from lungs to left atrium, 144, 145f

**Pulmonologist**, physician specialized in treating diseases and disorders of respiratory system, 234

**Pulmonology**, branch of medicine specializing in conditions of respiratory system, 234

**Pulp cavity**, hollow interior of tooth; contains soft tissue made up of blood vessels, nerves, and lymph vessels, 266, 267f

**Pulse** (P), expansion and contraction produced by blood as it moves through artery; can be taken at several pulse points throughout body where artery is close to surface, 149

**Pupil**, hole in center of iris; size is changed by iris dilating or constricting, 455, 456f, 457

**Pupillary**, pertaining to pupil, 462

Purified protein derivative (PPD). See Tuberculin skin test

**Purkinje fibers**, part of conduction system of heart; found in ventricular myocardium, 145, 146f

**Purpura**, hemorrhages into skin and mucous membranes, 60, 60f

**Purulent**, containing pus or an infection that is producing pus, 60

**Pustule**, raised spot on skin containing pus, 60, 60f

**Pyelitic**, pertaining to renal pelvis, 313

**Pyelitis**, inflammation of renal pelvis, 318

**Pyelogram**, X-ray record of the renal pelvis, 320

**Pyelonephritis**, inflammation of renal pelvis and kidney; one of most common types of kidney disease; may be result of lower urinary tract infection that moved up to kidney by way of ureters; may be large quantities of white blood cells and bacteria in urine, and blood (hematuria) may even be present in urine in this condition; can occur with any untreated or persistent case of cystitis, 318

**Pyeloplasty**, surgical repair of renal pelvis, 323

**Pyloric**, pertaining to pylorus, 276

**Pyloric sphincter**, located at distal end of stomach; controls passage of food into duodenum, 268f, 269, 272f

**Pyoderma**, pus-producing skin infection, 60

**Pyosalpinx**, condition of having pus in fallopian tubes, 350

**Pyothorax**, condition of having pus in chest cavity, 237, 242

**Pyromania**, impulse control disorder in which patient is unable to control impulse to start fires, 512

**Pyrosis**, pain and burning sensation usually caused by stomach acid splashing up into the esophagus; commonly called *heartburn*, 278

**Pyuria**, presence of pus in urine, 316

## Q

**Quadriplegia**, paralysis of all four extremities; same as tetraplegia, 432

## R

**Radial**, pertaining to radius; lower arm bone, 97

Radial artery, 148f

**Radial keratotomy**, spokelike incisions around cornea that result in it becoming flatter; surgical treatment for myopia, 472

Radial nerve, 427f

Radial vein, 150f

**Radiation therapy**, use of X-rays to treat disease, especially cancer, 538

**Radical mastectomy**, surgical removal of breast tissue plus chest muscles and axillary lymph nodes, 358

**Radical surgery**, extensive surgery to remove as much tissue associated with tumor as possible, 538

**Radiculitis**, nerve root inflammation, 437

**Radiculopathy**, disease of nerve root, 437

**Radioactive implant**, embedding radioactive source directly into tissue to provide highly localized radiation dosage to damage nearby cancerous cells; also called *brachytherapy*, 538

**Radiography**, making of X-ray pictures, 107, 517

**Radioimmunoassay** (RIA), test used to measure levels of hormones in plasma of blood, 405

**Radioisotope**, radioactive form of element, 517

**Radiologist**, physician who practices diagnosis and treatment by use of radiant energy; responsible for interpreting X-ray films, 517

**Radiology**, branch of medicine that uses radioactive substances such as X-rays, isotopes, and radiation to prevent, diagnose, and treat diseases, 520

**Radiolucent**, structures that allow X-rays to pass through and expose photographic plate, making it appear as black area on X-ray, are termed *radiolucent*, 517

**Radiopaque**, structures impenetrable to X-rays, appearing as light area on radiograph (X-ray), 517

**Radius**, one of forearm bones in upper extremity, 92, 92f, 92t

**Range of motion** (ROM), range of movement of a joint, from maximum flexion through maximum extension; measured as degrees of a circle, 525

**Raynaud's phenomenon**, periodic ischemic attacks affecting extremities of body, especially fingers, toes, ears, and nose; affected extremities become cyanotic and very painful; attacks are brought on by arterial constriction due to extreme cold or emotional stress, 160

**Reabsorption**, second phase of urine production; substances needed by body are reabsorbed as filtrate passes through kidney tubules, 310, 310f

**Recklinghausen disease**, excessive production of parathyroid hormone, which results in degeneration of bones, 401

**Rectal**, (1) pertaining to rectum; (2) substances introduced directly into rectal cavity in form of suppositories or solution; drugs may have to be administered by this route if patient is unable to take them by mouth due to nausea, vomiting, and surgery, 276, 506t

**Rectocele**, protrusion or herniation of rectum into vagina, 351

**Rectum**, area at end of digestive tube for storage of feces that leads to anus, 264, 270, 270f, 338f, 341f, 343f, 363f

**Rectus abdominis**, muscle named for its location and direction of its fibers: rectus means "straight" and abdominis means "abdominal," 116

**Rectus muscles**, rectus means "straight"; four of eye muscles are rectus muscles, 458

**Red blood cell count** (RBC), blood test to determine number of erythrocytes in volume of blood; decrease in red blood cells may indicate anemia; increase may indicate polycythemia, 191

**Red blood cell morphology**, examination of blood for abnormalities in shape (morphology) of erythrocytes; used to determine diseases like sickle-cell anemia, 191

**Red blood cells** (RBCs), also called *erythrocytes*; contain hemoglobin, and iron-containing pigment that binds oxygen in order to transport it to cells of body, 181, 182, 183f

**Red bone marrow**, tissue that manufactures most of blood cells; found in cancellous bone cavities, 85

**Reduction**, correcting a fracture by realigning bone fragments; *closed reduction* is doing this without entering body; *open reduction* is making surgical incision at site of fracture to do reduction, often necessary where there are bony fragments to be removed, 110

**Refractive error test**, eye examination performed to determine and correct refractive errors in eye, 470

**Refract**, bending of light rays as they enter eye, 456

**Regional anesthesia**, also referred to as *nerve block*; anesthetic interrupts patient's pain sensation in a particular region of body; injected near nerve that will be blocked from sensation; patient usually remains conscious, 530t

Regional ileitis. See Crohn's disease

**Regurgitation**, to flow backward; within cardiovascular system refers to blood flowing backward through valve; within digestive system refers to food flowing backward from stomach to mouth, 155, 279

**Rehabilitation**, process of treatment and exercise that can help person with disability attain maximum function and well-being, 525

**Rehabilitation centers**, facilities that provide intensive physical and occupational therapy; include inpatient and outpatient treatment, 15

Rehabilitation services, 522–27

abbreviations, 527

occupational therapy, 523

physical therapy, 523

therapeutic procedures, 525–27

vocabulary, 523–25

**Reinfection**, infection that occurs when person becomes infected again with same pathogen, 201

**Relapse**, return of disease symptoms after period of improvement, 537

**Remission**, period during which symptoms of disease or disorder leave; can be temporary, 537

**Renal**, pertaining to kidney, 313

**Renal artery**, artery that originates from abdominal aorta and carries blood to nephrons of kidney, 148f, 306, 307f, 310f

**Renal cell carcinoma**, cancerous tumor that arises from kidney tubule cells, 318

**Renal colic**, pain caused by kidney stone, which can be excruciating and generally requires medical treatment, 316

**Renal corpuscle**, part of a nephron; double-walled cuplike structure called glomerular capsule or Bowman's capsule and contains capillary network

called glomerulus; afferent arteriole carries blood to glomerulus and efferent arteriole carries blood away from glomerulus; filtration stage of urine production occurs in renal corpuscle as wastes are filtered from blood in glomerulus and enter Bowman's capsule, 307

**Renal failure**, inability of kidneys to filter wastes from blood resulting in uremia; may be acute or chronic; major reason for patient being placed on dialysis, 318

**Renal papilla**, tip of renal pyramid, 306, 307f

**Renal pelvis**, large collecting site for urine within kidney; collects urine from each calyx; urine leaves renal pelvis via ureter, 306, 307f

**Renal pyramid**, triangular-shaped region of renal medulla, 306, 307f

**Renal transplant**, surgical replacement with a donor kidney, 323, 323f

**Renal tubule**, network of tubes found in a nephron; consists of proximal convoluted tubule, loop of Henle, distal tubule, and collecting tubule; where reabsorption and secretion stages of urine production occur; as glomerular filtrate passes through, most of water and some of dissolved substances, such as amino acids and electrolytes, are reabsorbed; at same time, substances that are too large to filter into Bowman's capsule, such as urea, are secreted directly from bloodstream into renal tubule; filtrate that reaches collecting tubule becomes urine, 307

**Renal vein**, carries blood away from kidneys, 306, 307f, 310f

**Repetitive motion disorder**, group of chronic disorders involving tendon, muscle, joint, and nerve damage, resulting from tissue being subjected to pressure, vibration, or repetitive movements for prolonged periods, 123

Reproductive system, 335–73

**Resection**, to surgically cut out or remove; excision, 533

**Residual hearing**, amount of hearing still present after damage has occurred to auditory mechanism, 482

**Residual volume** (RV), air remaining in lungs after forced exhalation, 229t

Respirator. See Ventilator

Respiratory distress syndrome of the newborn. See Infant respiratory distress syndrome

**Respiratory membrane**, formed by tight association of walls of alveoli and capillaries; gas exchange between lungs and blood occurs across this membrane, 227

Respiratory muscles, 229–30, 229t, 230f

Respiratory rate, 230, 231t

**Respiratory system**, brings oxygen into lungs and expels carbon dioxide; organs include nose, pharynx, larynx, trachea, bronchial tubes, and lungs, 221–50 abbreviations, 249–50

adjective forms of anatomical terms, 233

anatomy and physiology, 224–31

bronchial tubes, 227, 227f–228f

diagnostic procedures, 244–45

larynx, 226, 226f

- lung volumes/capacities, 228, 229f  
lungs, 228  
muscles, 229–30, 229t, 230f  
nasal cavity, 224–25, 225f  
pathology, 234–43  
pharmacology, 249  
pharynx, 226  
rate, 230, 231t  
terminology, 231–33  
therapeutic procedures, 246–48  
trachea, 226–27, 226f
- Respiratory therapist (RT)**, allied health professional whose duties include conducting pulmonary function tests, monitoring oxygen and carbon dioxide levels in blood, and administering breathing treatments, 228, 234
- Respiratory therapy**, allied health specialty that assists patients with respiratory and cardiopulmonary disorders, 234
- Retina**, innermost layer of eye; contains visual receptors called rods and cones that receive light impulses and transmit them to brain via optic nerve, 455, 456, 456f, 457, 457f
- Retinal**, pertaining to retina, 462
- Retinal arteries, 460f
- Retinal blood vessels**, blood vessels that supply oxygen to rods and cones of retina, 457, 457f
- Retinal detachment**, occurs when retina becomes separated from choroid layer; separation seriously damages blood vessels and nerves, resulting in blindness, 467
- Retinal veins, 460f
- Retinitis pigmentosa**, progressive disease of eye resulting in retina becoming hard (sclerosed), pigmented (colored), and atrophied (wasting away); no known cure, 467
- Retinoblastoma**, malignant eye tumor occurring in children, usually under the age of 3; requires enucleation, 467
- Retinopathy**, retinal disease, 467
- Retinopexy**, surgical fixation of retina, 472
- Retrograde pyelogram (RP)**, diagnostic X-ray in which dye is inserted through urethra to outline bladder, ureters, and renal pelvis, 320, 320f
- Retroperitoneal**, pertaining to behind peritoneum; describes position of kidneys, which is outside of peritoneal sac alongside spine, 306
- Retrovirus. See Human immunodeficiency virus
- Reverse transcriptase inhibitor drugs**, medication that inhibits reverse transcriptase, enzyme needed for viruses to reproduce, 209
- Reye's syndrome**, brain inflammation and damage to various organs, especially liver, in children under age 15 after a viral infection; associated with taking aspirin, 435
- Rh factor**, antigen marker found on erythrocytes of persons with Rh+ blood, 184, 185
- Rh-negative (Rh–)**, person with Rh– blood type; person's RBCs do not have Rh marker and will make antibodies against Rh+ blood, 185
- Rh-positive (Rh+)**, person with Rh+ blood type; person's RBCs have Rh marker, 185
- Rheumatoid arthritis (RA)**, chronic form of arthritis with inflammation of joints, swelling, stiffness, pain, and changes in cartilage that can result in crippling deformities, 105, 105f
- Rhinitis**, inflammation of nose, 237
- Rhinomycosis**, condition of having fungal infection in nose, 239
- Rhinoplasty**, plastic surgery of nose, 247
- Rhinorrhagia**, rapid flow of blood from nose, 237
- Rhinorrhea**, discharge from the nose; commonly called a runny nose, 237
- Rhonchi**, somewhat musical sound during expiration, often found in asthma or infection, caused by spasms of bronchial tubes; also called *wheezing*, 238
- Rhytidectomy**, surgical removal of excess skin to eliminate wrinkles; commonly referred to as a *face lift*, 70
- Rib cage**, also called *chest cavity*; formed by curved ribs extending from vertebral column around sides and attaching to sternum; ribs are part of axial skeleton, 89–90, 90f
- Ribs, 88f
- Rickets**, deficiency in calcium and vitamin D found in early childhood that results in bone deformities, especially bowed legs, 103
- Right atrium, 140f, 142f, 145f
- Right coronary artery, 147f
- Right hypochondriac**, anatomical division of abdomen; right upper row, 37t
- Right inguinal**, anatomical division of abdomen; right lower row, 37t
- Right lower quadrant (RLQ)**, clinical division of abdomen; contains portions of small and large intestines, right ovary and fallopian tube, appendix, and right ureter, 38t
- Right lumbar**, anatomical division of abdomen, right middle row, 37t
- Right lymphatic duct**, one of two large lymphatic ducts that drains right arm and right side of head, neck, and chest; empties lymph into right subclavian vein, 197
- Right upper quadrant (RUQ)**, clinical division of abdomen; contains right lobe of liver, gallbladder, portion of pancreas, and portions of small and large intestines, 38t
- Right ventricle, 140f, 142f, 145f
- Rinne and Weber tuning-fork tests**, physician holds tuning fork, instrument that produces constant pitch when struck against or near bones on side of head; assess both nerve and bone conduction of sound, 485
- Rods**, sensory receptors of retina that are active in dim light and do not perceive color, 457
- Roentgen (r)**, unit for describing exposure dose of radiation, 518
- Roentgenology**, X-rays, 517
- Root**, portion of tooth below gum line, 266, 267f
- Root canal**, dental treatment involving pulp cavity of root of tooth; procedure used to save tooth that is badly infected or abscessed, 266, 267f, 288
- Rotation**, moving around a central axis, 119t



**Rotator cuff injury**, rotator cuff consists of joint capsule of shoulder joint reinforced by tendons from several shoulder muscles; at high risk for strain or tearing injuries, 123

Round window, 477f, 478, 478f

Route of administration, 504

**Rubella**, contagious viral skin infection; commonly called *German measles*, 66

**Rugae**, prominent folds in mucosa of stomach; smooth out and almost disappear allowing stomach to expand when full of food; also found in urinary bladder, 268, 268f, 308

Rule of Nines, 62, 64f

## S

**Saccule**, found in inner ear; plays role in equilibrium, 478

**Sacral**, pertaining to sacrum, 97

**Sacrum**, five fused vertebrae that form large flat bone in upper buttock region, 88f, 89, 90f, 90t

**Sagittal plane**, vertical plane that divides body into left and right sections, 33, 33f

**Sagittal section**, sectional view of body produced by cut along sagittal plane, 33

**Saliva**, watery fluid secreted into mouth from salivary glands; contains digestive enzymes that break down carbohydrates and lubricants that make it easier to swallow food, 265

**Salivary glands**, exocrine glands with ducts that open into mouth; produce saliva, which makes bolus of food easier to swallow and begins digestive process; three pairs include parotid, submandibular, and sublingual, 263, 264, 271

**Salpingectomy**, surgical removal of fallopian tubes, 358

**Salpingitis**, inflammation of fallopian tube or tubes; also, inflammation of eustachian tube, 350, 483

**Salpingocystitis**, tubal pregnancy, 353

**Salpingotomy**, incision into fallopian tubes, 487

**Sanguinous**, pertaining to blood, 186

**Sarcoidosis**, inflammatory disease of lymph system in which lesions may appear in liver, skin, lungs, lymph nodes, spleen, eyes, and small bones of hands and feet, 206

**Scabies**, contagious skin disease caused by egg-laying mite that causes intense itching; often seen in children, 66

**Scalpel**, surgical instrument used to cut and separate tissue, 530t

**Scan**, recording emission of radioactive waves on photographic plate after substance has been injected into body, 518, 518f

**Scapula**, also called *shoulder blade*; upper extremity bone, 92, 92f, 92t

**Scapular**, pertaining to scapula or shoulder blade, 97

**Schedule I**, drugs with highest potential for addiction and abuse; not accepted for medical use; examples are heroin and LSD, 502t

**Schedule II**, drugs with high potential for addiction and abuse; accepted for medical use in United States; examples are codeine, cocaine, morphine, opium, and secobarbital, 502t

**Schedule III**, drugs with moderate-to-low potential for addiction and abuse; examples are butabarbital, anabolic steroids, and acetaminophen with codeine, 502t

**Schedule IV**, drugs with lower potential for addiction and abuse than Schedule III drugs; examples are chloral hydrate, phenobarbital, and diazepam, 502t

**Schedule V**, drugs with low potential for addiction and abuse; example is low-strength codeine combined with other drugs to suppress coughing, 502t

**Schizophrenia spectrum**, a classification of psychiatric disorders in the DSM-5 characterized by distortions of reality such as delusions and hallucinations, 512

Schwann cell, 421f

Sciatic nerve, 427f

**Sclera**, tough protective outer layer of eyeball; commonly referred to as “white of eye,” 455, 456, 456f

**Scleral**, pertaining to sclera, 462

**Scleral buckling**, placing a band of silicone around outside of sclera to stabilize detaching retina, 472

**Scleritis**, inflammation of sclera, 467

**Scleroderma**, condition in which skin has lost its elasticity and become hardened, 60

**Scleromalacia**, softening of sclera, 464

**Sclerotomy**, to cut into the sclera, 472

**Scoliosis**, abnormal lateral curvature of spine, 104, 104f

**Scratch test**, form of allergy testing in which body is exposed to allergen through light scratch in skin, 207, 208f

**Scrotum**, sac that serves as container for testes; divided by septum, supports testicles and lies between legs and behind penis, 364

**Scrub nurse**, surgical assistant who hands instruments to surgeon; person wears sterile clothing and maintains sterile operative field, 533

**Sebaceous cyst**, sac under skin filled with sebum or oil from sebaceous gland; can grow to large size and may need to be excised, 66

**Sebaceous glands**, also called *oil glands*; produce substance called sebum that lubricates skin surface, 51f, 54

**Seborrhea**, oily discharge, 60

**Sebum**, thick, oily substance secreted by sebaceous glands that lubricates skin to prevent drying out; when sebum accumulates, it can cause congestion in sebaceous glands and whiteheads or pimples may form; when sebum becomes dark it is referred to as *comedo* or *blackhead*, 54

Second-degree burn. *See* Burns

**Secretion**, third phase of urine production; additional waste products are added to filtrate as it passes through kidney tubules, 310, 310f

**Sedative**, produces relaxation without causing sleep, 442

**Seizure**, sudden, uncontrollable onset of symptoms, such as in an epileptic seizure, 432

**Self-inoculation**, infection that occurs when person becomes infected in different part of body by pathogen from another part of his or her own body, such as intestinal bacteria spreading to urethra, 201

- Semen**, contains sperm and fluids secreted by male reproductive system glands; leaves body through urethra, 363
- Semen analysis**, procedure used when performing fertility workup to determine if male is able to produce sperm; semen is collected by patient after abstaining from sexual intercourse for a period of three to five days; sperm in semen are analyzed for number, swimming strength, and shape; also used to determine if vasectomy has been successful; after a period of six weeks, no sperm should be present in sample from patient, 371
- Semicircular canals**, portion of labyrinth associated with balance and equilibrium, 477f, 478
- Semiconscious**, state of being aware of surroundings and responding to stimuli only part of time, 432
- Semilunar valve**, heart valves located between ventricles and great arteries leaving heart; pulmonary valve is located between the right ventricle and the pulmonary artery aortic valve is located between left ventricle and aorta, 144
- Seminal vesicles**, two male reproductive system glands located at base of bladder; secrete fluid that nourishes sperm into vas deferens; fluid plus sperm constitutes much of semen, 362, 363, 363f, 365
- Seminiferous tubules**, network of coiled tubes that make up bulk of testes; sperm development takes place in walls of tubules and mature sperm are released into tubule in order to leave testes, 364, 394f
- Sensorineural hearing loss**, type of hearing loss in which sound is conducted normally through external and middle ear but there is a defect in inner ear or with cochlear nerve, resulting in inability to hear; hearing aid may help, 479
- Sensory neurons**, nerves that carry sensory information from sensory receptors to brain; also called *afferent neurons*, 426
- Sensory receptors**, nerve fibers located directly under skin surface; detect temperature, pain, touch, and pressure; messages for these sensations are conveyed to brain and spinal cord from nerve endings in skin, 420
- Sepsis. See Septicemia
- Septal**, pertaining to nasal septum, 233
- Septicemia**, having bacteria in bloodstream; commonly referred to as *sepsis* or *blood poisoning*, 188
- Sequential multiple analyzer computer (SMAC)**, machine for doing multiple blood chemistry tests automatically, 191
- Serous fluid**, watery secretion of serous membranes, 228
- Serum**, clear, sticky fluid that remains after blood has clotted, 182
- Serum bilirubin**, blood test to determine amount of waste product bilirubin in bloodstream; elevated levels indicate liver disease, 285
- Serum lipoprotein level**, laboratory test to measure amount of cholesterol and triglycerides in blood, 161
- Severe acute respiratory syndrome (SARS)**, acute viral respiratory infection that begins like the flu but quickly progresses to severe dyspnea; high fatality rate in persons over age 65; first appeared in China in 2003, 242
- Severe combined immunodeficiency syndrome (SCIDS)**, disease seen in children born with nonfunctioning immune system; often forced to live in sealed sterile rooms, 206
- Sex hormones**, secreted by gonads and adrenal cortex; estrogen and progesterone in females; testosterone in males, 338, 363
- Sexual dysfunctions**, a classification of psychiatric disorders in the DSM-5 characterized by having difficulty during any stage of normal sexual activity that negatively impacts quality of life; includes erectile dysfunction and premature ejaculation, 514
- Sexual masochism disorder**, paraphilic disorder characterized by receiving sexual gratification from being hurt or abused, 513
- Sexually transmitted disease (STD)**, disease usually acquired as a result of sexual intercourse; formerly referred to as *venereal disease*, 370
- Shield**, protective device used to protect against radiation, 518
- Shingles**, eruption of painful blisters along a nerve path; thought to be caused by a *Herpes zoster* virus infection of the nerve root, 437, 437f
- Short bone**, type of bone that is roughly cube shaped; carpals are short bones, 85, 85f
- Shortness of breath (SOB)**, term used to indicate that patient is having some difficulty breathing; cause can range from mild SOB after exercise to SOB associated with heart disease, 238
- Sialadenitis**, inflammation of salivary gland, 279
- Sickle cell anemia**, severe, chronic, incurable disorder that results in anemia and causes joint pain, chronic weakness, and infections; actual blood cell is crescent shaped, 189, 189f
- Side effect**, response to drug other than effect desired, 507
- Sigmoid colon**, final section of colon; follows S-shaped path and terminates in rectum, 269f, 270, 270f
- Sigmoidal**, pertaining to sigmoid colon, 276
- Sigmoidoscope**, instrument to view inside sigmoid colon, 287
- Sigmoidoscopy**, using flexible sigmoidoscope to visually examine sigmoid colon; commonly done to diagnose cancer and polyps, 287
- Silicosis**, form of respiratory disease resulting from inhalation of silica (quartz) dust; considered an occupational disease, 242
- Simple fracture. See Closed fracture
- Simple mastectomy**, surgical removal of breast tissue, 358
- Singular endings, 12
- Sinoatrial node (SA)**, also called *pacemaker of heart*; area of right atria that initiates electrical pulse that causes heart to contract, 145, 146f
- Sinus**, hollow cavity within bone, 86
- Skeletal**, pertaining to skeleton, 125
- Skeletal muscle**, voluntary muscle attached to bones by tendon, 25, 114, 114f, 115, 115f
- Skeletal muscle relaxant**, produces relaxation of skeletal muscle, 125
- Skeletal muscle tissue, 25



- Skeletal system**, 82–111, 83f  
 abbreviations, 111  
 adjective forms of anatomical terms, 96–98  
 anatomy and physiology, 84–94  
 appendicular skeleton, 86, 90–94, 91f  
 axial skeleton, 86, 87–90, 88f  
 bones, 84–86  
 diagnostic procedures, 107  
 joints, 93–94, 94f  
 pathology, 98–106  
 pharmacology, 110  
 terminology, 95–96  
 therapeutic procedures, 108–10
- Skeleton**, bones forming framework for body; site for skeletal muscle attachments, 84  
 appendicular, 86, 90–94, 91f  
 axial, 86, 87–90, 88f
- Skin**, major organ of integumentary system; forms barrier between external and internal environments, 50–52, 51f, 61–67
- Skin graft** (SG), transfer of skin from normal area to cover another site; used to treat burn victims and after some surgical procedures, 69
- Skull**, 87, 88f, 89f, 89t, 94f
- Sleep apnea**, condition in which breathing stops repeatedly during sleep long enough to cause drop in oxygen levels in blood, 242
- Sleep apnea study**. See Polysomnography
- Sleep–wake disorders**, a classification of psychiatric disorders in the DSM-5 relating to either sleeping or wakefulness; includes insomnia disorder and narcolepsy, 513
- Slit lamp microscopy**, examining the conjunctiva, cornea, iris, and lens of the eye, 470
- Small intestine**, portion of digestive tube between stomach and colon, and major site of nutrient absorption; three sections: duodenum, jejunum, and ileum, 263, 264, 269–70, 281–83
- Smooth muscle**, involuntary muscle found in internal organs such as digestive organs or blood vessels, 25, 26f, 114, 114f, 115, 115f, 147f
- Snellen chart**, used for testing distance vision; contains letters of varying size and is administered from distance of 20 feet; person who can read at 20 feet what average person can read at that distance is said to have 20/20 vision, 470
- Sodium** (Na<sup>+</sup>), inorganic substance found in plasma, 182
- Soft palate**, 225f, 265f–266f
- Somatic nerves**, serve skin and skeletal muscles and mainly involved with conscious and voluntary activities of body, 426, 427
- Somatic symptom and related disorders**, a classification of psychiatric disorders in the DSM-5 in which patient has physical symptoms for which no physical disease can be determined; include somatic symptom disorder and conversion disorder, 513
- Somatic symptom disorder**, disorder involving a preoccupation with health concerns, 513
- Somatotropin**, another name for growth hormone; promotes growth of body by stimulating cells to rapidly increase in size and divide, 393
- Sound waves**, 479f
- Spasm**, sudden, involuntary, strong muscle contraction, 122
- Spastic colon**. See Irritable bowel syndrome
- Specialty senses**, organs that perceive environmental conditions; eyes, ears, nose, and tongue contain special sense organs, 31t
- Specialty care hospitals**, provide care for very specific types of disease; example is psychiatric hospital, 15
- Specific gravity** (sp. grav.), characteristic of urine that indicates amount of dissolved substances in urine, 311, 311t
- Speculum**, surgical instrument used to spread apart walls of cavity, 356, 356f, 530t
- Spelling**, of medical terms, 11–12
- Sperm**, also called *spermatozoon* (plural is *spermatozoa*); male sex cell; one sperm fuses with ovum to produce a new being, 363, 394, 394f
- Sperm cells**, 24f
- Spermatic**, pertaining to sperm, 367
- Spermatic cord**, term for cordlike collection of structures that include vas deferens, arteries, veins, nerves, and lymph vessels; spermatic cord suspends testes within scrotum, 365
- Spermatocide**, substance that kills sperm, 373
- Spermatogenesis**, formation of mature sperm, 364, 364f
- Spermatolysis**, refers to anything that destroys sperm, 367
- Spermatozoon**, 364
- Sphenoid bone**, cranial bone, 87, 89f, 89t
- Sphincter**, ring of muscle around tubular organ; can contract to control opening of tube, 269, 364
- Sphygmomanometer**, instrument for measuring blood pressure; also referred to as *blood pressure cuff*, 149, 161, 161f
- Spina bifida**, congenital defect in walls of spinal canal in which laminae of vertebra do not meet or close; may result in meninges or spinal cord being pushed through opening, 104, 436, 436f
- Spinal**, pertaining to spine, 429
- Spinal cavity**, dorsal body cavity within spinal column that contains spinal cord, 36, 36f, 37t, 424, 424f
- Spinal column**. See Vertebral column
- Spinal cord**, provides pathway for impulses traveling to and from brain; column of nerve fibers that extends from medulla oblongata of brain down to level of second lumbar vertebra, 25, 31t, 419, 420, 423f, 424–25, 424f, 435–36
- Spinal cord injury** (SCI), bruising or severing of spinal cord from blow to vertebral column resulting in muscle paralysis and sensory impairment below injury level, 436
- Spinal fusion**, surgical immobilization of adjacent vertebrae; may be done for several reasons, including correction for herniated disk, 109
- Spinal nerves**, nerves that arise from spinal cord, 420, 427f
- Spinal puncture**. See Lumbar puncture
- Spinal stenosis**, narrowing of spinal canal causing pressure on cord and nerves, 104
- Spinal tap**. See Lumbar puncture

- Spiral fracture**, fracture line spirals around shaft of bone; can be caused by twisting injury, 101
- Spirometer**, instrument consisting of container into which patient can exhale for purpose of measuring air capacity of lungs, 245
- Spirometry**, using device to measure breathing capacity of lungs, 245
- Spleen**, organ in lymphatic system that filters microorganisms and old red blood cells from blood, 195, 196, 199, 199f
- Splenectomy**, surgical removal of spleen, 208
- Splenic**, pertaining to spleen, 203
- Splenomegaly**, enlargement of spleen, 204
- Split-thickness skin graft (STSG), 72
- Spondylolisthesis**, forward sliding of lumbar vertebra over vertebra below it, 104
- Spondylosis**, ankylosing of the spine; general term for any degenerative condition of the vertebral column, 104
- Spongy bone**, bony tissue found inside bone; contains cavities that hold red bone marrow; also called *cancellous bone*, 85, 86f, 94f
- Spontaneous abortion**, loss of fetus without any artificial aid; also called *miscarriage*, 353
- Sprain**, pain and disability caused by trauma to joint; ligament may be torn in severe sprains, 106
- Sputum**, mucus or phlegm coughed up from lining of respiratory tract, 237, 238
- Sputum culture and sensitivity** (C&S), testing sputum by placing it on culture medium and observing any bacterial growth; specimen is then tested to determine antibiotic effectiveness, 244
- Sputum cytology**, testing for malignant cells in sputum, 244
- Squamous cell carcinoma** (SCC), epidermal cancer that may go into deeper tissue but does not generally metastasize, 66, 66f
- Staging**, process of classifying tumors based on degree of tissue invasion and potential response to therapy; TNM staging system is frequently used; *T* refers to tumor's size and invasion, *N* refers to lymph node involvement, and *M* refers to presence of metastases of tumor cells, 535–36, 536t
- Staging laparotomy**, surgical procedure in which abdomen is entered to determine extent and staging of tumor, 538
- Staging tumors, 535–36, 536t
- Standard precautions, 201
- Stapedectomy**, removal of stapes bone to treat otosclerosis (hardening of bone); prosthesis or artificial stapes may be implanted, 487
- Stapes**, one of three ossicles of middle ear; attached to oval window leading to inner ear; also called *stirrup*, 477f, 478, 478f
- Stent**, stainless steel tube placed within blood vessel or duct to widen lumen, 166
- Sterility**, the inability to produce offspring, 368
- Sterilization**, process of rendering male or female sterile or unable to conceive children, 372
- Sternal**, pertaining to sternum or breast bone, 97
- Sternocleidomastoid**, muscle named for its attachments: sternum, clavicle, and mastoid process, 116
- Sternum**, also called *breast bone*; part of axial skeleton and anterior attachment for ribs, 88f, 89, 90f
- Steroid sex hormones**, class of hormones secreted by adrenal cortex; includes aldosterone, cortisol, androgens, estrogens, and progestins, 388t, 390
- Stethoscope**, instrument for listening to body sounds, such as chest, heart, or intestines, 161
- Stillbirth**, viable-aged fetus dies before or at time of delivery, 353
- Stirrup. See Stapes
- Stomach**, J-shaped muscular organ that acts as sac to collect, churn, digest, and store food; composed of three parts: fundus, body, and antrum; hydrochloric acid is secreted by glands in mucous membrane lining; food mixes with other gastric juices and hydrochloric acid to form semisoft mixture called chyme, which then passes into duodenum, 263, 264, 268–69, 270f, 279–80
- Stool culture**, laboratory test of feces to determine if there are any pathogenic bacteria present, 285
- Stool guaiac. See Fecal occult blood test
- Strabismus**, eye muscle weakness resulting in each eye looking in different direction at same time; may be corrected with glasses, eye exercises, and/or surgery; also called *crossed eyes*, 468
- Strabotomy**, incision into eye muscles in order to correct strabismus, 472
- Strain**, trauma to muscle from excessive stretching or pulling, 123
- Stratified squamous epithelium**, layers of flat or scalelike cells found in epidermis; *stratified* means multiple layers and *squamous* means flat, 51–52, 51f
- Strawberry hemangioma**, congenital collection of dilated blood vessels causing red birthmark that fades a few months after birth, 66, 66f
- Stress fracture**, slight fracture caused by repetitive low-impact forces, like running, rather than single forceful impact, 101
- Stress testing**, method for evaluating cardiovascular fitness; patient is placed on treadmill or bicycle and then subjected to steadily increasing levels of work; EKG and oxygen levels are taken while patient exercises, 163, 163f
- Striated muscle**, another name for skeletal muscle, referring to its striped appearance under microscope, 115, 115f
- Stricture**, narrowing of passageway in urinary system, 316
- Stridor**, harsh, high-pitched, noisy breathing sound made when there is obstruction of bronchus or larynx; found in conditions such as croup in children, 238
- Stroke. See Cerebrovascular accident
- Stye (sty). See Hordeolum
- Subarachnoid space**, area located between arachnoid layer and pia mater; contains cerebrospinal fluid, 425, 425f
- Subcutaneous** (Subq, Subc), (1) pertaining to under skin; (2) injection of medication under skin, 505f, 506t, 530t

Subclavian artery, 148*f*

Subclavian vein, 150*f*

**Subcutaneous layer**, deepest layer of skin where fat is formed; layer of fatty tissue protects deeper tissues of body and acts as insulation for heat and cold, 50, 51*f*, 52

**Subdural**, pertaining to below the dura mater, 429

**Subdural hematoma**, mass of blood forming beneath dura mater of brain, 438, 438*f*

**Subdural space**, space located between dura mater and arachnoid layer, 425, 425*f*

**Sublingual** (sl), (1) pertaining to under tongue; (2) administration of medicine by placing it under tongue, 276, 504*f*, 504*t*

Sublingual duct, 271*f*

**Sublingual glands**, pair of salivary glands in floor of mouth, 271, 271*f*

**Subluxation**, incomplete dislocation; joint alignment is disrupted, but ends of bones remain in contact, 106

**Submandibular**, pertaining to under the mandible, 276

Submandibular duct, 265*f*, 271*f*

**Submandibular glands**, pair of salivary glands in floor of mouth, 271, 271*f*

**Substance use and addictive disorders**, a classification of psychiatric disorders in the DSM-5; includes substance use disorders and gambling disorder, 513

**Substance use disorder**, overindulgence or dependence on chemical substances including alcohol, illegal drugs, and prescription drugs, 513

**Sudden infant death syndrome** (SIDS), sudden, unexplained death of infant in which postmortem examination fails to determine cause of death, 242

**Sudoriferous glands**, typical sweat glands of skin, 54

**Suffix**, word part attached to end of word; frequently indicates condition, disease, or procedure; almost all medical terms have a suffix, 2, 3, 7–9  
adjective, 9  
procedural, 10  
surgical, 9–10

Suffocation. *See* Asphyxia

**Sulci**, also called *fissures*; grooves that separate gyri of cerebral cortex; singular is *sulcus*, 423

**Superficial**, directional term meaning nearer surface of body, 40*t*

**Superior**, directional term meaning toward head, or above, 39*f*, 39*t*

Superior mesenteric vein, 150*f*

**Superior vena cava**, branch of vena cava that drains blood from chest and upper body, 141*f*, 142*f*, 144, 145*f*, 146*f*, 150*f*

**Supination**, turning palm or foot upward, 119*f*, 119*t*

**Supine**, directional term meaning lying horizontally and facing upward, 40*f*, 40*t*

Supplemental air. *See* Expiratory reserve volume

**Supplemental oxygen therapy**, providing patient with additional concentration of oxygen to improve oxygen levels in bloodstream; oxygen may be provided by mask or nasal cannula, 246

**Suppositories** (suppos), method for administering medication by placing it in substance that will melt after being placed in body cavity, usually rectally, and release medication, 506*t*

**Suppurative**, containing or producing pus, 60

**Surgeon**, physician who has completed additional training of five years or more in surgical specialty area; specialty areas include orthopedics; neurosurgery; gynecology; ophthalmology; urology; and thoracic, vascular, cardiac, plastic, and general surgery, 529

**Surgery**, branch of medicine dealing with operative procedures to correct deformities and defects, repair injuries, and diagnose and cure diseases, 528–33

abbreviations, 533

anesthesia, 529, 530*t*

surgical instruments, 529, 530*t*, 531*f*

surgical positions, 531, 531*f*, 532*t*

vocabulary, 532–33

**Surgical center**, facility that provides services that range from simple surgeries to diagnostic testing to therapy and do not require overnight hospitalization; also called *ambulatory care center* or *outpatient clinic*, 15

Surgical instruments, 529, 530*t*, 531*f*

Surgical positions, 531, 531*f*, 532*t*

Surgical suffixes, 9–10

Suspensory ligament, 457

Suture, 89*f*

**Suture material**, used to close wound or incision; examples are catgut, silk thread, or staples; may or may not be removed when wound heals, depending on type of material used, 533

**Sweat duct**, duct leading from sweat gland to surface of skin; carries sweat, 51*f*, 54

**Sweat glands**, produce sweat, which assists body in maintaining its internal temperature by creating a cooling effect when it evaporates, 51*f*, 54

**Sweat pore**, surface opening of sweat duct, 51*f*, 54

**Sweat test**, performed on sweat to determine level of chloride; there is an increase in skin chloride in disease cystic fibrosis, 245

Swimmer's ear. *See* Otitis externa

**Sympathetic branch**, part of autonomic nervous system; stimulates body in times of stress and crisis by increasing heart rate, dilating airways to allow for more oxygen, increasing blood pressure, inhibiting digestion, and stimulating production of adrenaline during crisis, 427

Symphysis pubis, 338*f*, 343*f*, 363*f*

**Synapse**, point at which axon of one neuron meets dendrite of next neuron, 420

**Synaptic cleft**, gap between two neurons, 420

**Syncope**, fainting, 432

**Syndrome**, group of symptoms and signs that when combined present clinical picture of disease or condition, 400

**Synovectomy**, surgical removal of synovial membrane, 109

**Synovial**, pertaining to synovial membrane, 96

**Synovial fluid**, secreted by synovial membrane in synovial joint; lubricates joint and reduces friction, 94, 94*f*

**Synovial joint**, freely moving joint that is lubricated by synovial fluid, 94, 94*f*

**Synovial membrane**, lines synovial joint; secretes lubricating fluid called *synovial fluid*, 94, 94*f*

**Synovitis**, inflammation of synovial membrane, 99

**Syphilis**, infectious, chronic venereal disease that can involve any organ; may exist for years without symptoms; treated with antibiotic penicillin, 370

**System**, several organs working in compatible manner to perform complex function or functions; examples include digestive system, cardiovascular system, and respiratory system, 27, 27–31*t*

**Systemic circulation**, transports oxygenated blood from left side of heart to cells of body and then back to right side of heart, 140, 140*f*

**Systemic lupus erythematosus (SLE)**, chronic disease of connective tissue that injures skin, joints, kidneys, nervous system, and mucous membranes; may produce characteristic butterfly rash across cheeks and nose, 67, 106

Systemic veins, 140*f*

**Systole**, period of time during which heart chamber is contracting, 144

**Systolic pressure**, maximum pressure within blood vessels during heart contraction, 149

## T

**T cells**, lymphocytes active in cellular immunity, 199, 395

**T lymphocytes**, type of lymphocyte involved with producing cells that physically attack and destroy pathogens, 199

**Tachycardia**, abnormally fast heart rate, over 100 bpm, 155

**Tachypnea**, rapid breathing rate, 238

**Tagging**, attachment of radioactive material to chemical and tracing it as it moves through body, 518

**Talipes**, congenital deformity of foot; also referred to as *clubfoot*, 106

**Target organs**, hormones act on them to either increase or decrease organ's activity level, 388

**Tarsal**, pertaining to ankle, 97

**Tarsus**, collective name for the seven ankle and heel bones in each lower extremity, 91*f*, 92, 93*f*, 93*t*

**Taste buds**, found on surface of tongue; designed to detect bitter, sweet, sour, salty, and umami flavors in our food, 265

**Tears**, fluid that washes and lubricates anterior surface of eyeball, 459

**Teeth**, structures in mouth that mechanically break up food into smaller pieces during chewing, 265, 266, 266*f*, 267*f*

**Temporal bone**, cranial bone, 87, 89*f*, 89*t*, 477*f*

**Temporal lobe**, one of four cerebral hemisphere lobes; controls hearing and smell, 423, 423*f*

**Tenaculum**, long-handled clamp surgical instrument, 530*t*

**Tendinitis**, inflammation of tendon, 123

**Tendinous**, pertaining to tendon, 121

**Tendons**, strong connective tissue cords that attach skeletal muscles to bones, 25

**Tendoplasty**, surgical repair of a tendon, 124

**Tendotomy**, incision into a tendon, 124

Tennis elbow. *See* Lateral epicondylitis

**Tenodesis**, surgical procedure to stabilize a joint by anchoring down tendons of muscles that move joint, 124

**Tenodynia**, pain in tendon, 122

**Tenoplasty**, surgical repair of tendon, 124

**Tenorrhaphy**, suturing a tendon, 124

**Testes**, male gonads; oval glands located in scrotum that produce sperm and male hormone, testosterone, 362, 363–64, 363*f*, 368, 372*f*, 387, 389*t*, 394, 394*f*

**Testicles**, also called *testes* (singular is *testis*); oval-shaped organs responsible for development of sperm within seminiferous tubules; testes must be maintained at proper temperature for sperm to survive; lower temperature level is controlled by placement of scrotum outside body; hormone testosterone, which is responsible for growth and development of male reproductive organs, is also produced by testes, 363*f*, 364

**Testicular**, pertaining to testes, 367, 398

**Testicular carcinoma**, cancer of one or both testicles, 368

**Testicular torsion**, twisting of spermatic cord, 368

**Testosterone**, male hormone produced in testes; responsible for growth and development of male reproductive organs, 364, 389*t*, 394, 394*f*

**Tetany**, condition resulting from calcium deficiency in blood; characterized by muscle twitches, cramps, and spasms, 392, 401

**Tetralogy of Fallot**, combination of four congenital anomalies: pulmonary stenosis, interventricular septal defect, abnormal blood supply to aorta, and hypertrophy of right ventricle; needs immediate surgery to correct, 158

**Thalamic**, pertaining to thalamus, 430

**Thalamus**, portion of diencephalon; composed of gray matter and acts as center for relaying impulses from eyes, ears, and skin to cerebrum; also controls pain perception, 392, 393*f*, 422*f*, 423

**Thalassemia**, genetic disorder in which person is unable to make functioning hemoglobin; results in anemia, 189

**Therapeutic abortion**, termination of pregnancy for health of mother, 358

**Therapeutic exercise**, exercise planned and carried out to achieve specific physical benefit, such as improved range of motion, muscle strength, or cardiovascular function, 526

**Thermotherapy**, applying heat to body for therapeutic purposes, 526

Third-degree burn. *See* Burns

**Thoracalgia**, chest pain, 238

**Thoracentesis**, surgical puncture of chest wall for removal of fluids, 247, 247*f*

**Thoracic**, pertaining to chest, 98, 233

**Thoracic cavity**, ventral body cavity in chest area containing lungs and heart, 36, 36*f*, 37*t*

**Thoracic duct**, largest lymph vessel; drains entire body except for right arm, chest wall, and both lungs; empties lymph into left subclavian vein, 197, 198*f*

**Thoracic region**, chest region of body, 34*t*, 35*f*

**Thoracic surgeon**, physician specialized in treating conditions and diseases of respiratory system by surgical means, 234

**Thoracic surgery**, branch of medicine specializing in surgery on respiratory system and thoracic cavity, 234



- Thoracic vertebrae** (T1, T2, etc.), 12 vertebrae in chest region, 89, 90f, 90t
- Thoracostomy**, insertion of tube into chest for purpose of draining off fluid or air, 247
- Thoracotomy**, incision into chest, 247
- Thrombin**, clotting enzyme that converts fibrinogen to fibrin, 184
- Thrombocytes**, also called *platelets*; play critical part in blood-clotting process by agglutinating into small clusters and releasing thrombokinase, 184
- Thrombocytic**, pertaining to platelets, 186
- Thrombocytosis**, too many clotting cells (platelets), 190
- Thrombolytic**, able to dissolve existing blood clots, 166, 192
- Thrombolytic therapy**, drugs, such as streptokinase or tissue plasminogen activator, are injected into blood vessel to dissolve clots and restore blood flow, 164
- Thrombopenia**, too few clotting cells, 190
- Thrombophlebitis**, inflammation of vein that results in formation of blood clots within vein, 160
- Thromboplastin**, substance released by platelets; reacts with prothrombin to form thrombin, 184
- Thrombus**, blood clot, 155, 155f
- Thymectomy**, removal of thymus gland, 208, 406
- Thymic**, pertaining to thymus gland, 203, 398
- Thymitis**, inflammation of thymus gland, 403
- Thymoma**, malignant tumor of thymus gland, 205, 403
- Thymosin**, hormone secreted by thymus gland; causes lymphocytes to change into T lymphocytes, 199, 389t, 395
- Thymus gland**, endocrine gland located in upper mediastinum that assists body with immune function and development of antibodies; as part of immune response it secretes hormone, thymosin, that changes lymphocytes to T cells, 195, 196, 199, 199f, 387, 389t, 395, 395f, 403
- Thyroid cartilage**, piece of cartilage associated with larynx; commonly called *Adam's apple* and is larger in males, 225f, 226
- Thyroid echography**, ultrasound examination of thyroid that can assist in distinguishing thyroid nodule from cyst, 405
- Thyroid function test (TFT)**, blood tests used to measure levels of  $T_3$ ,  $T_4$ , and TSH in bloodstream to assist in determining thyroid function, 405
- Thyroid gland**, endocrine gland located on either side of trachea; shape resembles butterfly with large left and right lobe connected by narrow isthmus; produces hormones thyroxine ( $T_4$ ), triiodothyronine ( $T_3$ ), and calcitonin (CT), 387, 389t, 395–96, 396f, 403–04
- Thyroid replacement hormone**, given to replace thyroid in patients with hypothyroidism or who have had thyroidectomy, 407
- Thyroid scan**, test in which radioactive element is administered that localizes in thyroid gland; gland can then be visualized with scanning device to detect pathology such as tumors, 405
- Thyroid-stimulating hormone (TSH)**, hormone secreted by anterior pituitary; regulates function of thyroid gland, 389t, 393
- Thyroidal**, pertaining to thyroid gland, 398
- Thyroidectomy**, removal of entire thyroid or portion (partial thyroidectomy) to treat variety of conditions, including nodes, cancer, and hyperthyroidism, 406
- Thyromegaly**, enlarged thyroid, 400
- Thyrotoxicosis**, condition that results from excessive secretion of thyroid gland hormones; symptoms include rapid heart action, tremors, enlarged thyroid gland, exophthalmos, and weight loss, 404
- Thyroxine ( $T_4$ )**, hormone produced by thyroid gland; also known as  $T_4$  and requires iodine for production; regulates level of cell metabolism; the greater the level of hormone in the bloodstream, the higher the cell metabolism, 389t, 395
- Tibia**, also called *shin bone*; lower extremity bone, 92, 93f, 93t
- Tibial**, pertaining to tibia or shin bone, 98
- Tidal volume (TV)**, amount of air that enters lungs in single inhalation or leaves lungs in single exhalation of quiet breathing, 229t
- Tinea**, fungal skin disease resulting in itching, scaling lesions, 67
- Tinea capitis**, fungal infection of scalp; commonly called *ringworm*, 67
- Tinea pedis**, fungal infection of foot; commonly called *athlete's foot*, 67
- Tinnitus**, ringing in ears, 482
- Tissues**, formed when cells of same type are grouped to perform one activity; for example, nerve cells combine to form nerve fibers; there are four types: nervous, muscle, epithelial, and connective connective, 25, 26f epithelial, 25, 26f muscle, 25, 26f nervous, 25, 26f, 420, 421f
- Tolerance**, development of capacity for withstanding large amount of substance, such as foods, drugs, or poison, without any adverse effect; decreased sensitivity to further doses will develop, 507
- Tongue**, muscular organ in floor of mouth; works to move food around inside mouth and is also necessary for speech, 225f, 265, 265f–266f, 271f
- Tonic-clonic seizure**, type of severe epileptic seizure characterized by loss of consciousness and convulsions; seizure alternates between strong continuous muscle spasms (tonic) and rhythmic muscle contraction and relaxation (clonic); also called *grand mal seizure*, 432
- Tonometry**, measurement of intraocular pressure of eye using tonometer to check for condition of glaucoma; generally part of normal eye exam for adults, 470
- Tonsillar**, pertaining to tonsils, 203
- Tonsillectomy**, surgical removal of tonsils, 208
- Tonsillitis**, inflammation of tonsils, 205
- Tonsils**, collections of lymphatic tissue located in pharynx to combat microorganisms entering body through nose or mouth; include pharyngeal tonsils, palatine tonsils, and lingual tonsils, 195, 196, 199, 199f
- Tooth cavity**. See Dental caries

- Topical**, applied directly to skin or mucous membranes; distributed in ointment, cream, or lotion form; used to treat skin infections and eruptions, 506t, 530t
- Topical anesthesia**, applied using either liquid or gel placed directly onto specific area; patient remains conscious; used on skin, cornea, and mucous membranes in dental work, 529, 530t
- Torticollis**, severe neck spasms pulling head to one side; commonly called *wryneck* or *crick in the neck*, 123
- Total abdominal hysterectomy–bilateral salpingo-oophorectomy** (TAH-BSO), removal of entire uterus, cervix, both ovaries, and both fallopian tubes, 358
- Total calcium**, blood test to measure total amount of calcium to assist in detecting parathyroid and bone disorders, 405
- Total hip arthroplasty** (THA), surgical reconstruction of hip by implanting prosthetic or artificial hip joint; also called *total hip replacement*, 109, 109f
- Total hip replacement (THR). See Total hip arthroplasty
- Total knee arthroplasty** (TKA), surgical reconstruction of knee joint by implanting prosthetic knee joint; also called *total knee replacement*, 109
- Total knee replacement (TKR). See Total knee arthroplasty
- Total lung capacity** (TLC), volume of air in lungs after maximal inhalation, 229t
- Total parenteral nutrition** (TPN), providing 100% of patient's nutrition intravenously; used when patient is unable to eat, 288
- Toxemia. See Preeclampsia
- Toxic shock syndrome** (TSS), rare and sometimes fatal staphylococcus infection that generally occurs in menstruating women, 351
- Toxicity**, extent or degree to which substance is poisonous, 507
- Toxins**, substances poisonous to body; many are filtered out of blood by kidney, 199
- Tracheal**, pertaining to trachea, 233
- Trachea**, also called *windpipe*; conducts air from larynx down to main bronchi in chest, 223, 225f, 226–27, 226f, 227f, 229, 266f, 395f
- Tracheostenosis**, narrowing and stenosis of lumen or opening into trachea, 238
- Tracheostomy**, surgical procedure used to make opening in trachea to create airway; tracheostomy tube can be inserted to keep opening patent, 247
- Tracheotomy**, surgical incision into trachea to provide airway, 247, 248f
- Tract**, bundle of fibers located within central nervous system, 421
- Traction**, process of pulling or drawing, usually with mechanical device; used in treating orthopedic (bone and joint) problems and injuries, 110, 526
- Tractotomy**, incision into spinal cord tract, 441
- Trademark**, pharmaceutical company's brand name for drug, 501
- Transcutaneous electrical nerve stimulation** (TENS), application of mild electrical stimulation to skin via electrodes placed over painful area, causing interference with transmission of painful stimuli; can be used in pain management to interfere with normal pain mechanism, 526
- Transdermal**, route of drug administration; medication coats underside of patch applied to skin; medication is then absorbed across skin, 506t
- Transfusion reaction. See Hemolytic reaction
- Transient ischemic attack** (TIA), temporary interference with blood supply to brain, causing neurological symptoms such as dizziness, numbness, and hemiparesis; may lead eventually to full-blown stroke (CVA), 435
- Transurethral resection of the prostate** (TUR, TURP), surgical removal of prostate gland by inserting device through urethra and removing prostate tissue, 372
- Transverse colon**, section of colon that crosses upper abdomen from right side of body to left, 269f, 270, 270f
- Transverse fracture**, complete fracture straight across bone at right angles to long axis of bone, 102, 102f
- Transverse plane**, horizontal plane that divides body into upper (superior) and lower (inferior) sections; also called *horizontal plane*, 33, 33f
- Transverse section**, sectional view of body produced by cut along transverse plane, 33
- Trauma- and Stressor-related disorders**, a classification of psychiatric disorders in the DSM-5 involving exposure to actual or implied death, injury, or violence; includes posttraumatic stress disorder, 513
- Traumatic brain injury** (TBI), brain damage resulting from impact (such as a car accident), blast waves (such as from an explosion), or a penetrating projectile (such as caused by a bullet); symptoms may be mild, moderate, or severe and may include loss of consciousness, headache, vomiting, loss of motor coordination, and dizziness, 435
- Treadmill test. See Stress testing
- Tremor**, involuntary quivering movement of part of body, 432
- Trendelenburg position**, surgical position in which patient is lying face up and on incline with head lower than legs, 531f, 532t
- Trephine**, surgical saw used to remove disk-shaped piece of tissue, 530t
- Trichomoniasis**, genitourinary infection usually without symptoms (asymptomatic) in both males and females; disease in women can produce itching and/or burning and foul-smelling discharge, and can result in vaginitis, 370
- Trichomycosis**, abnormal condition of hair fungus, 67
- Tricuspid valve**, between right atrium and ventricle of heart; prevents blood from flowing backward into atrium; has three cusps or flaps, 142f, 143f, 144, 145f
- Trigeminal nerve, 426t
- Triiodothyronine** ( $T_3$ ), hormone produced by thyroid gland known as  $T_3$  that requires iodine for its production; regulates level of cell metabolism; the greater the level of hormone in bloodstream, the higher the cell metabolism, 389t, 395
- Trochanter**, large blunt process that provides attachment for tendons and muscles, 86, 87f
- Trochlear nerve, 426t
- Trunk**, torso region of body, 34t, 35f



**Tubal ligation**, surgical tying-off of fallopian tubes to prevent conception from taking place; results in sterilization of female, 358

**Tubal pregnancy**. See *Salpingocyesis*

**Tubercle**, small, rounded process that provides attachment for tendons and muscles, 86

**Tuberculin skin tests** (TB test), applying chemical agent (Tine or Mantoux tests) under surface of skin to determine if patient has been exposed to tuberculosis, 245

**Tuberculosis** (TB), infectious disease caused by tubercle bacillus, *Mycobacterium tuberculosis*"; most commonly affects respiratory system and causes inflammation and calcification of system; incidence is on the increase and is seen in many patients with weakened immune systems, 242

**Tuberosity**, large, rounded process that provides attachment to tendons and muscles, 86

**Tumor**, abnormal growth of tissue that may be benign or malignant; also called *neoplasm*, 535

**Two-hour postprandial glucose tolerance test**, assists in evaluating glucose metabolism; patient eats high-carbohydrate diet and fasts overnight before test; blood sample is then taken two hours after meal, 405

**Tympanectomy**, surgical removal of eardrum, 487

**Tympanic**, pertaining to eardrum, 481

**Tympanic membrane**, also called *eardrum*; as sound moves along auditory canal, it strikes tympanic membrane causing it to vibrate; this conducts sound wave into middle ear, 477, 478, 478f

**Tympanitis**, eardrum inflammation, 483

**Tympanogram**, graphic record that illustrates results of tympanometry, 485

**Tympanometer**, instrument to measure eardrum's movement, 485

**Tympanometry**, measurement of movement of tympanic membrane; can indicate presence of pressure in middle ear, 485

**Tympanoplasty**, another term for surgical reconstruction of eardrum; also called *myringoplasty*, 487

**Tympanorrhexis**, ruptured eardrum, 482

**Tympanotomy**, incision into eardrum, 487

**Type A blood**, one of ABO blood types; person with type A markers on his or her RBCs; type A blood will make anti-B antibodies, 184

**Type AB blood**, one of ABO blood types; person with both type A and type B markers on his or her RBCs; since it has both markers, it will not make antibodies against either A or B blood, 184

**Type B blood**, one of ABO blood types; person with type B markers on his or her RBCs; type B blood will make anti-A antibodies, 184

**Type O blood**, one of ABO blood types; person with no markers on his or her RBCs; type O blood will not react with anti-A or anti-B antibodies; therefore, is considered universal donor, 184

**Type and cross-match**, lab test performed before person receives blood transfusion; double-checks blood type of both donor's and recipient's blood, 192

## U

**Ulcer**, open sore or lesion in skin or mucous membrane, 61, 61f

**Ulcerative colitis**, ulceration of unknown origin of mucous membranes of colon; also known as *inflammatory bowel disease* (IBD), 283

**Ulna**, one of forearm bones in upper extremity, 92, 92f, 92t

**Ulnar**, pertaining to ulna, one of lower arm bones, 98

**Ulnar artery**, 148f

**Ulnar nerve**, 427f

**Ulnar vein**, 150f

**Ultrasound** (US), use of high-frequency sound waves to create heat in soft tissues under skin; particularly useful for treating injuries to muscles, tendons, and ligaments, as well as muscle spasms; in radiology, ultrasound waves can be used to outline shapes of tissues, organs, and fetus, 521, 521f, 527, 527f

**Ultraviolet** (UV), 72

**Umbilical**, anatomical division of abdomen; middle section of middle row, 37t

**Umbilical cord**, extends from baby's umbilicus (navel) to placenta; contains blood vessels that carry oxygen and nutrients from mother to baby and carbon dioxide and wastes from baby to mother, 343–44, 343f

**Unconscious**, condition or state of being unaware of surroundings with inability to respond to stimuli, 432

**Ungual**, pertaining to nails, 56

**Unit dose**, drug dosage system that provides prepackaged, prelabeled, individual medications ready for immediate use by the patient, 507

**Universal donor**, type O blood is considered universal donor; with no markers on RBC surface, will not trigger reaction with anti-A or anti-B antibodies, 184

**Universal recipient**, person with type AB blood has no antibodies against other blood types and therefore, in emergency, can receive any type of blood, 184

**Upper extremity** (UE), the arm, 90, 91f, 92t, 525

**Upper gastrointestinal** (UGI) **series**, administering barium contrast material orally and then taking X-ray to visualize esophagus, stomach, and duodenum, 286

**Uptake**, absorption of radioactive material and medicines into organ or tissue, 518

**Urea**, waste product of protein metabolism; diffuses through tissues in lymph and is returned to circulatory system for transport to kidneys, 182

**Uremia**, excess of urea and other nitrogenous waste in blood, 306, 316

**Ureteral**, pertaining to ureter, 313

**Ureterectasis**, dilation of ureter, 316

**Ureterolith**, a calculus in ureter, 316

**Ureterostenosis**, narrowing of ureter, 316

**Ureters**, organs in urinary system that transport urine from kidney to bladder, 305, 306, 307, 307f, 308, 308f

**Urethra**, tube that leads from urinary bladder to outside of body; in male it is also used by reproductive system to release semen, 305, 306, 308, 309, 309f, 338f, 363f

**Urethral**, pertaining to urethra, 313

**Urethralgia**, urethral pain, 316

**Urethrorrhagia**, profuse bleeding from urethra, 316

**Urethroscope**, instrument to view inside urethra, 321

**Urethrostenosis**, narrowing of urethra, 316

**Urgency**, feeling need to urinate immediately, 316

**Urinalysis** (U/A, UA), laboratory test consisting of physical, chemical, and microscopic examination of urine, 311, 311*t*, 319

**Urinary**, pertaining to urine, 313

**Urinary bladder**, organ in the urinary system that stores urine, 305, 306, 308–09, 308*f*, 309*f*, 318, 338*f*, 341*f*, 343*f*, 363*f*

**Urinary incontinence**, involuntary release of urine; in some patients indwelling catheter is inserted into bladder for continuous urine drainage, 316, 316*f*

**Urinary meatus**, external opening of urethra, 309, 341, 341*f*, 364

**Urinary retention**, inability to fully empty bladder; often indicates blockage in urethra, 317

**Urinary system**, filters wastes from blood and excretes waste products in form of urine; organs include kidneys, ureters, urinary bladder, and urethra, 303–25  
 abbreviations, 324–25  
 adjective forms of anatomical terms, 313  
 anatomy and physiology, 306–11  
 diagnostic procedures, 319–21  
 homeostasis, kidneys and, 309  
 kidneys, 306–07, 307*f*  
 pathology, 314–18  
 pharmacology, 324  
 terminology, 312–13  
 therapeutic procedures, 321–23  
 ureters, 307, 308*f*  
 urethra, 309, 309*f*  
 urinary bladder, 308–09, 308*f*  
 urinary production stages, 310, 310*f*  
 urine, 311, 311*t*

**Urinary tract infection (UTI)**, infection of any organ of urinary system, usually caused by bacteria, such as *E. coli*; most often begins with cystitis and may ascend into ureters and kidneys; most common in women because of shorter urethra, 318

**Urination**, release of urine from urinary bladder, 308

**Urine**, fluid that remains in urinary system following three stages of urine production: filtration, reabsorption, and secretion, 306, 311, 311*t*  
 production, 310, 310*f*

**Urine culture and sensitivity (C&S)**, laboratory test of urine for bacterial infection; attempt to grow bacteria on culture medium in order to identify it and determine which antibiotics it is sensitive to, 319

**Urinometer**, instrument to measure urine, 319

**Urologist**, physician specialized in treating conditions and diseases of urinary system and male reproductive system, 314, 367

**Urology**, branch of medicine specializing in conditions of urinary system and male reproductive system, 314, 367

**Urticaria**, hives; skin eruption of pale reddish wheals (circular elevations of skin) with severe itching; usually associated with food allergy, stress, or drug reactions, 61, 204

**Uterine**, pertaining to uterus, 347

**Uterine tubes**, carry ovum from ovary to uterus; also called *fallopian tubes* or *oviducts*, 337, 338, 338*f*, 339–40, 339*f*, 340*f*, 350

**Uterus**, also called *womb*; internal organ of female reproductive system; hollow, pear-shaped organ located in lower pelvic cavity between urinary bladder and rectum; receives fertilized ovum and becomes implanted in uterine wall, which provides nourishment and protection for developing fetus; divided into three regions: fundus, corpus, and cervix, 309*f*, 337, 338, 340–41, 340*f*, 343*f*, 350–51

**Utricle**, found in inner ear; plays role in equilibrium, 478

**Uveal**, pertaining to choroid layer of eye, 462

**Uveitis**, inflammation of uvea of eye, 467

**Uvula**, structure that hangs down from posterior edge of soft palate, helps in production of speech and is location of gag reflex, 265, 265*f*–266*f*

## V

**Vaccination**, providing protection against communicable diseases by stimulating immune system to produce antibodies against that disease; also called *immunization*, 200, 208

**Vagina**, organ in female reproductive system that receives penis and semen, 309*f*, 337, 338, 338*f*, 340*f*, 341, 341*f*, 343*f*, 351

**Vaginal**, (1) pertaining to vagina; (2) tablets and suppositories inserted vaginally and used to treat vaginal yeast infections and other irritations, 347, 506*t*

**Vaginal hysterectomy**, removal of uterus through vagina rather than through abdominal incision, 358

**Vaginal orifice**, external vaginal opening; may be covered by hymen, 341, 341*f*

**Vaginitis**, inflammation of vagina, 351

Vagus nerve, 426*t*

**Valve replacement**, removal of diseased heart valve and replacement with artificial valve, 166

**Valves**, flaplike structures found within tubular organs such as lymph vessels, veins, and heart; function to prevent backflow of fluid, 196*f*, 197

**Valvoplasty**, surgical repair of valve, 166

**Valvular**, pertaining to valve, 153

**Valvulitis**, inflammation of valve, 158

**Varicella**, contagious viral skin infection; commonly called *chickenpox*, 67, 67*f*

**Varicocele**, enlargement of veins of spermatic cord, which commonly occurs on left side of adolescent males; seldom needs treatment, 368

**Varicose veins**, swollen and distended veins, usually in legs, 160

**Vas deferens**, also called *ductus deferens*; long, straight tube that carries sperm from epididymis up into pelvic cavity where it continues around bladder and empties into urethra; one component, along with nerves and blood vessels, of spermatic cord, 362, 363, 363*f*, 365, 372*f*, 394*f*

- Vasal**, pertaining to vas deferens, 367
- Vascular**, pertaining to vessels, 153
- Vasectomy**, removal of segment or all of vas deferens to prevent sperm from leaving male body; used for contraception purposes, 372, 372f
- Vasoconstrictor**, contracts smooth muscle in walls of blood vessels; raises blood pressure, 166
- Vasodilator**, produces relaxation of blood vessels to lower blood pressure, 166
- Vasopressin**, substance given to control diabetes insipidus and promote reabsorption of water in kidney tubules, 407
- Vasovasostomy**, creation of new opening between two sections of vas deferens; used to reverse vasectomy, 372
- Vegetation, 157
- Veins**, blood vessels of cardiovascular system that carry blood toward heart, 139, 140, 147f, 149, 150f, 196f
- Vena cava, 140f
- Venereal disease (VD). See Sexually transmitted disease
- Venipuncture. See Phlebotomy
- Venous**, pertaining to vein, 153
- Ventilation**, movement of air in and out of lungs, 224
- Ventilation-perfusion scan**, nuclear medicine diagnostic test especially useful in identifying pulmonary emboli; radioactive air is inhaled for ventilation portion to determine if air is filling entire lung; radioactive intravenous injection shows whether blood is flowing to all parts of lung, 244
- Ventilator**, machine that provides artificial ventilation for patient unable to breathe on his or her own; also called *respirator*, 246
- Ventral**, directional term meaning more toward the front or belly side of body, 39f, 39t
- Ventral cavities, 37t
- Ventricles**, two lower chambers of heart that receive blood from atria and pump it back out of heart; left ventricle pumps blood to body, and right ventricle pumps blood to lungs; also fluid-filled spaces within cerebrum; contain cerebrospinal fluid (watery, clear) that provides protection from shock or sudden motion to brain, 142f, 145f, 424
- Ventricular**, pertaining to ventricle, 153, 430
- Ventricular septal defect (VSD)**, a congenital septal defect between the ventricles, 156
- Venules**, smallest veins; receive deoxygenated blood leaving capillaries, 149, 153
- Vermiform appendix**, small outgrowth at end of cecum; function or purpose is unknown, 270
- Verruca**, warts; benign neoplasm (tumor) caused by virus; has rough surface that is removed by chemicals and/or laser therapy, 67
- Vertebrae, 88f
- Vertebral**, pertaining to vertebrae, 98, 430
- Vertebral canal**, bony canal through vertebrae that contains spinal cord, 424, 424f
- Vertebral column**, part of axial skeleton; a column of 26 vertebrae that forms backbone and protects spinal cord; divided into five sections: cervical, thoracic, and lumbar vertebrae, sacrum, and coccyx; also called *spinal column*, 89, 424
- Vertebral region**, spinal column region of body, 34t
- Vertigo**, sensation of spinning or whirling around; incorrectly used to mean dizziness, 482
- Vesicle**, small, fluid-filled raised spot on skin, 61, 61f
- Vesicular**, pertaining to seminal vesicle, 367
- Vestibular**, pertaining to vestibule, 481
- Vestibular nerve**, branch of vestibulocochlear nerve responsible for sending equilibrium information to brain, 477, 477f
- Vestibulocochlear nerve**, eighth cranial nerve; responsible for hearing and balance, 426t, 477
- Viruses**, group of infectious particles that cause disease, 199
- Viscera**, name for internal organs of body, such as lungs, stomach, and liver, 36
- Visceral**, pertaining to viscera or internal organs, 41
- Visceral layer**, inner pleural layer; adheres to surface of lung, 36
- Visceral muscle**, muscle found in walls of internal organs such as stomach, 115, 115f
- Visceral pericardium**, inner layer of pericardium surrounding heart, 142
- Visceral peritoneum**, inner layer of serous membrane sac encasing abdominopelvic viscera, 36
- Visceral pleura**, inner layer of serous membrane sac encasing thoracic viscera, 228
- Vision, 459, 460f, 468
- Visual acuity (VA) test**, measurement of sharpness of patient's vision; a Snellen chart is usually used for this test and patient identifies letters from distance of 20 feet, 470
- Vital capacity (VC)**, total volume of air that can be exhaled after maximum inhalation; amount will be equal to sum of tidal volume, inspiratory reserve volume, and expiratory reserve volume, 229t
- Vital signs (VS)**, respiration, pulse, temperature, skin color, blood pressure, and reaction of pupils; signs of condition of body functions, 230
- Vitamin D therapy**, maintaining high blood levels of calcium in association with vitamin D helps maintain bone density and treats osteomalacia, osteoporosis, and rickets, 110
- Vitiligo**, disappearance of pigment from skin in patches, causing a milk-white appearance; also called *leukoderma*, 67
- Vitreous body, 456f
- Vitreous humor**, transparent jellylike substance inside eyeball, 457
- Vocal cords**, structures within larynx that vibrate to produce sound and speech, 225f, 226
- Voiding**, another term for urination, 308
- Voiding cystourethrography (VCUG)**, X-ray taken to visualize urethra while patient is voiding after contrast dye has been placed in bladder, 320
- Voluntary muscles**, those that person can consciously choose to contract; skeletal muscles of arm and leg are examples, 114
- Volvulus**, condition in which bowel twists upon itself and causes painful obstruction that requires immediate surgery, 283, 283f
- Vomer bone**, facial bone, 89, 89f, 89t

**Voyeuristic disorder**, paraphilic disorder characterized by receiving sexual gratification from observing others engaged in sexual acts, 513

**Vulva**, general term meaning external female genitalia; consists of Bartholin's glands, labia majora, labia minora, and clitoris, 337, 338, 341, 341f

**Vulvar**, pertaining to vulva, 347

## W

Walking pneumonia. *See Mycoplasma pneumonia*

Wall-eyed. *See Exotropia*

Warts. *See Verruca*

**Wax emulsifiers**, substances used to soften earwax to prevent buildup within external ear canal, 488

**Western blot**, test used as backup to ELISA blood test to detect presence of antibody to HIV (AIDS virus) in blood, 207

**Wet gangrene**, area of gangrene becoming infected by pus-producing bacteria, 67

**Wheal**, small, round raised area on skin that may be accompanied by itching, 61, 61f

**Whiplash**, cervical muscle and ligament sprain or strain, 105

**Whirlpool**, bath in which there are continuous jets of hot water reaching body surfaces, 527

**White blood cell count (WBC)**, blood test to measure number of leukocytes in volume of blood; increase may indicate presence of infection or disease such as leukemia; decrease in WBCs is caused by X-ray therapy and chemotherapy, 191

**White blood cell differential (diff)**, blood test to determine the number of each variety of leukocyte, 191

**White blood cells (WBCs)**, blood cells that provide protection against invasion of bacteria and other foreign material, 182, 183f

**White matter**, tissue in central nervous system; consists of myelinated nerve fibers, 421

**Whole blood**, refers to mixture of both plasma and formed elements, 192

Whooping cough. *See Pertussis*

**Wilms' tumor**, malignant kidney tumor found most often in children, 318

Windpipe. *See Trachea*

Wisdom teeth, 265f, 266, 267f

Womb, 340

Word building, 11

**Word root**, foundation of medical term that provides basic meaning of word; in general, will indicate body system or part of body being discussed; word may have more than one word root, 2, 3

Wryneck. *See Torticollis*

## X

**X-rays**, high-energy wave that can penetrate most solid matter and present image on photographic film, 517, 518

**Xenograft**, skin graft from animal of another species (usually pig); also called *heterograft*, 70

**Xeroderma**, dry skin, 61

**Xerophthalmia**, dry eyes, 464

## Y

**Yellow bone marrow**, located mainly in center of diaphysis of long bones; contains mainly fat cells, 85, 86f

## Z

**Zygomatic bone**, facial bone, 89, 89f, 89t