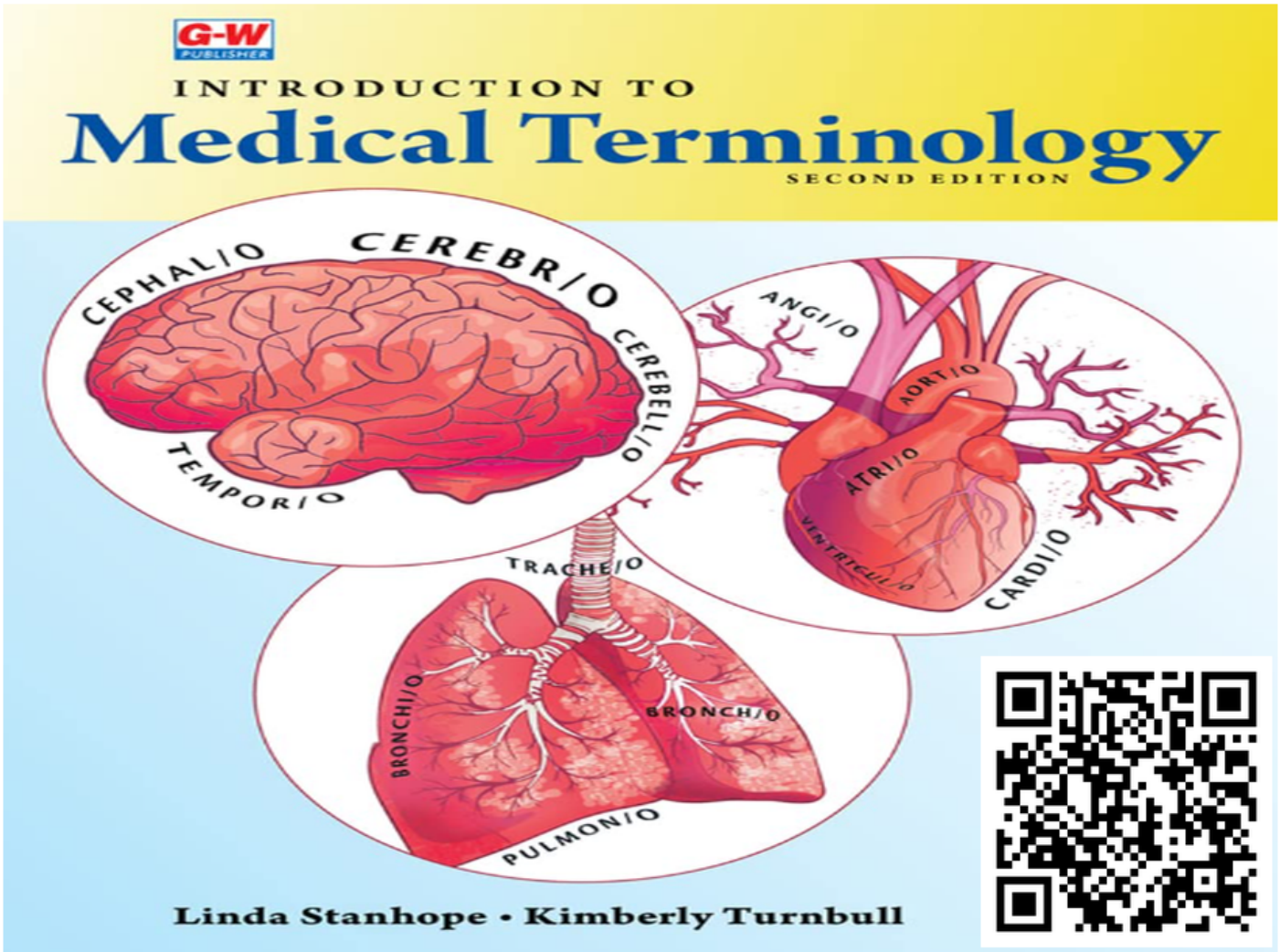
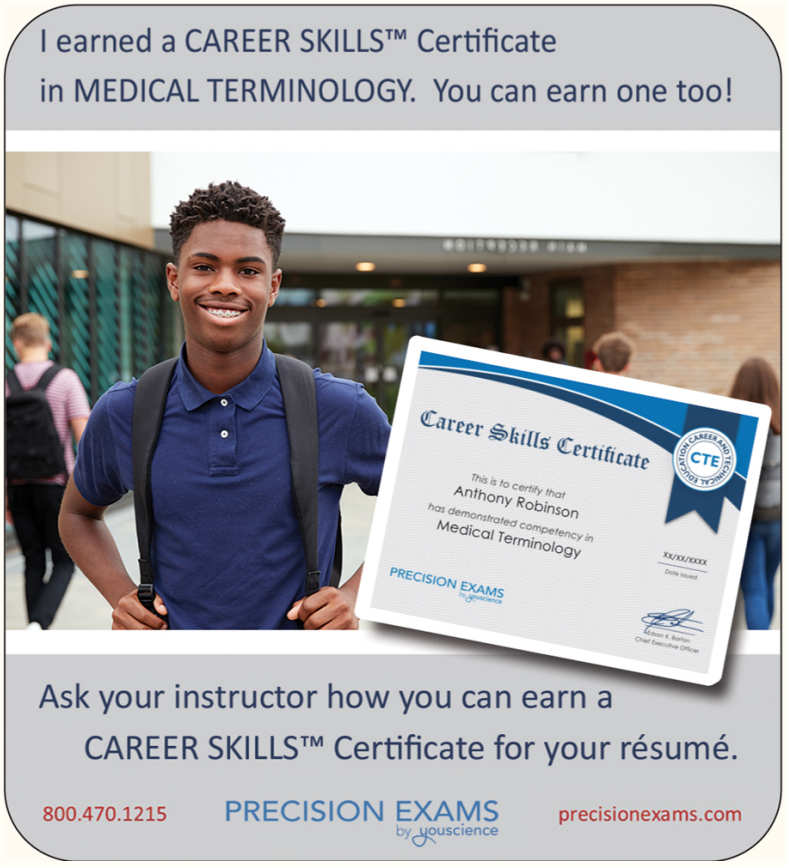


- Suite of on-demand reporting to measure program and student academic growth
- Easy-to-use, 100% online administration

To see how *Introduction to Medical Terminology* correlates to Precision Exams by YouScience standards, visit the Correlations tab at www.g-w.com/introduction-medical-terminology-2023 . For more information about Precision Exams by YouScience, visit www.youscience.com/certifications/career-clusters/ .



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Dermatology Technician
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Physical Therapist
Orthopedic Surgeon
Prosthetist
Radiologic Technologist
Certified Fitness Trainer
Exercise Physiologist
Sports Medicine Physician
Cardiologist
Cardiovascular Technologist
Telemetry Nurse
Allergist/Immunologist
Epidemiologist
Oncology Nurse

Respiratory Therapist
Perfusionist
Pulmonologist
Thoracic Surgeon
Gastroenterologist
Registered Dietitian
Dentist
Dental Hygienist
Physician Anesthesiologist
Electroneurodiagnostic Technologist
Neurosurgeon
Mental Health Professionals
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Audiologist
Nutritionist
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Phlebotomist
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To the Student

Have you ever found yourself totally captivated by a medical program, watching a surgery and listening to the conversation around the operating room? Were you ever intrigued by the long, technical, multisyllable words your healthcare provider used to describe a diagnosis or procedure you, a family member, or a friend experienced? Do you already understand common medical abbreviations such as EKG or STAT, and do you want to learn more? Have you ever learned about a disease process by searching for symptoms online?

If you answered "yes" to any of these questions, welcome to *Medical Terminology* ! Medical terminology is the language of medicine and the very foundation of understanding the world of healthcare. As a future healthcare professional, you will benefit from knowing and understanding medical terminology, regardless of the area of medicine you choose. The biomedical laboratory technician, the certified personal trainer, the X-ray technician, and the surgeon all need a solid background in medical terminology. You will find that medical terminology is a useful tool in all future healthcare courses.

Our textbook is an excellent means for you to discover the basics of medical terminology. Real-world *Case Studies* will challenge you to think critically and evaluate your own interpretations of diagnoses and treatments. You will find yourself learning up-to-date, state-of-the-art procedures with *Workplace Skills Lab* , *Team Challenge* , *Inquiring Minds* , *Student Challenge* , and *Ponder This* activities.

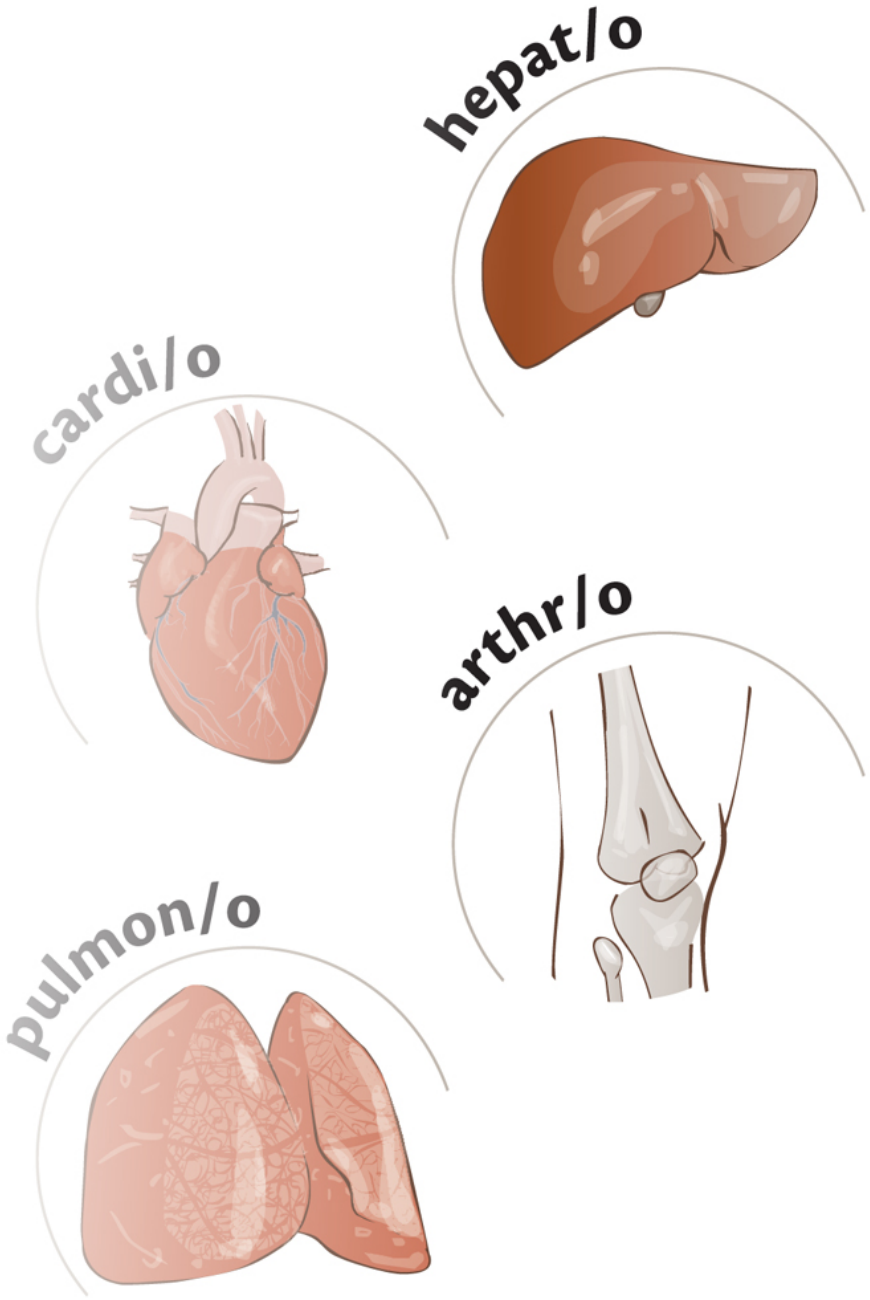
In each chapter, you will read an overview of the human anatomy and physiology for a new body system, and you will study the diseases and conditions related to that system. In addition, you will learn about common diagnostic procedures, surgical procedures, and therapeutic treatments for those diseases and conditions. Frequently used medical abbreviations are listed and embedded in simulated medical records so that you can practice using and interpreting the same terms you will encounter in real-world healthcare settings. You will also read about possible career options in each chapter.

As you learn about each body system, you will be exposed to terms specific to that system. Soon you will notice that the beginnings, ends, and core parts of long, difficult words begin to look familiar. Your hard work and study will begin to pay off as repetition makes your learning stick!

We hope you will love medical terminology as much as we do. Enjoy the fascinating world of the language of medicine!

Linda Stanhope
Kimberly Turnbull

Chapter 1
Basics of Medical Terminology



Ahmet Cigsar/iStock/Getty Images Plus via Getty Images

LEARNING OUTCOMES

After studying this chapter, you will be able to

- identify the roles of the basic word parts used to build medical terms;
- identify and define the prefixes, word roots, and suffixes introduced in this chapter;
- analyze unfamiliar medical terms using your knowledge of word parts;
- correctly pronounce medical terms using phonetic spellings;
- correctly spell medical terms;
- combine word parts to build new medical terms and dissect medical terms into their word parts;
- identify the meanings of common terms used to describe the classifications and assessment of diseases and conditions; and
- interpret medical abbreviations.

HOSA Event Prep

Can you define the term *gastritis* ? Do you know how to build the medical term that means “surgical repair of the nose”? Do you know which parts of the body are distal to the elbow? As you study this chapter, you will learn the answers to these questions and more. You can demonstrate your knowledge by participating in a HOSA—Future Health Professionals event. HOSA events provide opportunities to build the technical, leadership, and teamwork skills you need to pursue a career in the healthcare field.

One example of a HOSA competitive event is the HOSA *Medical Terminology* competitive event. Go to the HOSA website to learn more about the HOSA *Medical Terminology* event. Find out:

- The purpose of the event
- What is involved in the event
- What knowledge is demonstrated in the event

The information and activities in this chapter can help prepare you for this and other competitive events. In the chapter, Event Prep

icons label these activities. As you prepare for HOSA competitive events, be sure to check the website and talk with your HOSA advisor for the most up-to-date guidelines and procedures. Once you have learned about the *Medical Terminology* event, answer the following questions:

1. How might participating in this event benefit you personally and your future career? Explain.
2. Are you interested in participating in this event? Why or why not?

Case Study

Shera Cooper, a 37 *y/o AAF* , comes to the ER *c/o abd* pain in the *hypogastric region* and *vaginal hemorrhage.* Dr. Irvin has called for a surgical *consult* after examining Shera and her *CT* scan. Colleen, assistant to Dr. Snyder, an *OB/GYN* , has called the *OR* to set up a room for an exploratory *l aparotomy* . Before surgery, Dr. Snyder orders a *stat CBC* , *Pro. time, PTT, UA, T&C, EKG,* and *CXR.*

Confusing, right? Now read the following transcription that spells out the meanings of the medical abbreviations and terms in the case study. Definitions of medical terms have been provided in brackets.

Shera Cooper, a 37- *year-old, African-American female* , comes to the *emergency room complaining of abdominal pain* in the *lower middle section of the abdomen* and *heavy bleeding from the vagina* . Dr. Irvin has called for a surgical consultation after examining the patient and her *computerized tomography* [specialized X-ray] scan. Colleen, assistant to Dr. Snyder, an *obstetrician/gynecologist* [specialist who delivers babies and treats disorders of the female reproductive system], has called the *operating room* to set up for an *exploratory laparotomy* [surgical procedure in which small incisions are made in the patient's abdomen and a camera is inserted into the abdomen to see what is happening inside the patient]. Before surgery, Dr. Snyder orders blood work to be done *immediately* . The blood work includes a *complete blood cell count, prothrombin time* [blood-clotting test], *partial*

thromboplastin time [another type of blood-clotting test], *urinalysis* [urine test], *type and crossmatch* [test to determine blood-type compatibility should the patient need a blood transfusion], *electrocardiogram* [a screening test to check for irregularities in the heart], and *chest X-ray* .

nattrass/E+ via Getty Images

Your Turn

Imagine that you are a busy healthcare professional seeing many patients in one day. Compare the two descriptions above. Which paragraph would you rather enter in a medical record—the first or the second? Explain your answer. As you can see, the first paragraph is much more condensed. The medical abbreviations and terms allow for clear, concise, and effective communication without sacrificing accuracy of meaning or patient safety. As you study this text, you will see many similar examples of medical terminology used in a professional context.

Medical Term Scavenger Hunt

In this chapter, you will learn many basic medical word parts and terms. Before you begin this chapter, read the following doctor's

orders related to Shera's experience from the Case Study.

Routine **pre-op** orders

VS q 15 **min**

Keep **pt NPO**

Start **IV** access

Obtain list of pt **Rx** and all **OTC** meds

Consult anesthesiologist

For each highlighted medical term or abbreviation, search through this chapter to find the meaning. Use Appendix B : Medical Abbreviations or the Glossary/Index if you cannot find the meaning of a term or abbreviation.The terms and abbreviations in the scenario are listed below. Define and look up the pronunciation of each term to help you understand Shera's story.Then rewrite the orders in common language.

1. pre-op
2. VS
3. q
4. min
5. pt
6. NPO
7. IV
8. Rx
9. OTC

Introduction

Professionals in the science and healthcare fields use a language called **medical terminology** . This language helps them communicate and summarize their observations clearly, concisely, and effectively with one another. They must translate

this medical language into conversational language when communicating with patients.

To nonhealthcare professionals, medical terminology may appear to be a foreign language. In fact, this specialized language includes thousands of words and entire dictionaries. While it is not necessary to memorize every word in a medical dictionary, a successful healthcare career requires mastery of the common medical word parts, their meanings, and a solid understanding of how to break down and build medical terms.

Structure of a Medical Term

A combination of one or more basic word parts forms most medical terms. These word parts include combining forms (which consist of a root word and a combining vowel), prefixes, and suffixes.

- A **root word** is the central part of a medical word. Usually, the root word indicates a body part. Most root words come from Latin or Greek. Medical terms composed of word parts contain at least one root word. Often, they contain more than one. A root word can never stand alone. A prefix, suffix, and/or another root word must be added to form a medical term.
- A **combining vowel** is a vowel attached to the end of a root word. Combining vowels have the following general characteristics:
  - The most common combining vowel is the letter *o*. Occasionally, a combining vowel will be *a*, *e*, *i*, or *u*.
  - Combining vowels link word parts, making medical terms easier to pronounce.
  - A combining vowel is inserted between root words that are combined.
  - When a suffix begins with a consonant, a combining vowel is inserted between the root word and the suffix. When a suffix

begins with a vowel, a combining vowel is usually *not* inserted.

- A **combining form** is a root word plus a combining vowel. Throughout this text, root words are shown with their common combining vowels. For example, the root word **gl yc** is represented as **glyc/o** (root word plus combining vowel).
- A **prefix** is a single letter or group of letters attached to the front of a root word. Prefixes usually indicate location, time, or number.
- A **suffix** is a single letter or group of letters attached to the end of a root word. Suffixes usually indicate a condition, disease, diagnostic procedure, or surgical or therapeutic treatment.

Some medical terms have no prefix. Others are made up of a root word and suffix or a prefix and suffix. As you work your way through this book, you will encounter medical terms containing differing combinations of word parts.

Once you have mastered the root words, prefixes, and suffixes commonly used in the language of medicine and healthcare, you will have the tools you need to dissect and interpret hundreds of medical terms. This will help you understand medical records and scenarios.

Fascinating Fact

Currently, the longest medical term is pneumonoultramicroscopicsilicovolcanoconiosis. Can you define this?

How to Read a Medical Term

In general, you can "decode" a medical term by first interpreting the suffix, returning to the beginning of the word, and

then working your way forward. Take a look at the example that follows.

1. First, identify the word parts that make up the term. As an example, examine the term *hypoglycemia* . In the chart that follows, you will see that *hypoglycemia* contains a prefix, a root word, and a suffix.

Prefix		Root Word		Suffix		Medical Term
hypo -	+	glyc	+	- emia	=	hypoglycemia

2. Next, identify the meaning of each word part.

Prefix		Root Word		Suffix		Medical Term
hypo -	+	glyc	+	- emia	=	hypoglycemia
below normal; deficient	+	sugar; glucose	+	blood condition	=	blood condition of below-normal sugar

3. Then, put all the word parts together to form a definition:

   Hypoglycemia is a blood condition in which sugar, or glucose, levels are below normal.

Pronunciation and Spelling

Correct pronunciation and spelling are important writing and reading strategies in the medical and healthcare fields. **Figure 1.1** includes some general guidelines for pronouncing medical terms.

General Rules for Pronouncing Medical Terms	Examples
ae sounds like *ay* or *igh*	vertebrae (*ae* is pronounced "ay" as in *day*), *pleurae* (*ae* is pronounced "igh" as in *high*) *Note:* Medical terms ending with the letter combination *ae* (which signifies a plural form) have acceptable, alternative pronunciations. For instance, the term *pleurae* may be pronounced PLOO-ree instead of PLOO-righ.
c sounds like a soft *s* when it comes before *e* , *i* , or *y*	*cellular, cilia, cycle, cyst*
ch sounds like *k*	*chemotherapy, cholecystectomy, chronic*
g sounds like *j* when it comes before *e* , *i* , or *y*	*generic, angioplasty, allergy*
i sounds like "eye" when it is added to the end of a word to form a plural	*bacilli, fungi, nuclei*
ps sounds like a soft *s*	*psoriasis , psychiatric, psychology*
pn sounds like *n*	*pneumatic, pneumonia, pneumothorax*

Figure 1.1 General rules for pronouncing medical terms.

Pronunciations in This Book

Throughout this book, you will find a *phonetic spelling* , or pronunciation, in parentheses whenever a medical term is introduced. When a syllable within a term is emphasized during pronunciation, it appears in uppercase letters. Syllables that have no emphasis when pronounced appear in lowercase letters.

When you encounter a medical term you do not know, you will first want to break it down into its parts. The pronunciation guide in **Figure 1.2** will help you interpret the pronunciations throughout this book, as well as terms that you encounter beyond this course. Other excellent resources for medical pronunciation include *Stedman's Medical Dictionary* or *Taber's Cyclopedic Medical Dictionary.*

Vowel Sounds

Diacritic Representation	Sounds Like	Phonetic Representation	Example Words	Phonetic Spelling
ă	cat	a	an a logous a natomic	uh-NAL-uh-gus AN-uh-TOM-ik
ā	day	ay	inflamm a tion	in-fluh-MAY-shun
ä, ŏ	hot	ah	abd o minal qu a driplegia	ab-DAH-mih-nuhl

Diacritic Representation	Sounds Like	Phonetic Representation	Example Words	Phonetic Spelling
				QUAH-drih-PLEE-jee-uh
aů	out	ow	g ou t	gowt
ĕ	met	e	dysl e xia	dis-LEK-see-uh
ē	bee	ee	p e diatrician r e nal	PEE-DEE-uh-TRISH-un REE-nuhl
er	care, stair	are, air	healthc a re gen e ric	HELTH-kare juh-NAIR-ik
ə (schwa)	a bate parenth e ses euph o ny	ih, uh	di a gnosis el e ment c o ngenit a l	DIGH-uhg-NOH-sis EL-uh-ment kun-JEN-ih-tuhl
ər	term, bird,	er, ur	rotat o r b u rsa	ROH-tay-ter BUR-suh

Diacritic Representation	Sounds Like	Phonetic Representation	Example Words	Phonetic Spelling
	word, burn			
ĭ	fin	i, ih	l y̲ mph i̲ nc i̲ sion	limf in-SIH-zhun
ī	five, night, hydrate	igh	m i̲ tochondria carboh y̲ drate	MIGH-toh-KAHN-dree-uh KAR-boh-HIGH-drayt
ir	mere	eer	ant er̲ ior	an-TEER-ee-or
ō	go	oh	amni o̲ centesis micr o̲ bial	AM-nee-oh-sen-TEE-sis migh-KROH-bee-uhl
ȯ	all, saw	aw	gl au̲ coma n au̲ sea	glaw-KOH-muh NAW-zee-uh

Diacritic Representation	Sounds Like	Phonetic Representation	Example Words	Phonetic Spelling
				or NAW-zhuh
oi	boy	oy	thyr oi d Fr eu d	THIGH-royd FROYD
ȯr, ôr	warn, worn	or	a or ta	ay-OR-tuh
ŭ	drum	u	f u ngus	FUNG-gus
ū, ü	food, news, use	oo, ew	ac ou stic integ u mentary	uh-KOO-stik in-TEG-yoo-MEN-tuh-ree
u̇	book	u	s u gar	SHU-ger
yu̇r	fury	yu(r)	an eur ysm ur inalysis	AN-yur-izm YUR-ih-NAL-ih-sis

Consonant Sounds

Diacritic Representation	Sounds Like	Phonetic Representation	Example Words	Phonetic Spelling

Diacritic Representation	Sounds Like	Phonetic Representation	Example Words	Phonetic Spelling
j	joke, gem	j	g enetic anti g en	juh-NET-ik AN-tih-jen
k	kite	k	ch orion c artilage	KOR-ee-ahn KAR-tih-luhj
ngk	ink	ngk	lary nx	LAIR-ingks
s	splash, cymbal	s	c yst	SIST
sh	shine	sh	Eusta ch ian mo ti on	yoo-STAY-shee-un MOH-shun
x	taxi	ks	corte x	KOR-teks
z	drums	z	z oonotic diagnose s	ZOH-uh-NAH-tik DIGH-ug-NOH-seez

Diacritic Representation	Sounds Like	Phonetic Representation	Example Words	Phonetic Spelling
zh	measure	zh	Haver sian vi sion	huh-VER-zhun VIZH-un

Figure 1.2 Diacritic representations and pronunciations.

Singular and Plural Spellings

Often, adding *-s* or *-es* to a singular medical term will make it a plural form. Many terms, however, come from Greek or Latin, so there are exceptions to this rule. Some examples of irregular plural forms are in **Figure 1.3** .

Singular Ending	Example
-a	larva
-ax	thorax
-ex	index
-is	prosthesis
-ix	appendix
-ma	condyloma
-on	ganglion
-um	atrium
-us	bronchus
-y	myopathy

Singular Ending	Example
Plural Ending	**Example**
-ae	larvae
-aces	thoraces
-ices	indices
-es	prostheses
-ices	appendices
-mata	condylomata
-a	ganglia
-a	atria
-i	bronchi
-ies	myopathies

Figure 1.3 Singular and plural endings for medical terms.

Student Challenge

Practice Pronunciation

Go for it! With a classmate, pronounce the following terms, using what you have learned so far. If you are unsure how to pronounce a term correctly, look it up in a medical dictionary to find the right pronunciation.

1. chyme
2. pneumocystis
3. psychologist
4. bronchi
5. cycle
6. larvae

7. eupnea
8. Cheyne-Stokes
9. tachypnea

Medical Word Parts

In the language of medical terminology, you can use root words, prefixes, and suffixes to form thousands of terms. To begin your study of medical terminology, start with the word parts in the tables that follow. After you have reviewed these word parts, you will have the opportunity to begin building and dissecting medical terms.

Combining Forms

Combining Form (Root Word plus Combining Vowel)	Meaning
alveol/o	alveolus; air sac
arthr/o	joint
aur/o	ear
bi/o	life
cardi/o	heart
caud/o	tail
cephal/o	head
cervic/o	neck; cervix (neck of uterus)
col/o, colon/o	large intestine; colon
cost/o	rib

Combining Form (Root Word plus Combining Vowel)	Meaning
cutane/o	skin
enter/o	intestines (usually the small intestine)
gastr/o	stomach
glyc/o	sugar; glucose
hem/o	blood
hepat/o	liver
lip/o	fat
log/o	study
my/o	muscle
nas/o	nose
nephr/o	kidney
neur/o	nerve
or/o	mouth
oste/o	bone
path/o	disease
pulmon/o	lung
rhin/o	nose
sarc/o	flesh; connective tissue
thorac/o	chest
uter/o	uterus

Inquiring Minds

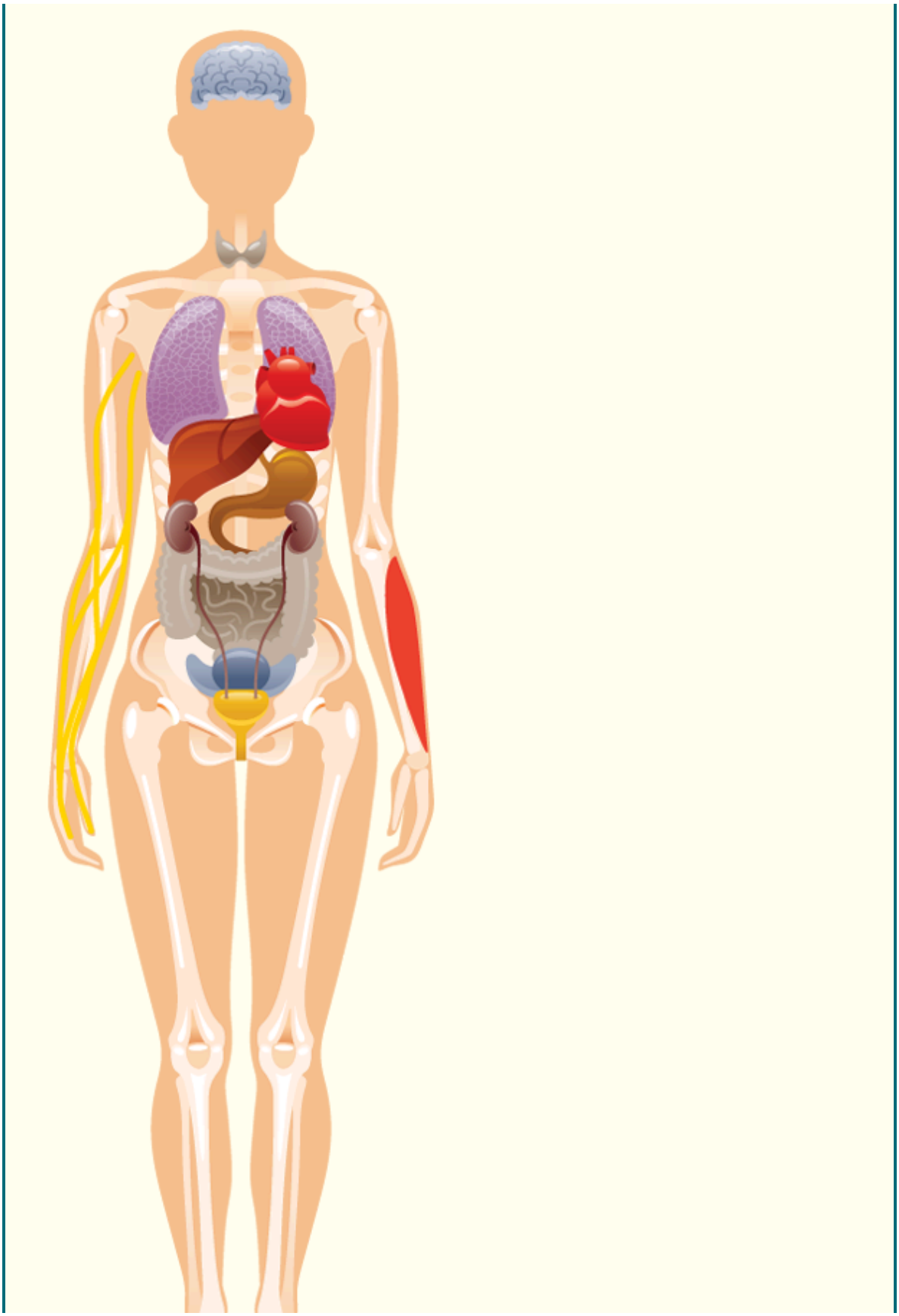
Labeling the Body

Estimated time: 3 minutes

Materials needed: unlabeled body outline (similar to the one shown), list of word parts in envelopes, dry-erase markers, tissues, timer or stopwatch

Directions: Form groups of two or three. In your group, you will review 10 word parts from the list given to your group and accurately label them on your body outline in the designated time.

1. Obtain the needed materials from your instructor.
2. When your instructor begins the time, open the envelope given to your group and read the list of word parts.
3. Accurately label all 10 word parts on the body outline provided to your group.
4. Stop working when your instructor stops the time.
5. Compare your labeled outline with other groups. Which group had the most word parts labeled accurately? Label any word parts you missed.



OlgaChernyak/Shutterstock.com

Fascinating Fact

Does your stomach grumble when you are hungry? There is a medical term for that! These grumbles are called *borborygmus* . Next time you are hungry and your stomach growls, you have a name for those noises.

Prefixes

Prefix	Meaning
a-, an-	not; without
ante-	before
anti-	against
bi-	two; both
brady-	slow
endo-	in; within
epi-	on; over; upon
hyper-	above; above normal; excessive
hypo-	below; below normal; deficient
inter-	between
intra-	within; into

Prefix	Meaning
peri-	around; surrounding
sub-	below; under
supra-	above
tachy-	fast
trans-	across
ultra-	beyond; excess

Suffixes

Suffix	Meaning
-ac, -al, -ar, -ary, -iac, -ial, -ic, -ical, -ior	pertaining to
-algia	pain
-cyte	cell
-ectomy	surgical removal; excision
-emia	blood condition
-gen	substance that produces
-ia	condition
-ine	a substance (noun) pertaining to (adjective)
-itis	inflammation
-logist	specialist (one who studies)
-logy	study of

Suffix	Meaning
-megaly	enlargement
-oma	tumor; mass
-osis	process; abnormal condition
-pathy	disease
-plasty	surgical repair
-stomy	surgical opening
-tomy	process of cutting; incision
-um	structure; tissue; thing

Student Challenge

Building Terms

Since you have learned some medical word parts, challenge yourself to put two word parts together to come up with a word that describes a headache.

Team Challenge

hosa EVENT PREP

Five in One

In small groups, read the five definitions that follow and build the correct medical terms. Refer to the list of combining forms, prefixes, and suffixes in this chapter. See how many terms you can build in one minute.

1. surgical repair of the nose
2. study of life
3. structure or tissue surrounding the heart

4. inflammation of the small intestines
5. tumor or mass of the connective tissue

Classification and Description of Diseases and Conditions

Etiology (ee-tee-AH-loh-jee) is the study of the causes of pathological (PATH-uh-LAHJ-ih-kuhl) conditions, or diseases and disorders. More specifically, the term *etiology* means "the cause of a particular disease, disorder, or condition."

Throughout this textbook, the terms *disease* and *condition* are used. In general, the term **condition** applies to acute (short-term) health issues. Examples of *conditions* include the common cold, ankle sprain, and muscle strain. The term **disease** describes a chronic (long-term) health issue such as diabetes, cancer, and rheumatoid arthritis.

Diseases and conditions are classified and described according to their etiological (ee-tee-uh-LAH-jih-kuhl) characteristics. These medical terms of classification aid healthcare professionals and medical specialists in assessing and treating patients. Such terms will appear in medical scenarios and records throughout the text. Understanding these medical terms helps healthcare workers interpret medical scenarios and records correctly.

Disease/Disorder Classification or Characteristic	Definition
acute uh-KYOOT	An illness or injury characterized by rapid onset, severe symptoms, and short duration; may require medical care.

Disease/Disorder Classification or Characteristic	Definition
autoimmune AW-toh-ih-MYOON	Abnormal condition in which the immune system produces antibodies against (attacks) its own tissues. Examples include rheumatoid arthritis and multiple sclerosis.
benign bee-NIGHN; buh-NIGHN	Nonrecurring; nonmalignant. Used to describe noncancerous tumors (growths) in which the patient has a good chance of survival.
chronic	An illness or injury characterized by long duration and slow progression; for example, congestive heart failure.
congenital kuhn-JEN-ih-tuhl	A condition that is present at birth and may be the result of either genetic or environmental factors; cerebral palsy, for example.
convalescence KAHN-vuh-LESS-ents	A period of gradual recovery after illness or injury.
debilitating dee-BIL-ih-tay-ting; deh-BIL-ih-tay-ting	Having a weakening or fatiguing effect.
endemic en-DEM-ik	A disease that is ongoing and restricted to a specific population, group, or area of land.
endogenous en-DAH-juh-nus	An injury or condition that originates within the body; for example, circulatory

Disease/Disorder Classification or Characteristic	Definition
	disorders, diabetes, and immune system disorders.
epidemic EP-ih-DEM-ik	A sudden, widespread outbreak of a disease within a population, group, or area of land.
exogenous ek-SAH-juh-nus	An injury or condition that originates outside the body; for example, trauma, chemical injury, or infection by an airborne pathogen.
genetic	Inherited; passed on from one's biological parents.
hypersensitivity	Condition in which the body's immune system has an exaggerated response to an *antigen* , a substance that is harmful or perceived by the body to be harmful; *allergy* .
iatrogenic igh-AT-troh-JEN-ik	An infection or disease that arises as a complication of medical or surgical intervention. Radiation and chemotherapy, for example, commonly produce the *iatrogenic* effects of nausea, vomiting, hair loss, and anemia.
idiopathic ID-ee-oh-PATH-ik	A disease that has an unknown etiology (cause).
immunological IM-yoo-noh-LAHJ-ih-kuhl	Pertaining to a reaction between an antigen and an *antibody* , a protein that

Disease/Disorder Classification or Characteristic	Definition
	the body makes in response to an antigen.

Inquiring Minds

Travel Immunizations

If you were planning to travel to another country, what diseases would you have to worry about encountering? Visit the Centers for Disease Control and Prevention (CDC) website and search for a list of destinations and guidelines for travelers' health. Select three countries you would like to visit and read about the health concerns you would need to consider before traveling. What special immunizations, if any, would you need before leaving your home country? Share your findings with your classmates.

Ponder This

Travel and Disease

During a medical assessment, healthcare professionals commonly ask patients the following questions: *Where do you live?* and *Have you traveled outside the country in the past six months?* Why do you think patients are asked these questions? Share your response with your classmates along with an explanation for your reasoning.