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Seventh Edition

# Medical Terminology

**A LIVING LANGUAGE**

**Bonnie F. Fremgen, PhD**

Former Associate Dean

Allied Health Program

Robert Morris College

Chicago, IL

**Suzanne S. Frucht, PhD**

Associate Professor Emeritus

Northwest Missouri State University

Maryville, MO



**Pearson**

330 Hudson Street, New York, NY 10013

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Printer/Binder: LSC Communications, Inc.  
Cover Printer: Phoenix Color/Hagerstown  
Text Font: Meridien Com 11/13

## DEDICATION

To my husband for his love and encouragement.  
Bonnie Fremgen

To my granddaughter, Adrienne, who every day  
brings a smile to my face.

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

I would like to extend a special thank you to Garnet  
Tomich who added to her normal workload by  
taking on the immense task of double-checking  
the pronunciations of every term in this edition and  
updating them as needed to ensure consistency.

Suzanne Frucht

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

Names: Fremgen, Bonnie F., author. | Frucht, Suzanne S., author.  
Title: Medical terminology : a living language / Bonnie F. Fremgen, Suzanne S. Frucht.  
Description: Seventh edition. | Hoboken, New Jersey : Pearson Education, 2017. | Includes bibliographical references and index.  
Identifiers: LCCN 2017041703 | ISBN 9780134701202 | ISBN 0134701208  
Subjects: | MESH: Medicine | Terminology  
Classification: LCC R123 | NLM W 15 | DDC 610.1/4--dc23  
LC record available at <https://lccn.loc.gov/2017041703>

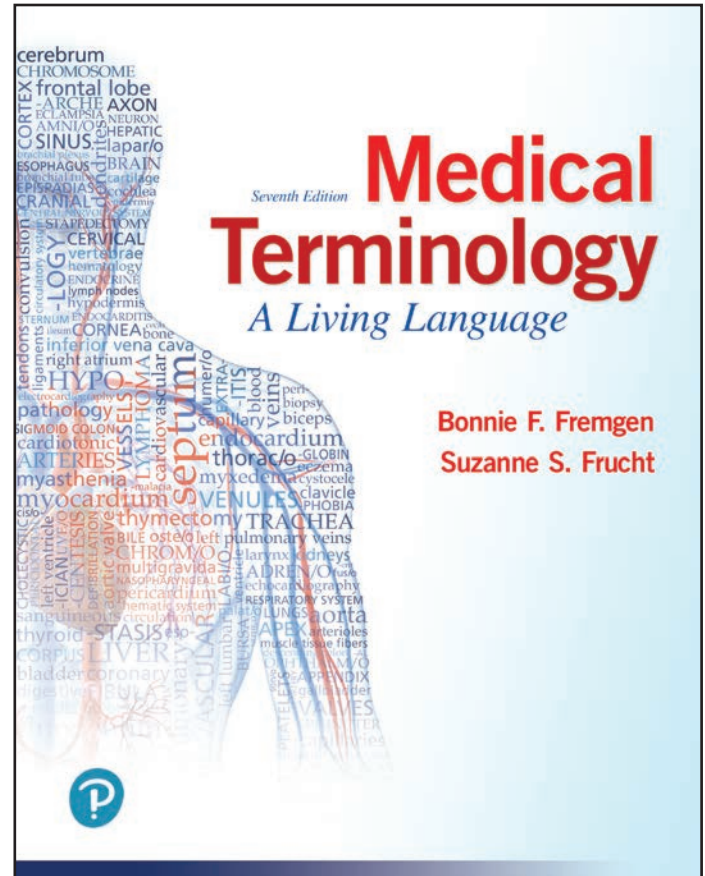
# Welcome!

Welcome to the fascinating study of Medical Terminology: A Living 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 Terminology: A Living Language within a real-world context.

In developing this book we had seven goals in mind:

1. To provide you with 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 Terminology: A Living Language with an abundance of real-life photographs and accurate illustrations.
6. To provide you with a wealth of practice applications throughout and 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 MyLab Medical Terminology.

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

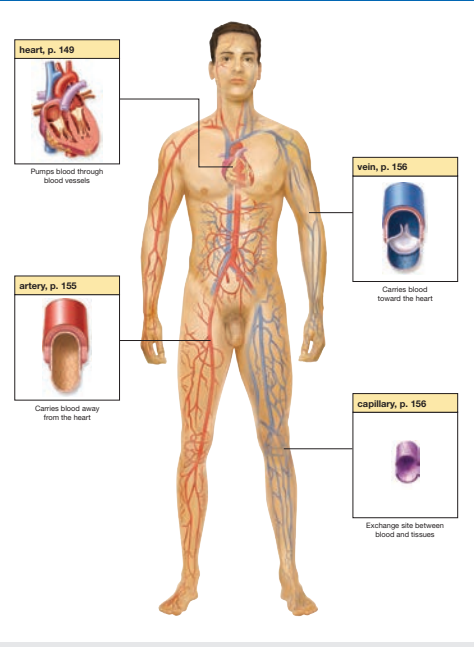
Thirteen chapters and only the most essential anatomy and physiology coverage make this book a perfect midsized fit for a one-term course.

### Brief Contents

- 1 Introduction To Medical Terminology 1
- 2 Body Organization 25
- 3 Integumentary System 55
- 4 Musculoskeletal System 89
- 5 Cardiovascular System 145
- 6 Blood and the Lymphatic and Immune Systems 185
- 7 Respiratory System 227
- 8 Digestive System 267
- 9 Urinary System 311
- 10 Reproductive System 345
- 11 Endocrine System 393
- 12 Nervous System and Mental Health 425
- 13 Special Senses: The Eye and Ear 471
- Appendices 515
- Answer Keys 535
- Glossary/Index 551

## Chapter-Opening Page Spreads

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

CARDIOVASCULAR SYSTEM	Cardiovascular System Illustrated																																																																														
<b>AT A GLANCE</b>																																																																															
<p><b>Function</b> 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.</p> <p><b>Organs</b> The primary structures that comprise the cardiovascular system:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;"><b>blood vessels</b></td> <td style="width: 50%;"><b>heart</b></td> </tr> <tr> <td> <ul style="list-style-type: none"> <li>• arteries</li> <li>• capillaries</li> <li>• veins</li> </ul> </td> <td></td> </tr> </table> <p><b>Word Parts</b> Presented 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.</p> <table style="width: 100%; border: none;"> <tr> <td colspan="4"><b>Combining Forms</b></td> </tr> <tr> <td style="width: 25%;"><b>angi/o</b></td> <td style="width: 25%;">vessel</td> <td style="width: 25%;"><b>sept/o</b></td> <td style="width: 25%;">wall</td> </tr> <tr> <td><b>aorti/o</b></td> <td>aorta</td> <td><b>son/o</b></td> <td>sound</td> </tr> <tr> <td><b>arteri/o</b></td> <td>artery</td> <td><b>sphygm/o</b></td> <td>pulse</td> </tr> <tr> <td><b>arteriol/o</b></td> <td>arteriole</td> <td><b>steth/o</b></td> <td>chest</td> </tr> <tr> <td><b>ather/o</b></td> <td>fatty substance</td> <td><b>thromb/o</b></td> <td>clot</td> </tr> <tr> <td><b>atri/o</b></td> <td>atrium</td> <td><b>valv/o</b></td> <td>valve</td> </tr> <tr> <td><b>cardi/o</b></td> <td>heart</td> <td><b>valvul/o</b></td> <td>valve</td> </tr> <tr> <td><b>coron/o</b></td> <td>heart</td> <td><b>varic/o</b></td> <td>dilated vein</td> </tr> <tr> <td><b>embol/o</b></td> <td>plug</td> <td><b>vascul/o</b></td> <td>blood vessel</td> </tr> <tr> <td><b>fibrin/o</b></td> <td>fibers</td> <td><b>vss/o</b></td> <td>vessel</td> </tr> <tr> <td><b>isch/o</b></td> <td>to hold back</td> <td><b>ven/o</b></td> <td>vein</td> </tr> <tr> <td><b>myocard/i/o</b></td> <td>heart muscle</td> <td><b>ventricul/o</b></td> <td>ventricle</td> </tr> <tr> <td><b>phleb/o</b></td> <td>vein</td> <td><b>venul/o</b></td> <td>venule</td> </tr> </table> <p><b>Suffixes</b></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;"><b>-cardia</b></td> <td>heart condition</td> <td style="width: 50%;"><b>-spasm</b></td> <td>involuntary muscle contraction</td> </tr> <tr> <td><b>-manometer</b></td> <td>instrument to measure pressure</td> <td><b>-tension</b></td> <td>pressure</td> </tr> <tr> <td><b>-ole</b></td> <td>small</td> <td><b>-tonic</b></td> <td>pertaining to tone</td> </tr> <tr> <td><b>-pressor</b></td> <td>to press down</td> <td><b>-ule</b></td> <td>small</td> </tr> </table> <p><b>Prefixes</b></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;"><b>di-</b></td> <td>two</td> </tr> </table>	<b>blood vessels</b>	<b>heart</b>	<ul style="list-style-type: none"> <li>• arteries</li> <li>• capillaries</li> <li>• veins</li> </ul>		<b>Combining Forms</b>				<b>angi/o</b>	vessel	<b>sept/o</b>	wall	<b>aorti/o</b>	aorta	<b>son/o</b>	sound	<b>arteri/o</b>	artery	<b>sphygm/o</b>	pulse	<b>arteriol/o</b>	arteriole	<b>steth/o</b>	chest	<b>ather/o</b>	fatty substance	<b>thromb/o</b>	clot	<b>atri/o</b>	atrium	<b>valv/o</b>	valve	<b>cardi/o</b>	heart	<b>valvul/o</b>	valve	<b>coron/o</b>	heart	<b>varic/o</b>	dilated vein	<b>embol/o</b>	plug	<b>vascul/o</b>	blood vessel	<b>fibrin/o</b>	fibers	<b>vss/o</b>	vessel	<b>isch/o</b>	to hold back	<b>ven/o</b>	vein	<b>myocard/i/o</b>	heart muscle	<b>ventricul/o</b>	ventricle	<b>phleb/o</b>	vein	<b>venul/o</b>	venule	<b>-cardia</b>	heart condition	<b>-spasm</b>	involuntary muscle contraction	<b>-manometer</b>	instrument to measure pressure	<b>-tension</b>	pressure	<b>-ole</b>	small	<b>-tonic</b>	pertaining to tone	<b>-pressor</b>	to press down	<b>-ule</b>	small	<b>di-</b>	two	 <p>The illustration shows a human figure with the cardiovascular system highlighted in red and blue. Callouts include:</p> <ul style="list-style-type: none"> <li><b>heart, p. 140</b>: Shows the heart with the text "Pumps blood through blood vessels".</li> <li><b>vein, p. 156</b>: Shows a cross-section of a vein with the text "Carries blood toward the heart".</li> <li><b>artery, p. 155</b>: Shows a cross-section of an artery with the text "Carries blood away from the heart".</li> <li><b>capillary, p. 156</b>: Shows a cross-section of a capillary with the text "Exchange site between blood and tissues".</li> </ul>
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## Anatomy & Physiology

Prior to being introduced to terms associated with an organ system, the anatomy and physiology of that body system is described in concise and easy to understand language. Information coverage begins with the overall function and the organs that comprise the system. Then each organ is addressed with its structure and how it contributes to the function of that system. Having a grasp of this basic level of information before being introduced to terms associated with each system makes it easier for students to understand the pathologic, diagnostic, and therapeutic terms.

### Key Terms

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

### EXPANDED! Pronunciations

Every chapter includes sound-it-out pronunciations to help students say medical terms accurately.

### Color-Coded Word Parts

Red combining forms, blue suffixes, and gold prefixes allow for quick recognition throughout the book.

### Informative and Interesting Sidebars

- The popular **Med Term Tip** feature offers tidbits of noteworthy information about medical terms that engage learners.
- **Word Watch** points out words that have a similar sound or similar spelling, and also alerts students about abbreviations that have more than one meaning.
- **What's In A Name?** reinforces the breakdown of terms into word parts.

230 Chapter 7

## Anatomy and Physiology of the Respiratory System

**bronchial tubes** (BRONG-kee-ah)  
**carbon dioxide**  
**exhalation** (eks-hah-LAY-shun)  
**external respiration**  
**inhalation** (in-hah-LAY-shun)  
**internal respiration**  
**larynx** (LAIR-inks)

**lungs**  
**nasal cavity** (NAY-zal)  
**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-et)  
**paranasal sinuses** (pair-ah-NAY-zal)

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 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).

**What's In A Name?**  
 Look for these word parts:  
 hal/o = to breathe  
 owl = 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.

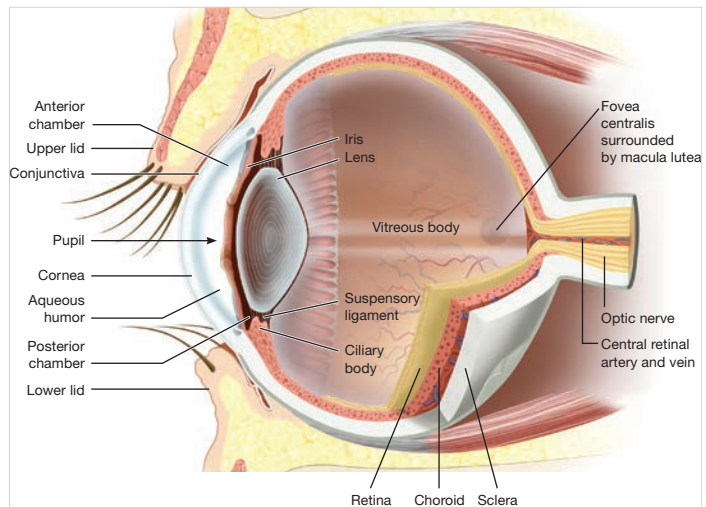
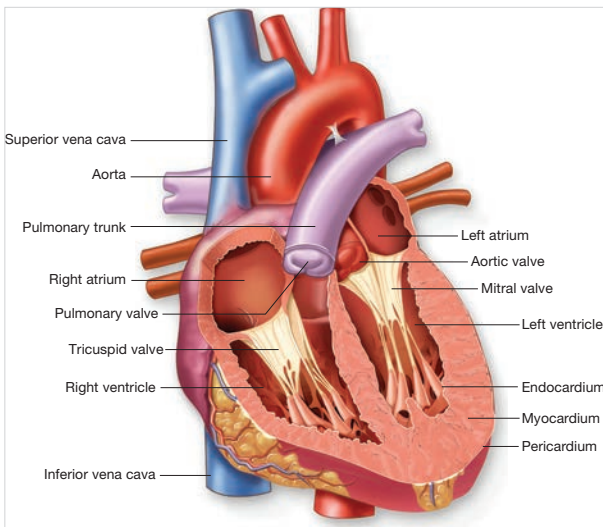
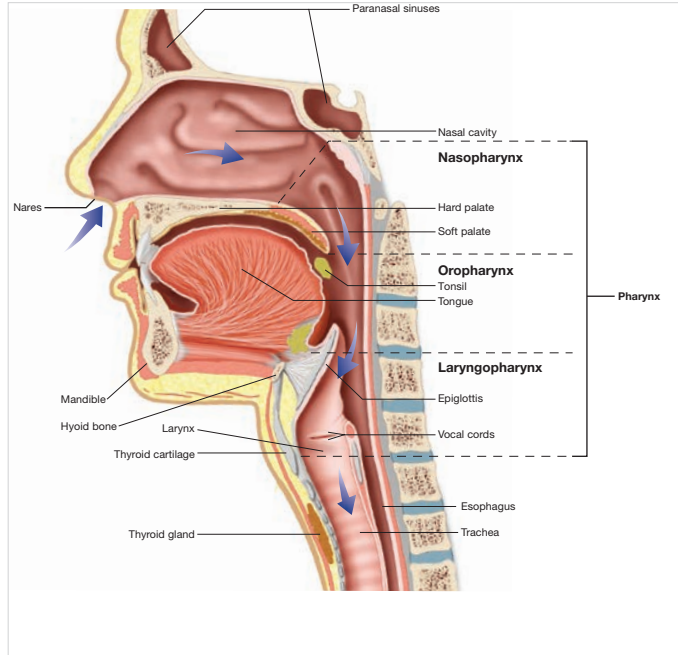
**What's In A Name?**  
 Look for these word parts:  
 muc/o = mucus  
 -ous = pertaining to

**Med Term Tip**  
 Anyone who has experienced a nosebleed, or epistaxis, is aware of the plentiful supply of blood vessels in the nose.



## Medically Accurate Illustrations

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



## Terminology Tables

Terms are categorized and presented in a clear, logical, color-coded format that eases the learning process. The major categories include Pathology, Adjective Forms, Diagnostic Procedures, Therapeutic Procedures, Pharmacology, and Abbreviations. Each major category table is further subdivided into smaller subsections of related terms, thereby making learning easier. Also, the three-column format of the tables allows for the term (with pronunciation and/or abbreviation), word parts (if appropriate), and definitions to be displayed. The Pharmacology table also includes drug name examples in a fourth column.

### 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>emmetr/o</b>	correct, proper	<b>opt/o</b>	eye, vision
<b>ambly/o</b>	dull, dim	<b>esthesi/o</b>	sensation, feeling	<b>optic/o</b>	eye, vision
<b>angi/o</b>	vessel	<b>grauc/o</b>	gray	<b>papill/o</b>	optic disk
<b>bi/o</b>	life	<b>ir/o</b>	iris	<b>phac/o</b>	lens
<b>blast/o</b>	immature	<b>irid/o</b>	iris	<b>phot/o</b>	light
<b>blephar/o</b>	eyelid	<b>kerat/o</b>	cornea	<b>pneum/o</b>	air
<b>chromat/o</b>	color	<b>lacrim/o</b>	tears	<b>presby/o</b>	old age
<b>conjunctiv/o</b>	conjunctiva	<b>macul/o</b>	macula lutea	<b>pupill/o</b>	pupil
<b>corne/o</b>	cornea	<b>mi/o</b>	lessening	<b>retin/o</b>	retina
<b>cry/o</b>	cold	<b>myc/o</b>	fungus	<b>scler/o</b>	sclera
<b>cycl/o</b>	ciliary body	<b>mydr/i</b>	widening	<b>stigmat/o</b>	point
<b>cyst/o</b>	sac	<b>nyctal/o</b>	night	<b>ton/o</b>	tone
<b>dacry/o</b>	tears	<b>ocul/o</b>	eye	<b>uve/o</b>	choroid
<b>diplo/o</b>	double	<b>ophthalm/o</b>	eye	<b>xer/o</b>	dry

Suffixes					
<b>-al</b>	pertaining to	<b>-logy</b>	study of	<b>-pexy</b>	surgical fixation
<b>-algia</b>	pain	<b>-malacia</b>	abnormal softening	<b>-phobia</b>	fear
<b>-ar</b>	pertaining to	<b>-meter</b>	instrument to measure	<b>-plasty</b>	surgical repair
<b>-ary</b>	pertaining to	<b>-metrist</b>	specialist in measuring	<b>-plegia</b>	paralysis
<b>-atic</b>	pertaining to	<b>-metry</b>	process of measuring	<b>-ptosis</b>	drooping
<b>-ectomy</b>	surgical removal	<b>-oma</b>	tumor; mass	<b>-rrhagia</b>	abnormal flow condition
<b>-edema</b>	swelling	<b>-opia</b>	vision condition	<b>-scope</b>	instrument for viewing
<b>-graphy</b>	process of recording	<b>-opsia</b>	vision condition	<b>-scopy</b>	process of visually examining
<b>-ia</b>	condition	<b>-osis</b>	abnormal condition	<b>-tic</b>	pertaining to
<b>-ic</b>	pertaining to	<b>-otomy</b>	cutting into	<b>-tropia</b>	turned condition
<b>-ician</b>	specialist	<b>-pathy</b>	disease		
<b>-ism</b>	state of				
<b>-itis</b>	inflammation				

Prefixes					
<b>a-</b>	without	<b>exo-</b>	outward	<b>intra-</b>	within
<b>an-</b>	without	<b>extra-</b>	outside of	<b>micro-</b>	small
<b>anti-</b>	against	<b>hemi-</b>	half	<b>mono-</b>	one
<b>de-</b>	without	<b>hyper-</b>	excessive	<b>myo-</b>	to shut
<b>eso-</b>	inward				

### Pharmacology

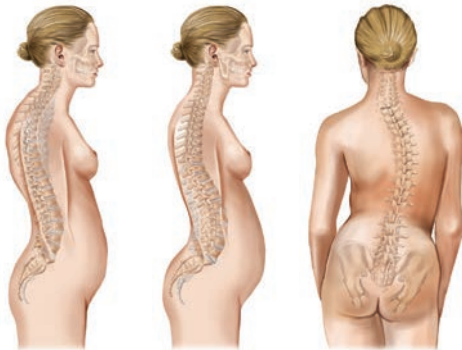
Vocabulary			
Term	Word Parts	Definition	
<b>cumulative action</b>		Action that occurs in body when drug is allowed to accumulate or stay in body	
<b>prophylaxis</b> (proh-fih-LAK-sis)	<b>pro-</b> = before <b>-phylaxis</b> = protection	Prevention of disease; for example, antibiotic can be used to prevent occurrence of bacterial infection	
Drugs			
Classification	Word Parts	Action	Examples
<b>antibiotic</b> (an-tih-bye-AW-tik)	<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>Med Term Tip</b> There are three accepted pronunciations for the prefix <b>anti-</b> , "an-tih," "an-tee," and "an-ye."		
<b>antihistamine</b> (an-tih-HIST-ah-meen)	<b>anti-</b> = against	Blocks effects of histamine released by body during allergy attack	fenexfenadine, Allegra; loratadine, Claritin; diphenhydramine, Benadryl
<b>antitussive</b> (an-tih-TUSS-iv)	<b>anti-</b> = without <b>tuss/o</b> = cough	Relieves urge to cough	hydrocodon, Hycodan; dextromethorphan, Vicks Formula 44
<b>bronchodilator</b> (BRONG-koh-dye-lay-ter)	<b>bronch/o</b> = bronchus	Relaxes muscle spasms in bronchial tubes; used to treat asthma	albuterol, Proventil, Ventolin; salmeterol, Serevent
<b>corticosteroids</b> (kor-tih-koh-STAIR-oydz)	<b>cortic/o</b> = outer layer, cortex	Reduces inflammation and swelling in respiratory tract	fluticasone, Flonase; mometasone, Nasonex; triamcinolone, Azmacort
<b>decongestant</b> (dee-kon-JES-tant)	<b>de-</b> = without	Reduces stuffiness and congestion throughout respiratory system	oxymetazoline, Afrin, Dristan, Sinex; pseudoephedrine, Drixoral, Sudafed

### Abbreviations

<b>#</b>	number	<b>ii</b>	two
<b>BCC</b>	basal cell carcinoma	<b>iii</b>	three
<b>bid</b>	two times a day	<b>MM</b>	malignant melanoma
<b>BX, bx</b>	biopsy	<b>oint</b>	ointment
<b>C&amp;S</b>	culture and sensitivity	<b>qid</b>	four times a day
<b>decub</b>	decubitus ulcer	<b>SCC</b>	squamous cell carcinoma
<b>Derm, derm</b>	dermatology	<b>SG</b>	skin graft
<b>FS</b>	frozen section	<b>SLE</b>	systemic lupus erythematosus
<b>I&amp;D</b>	incision and drainage	<b>STSG</b>	split-thickness skin graft
<b>i</b>	one	<b>Subc, Subq</b>	subcutaneous
<b>ID</b>	intradermal	<b>tid</b>	three times a day
		<b>UV</b>	ultraviolet
		<b>x</b>	times

**Word Watch**  
Be careful when using the abbreviation **ID** meaning intradermal and **I&D** meaning incision and drainage.

### Pathology (continued)

Term	Word Parts	Definition
		
<b>Figure 4-19</b> Abnormal spinal curvatures: kyphosis, lordosis, and scoliosis.		
<b>kyphosis</b> (excessive posterior thoracic curvature - hunchback)	<b>kyph/o</b> = bent backward <b>-osis</b> = abnormal condition	Abnormal increase in forward curvature of lumbar spine; also known as <b>swayback</b>
<b>lordosis</b> (excessive anterior lumbar curvature - swayback)	<b>lord/o</b> = crooked <b>-osis</b> = abnormal condition	Abnormal lateral curvature of spine; see again Figure 4-19 for illustration of abnormal spine curvatures
<b>spina bifida</b> (SPY-nah / BIF-ih-dah)	<b>spin/o</b> = spine <b>bi-</b> = two	Congenital anomaly occurring when vertebra fails to fully form around spinal cord; see also Figure 12-12C
<b>spinal stenosis</b> (steh-NOH-sis)	<b>spin/o</b> = spine <b>-al</b> = pertaining to	Narrowing of spinal canal causing pressure on cord and nerves
	<b>Word Watch</b> Watch how the term <b>stenosis</b> is used in this condition. It most often appears as the suffix <b>-stenosis</b> . However, in this case, it is used as a freestanding word.	
<b>spondylolisthesis</b> (spon-dih-loh-liss-THEE-sis)	<b>spondyl/o</b> = vertebra <b>-listhesis</b> = slipping	Forward sliding of lumbar vertebra over vertebra below it
<b>spondylosis</b> (spon-dih-LOH-sis)	<b>spondyl/o</b> = vertebra <b>-osis</b> = abnormal condition	Specifically refers to ankylosing of spine, but commonly used in reference to any degenerative condition of vertebral column

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 patient's own blood several weeks prior to actual need; can then be used to replace blood lost during 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 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 (BMT)</b>		Patient receives red bone marrow from donor after 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>		Transfusion in which most of 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 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
<b>whole blood</b>		Transfusion of a mixture of both plasma and formed elements

Diagnostic Procedures (continued)		
Term	Word Parts	Definition
<b>Pap</b> (Papanicolaou) smear (pap-ah-NIK-oh-lao)		Test for early detection of cancer of the cervix named after developer of test, George Papanicolaou, a Greek physician; a scraping of cells is removed from the cervix for examination under microscope
<b>pregnancy test</b> (PREG-nan-see)		Chemical test that can determine pregnancy during first few weeks; can be performed in physician's office or with home-testing kit
<b>vaginal smear wet mount</b> (VAJ-in-al)	<b>vagin/o</b> = vagina <b>-al</b> = pertaining to	Microscopic examination of cells obtained by swabbing vaginal wall; used to diagnose candidiasis
<b>Diagnostic Imaging</b>		
<b>hysterosalpingography (HSG)</b> (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 X-ray after injecting radiopaque material into uterus and uterine tubes
<b>mammogram</b> (MAM-oh-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
<b>pelvic ultrasonography</b> (PEL-vik / ul-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 image or photograph of an organ, such as uterus, ovaries, or fetus

Adjective Forms of Anatomical Terms		
Term	Word Parts	Definition
<b>conjunctival</b> (kon-junk-TYE-val)	<b>conjunctiv/o</b> = conjunctiva <b>-al</b> = pertaining to	Pertaining to conjunctiva
<b>corneal</b> (KOR-nee-al)	<b>corne/o</b> = cornea <b>-al</b> = pertaining to	Pertaining to cornea
<b>Word Watch</b> Be careful using the combining forms <b>core/o</b> meaning pupil and <b>corne/o</b> meaning cornea.		
<b>extraocular</b> (eks-trah-OK-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-OK-yoo-lar)	<b>intra-</b> = within <b>ocul/o</b> = eye <b>-ar</b> = pertaining to	Pertaining to within eye
<b>iridal</b> (IR-ic-al)	<b>irid/o</b> = iris <b>-al</b> = pertaining to	Pertaining to iris
<b>lacrimal</b> (LAK-rim-al)	<b>lacrim/o</b> = tears <b>-al</b> = pertaining to	Pertaining to tears
<b>macular</b> (MAK-yoo-lar)	<b>macul/o</b> = macula lutea <b>-ar</b> = pertaining to	Pertaining to macula lutea
<b>ocular</b> (OK-yoo-lar)	<b>ocul/o</b> = eye <b>-ar</b> = pertaining to	Pertaining to eye
<b>ophthalmic</b> (off-THAL-mik)	<b>ophthalm/o</b> = eye <b>-ic</b> = pertaining to	Pertaining to eye
<b>optic</b> (OP-tik)	<b>opt/o</b> = eye, vision <b>-ic</b> = pertaining to	Pertaining to eye or vision
<b>optical</b> (OP-tih-kal)	<b>optico/o</b> = eye, vision <b>-al</b> = pertaining to	Pertaining to eye or vision
<b>pupillary</b> (PYOO-pih-lair-ee)	<b>pupill/o</b> = pupil <b>-ary</b> = pertaining to	Pertaining to pupil
<b>retinal</b> (RET-lh-nal)	<b>retin/o</b> = retina <b>-al</b> = pertaining to	Pertaining to retina
<b>scleral</b> (SKLAIR-al)	<b>scler/o</b> = sclera <b>-al</b> = pertaining to	Pertaining to sclera
<b>uveal</b> (YOO-vee-al)	<b>uve/o</b> = choroid <b>-al</b> = pertaining to	Pertaining to choroid layer of eye

## UPDATED! Practice As You Go

An assortment of exercises is peppered throughout the chapters to assess students' understanding of the material discussed.

### PRACTICE AS YOU GO

#### D. 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                            |

### PRACTICE AS YOU GO

#### F. 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   | _____ |

# Chapter Review

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

**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 explain each term as you would to a nonmedical person.

**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 nulliparous 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 overlapping cervix. However, there is no evidence of abruptio placentae at this time. Fetal size estimate is consistent with 25 weeks' gestation. The fetal heart rate is strong with a rate of 150 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 abnormally 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	Explanation
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____
7. _____	_____
8. _____	_____
9. _____	_____
10. _____	_____
11. _____	_____
12. _____	_____

## 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.

**Chart Note Transcription**  
The chart note below contains 10 phrases that can be reworded with a medical term presented 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**  
Date: 17 May 2017

**Current Complaint:** A 64-year-old female with an open sore 1 on her right leg is seen by the specialist in treating diseases of the skin.

**Past History:** Patient states she first noticed an area of rash appearing between 3 and grooves of the skin 4 just below her right knee about six weeks ago. One week later, large open sores 5, pus 6 appeared. Patient states the raised spots containing pus ruptured and the open sores appeared.

**Signs and Symptoms:** Patient has a deep open sore 5 x 2 cm. It is 4 cm distal to the knee on the lateral aspect of the right leg. It appears to extend into the deep skin layer 8 and the edges show signs of bleeding 9. The open sore has a small amount of drainage but there is no odor. A group of the organisms that are present in the skin to identify the microorganisms and determine the best antibiotic 10 if the drainage revealed Staphylococcus bacteria in the open sore.

**Diagnosis:** Inflammation of connective tissue in the skin 9

**Treatment:** Removal of damaged tissue 10 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. _____

## 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.


**Labeling Exercises**

**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.

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

**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.

 Mary Pearl, age 66, 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 therapeutic 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 this textbook.
4. What two diagnostic procedures did the physician order? Describe them in your own words. What were the results? (One of the procedures is described in Chapter 6 of this text.)
5. What treatments were ordered? Explain what the physical therapy procedures involve.
6. This patient is experiencing an acute episode. Explain what this phrase means and contrast it with chronic.

## 3) Case Study

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

**Practice Exercises**

**A. Using Abbreviations**  
Fill in each blank with the appropriate abbreviation.

1. A(n) \_\_\_\_\_ is a specialist in treating conditions of the female reproductive system and a(n) \_\_\_\_\_ specializes in treating pregnant women.
2. \_\_\_\_\_ always develops symptoms just prior to the menstrual period.
3. \_\_\_\_\_ is also called erythroblasts ferri.
4. A(n) \_\_\_\_\_ can be observed at an earlier stage of the pregnancy than an amniocentesis.
5. When she stopped taking \_\_\_\_\_, Nancy had a(n) \_\_\_\_\_ inserted into her uterus for contraception.
6. Some cases of cervical cancer are caused by a(n) \_\_\_\_\_ infection.
7. \_\_\_\_\_ were formerly referred to as VD.
8. The \_\_\_\_\_ is an important screening tool for prostate cancer.
9. A(n) \_\_\_\_\_ is performed when the prostate gland is blocking urine flow from the bladder.
10. \_\_\_\_\_ is associated with prolonged tearing of a supra-abdominal tamen.

**B. Define the Term**

1. epinephrine \_\_\_\_\_
2. hydrolysis \_\_\_\_\_
3. transurethral resection of the prostate (TURP) \_\_\_\_\_
4. vertebra \_\_\_\_\_
5. osteoblasts \_\_\_\_\_
6. necrotoxy \_\_\_\_\_
7. carcinoma \_\_\_\_\_
8. gastritis \_\_\_\_\_
9. mucinosis \_\_\_\_\_
10. nulliparous \_\_\_\_\_
11. dystonia \_\_\_\_\_
12. myocarditis \_\_\_\_\_
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 colp/o refers to the cervix. Use it to write a term that means:

1. removal of the cervix \_\_\_\_\_

**Practice Exercises**—A wide array of updated workbook exercises at the end of each chapter serve as a fun and challenging study review. A larger variety of question types leads to a more engaging assessment of student understanding of concepts like spelling, adjective formation, and anatomy and physiology.

# MyLab Medical Terminology™

## What is MyLab Medical Terminology?

MyLab Medical Terminology is a comprehensive online program that gives you, the student, the opportunity to test your understanding of information, concepts and medical language to see how well you know the material. From the test results, MyLab Medical Terminology builds a self-paced, personalized study plan unique to your needs. Remediation in the form of etext pages, illustrations, exercises, audio segments, and video clips is provided for those areas in which you may need additional instruction, review, or reinforcement. You can then work through the program until your study plan is complete and you have mastered the content. MyLab Medical Terminology is available as a standalone program or with an embedded etext.

MyLab Medical Terminology is organized to follow the chapters and learning outcomes in *Medical Terminology: A Living Language*. With MyLab Medical Terminology, you can track your own progress through your entire med term course.

## How do Students Benefit?

Here's how MyLab Medical Terminology helps you.

- Keep up with information presented in the text and lectures.
- Save time by focusing study and review just the content you need.
- Increase understanding of difficult concepts with study material for different learning styles.
- Remediate in areas in which you need additional review.

## Key Features of MyLab Medical Terminology

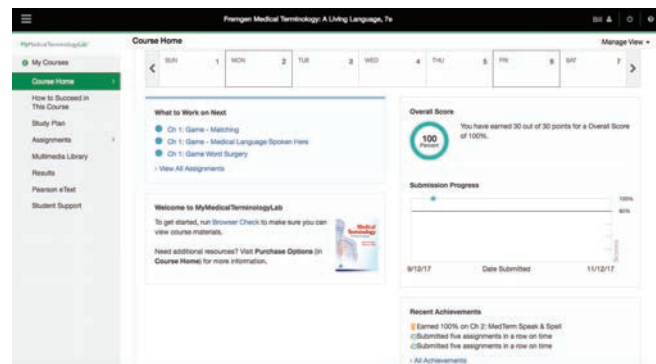
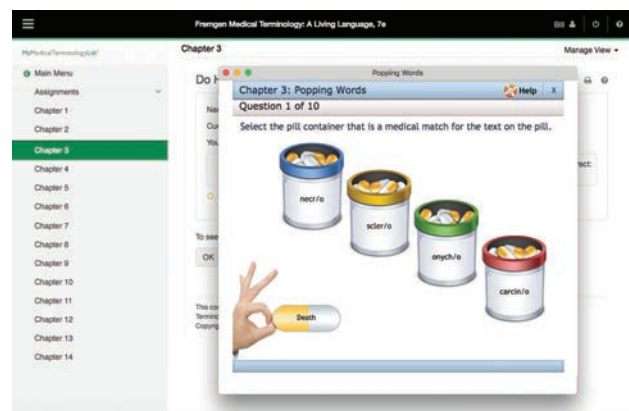
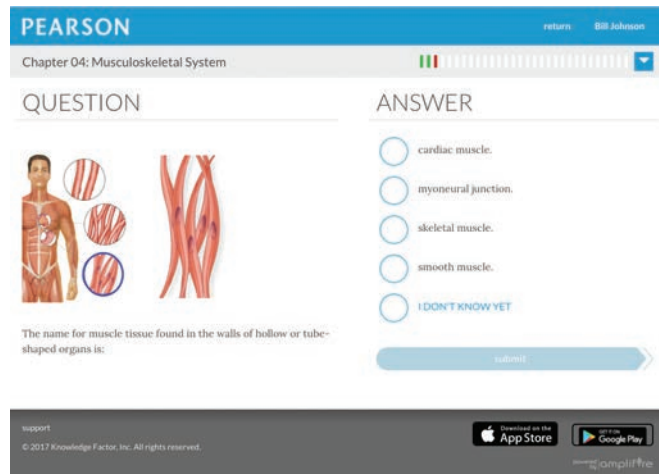
Pre-Tests and Post-Tests. Using questions aligned to the learning outcomes in *Medical Terminology: A Living Language*, multiple tests measure your understanding of topics.

Personalized Study Material. Based on the topic pre-test results, you receive a personalized study plan, highlighting areas where you may need improvement. It includes these study tools

- Links to specific pages in the etext
- Images for review
- Interactive exercises
- Animations and video clips
- Audio glossary
- Access to full Personalized Study Material

## How do Instructors Benefit?

- Save time by providing students with a comprehensive, media-rich study program.
- Track student understanding of course content in the program gradebook.
- Monitor student activity with viewable student assignments.



# 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 seventh 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.

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:

- Based on market feedback, we have taken the content that appeared in the special topics chapter in previous editions, and have now broken it up and interspersed this material throughout the book to better correspond with the body systems organization of the text. We hope this change will make incorporating this information easier into your course.
- All of the phonetic pronunciations have been reviewed and revised as needed to ensure consistency and to provide the most commonly used pronunciation.
- The beginning of the Terminology section in each chapter includes an even more comprehensive list of all combining forms, suffixes, and prefixes used to build terms in the remaining sections of the chapter.
- For this seventh edition, every term presented in the book has been evaluated for its currency and additional terms have been added throughout to reflect the newest technologies and procedures.
- **Practice As You Go**, our popular “speed bump” feature scattered throughout the chapters, has been expanded to appear more frequently throughout each chapter to allow 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.
- End-of-Chapter Practice Exercises have been revamped to better emphasize terminology usage rather than simple recall of word parts. In addition to the rewriting of many standard question types, new exercises have been added to the end of each chapter to provide students an engaging opportunity to assess their skills in:
  - spelling
  - building medical terms
  - using abbreviations
  - defining medical terms
  - understanding true-to-life scenarios
  - labeling drawings of human anatomy

## Organization of the Book

### Introductory Chapters

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 learn about terminology for medical records, the different healthcare settings, and about Pharmacology and the elements of a prescription. 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. Chapter 2 also includes a discussion about the routes used to introduce drugs into the body.

## Body Systems 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 phonetic pronunciation guide. Key terms are boldfaced the first time they appear in the narrative for easy recognition. 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 each chapter.

## Appendices

The appendices contain helpful reference lists of word parts and definitions provided in the text. This information is intended for quick access and includes three appendices: Word Parts Arranged Alphabetically and Defined, Word Parts Arranged Alphabetically by Definition, and Abbreviations.

## Answer Keys

A comprehensive listing of answers is provided in the back of the book for all of the Practice As You Go exercises, as well as the Chapter Review section's Real-World Applications activities, Practice Exercises, and Labeling Exercises. Students should use these answer keys to check their answers as they complete each chapter to better assess any areas that may need additional study.

## Glossary/Index

Lastly, all of the key terms in the book appear again in the combination glossary/index at the end of the text. In addition to providing a page reference for each entry, complete definitions of key terms are also presented for quick access.

# About the Authors



## Bonnie F. Fremgen

Bonnie F. Fremgen, PhD, is a former Associate Dean of the Allied Health Program at Robert Morris College and was vice president of a hospital in suburban Chicago. She was also director of continuing education at three Chicago area hospitals. 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 as well as responsibility for departments of social services, home health care, discharge planning, quality assurance, and hospital-wide education. She currently has two patents on a unique circulation-assisting wheelchair.

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. Dr. Fremgen has also taught ethics at the University of Notre Dame, South Bend, Indiana; University of Detroit, Detroit, Michigan; and Saint Xavier University, Chicago, Illinois.



## 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 to 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 120 colleagues from schools across the country who 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.

## Reviewers of the Seventh Edition

**Pamela A. Dobbins, MS**  
Shelton State Community  
College  
Natural Sciences-Biology  
Tuscaloosa, Alabama

**Gerry Gordon, BA, CPC, CPB**  
Daytona College  
Medical Billing and Coding,  
Adjunct Faculty  
Ormond Beach, Florida

**Timothy J. Jones, BA, MA**  
Oklahoma City Community  
College  
Health Professions  
Oklahoma City, Oklahoma

**Amy Bolinger Snow, MS**  
Greenville Technical College  
Biological Sciences  
Department  
Greenville, South Carolina

**Pamela J. Edwards, MA,  
CCMA, CBCS, NRCMA**  
Lone Star College System  
Business and Social Sciences  
Division  
Conroe, Texas

**Marleshia D. Hall, PhD**  
Shelton State Community  
College  
Department of Natural  
Sciences  
Tuscaloosa, Alabama

**Tammie Petersen RNC-OB, BSN**  
Austin Community College  
Health Sciences  
Austin, Texas

## Reviewers of Earlier Editions

**Yvonne Alles, MBA, RMT**  
Davenport University  
Grand Rapids, Michigan

**Pam Besser, PhD**  
Jefferson Community and  
Technical College  
Louisville, Kentucky

**Barbara Bussard, Instructor**  
Southwestern Michigan College  
Dowagiac, Michigan

**Antoinette Deshaies, RN,  
BSPA**  
Glendale Community College  
Glendale, Arizona

**Rachael C. Alstatter, Program  
Director**  
Southern Ohio College  
Fairfield, Ohio

**Norma J. Bird, MEd, BS, CMA**  
Idaho State University College  
of Technology  
Pocatello, Idaho

**Toni Cade, MBA, RHIA, CCS**  
University of Louisiana at  
Lafayette  
Lafayette, Louisiana

**Pamela Dobbins, MS, BS, AAS**  
Shelton State Community  
College  
Tuscaloosa, Alabama

**Steve Arinder, BS, MPH**  
Meridian Community College  
Meridian, Mississippi

**Trina Blaschko, RHIT**  
Chippewa Valley Technical  
College  
Eau Claire, Wisconsin

**Nicole Claussen, MS, CST, FAST**  
Rolla Technical Institute  
Rolla, Missouri

**Carole DuBose, LPN, CST**  
Choffin School of Surgical  
Technology  
Youngstown, Ohio

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City College  
Gainesville, Florida

**Richard T. Boan, PhD**  
Midlands Technical College  
Columbia, South Carolina

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Modesto Junior College  
Modesto, California

**Carol Eckert, RN, MSN**  
Southwestern Illinois College  
Belleville, Illinois

**Beverly A. Baker, DA, CST**  
Western Iowa Technical  
Community College  
Sioux City, Iowa

**Susan W. Boggs, RN, BSN,  
CNOR**  
Piedmont Technical College  
Greenwood, South Carolina

**Linda A. Costarella, ND**  
Lake Washington Institute of  
Technology  
Kirkland, Washington

**Pamela Edwards, MA,  
NRCMA**  
Lone Star College System  
The Woodlands, Texas

**Michael Battaglia, MS**  
Greenville Technical College  
Taylors, South Carolina

**Bradley S. Bowden, PhD**  
Alfred University  
Alfred, New York

**Lyndal M. Curry, MA, RP**  
University of South Alabama  
Mobile, Alabama

**Jamie Erskine, PhD, RD**  
University of Northern Colorado  
Greeley, Colorado

**Nancy Ridinger Bean, Health  
Assistant Instructor**  
Wythe County Vocational School  
Wytheville, Virginia

**Jeannie Bower, BS, NRCAMA**  
Central Penn College  
Summerdale, Pennsylvania

**Nancy Dancs, PT**  
Waukesha County Technical  
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Pewaukee, Wisconsin

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Del Mar College  
Corpus Christi, Texas

**Deborah J. Bedford, CMA, AAS**  
North Seattle Community  
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Seattle, Washington

**Joan Walker Brittingham**  
Sussex Tech Adult Division  
Georgetown, Delaware

**Theresa H. deBeche, RN, MN,  
CNS**  
Louisiana State University at  
Eunice  
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**Mildred K. Fuller, PhD, MT  
(ASCP), CLS(NCA)**  
Norfolk State University  
Norfolk, Virginia

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Mercer County Community  
College  
Trenton, New Jersey

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Curriculum Coordinator**  
Pitt Community College  
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Broome Community College  
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Antonelli Medical and Professional Institute  
Pottstown, Pennsylvania
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North Idaho College  
Coeur d'Alene, Idaho
- Misty Shuler, RHIA**  
Asheville Buncombe Technical Community College  
Asheville, North Carolina
- Patricia A. Slachta, PhD, RN, ACNS-BC, CWOCN**  
Technical College of the Lowcountry  
Beaufort, South Carolina
- Donna J. Slovensky, PhD, RHIA, FAHIMA**  
University of Alabama at Birmingham  
Birmingham, Alabama
- Connie Smith, RPh**  
University of Louisiana at Monroe School of Pharmacy  
Monroe, Louisiana
- Karen Snipe, CPhT, ASBA, MAED**  
Trident Technical College  
Charleston, South Carolina
- Janet Stehling, RHIA**  
McLennan College  
Lorena, Texas
- Karen Stenback, MFA, CHHC**  
Antelope Valley College  
Lancaster, California
- Donna Stern**  
University of California San Diego  
La Jolla, California

**Jodi Taylor, AAS, LPN, RMA**  
Terra State Community College  
Fremont, Ohio

**Annmary Thomas, MEd,  
NREMT-P**  
Community College of  
Philadelphia  
Philadelphia, Pennsylvania

**Lenette Thompson, CST, AS**  
Piedmont Technical College  
Greenwood, South Carolina

**Scott Throneberry, BS, NREMT-P**  
Calhoun Community College  
Decatur, Alabama

**Maureen Tubbiola, MS, PhD**  
St. Cloud State University  
St. Cloud, Minnesota

**Marilyn Turner, RN, CMA**  
Ogeechee Technical College  
Statesboro, Georgia

**Marianne Van Deursen, MS,  
Ed, CMA (AAMA), MLT**  
Warren County Community  
College  
Washington, New Jersey

**Joan Ann Verderame, RN, MA**  
Bergen Community College  
Paramus, New Jersey

**Twila Wallace, MEd**  
Central Community College  
Columbus, Nebraska

**Kathy Wallington**  
Phillips Junior College  
Campbell, California

**Linda Walter, RN, MSN**  
Northwestern Michigan  
College  
Traverse City, Michigan

**Jean Watson, PhD**  
Clark College  
Vancouver, Washington

**Twila Weiszbrod, MPA**  
College of the Sequoias  
Visalia, California

**Sara J. Wellman, RHIT**  
Indiana University Northwest  
Gary, Indiana

**Leesa Whicker, BA, CMA**  
Central Piedmont Community  
College  
Charlotte, NC

**Lynn C. Wimett, RN, ANP,  
EdD**  
Regis University  
Denver, Colorado

**Kathy Zaiken, PharmD**  
Massachusetts College of  
Pharmacy and Health Sciences  
Boston, Massachusetts

**Judith Zappala, MT, ASCP,  
MBA**  
Middlesex Community College  
Lowell, Massachusetts

**Carole A. Zeglin, MEd, BS,  
MT, RMA (AMT)**  
Westmoreland County  
Community College  
Youngwood, Pennsylvania

# 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 many of the pieces of art that grace 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. Any corrections can be sent to us through your institution's Pearson representative or please mail them to:

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# Contents

Welcome! v

A Guide to What Makes This Book Special vi

MyLab Medical Terminology xii

Preface xiii

About the Authors xv

About the Illustrators xv

Our Development Team xvi

A Commitment to Accuracy xix

## 1 Introduction to Medical Terminology 1

Learning Objectives 1

Medical Terminology at a Glance 2

Building Medical Terms From Word Parts 3

Word Roots 3

Combining Vowel/Form 3

Prefixes 5

Suffixes 7

Word Building 11

Interpreting Medical Terms 11

Pronunciation 11

Spelling 11

Singular and Plural Endings 12

Abbreviations 13

The Medical Record 13

Healthcare Settings 15

Confidentiality 16

Pharmacology 16

Drug Names 16

Legal Classification of Drugs 17

How to Read a Prescription 18

Chapter Review 20

Practice Exercises 20

## 2 Body Organization 25

Learning Objectives 25

Body Organization at a Glance 26

Body Organization Illustrated 27



## Levels of Body Organization 28

Cells 28

Tissues 28

Organs and Systems 31

## Body 36

Body Planes 37

Body Regions 38

Body Cavities 40

Directional Terms 42

Routes and Methods of Drug Administration 45

## Abbreviations 48

## Chapter Review 49

Practice Exercises 49

Labeling Exercises 52

## 3 Integumentary System 55

Learning Objectives 55

Integumentary System at a Glance 56

Integumentary System Illustrated 57

Anatomy and Physiology of the Integumentary System 58

The Skin 58

Accessory Organs 60

## Terminology 63

Word Parts Used to Build Integumentary System Terms 63

Adjective Forms of Anatomical Terms 64

Pathology 65

Diagnostic Procedures 77

Therapeutic Procedures 77

Pharmacology 79

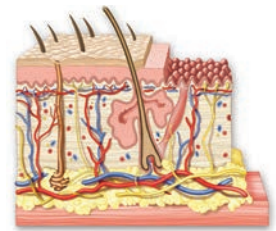
Abbreviations 80

## Chapter Review 81

Real-World Applications 81

Practice Exercises 84

Labeling Exercises 87



## 4 Musculoskeletal System 89

### Learning Objectives 89

#### SECTION I: SKELETAL SYSTEM AT A GLANCE 90

#### Skeletal System Illustrated 91 Anatomy and Physiology of the Skeletal System 92

Bones 92  
Skeleton 95  
Joints 101

#### Terminology 103

Word Parts Used to Build Skeletal System  
Terms 103  
Adjective Forms of Anatomical Terms 104  
Pathology 106  
Diagnostic Procedures 114  
Therapeutic Procedures 116  
Pharmacology 118  
Abbreviations 119

#### SECTION II: MUSCULAR SYSTEM AT A GLANCE 120

#### Muscular System Illustrated 121 Anatomy and Physiology of the Muscular System 122

Types of Muscles 122  
Naming Skeletal Muscles 124  
Skeletal Muscle Actions 124

#### Terminology 128

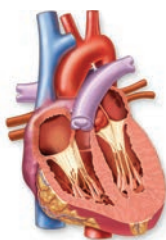
Word Parts Used to Build Muscular System  
Terms 128  
Adjective Forms of Anatomical Terms 128  
Pathology 129  
Diagnostic Procedures 131  
Therapeutic Procedures 132  
Pharmacology 133  
Abbreviations 134

#### Chapter Review 135

Real-World Applications 135  
Practice Exercises 138  
Labeling Exercises 143

## 5 Cardiovascular System 145

### Learning Objectives 145 Cardiovascular System at a Glance 146



### Cardiovascular System Illustrated 147 Anatomy and Physiology of the Cardiovascular System 148

Heart 149  
Blood Vessels 155

#### Terminology 159

Word Parts Used to Build Cardiovascular System  
Terms 159  
Adjective Forms of Anatomical Terms 160  
Pathology 162  
Diagnostic Procedures 168  
Therapeutic Procedures 170  
Pharmacology 173  
Abbreviations 174

#### Chapter Review 176

Real-World Applications 176  
Practice Exercises 179  
Labeling Exercises 183

## 6 Blood and the Lymphatic and Immune Systems 185



### Learning Objectives 185

#### SECTION I: BLOOD AT A GLANCE 186

#### Blood Illustrated 187 Anatomy and Physiology of Blood 188

Plasma 188  
Erythrocytes 188  
Leukocytes 189  
Platelets 189  
Blood Typing 190

#### Terminology 191

Word Parts Used to Build Blood Terms 191  
Adjective Forms of Anatomical Terms 192  
Pathology 193  
Diagnostic Procedures 196  
Therapeutic Procedures 197  
Pharmacology 197  
Abbreviations 198

#### SECTION II: THE LYMPHATIC AND IMMUNE SYSTEMS AT A GLANCE 200

#### The Lymphatic and Immune Systems Illustrated 201

## **Anatomy and Physiology of the Lymphatic and Immune Systems 202**

- Lymphatic Vessels 202
- Lymph Nodes 203
- Tonsils 205
- Spleen 205
- Thymus Gland 205
- Immunity 205

### **Terminology 208**

- Word Parts Used to Build Lymphatic and Immune System Terms 208
- Adjective Form of Anatomical Terms 209
- Pathology 209
- Diagnostic Procedures 214
- Therapeutic Procedures 214
- Pharmacology 215
- Abbreviations 216

### **Chapter Review 217**

- Real-World Applications 217
- Practice Exercises 220
- Labeling Exercises 225

## **7 Respiratory System 227**

### **Learning Objectives 227**

#### **Respiratory System at a Glance 228**

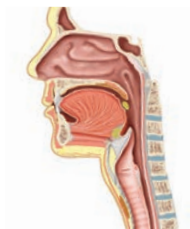
#### **Respiratory System Illustrated 229**

#### **Anatomy and Physiology of the Respiratory System 230**

- Nasal Cavity 230
- Pharynx 231
- Larynx 232
- Trachea 232
- Bronchial Tubes 233
- Lungs 234
- Lung Volumes and Capacities 235
- Respiratory Muscles 235
- Respiratory Rate 236

### **Terminology 237**

- Word Parts Used to Build Respiratory System Terms 237
- Adjective Forms of Anatomical Terms 239
- Pathology 240
- Diagnostic Procedures 249
- Therapeutic Procedures 251
- Pharmacology 254
- Abbreviations 255



### **Chapter Review 257**

- Real-World Applications 257
- Practice Exercises 260
- Labeling Exercises 265

## **8 Digestive System 267**

### **Learning Objectives 267**

#### **Digestive System at a Glance 268**

#### **Digestive System Illustrated 269**

#### **Anatomy and Physiology of the Digestive System 270**

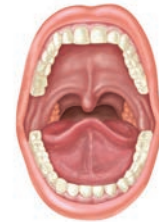
- Oral Cavity 270
- Pharynx 274
- Esophagus 274
- Stomach 275
- Small Intestine 275
- Large Intestine 277
- Accessory Organs of the Digestive System 278

### **Terminology 280**

- Word Parts Used to Build Digestive System Terms 280
- Adjective Forms of Anatomical Terms 282
- Pathology 284
- Diagnostic Procedures 292
- Therapeutic Procedures 295
- Pharmacology 298
- Abbreviations 299

### **Chapter Review 301**

- Real-World Applications 301
- Practice Exercises 304
- Labeling Exercises 309



## **9 Urinary System 311**

### **Learning Objectives 311**

#### **Urinary System at a Glance 312**

#### **Urinary System Illustrated 313**

#### **Anatomy and Physiology of the Urinary System 314**

- Kidneys 314
- Ureters 315
- Urinary Bladder 316



- Urethra 317
- Role of Kidneys in Homeostasis 318
- Stages of Urine Production 318
- Urine 319

**Terminology 320**

- Word Parts Used to Build Urinary System Terms 320
- Adjective Forms of Anatomical Terms 322
- Pathology 323
- Diagnostic Procedures 328
- Therapeutic Procedures 330
- Pharmacology 333
- Abbreviations 333

**Chapter Review 335**

- Real-World Applications 335
- Practice Exercises 338
- Labeling Exercises 343

**Anatomy and Physiology of the Male Reproductive System 373**

- External Organs of Reproduction 373
- Internal Organs of Reproduction 374

**Terminology 375**

- Word Parts Used to Build Male Reproductive System Terms 375
- Adjective Forms of Anatomical Terms 376
- Pathology 377
- Diagnostic Procedures 380
- Therapeutic Procedures 380
- Pharmacology 382
- Abbreviations 382

**Chapter Review 383**

- Real-World Applications 383
- Practice Exercises 386
- Labeling Exercises 391

**10 Reproductive System 345**

**Learning Objectives 345**

**SECTION I: FEMALE REPRODUCTIVE SYSTEM AT A GLANCE 346**



**Female Reproductive System Illustrated 347**

**Anatomy and Physiology of the Female Reproductive System 348**

- Internal Genitalia 348
- Vulva 351
- Breast 352
- Pregnancy 353

**Terminology 356**

- Word Parts Used to Build Female Reproductive System Terms 356
- Adjective Forms of Anatomical Terms 357
- Pregnancy Terms 358
- Pathology 359
- Diagnostic Procedures 364
- Therapeutic Procedures 367
- Pharmacology 369
- Abbreviations 370

**SECTION II: MALE REPRODUCTIVE SYSTEM AT A GLANCE 371**

**Male Reproductive System Illustrated 372**

**11 Endocrine System 393**

**Learning Objectives 393**

**Endocrine System at a Glance 394**

**Endocrine System Illustrated 395**



**Anatomy and Physiology of the Endocrine System 396**

- Adrenal Glands 398
- Ovaries 399
- Pancreas 399
- Parathyroid Glands 400
- Pineal Gland 400
- Pituitary Gland 401
- Testes 403
- Thymus Gland 403
- Thyroid Gland 403

**Terminology 405**

- Word Parts Used to Build Endocrine System Terms 405
- Adjective Forms of Anatomical Terms 406
- Pathology 407
- Diagnostic Procedures 412
- Therapeutic Procedures 413
- Pharmacology 414
- Abbreviations 415

**Chapter Review 416**

- Real-World Applications 416
- Practice Exercises 419
- Labeling Exercises 423



## 12 Nervous System and Mental Health 425

### Learning Objectives 425

#### SECTION I: NERVOUS SYSTEM AT A GLANCE 426

#### Nervous System Illustrated 427 Anatomy and Physiology of the Nervous System 428

- Nervous Tissue 428
- Central Nervous System 428
- Peripheral Nervous System 433

#### Terminology 436

- Word Parts Used to Build Nervous System Terms 436
- Adjective Forms of Anatomical Terms 437
- Pathology 438
- Diagnostic Procedures 447
- Therapeutic Procedures 448
- Pharmacology 450
- Abbreviations 451

#### SECTION II: MENTAL HEALTH AT A GLANCE 452

#### Mental Health Disciplines 453

- Psychology 453
- Psychiatry 453

#### Pathology 453

#### Therapeutic Procedures 457

#### Abbreviations 458

#### Chapter Review 459

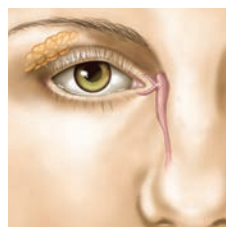
- Real-World Applications 459
- Practice Exercises 462
- Labeling Exercises 468



## 13 Special Senses: The Eye and Ear 471

### Learning Objectives 471

#### SECTION I: THE EYE AT A GLANCE 472



#### The Eye Illustrated 473

#### Anatomy and Physiology of the Eye 474

- The Eyeball 474
- Muscles of the Eye 476
- The Eyelids 476
- Conjunctiva 477
- Lacrimal Apparatus 477
- How Vision Works 477

#### Terminology 479

- Word Parts Used to Build Eye Terms 479
- Adjective Forms of Anatomical Terms 480
- Pathology 481
- Diagnostic Procedures 486
- Therapeutic Procedures 488
- Pharmacology 490
- Abbreviations 491

#### SECTION II: THE EAR AT A GLANCE 492

#### The Ear Illustrated 493

#### Anatomy and Physiology of the Ear 494

- External Ear 494
- Middle Ear 495
- Inner Ear 495
- How Hearing Works 496

#### Terminology 497

- Word Parts Used to Build Ear Terms 497
- Adjective Forms of Anatomical Terms 498
- Pathology 499
- Diagnostic Procedures 501
- Therapeutic Procedures 503
- Pharmacology 505
- Abbreviations 505

#### Chapter Review 506

- Real-World Applications 506
- Practice Exercises 509
- Labeling Exercises 514

## Appendices 515

- Appendix I: Word Parts Arranged Alphabetically and Defined 515
- Appendix II: Word Parts Arranged Alphabetically by Definition 522
- Appendix III: Abbreviations 528
- Answer Keys 535
- Glossary/Index 551



# 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. This chapter discusses the general guidelines for forming words; an understanding of word roots, combining forms, prefixes, and suffixes; pronunciation; and spelling. 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. 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. Key terms (with their pronunciations) are listed at the beginning of the section in which they are discussed, and each chapter contains numerous pathological, diagnostic, treatment, and surgical terms. Use these lists as an additional study tool for pre-viewing and reviewing terms.

Understanding medical terms requires 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 gold 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.

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## 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	<b>cardi</b> ( <i>heart</i> )
Prefix	<b>peri-</b> ( <i>around</i> )
Suffix	<b>-itis</b> ( <i>inflammation</i> )

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 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 *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

A combining vowel makes it possible to pronounce long medical terms with ease and to combine several word parts. 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.

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-skohp). But to combine **arthr** with **-itis** does not require a combining vowel: **arthritis** (ar-THRY-tis).

### 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.

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** (gastreenteritis 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, this format is used throughout this book.

## Common Combining Forms

What follows are some commonly used word roots in their combining form, their meaning, and examples of their use. 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>	protection	immunology (study of protection)
<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>rhino/o</b>	nose	rhinoplasty (surgical repair of the nose)

## PRACTICE AS YOU GO

### B. Name That Term

Use the suffix **-logy** 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

Adding a prefix to the front of a term forms a new medical word. Prefixes frequently provide information about the location of an organ, the number of parts, or time (frequency). For example, the prefix **bi-** stands for two of something, such as **bilateral** (bye-LAT-er-al), meaning *to have two sides*. However, not every term will have a prefix.

### Common Prefixes

What follows are some of the more common prefixes, their meanings, and examples of their use. 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)

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)

### Word Watch

Be extremely 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*

## Number Prefixes

What follows are some common prefixes pertaining to the number of items or measurement, their meanings, and examples of their use.

PREFIX	MEANING	EXAMPLE (DEFINITION)
<b>bi-</b>	two	bilateral (two sides)
<b>hemi-</b>	half	hemiplegia (paralysis of one side/half of the body)
<b>mono-</b>	one	monoplegia (paralysis of one extremity)
<b>multi-</b>	many	multigravida (woman with many [two or more] pregnancies)
<b>nulli-</b>	none	nulligravida (woman with no pregnancies)
<b>pan-</b>	all	pansinusitis (inflammation of all the sinuses)
<b>poly-</b>	many	polymyositis (inflammation of many muscles)
<b>quadri-</b>	four	quadriplegia (paralysis of all four limbs)
<b>semi-</b>	partial	semiconscious (partially conscious)
<b>tetra-</b>	four	tetraplegia (paralysis of all four limbs)
<b>tri-</b>	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.

- tachycardia \_\_\_\_\_
- pseudocyesis \_\_\_\_\_
- hypoglycemia \_\_\_\_\_
- intercostal \_\_\_\_\_
- eupnea \_\_\_\_\_
- postoperative \_\_\_\_\_
- monoplegia \_\_\_\_\_
- 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** (kar-DYE-tis), meaning *inflammation of the heart*. Every medical term *must* have a suffix. Most often the



**Med Term Tip**

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

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

What follows are some common suffixes, their meanings, and examples of their use. When written by themselves, suffixes are preceded by a hyphen.

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

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

## Adjective Suffixes

The following suffixes are used to convert a word root into an adjective. Each of these suffixes is usually translated as *pertaining to*.

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

## Surgical Suffixes

The following suffixes indicate surgical procedures.

SUFFIX	MEANING	EXAMPLE (DEFINITION)
<b>-centesis</b>	puncture to withdraw fluid	arthrocentesis (puncture to withdraw fluid from a joint)
<b>-ectomy</b>	surgical removal	gastrectomy (surgical removal of the stomach)
<b>-ostomy</b>	surgically create an opening	colostomy (surgically create an opening for the colon [through the abdominal wall])
<b>-otomy</b>	cutting into	thoracotomy (cutting into the chest)

### 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*