

9th Edition

Medical Terminology

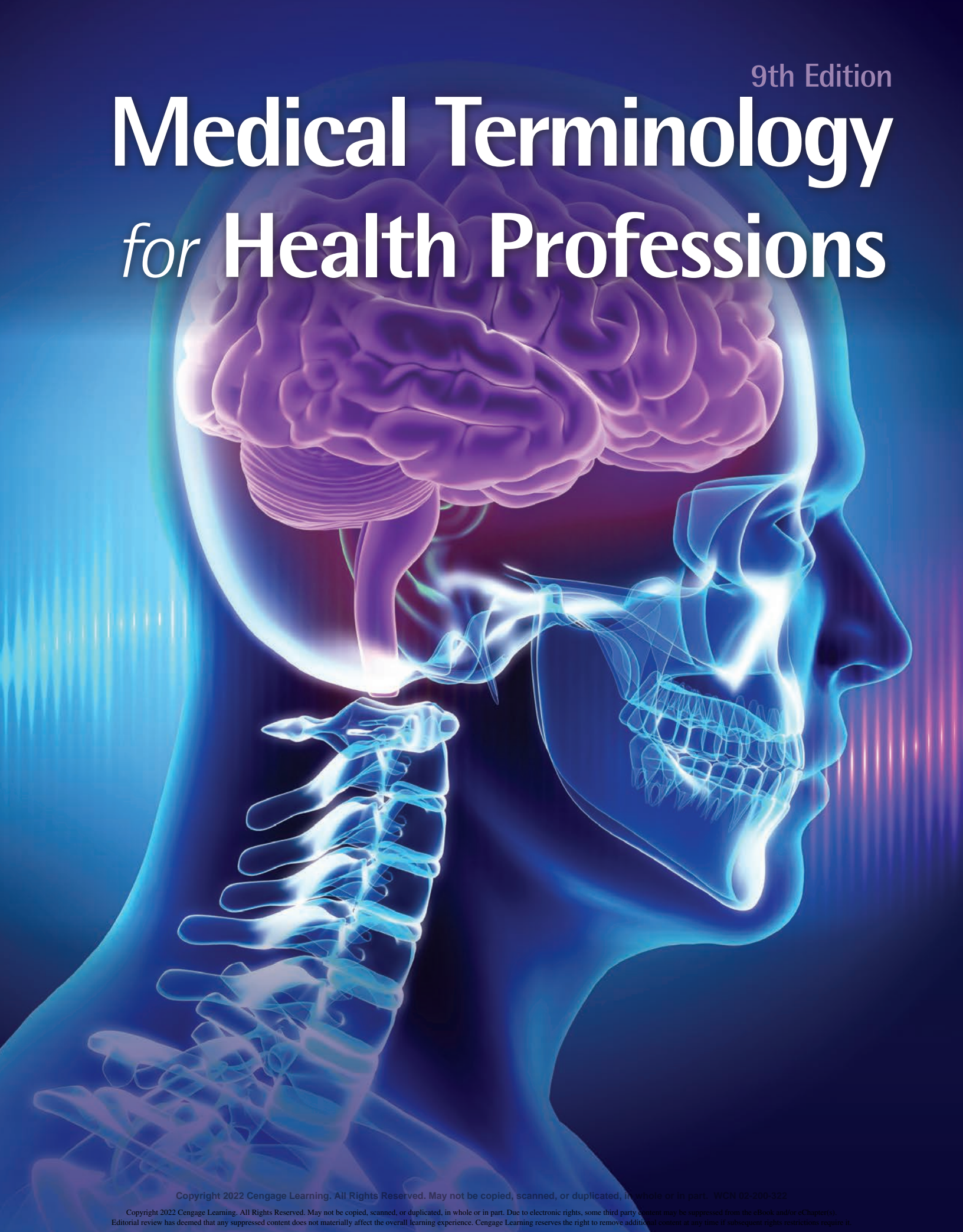
for Health Professions



Carol L. Schroeder
Laura Ehrlich
Katrina Schroeder Smith
Ann Ehrlich

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Medical Terminology *for* Health Professions



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**Medical Terminology for Health Professions,
Ninth Edition**

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Katrina Schroeder Smith, Ann Ehrlich**

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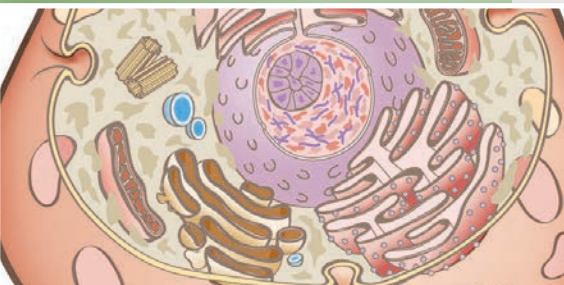
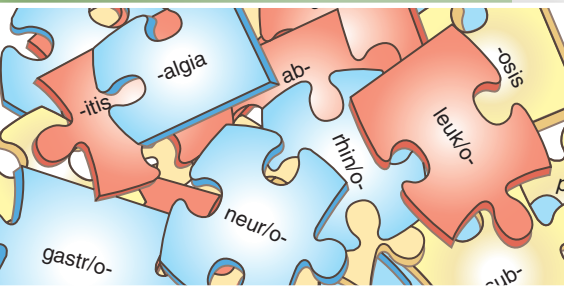
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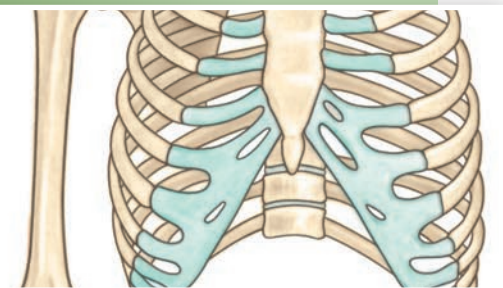
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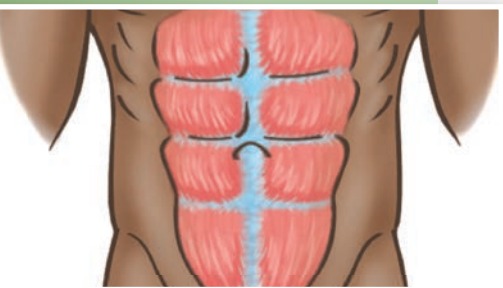
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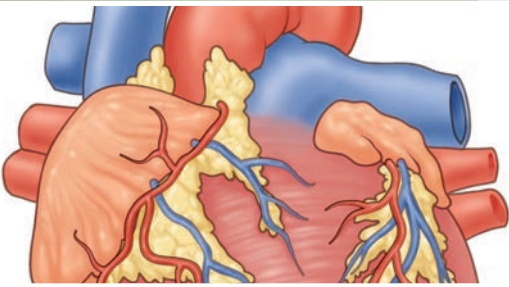
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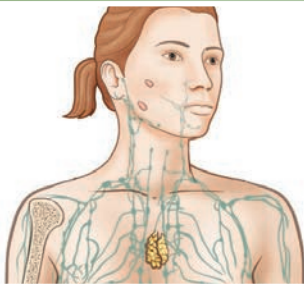
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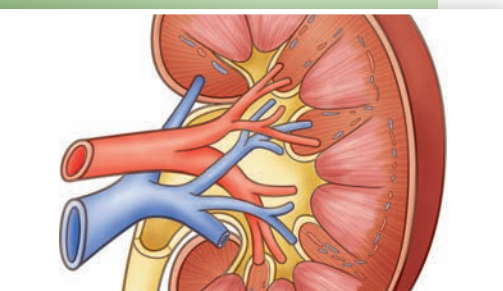
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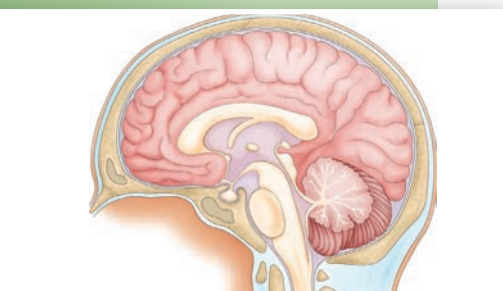
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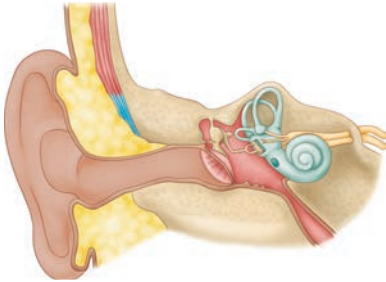
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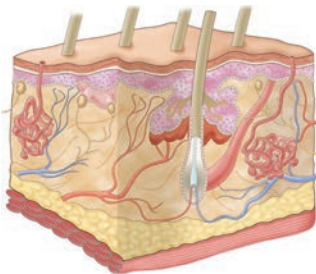
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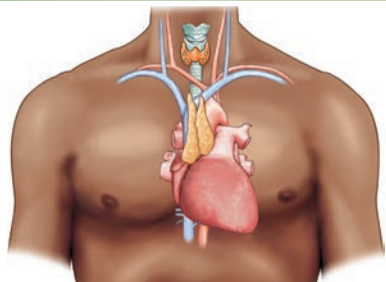
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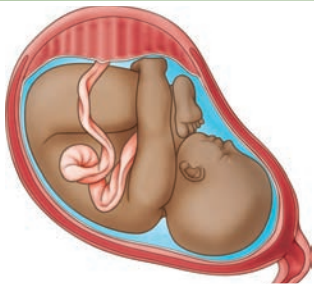
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RS.3. The suffix _____ means surgical fixation.

- desis**
- lysis**
- pexy**
- ptosis**

A

a-	no, not, without, away from, negative
-a	noun ending
ab-	away from, negative, absent
abdomin/o	abdomen
-able	capable of, able to
abrad/o, abras/o	rub or scrape off
abrupt/o	broken away from

PREFACE



TO THE LEARNER

Welcome to the world of medical terminology! Learning this special language is an important step in preparing for your career as a health care professional. Here's good news: learning medical terms is much easier than learning a foreign language because you are already familiar with quite a few of the words, such as *appendicitis* and *tonsillectomy*. Understanding new words becomes easier with the discovery that many of these terms are made up of interchangeable word parts that are used in different combinations. Once you understand this, you'll be well on your way to translating even the most difficult medical terms, including words you have never seen before. You'll be amazed to see how quickly your vocabulary will grow!

This book and the accompanying learning materials are designed to make the process as simple as possible. Review the “*How to Use This Book*” section so you can find your way around easily. Once you become comfortable with the format, you'll discover you are learning faster than you ever imagined possible.

CHAPTER ORGANIZATION

The text is designed to help you master medical terminology. It is organized into 15 chapters, the Word Part Review, the Comprehensive Medical Terminology Review, three appendices, an index, and removable flashcards. To gain the most benefit from your use of this text, take advantage of the many features, including the *Learning Exercises* plus the *Human Touch* stories and discussion questions that are included at the end of each chapter.

Primary terms are the most important terms in a chapter. When first introduced, the term appears in boldface and, if appropriate, is followed by the “sounds-like” pronunciation. Only primary terms are used as correct answers in the exercises and tests.

Secondary terms appear in *orange* italics. These terms, which are included to clarify the meaning of a primary term, are sometimes used as distracters, but not as correct answers, in exercises or tests.

Each chapter begins with a **vocabulary list** consisting of 15 word parts and 60 medical terms selected from among the primary terms in the chapter. *Note:* If your instructor is using the **Simplified Syllabus** version of this course, these are the terms that you will be expected to learn for all quizzes, tests, and exams.

Introductory Chapters and Word Part Review

Chapters 1 and 2 create the foundation that enables you to master the rest of the book. Chapter 1 introduces key word parts—the building blocks of most medical terms.

Chapter 2 introduces more word parts and provides an overview of basic terms used throughout the medical field, as well as some of the many career options open to you in health care.

After studying these chapters, complete the **Word Part Review** that follows Chapter 2. These practice activities and the accompanying test will help you determine whether you've mastered the concept of these all-important building blocks. If you are having trouble here, it is important to put more effort into learning these basics.

Body System Chapters

Chapters 3 through 14 are organized by body system. Because each body system stands alone, you can study these chapters in any sequence. Each chapter begins with an overview of the structures and functions of that system so you can relate these to the medical specialists, pathology, diagnostics, and treatment procedures that follow.

Chapter 15 introduces basic diagnostic procedures, examination positions, imaging techniques, laboratory tests, nuclear medicine, and pharmacology. It also includes a section on alternative and complementary medicines. This chapter can be studied at any point in the course.

Comprehensive Medical Terminology Review

This section, which follows Chapter 15, is designed to help you prepare for your final examination. It includes study tips, practice exercises, and a simulated final test; however, be aware that none of these questions are from the actual final test.

Appendices

Appendix A: Prefixes, Combining Forms, and Suffixes is a convenient alphabetic reference for the medical word parts. When you don't recognize a word part, you can look it up here.

Appendix B: Abbreviations and Their Meanings is an extensive list of commonly used abbreviations and their meanings. Abbreviations are important in medicine, and using them *accurately* is essential!

Appendix C: Terms Related to Diagnosis, Pathology and Procedures gives the definitions of all the primary terms in the text relating to diagnosis, pathology, and medical procedures.

Instructor & Student Resources

The following resources are included with your textbook to provide even more help as you study.

- **Flashcards.** Improve your knowledge and test your mastery by using the flashcards provided in the last section of the book. Remove these perforated pages carefully and then separate the cards. Flashcards are an effective study aid for use even when you have only a small amount of time.
- **Additional Online Resources.** Additional instructor and student resources for this product are available online. Instructor assets include an Instructor's Manual, Educator's Guide, PowerPoint® slides with art and answer keys, and a test bank powered by Cognero®, as well as a transition guide, correlations to two exams, and spreadsheets detailing media assets, time on task, and MindTap customization. Student assets include PowerPoint® slides with art. Sign up or sign in at www.cengage.com to search for and access this product and its online resources.

CHANGES TO THE NINTH EDITION

New techniques and terminology were carefully and thoroughly researched to make this latest edition as up-to-date as possible. Terms that are no longer in common use have been eliminated, and countless new terms and definitions have been added.

A detailed conversion guide that helps instructors make the change from the eighth to the ninth edition is available on the at <http://www.cengage.com>. A brief summary of some of the changes follows:

- Chapter 2: New section on advance directives
- Chapter 3: Expanded section on medications
- Chapter 6: Added COVID-19; new Human Touch story
- Chapter 8: Expanded dental procedures; added new section on nutrition support
- Chapter 12: New section on viral skin infections
- Chapter 13: Expanded coverage of diabetic pathology and treatment
- Chapter 14: New section on gender identity
- Chapter 15: Chapter title changed to **Diagnostic Procedures, Pharmacology, and Complementary Medicine**; new sections on stool analysis and durable medical equipment



ABOUT THE AUTHORS

CAROL L. SCHROEDER, UNIVERSITY OF WISCONSIN

Carol L. Schroeder has over 20 years of experience in finding innovative ways to present medical terminology at a level appropriate for this text's readers. Her background in technical writing, translating, and research is invaluable in continuously updating the content and in creating innovative activities and approaches—such as the Simplified Syllabus and Human Touch stories—that enable instructors to present engaging courses that help all students succeed.

LAURA EHRLICH, UNIVERSITY OF ROCHESTER SCHOOL OF NURSING

Laura Ehrlich, a registered nurse, enjoys the fast-paced, challenging environment of the emergency department as well as the knowledge that her skills save lives. She excels at explaining medical terminology to patients and training other nurses on new procedures, equipment, and technology. She is also a board-certified emergency nurse (CEN).

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Katrina Schroeder Smith is a registered dietitian who trained and works at Boston Children's Hospital, a Harvard Teaching Hospital. After finishing her dietetic internship at Simmons College, she completed the prestigious LEAH (Leadership Education in Adolescent Health) Fellowship in the adolescent department at Boston Children's Hospital. Currently she is a clinical dietitian in the adolescent clinic there, specializing in the nutritional care of young adults with HIV, eating disorders, elevated body weight, and polycystic ovarian syndrome (PCOS). She also writes guides and blogs for the Center for Young Women's Health and runs a small private practice in Brookline, Massachusetts.

ANN EHRLICH, GODDARD COLLEGE

Ann Ehrlich, who founded this series in 1988, was an experienced teacher, professional author and lifelong student. Considered one of the leading experts in the field of medical terminology, she wrote numerous books on such health topics as dental assisting, practice management, speech therapy and lymphedema.



ACKNOWLEDGEMENTS

Medical Terminology for Health Professions recently celebrated its 30th anniversary as one of the leading texts in the healthcare field. We are honored to carry on the work that Ann Ehrlich started in the 1980s, following her high standards for continuously updating every aspect of the book's content and the accompanying instructional materials.

We are very grateful for the input of the many reviewers and instructors who volunteer feedback, all of whom are an invaluable resource in guiding this book as it evolves. Their insights, comments, suggestions, and attention to detail are very important in making the text, and its many resources, up-to-date and accurate. Special thanks to Adam Lindsey, Ben Ehrlich, and Elise Anderson for their input on this edition. We would each especially like to thank our families for their support throughout the research, writing, and editing process.

Thanks also to the editorial and production staff of Cengage Learning for their very professional and extremely helpful assistance in making this revision possible, especially our editors, Deb Myette-Flis and Laura Stewart. We are very fortunate to have had Deb Myette-Flis providing her expertise to this project for the past six editions.

Please note that a portion of the royalties for this textbook provide scholarships for lymphedema therapists, helping to address a nation-wide shortage in this field.

*Carol L. Schroeder,
Laura Ehrlich, and
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HOW TO USE THIS BOOK



Medical Terminology for Health Professions, Ninth Edition, is designed to help you learn and remember medical terms with surprising ease. The key lies in the following features.

BODY SYSTEM OVERVIEW

The first page of each body system chapter is a chart giving an overview of the structures, related combining forms, and functions most important to that system.

Overview of
STRUCTURES, COMBINING FORMS, AND FUNCTIONS OF THE SKELETAL SYSTEM

Major Structures	Related Combining Forms	Primary Functions
Bones	oss/e, oss/i, oste/o, ost/o	Act as the framework for the body, protect the internal organs, and store calcium.
Bone Marrow	myel/o (also means spinal cord)	Red bone marrow helps form red blood cells. Yellow bone marrow stores fat.
Cartilage	chondr/o	Creates a smooth surface for motion within the joints.
Joints	arthr/o	
Ligaments		
Synovial		

VOCABULARY LIST

The second page of each chapter is a 75-item vocabulary list. This list includes 15 key word parts with their meanings and 60 important terms for the chapter with their pronunciations. This immediately alerts you to the key terms in the chapter and acts as a review guide. Next to each term is a box so you can check off each term when you've learned it.

Vocabulary Related to THE SKELETAL SYSTEM

This list contains essential word parts and medical terms for this chapter. These and the other important **primary terms** are shown in **boldface** throughout the chapter. **Secondary terms**, which appear in *orange italics*, clarify the meaning of primary terms.

Word Parts

- ankyl/o** crooked, bent, stiff
- arthr/o** joint
- burs/o** bursa
- chondr/i, chondr/o** cartilage
- cost/o** rib
- cran/i** skull
- desis** to bind, tie together
- kyph/o** bent, hump
- lord/o** curve, swayback, bent
- Lumb/o** lumbar, lower back
- myel/o** spinal cord, bone marrow
- osteo/o, oste/o** bone

- hemarthrosis** (hem-ar-THROH-sis)
- hematopoietic** (hee-MAH-toh-poy-et-ick)
- internal fixation**
- juvenile idiopathic arthritis** (id-ee-oh-PATH-ick ar-THRIGH-tis)
- kyphosis** (kye-FOH-sis)
- laminectomy** (lam-ih-NECK-toh-mee)
- lordosis** (lor-DOH-sis)
- lumbago** (lum-BAY-goh)
- malleolus** (mah-LEE-oh-lus)
- manubrium** (mah-NEW-tree-um)
- metacarpals** (met-ah-KAR-palz)
- metatarsals** (met-ah-TAHR-salz)
- multiple myeloma** (my-eh-LOH-mah)
- open fracture**
- orthopedic surgeon** (or-thoh-PEE-dick)
- orthotic** (or-THOT-ick)
- osteitis** (oss-tee-EYE-tis)
- osteoarthritis** (oss-tee-oh-ar-THRIGH-tis)
- osteochondroma** (oss-tee-oh-koh-DROH-mah)
- osteomalacia** (oss-tee-oh-mah-LAY-shee-ah)
- osteomyelitis** (oss-tee-oh-my-eh-LYE-tis)

LEARNING OBJECTIVES

The beginning of each chapter lists learning objectives to help you understand what is expected of you as you read the text and complete the exercises. These objectives are set off with a colored bar for easy identification.

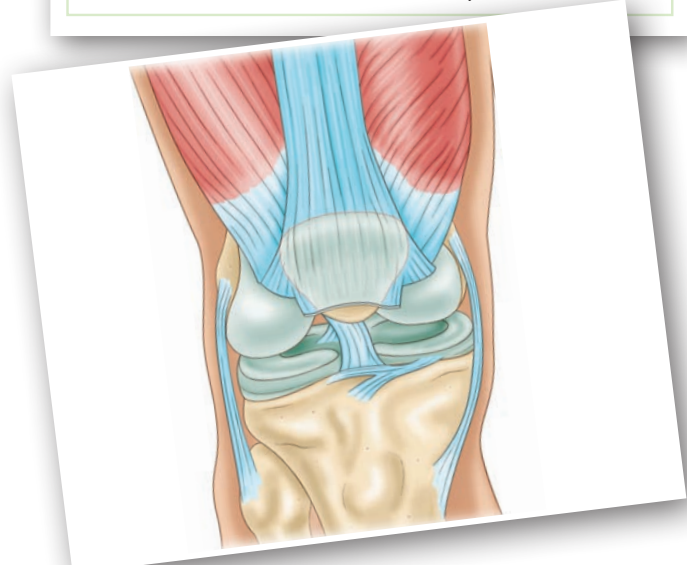
LEARNING OBJECTIVES

On completion of this chapter, you should be able to:

1. Identify and describe the major functions and structures of the skeletal system.
2. Describe three types of joints.
3. Differentiate between the axial and appendicular skeletons.
4. Identify the medical specialists who treat disorders of the skeletal system.
5. Recognize, define, spell, and pronounce the primary terms related to the pathology and the diagnostic and treatment procedures of the skeletal system.

ART PROGRAM

Our art program includes hundreds of photos and full-color illustrations that help clarify the text and contain important additional information. Review each illustration and read its caption carefully for easy and effective learning.



- The **ilium** (ILL-ee-um) is the broad, blade-shaped bone that forms the back and sides of the pubic bone.
- The **sacroiliac** (say-kroh-ILL-ee-ack) is the slightly movable articulation between the sacrum and posterior portion of the ilium (**sacr/o** means sacrum, **ili** means ilium, and **-ac** means pertaining to).
- The **ischium** (ISS-kee-um), which forms the lower posterior portion of the pubic bone, bears the weight of the body when sitting.

“SOUNDS-LIKE” PRONUNCIATION SYSTEM

The sounds-like pronunciation system makes pronunciation easy by respelling the word with syllables you can understand—and say—at a glance. Simply pronounce the term just as it appears in parentheses, accenting the syllables as follows:

- **Primary** (strongest) **accent**: capital letters and bold type
- **Secondary accent**: lowercase letters and bold type

WORD PARTS

Because word parts are so important to learning medical terminology, whenever a term made up of word parts is introduced, the definition is followed (in parentheses) by the word parts highlighted in **magenta** and defined.

PRIMARY AND SECONDARY TERMS

- **Primary terms** are the most important medical words in a chapter. When first introduced, the term appears in **boldface** and, if appropriate, is followed by the sounds-like pronunciation. These are the words students need to concentrate on learning. Only primary terms are used as correct answers in the exercises and tests.
- **Secondary terms** appear in **orange** italics. These terms are included to clarify the meaning of a primary term. Although used as distracters in exercises, the secondary terms are not used as correct answers in exercises or tests.

LEARNING EXERCISES

Each chapter includes 100 Learning Exercises in a variety of formats that require a one- or two-word written answer. Writing terms, rather than just circling a multiple-choice option, reinforces learning and provides practice in writing and spelling the terms.

PATHOLOGY OF THE MUSCULAR SYSTEM

Fibers, Fascia, and Tendons

- **Fasciitis** (fash-ee-EYE-tis) is inflammation of a fascia (**fasci** means fascia, and **-itis** means inflammation). Note the double “i” that results from the suffix **-itis** being added to the word root **fasci**.
- **Fibromyalgia** (figh-broh-my-AL-jee-ah) is a debilitating chronic condition characterized by fatigue; diffuse or specific muscle, joint, or bone pain; and a wide range of other symptoms (**fibr/o** means fibrous tissue, **my** means muscle, and **-algia** means pain). **Debilitating** means a condition causing weakness.
- **Tenosynovitis** (ten-oh-sin-oh-VYE-tis) is an inflammation of the sheath surrounding a tendon

- **Singultus** (sing-GUL-tus), also known as **hiccups**, is myoclonus of the diaphragm that causes the characteristic hiccup sound with each spasm.
- A **cramp** is a painful localized muscle spasm often named for its cause, such as menstrual cramps or writer’s cramp. A **charley horse** is a slang term for a cramp, usually in the leg, that came into use in the 1880s among baseball players.
- **Torticollis** (tor-tih-KOL-is), also known as **wryneck**, is a stiff neck due to spasmodic contraction of the neck muscles that pull the head toward the affected side.

LEARNING EXERCISES

MATCHING WORD PARTS 1

Write the correct answer in the middle column.

Definition	Correct Answer	Possible Answers
4.1. abnormal condition	_____	-cele
4.2. fascia	_____	fasci/o
4.3. fibrous tissue	_____	fibr/o
4.4. hernia, swelling	_____	-ia
4.5. movement	_____	kines/o, kinesi/o

MATCHING WORD PARTS 2

Write the correct answer in the middle column.

Definition	Correct Answer	Possible Answers
4.6. coordination	_____	my/o
4.7. muscle	_____	-rrhexis
4.8. set free	_____	tax/o
4.9. tendon	_____	tend/o
4.10. tone	_____	ton/o

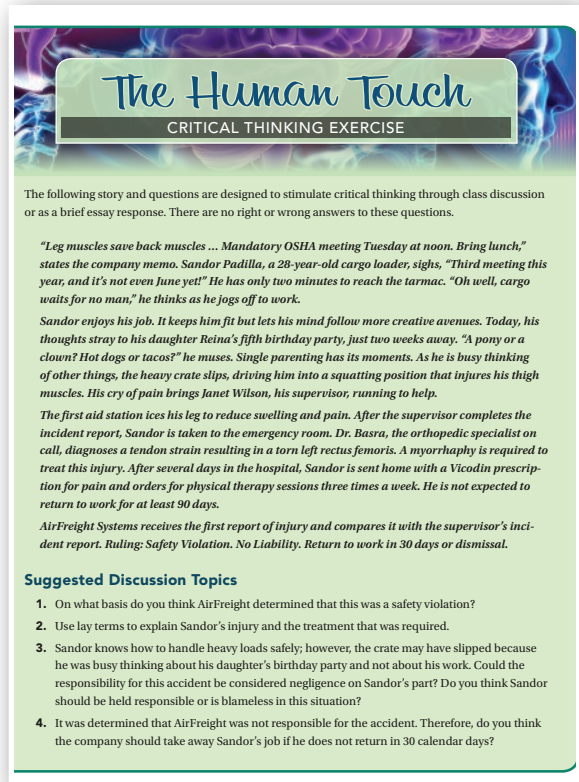
MATCHING MUSCLE DIRECTIONS AND POSITIONS

Write the correct answer in the middle column.

Definition	Correct Answer	Possible Answers
4.11. crosswise	_____	lateralis
4.12. ring like	_____	oblique

THE HUMAN TOUCH: CRITICAL THINKING EXERCISE

A real-life short story that involves patients and pathology, along with related critical thinking questions, at the end of each chapter helps you apply what you are learning to the real world. There are no right or wrong answers, just questions to get you started thinking about and using the new terms you have learned.



The Human Touch
CRITICAL THINKING EXERCISE

The following story and questions are designed to stimulate critical thinking through class discussion or as a brief essay response. There are no right or wrong answers to these questions.

"Leg muscles save back muscles ... Mandatory OSHA meeting Tuesday at noon. Bring lunch," states the company memo. Sandor Padilla, a 28-year-old cargo loader, sighs, "Third meeting this year, and it's not even June yet!" He has only two minutes to reach the tarmac. "Oh well, cargo waits for no man," he thinks as he jogs off to work.

Sandor enjoys his job. It keeps him fit but lets his mind follow more creative avenues. Today, his thoughts stray to his daughter Reina's fifth birthday party, just two weeks away. "A pony or a clown? Hot dogs or tacos?" he muses. Single parenting has its moments. As he is busy thinking of other things, the heavy crate slips, driving him into a squatting position that injures his thigh muscles. His cry of pain brings Janet Wilson, his supervisor, running to help.

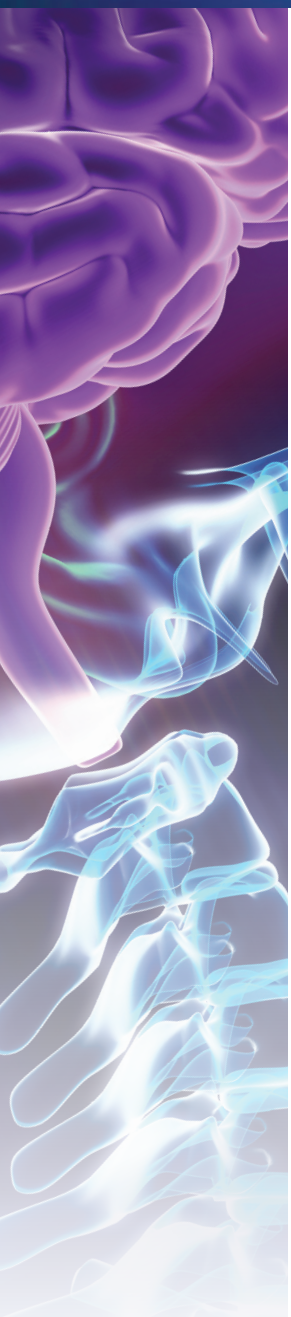
The first aid station ices his leg to reduce swelling and pain. After the supervisor completes the incident report, Sandor is taken to the emergency room. Dr. Basra, the orthopedic specialist on call, diagnoses a tendon strain resulting in a torn left rectus femoris. A myorrhaphy is required to treat this injury. After several days in the hospital, Sandor is sent home with a Vicodin prescription for pain and orders for physical therapy sessions three times a week. He is not expected to return to work for at least 90 days.

AirFreight Systems receives the first report of injury and compares it with the supervisor's incident report. Ruling: Safety Violation. No Liability. Return to work in 30 days or dismissal.

Suggested Discussion Topics

1. On what basis do you think AirFreight determined that this was a safety violation?
2. Use lay terms to explain Sandor's injury and the treatment that was required.
3. Sandor knows how to handle heavy loads safely; however, the crate may have slipped because he was busy thinking about his daughter's birthday party and not about his work. Could the responsibility for this accident be considered negligence on Sandor's part? Do you think Sandor should be held responsible or is blameless in this situation?
4. It was determined that AirFreight was not responsible for the accident. Therefore, do you think the company should take away Sandor's job if he does not return in 30 calendar days?

INTRODUCTION TO MEDICAL TERMINOLOGY



Overview of

INTRODUCTION TO MEDICAL TERMINOLOGY

Primary Medical Terms

Primary terms enable you to give priority to the most important words in your study of medical terminology. These terms are shown in **black boldface**.

Word Parts Are the Key

An introduction to word parts and how they are used to create complex medical terms.

Word Roots

The word parts that usually, but not always, indicate the part of the body involved.

Combining Form

A word root that has a vowel, usually the letter “o,” put on the end before the addition of another word root or suffix.

Suffixes

The word part attached at the end of word that usually, but not always, indicates the procedure, condition, disorder, or disease.

Prefixes

The word part attached at the beginning of word that usually, but not always, indicates location, time, number, or status.

Determining Meanings on the Basis of Word Parts

Knowledge of word parts helps decipher medical terms.

Using a Medical Dictionary or Online Resource

Guidelines to help make looking up terms online or in a medical dictionary easier.

Pronunciation

Learn how to pronounce words correctly using the “sounds-like” pronunciation system and audio files.

Spelling Is Always Important

A single spelling error can change the entire meaning of term.

Singular and Plural Endings

Unusual singular and plural endings used in medical terms.

Basic Medical Terms

Terms used to describe disease conditions.

Look-Alike, Sound-Alike Terms and Word Parts

Clarification of confusing terms and word parts that look or sound similar.

Using Abbreviations

Caution is always important when using abbreviations.

Vocabulary Related to **THE INTRODUCTION TO MEDICAL TERMINOLOGY**

This list contains essential word parts and medical terms for this chapter. These and the other important **primary terms** are shown in **boldface** throughout the chapter. *Secondary terms*, which appear in *orange italics*, clarify the meaning of primary terms.

Word Parts

- algia** pain, suffering
- dynia** pain
- ectomy** surgical removal, cutting out
- gram** picture or record
- hyper-** excessive, increased
- hypo-** deficient, decreased
- itis** inflammation
- osis** abnormal condition, disease
- ostomy** the surgical creation of an artificial opening to the body surface
- pre-** before, in front of
- plasty** surgical repair
- rrhage** bleeding, abnormal excessive fluid discharge
- rrhaphy** surgical suturing
- rrhea** flow or discharge
- sclerosis** abnormal hardening

Medical Terms

- abdominocentesis** (ab-**dom**-ih-noh-sen-**TEE**-sis)
- acronym** (**ACK**-roh-nim)
- acute**
- angiography** (**an**-jee-**OG**-rah-fee)
- appendectomy** (**ap**-en-**DECK**-toh-mee)
- arteriosclerosis** (ar-**tee**-ree-oh-skleh-**ROH**-sis)
- arthralgia** (ar-**THRAL**-jee-ah)
- colostomy** (koh-**LAHS**-toh-mee)
- cyanosis** (**sigh**-ah-**NOH**-sis)
- dermatologist** (**der**-mah-**TOL**-oh-jist)
- diagnosis** (**dye**-ag-**NOH**-sis)
- diarrhea** (**dye**-ah-**REE**-ah)
- edema** (eh-**DEE**-mah)
- endarterial** (**end**-ar-**TEE**-ree-al)
- eponym** (**EP**-oh-nim)
- erythrocyte** (eh-**RITH**-roh-**sight**)
- fissure** (**FISH**-ur)

- fistula** (**FIS**-chuh-lah)
- gastralgia** (gas-**TRAL**-jee-ah)
- gastritis** (gas-**TRY**-tis)
- gastroenteritis** (gas-troh-en-ter-**EYE**-tis)
- gastrosis** (gas-**TROH**-sis)
- hemorrhage** (**HEM**-or-idj)
- hepatomegaly** (**hep**-ah-toh-**MEG**-ah-lee)
- hypertension** (**high**-per-**TEN**-shun)
- hypotension** (**high**-poh-**TEN**-shun)
- infection** (in-**FECK**-shun)
- inflammation** (in-flah-**MAY**-shun)
- interstitial** (in-ter-**STISH**-al)
- intramuscular** (in-trah-**MUS**-kyou-lar)
- laceration** (**lass**-er-**AY**-shun)
- lesion** (**LEE**-zhun)
- malaise** (mah-**LAYZ**)
- mycosis** (my-**KOH**-sis)
- myelopathy** (my-eh-**LOP**-ah-thee)
- myopathy** (my-**OP**-ah-thee)
- natal** (**NAY**-tal)
- neonatology** (**nee**-oh-nay-**TOL**-oh-jee)
- neurorrhaphy** (new-**ROR**-ah-fee)
- otorhinolaryngology** (**oh**-toh-**rye**-noh-**lar**-in-**GOL**-oh-jee)
- palpation** (pal-**PAY**-shun)
- palpitation** (pal-pih-**TAY**-shun)
- pathology** (pah-**THOL**-oh-jee)
- phalanges** (fah-**LAN**-jeez)
- poliomyelitis** (**poh**-lee-oh-my-eh-**LYE**-tis)
- prognosis** (prog-**NOH**-sis)
- pyoderma** (**pye**-oh-**DER**-mah)
- pyrosis** (pye-**ROH**-sis)
- remission**
- sign**
- supination** (**soo**-pih-**NAY**-shun)
- suppuration** (**sup**-you-**RAY**-shun)
- supracostal** (**sue**-prah-**KOS**-tal)
- symptom** (**SIMP**-tum)
- syndrome** (**SIN**-drohm)
- tenorrhaphy** (ten-**OR**-ah-fee)
- tonsillitis** (ton-sih-**LYE**-tis)
- trauma** (**TRAW**-mah)
- triage** (tree-**AHZH**)
- viral** (**VYE**-ral)

LEARNING OBJECTIVES

On completion of this chapter, you should be able to:

1. Identify the roles of the four types of word parts used in forming medical terms.
2. Use your knowledge of word parts to analyze unfamiliar medical terms.
3. Describe the steps in locating a term in a medical dictionary or online resource.
4. Define the commonly used word roots, combining forms, suffixes, and prefixes introduced in this chapter.
5. Use the “sounds-like” pronunciation system and audio files to correctly pronounce the primary terms introduced in this chapter.
6. Recognize the importance of spelling medical terms correctly.
7. State why caution is important when using abbreviations.
8. Recognize, define, spell, and correctly pronounce the primary terms introduced in this chapter.

PRIMARY MEDICAL TERMS

In this textbook, you will be introduced to many medical terms; however, mastering them may be easier than you anticipate because **Medical Terminology for Health Professions** has many features to help you learn.

- **Primary terms** appear in **boldface**. Learning these terms should be your highest priority as only primary terms are used as correct answers in the Learning Exercises and tests.
- A **vocabulary list** with 15 essential word parts and 60 key primary terms (and their pronunciations) is at the beginning of each chapter.

- **Secondary terms** appear in **orange italics**. Some of these terms are the “also known as” names for conditions or procedures. Other secondary terms clarify words used in the definitions of primary terms.

WORD PARTS ARE THE KEY

Learning medical terminology is much easier once you understand how word parts work together to form medical terms (Figure 1.1). This textbook includes many aids to help you reinforce your word-building skills.

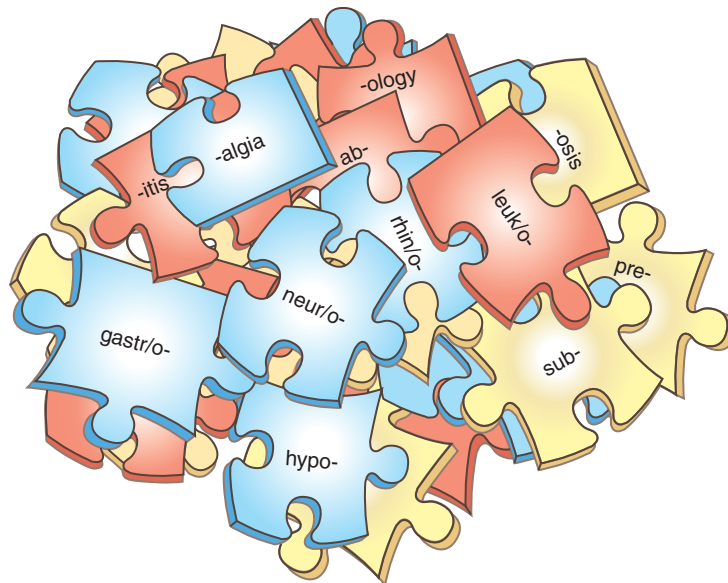


FIGURE 1.1 Word parts (word roots, combining forms, suffixes, and prefixes) make up most medical terms.

- The types of word parts and the rules for their use are explained in this chapter. Learn these rules and follow them.
- When a term is made up of recognizable word parts, these word parts and their meanings are included with the definition of that term. These word parts appear in **magenta**.
- The majority of the word parts used in medical terminology are of Latin origin, some are derived from Greek, and a few are from other languages.
- The Learning Exercises for each chapter include a “Challenge Word Building” section to help develop your skills in working with word parts.
- A **Word Part Review** follows Chapter 2. This section provides additional word part practice and enables you to evaluate your progress toward mastering the meaning of these word parts.

The Four Types of Word Parts

The four types of word parts used to create many medical terms are word roots, combining forms, suffixes, and prefixes. Guidelines for their use are shown in Table 1.1.

1. A **word root** contains the basic meaning of the term. In medical terminology, this word part usually, *but not always*, indicates the involved body part. For example, the word root meaning stomach is **gastr**.
2. A **combining form** is a word root with a combining vowel added at the end. It is used when two word roots are combined or when a suffix beginning with a consonant is added. When a combining form appears alone, it is shown with a back slash (/) between the word root and the combining vowel. For example, the combining form of the word root **gastr** is **gastr/o**. *Note: a, e, i, o, u, and sometimes y are vowels. All the other letters in the alphabet are consonants.*

TABLE 1.1

Word Part Guidelines

1. A word root cannot stand alone. A suffix must always be added at the end of the word to complete the term.
2. The rules for creating a combining form by adding a vowel apply when a suffix beginning with a consonant is added to a word root.
3. If a prefix is added, it is *always* placed at the beginning of the word.

3. A suffix usually, *but not always*, indicates the procedure, condition, disorder, or disease.
 - A suffix always comes at the end of the word.
 - You’ll know a word part is a suffix when it is shown with a hyphen (-) in front of it. For example, the suffix **-itis** means inflammation.
4. A prefix usually, *but not always*, indicates location, time, number, or status.
 - A prefix always comes at the beginning of a word.
 - You’ll know a word part is a prefix when it is shown with a hyphen (-) after it. For example, **hyper-** means excessive or increased.

WORD ROOTS

Word roots act as the foundation for most medical terms. They usually, *but not always*, describe the part of the body that is involved (Figure 1.2). As shown in Table 1.2, some word roots indicate color.

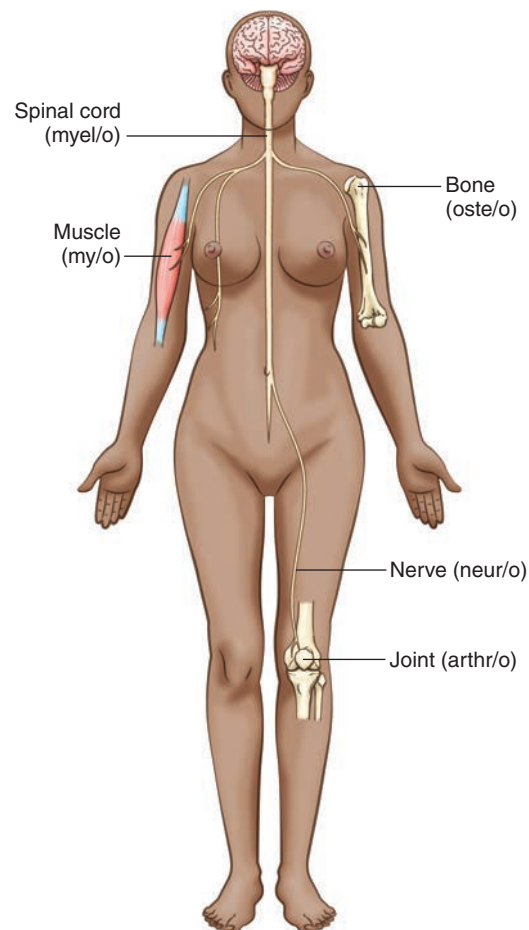


FIGURE 1.2 Word roots, shown here as combining forms, usually indicate the involved body part.

TABLE 1.2

Word Roots and Combining Forms Indicating Color

cyan/o means blue	Cyanosis (sigh -ah- NOH -sis) is blue discoloration of the skin caused by lack of adequate oxygen in the blood (cyan means blue, and -osis means abnormal condition or disease).
erythr/o means red	An erythrocyte (eh- RITH -roh- sight) is mature red blood cell (erythr/o means red, and -cyte means cell).
leuk/o means white	A leukocyte (LOO -koh- sight) is white blood cell (leuk/o means white, and -cyte means cell).
melan/o means black	Melanoma (mel-ah- NOH -mah) is a type of skin cancer (melan means black, and -oma means a tumor).
poli/o means gray	Poliomyelitis (poh -lee-oh- my -eh- LYE -tis) is viral infection of the gray nerve tissue of the spinal cord (poli/o means gray, myel means spinal cord, and -itis means inflammation).

Combining Forms Vowels

A combining form includes a vowel, usually the letter **o**, added to the end of a word root. It is usually added to make the resulting medical term easier to pronounce. The rules for the use of a combining vowel are as follows:

- When two word roots are joined, a combining vowel is always added to the first word root. A combining vowel is used at the end of the second word root *only if the suffix begins with a consonant*.
- For example, the term **gastroenteritis** combines two word roots with a suffix: when **gastr** (stomach) is joined with the word root **enter** (small intestine), a vowel is used to make the combining form **gastr/o**.
- The word root **enter** is joined to **-itis** *without a combining vowel* because this suffix begins with a vowel. **Gastroenteritis** (**gas**-troh-en-ter-**EYE**-tis) is an inflammation of the stomach and small intestine.

SUFFIXES

A suffix is *always* added at the end of a word to complete that term. In medical terminology, suffixes usually, *but not always*, indicate a procedure, condition, disorder, or disease.

A combining vowel is used when the suffix begins with a consonant. For example, when **neur/o** (nerve) is

joined with the suffix **-plasty** (surgical repair) or **-rrhaphy** (surgical suturing), the combining vowel **o** is used because **-plasty** and **-rrhaphy** both begin with a consonant.

- Neuroplasty** (**NEW**-roh-**plas**-tee) is the surgical repair of a nerve.
- Neurorrhaphy** (new-**ROR**-ah-fee) is suturing together the ends of a severed nerve.

A combining vowel is *not* used when the suffix begins with a vowel. For example, the word root **tonsill** means tonsils. No combining vowel is needed when adding either **-itis** (inflammation) or **-ectomy** (surgical removal) to **tonsill**, because they both start with a vowel (Figure 1.3). These suffixes complete the term and tell us what is happening to the tonsils.

- Tonsillitis** (**ton**-sih-**LYE**-tis) is an inflammation of the tonsils.
- A **tonsillectomy** (**ton**-sih-**LECK**-toh-mee) is the surgical removal of the tonsils.

Suffixes as Noun Endings

A **noun** is a word that is the name of a person, place, or thing. In medical terminology, some suffixes change the word root into a noun. For example, the **cranium** (**KRAY**-nee-um) is the portion of the skull that encloses the brain (**crani** means skull, and **-um** is a noun ending). Suffixes that are commonly used as noun endings are shown in Table 1.3.

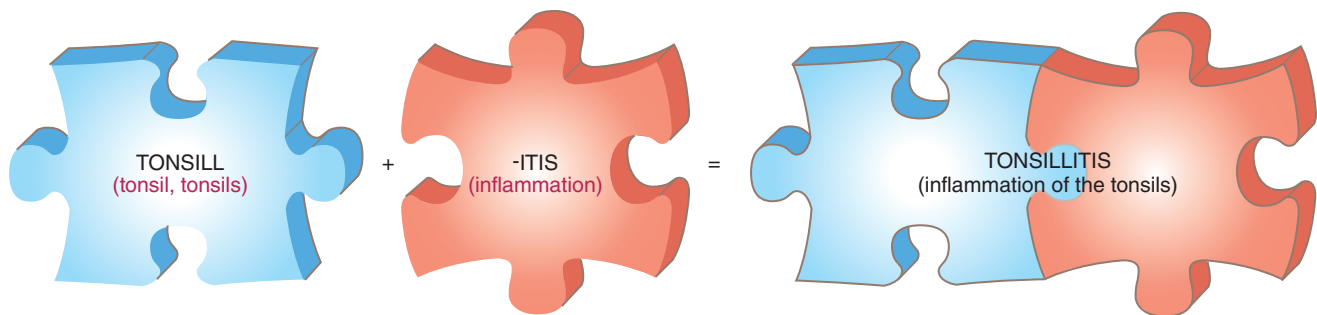


FIGURE 1.3 The term *tonsillitis* is created by adding the suffix **-itis** to the word root **tonsill**.

Suffixes Meaning “Pertaining To”

An **adjective** is a word that defines or describes. In medical terminology, many suffixes meaning “pertaining to” are used to change the meaning of a word root into an adjective. For example, the word root **cardi** means heart, and the suffix **-ac** means pertaining to. Once combined, they form the term **cardiac** (KAR-dee-ack), an adjective that means pertaining to the heart. Commonly used suffixes meaning pertaining to are shown in Table 1.4.

Suffixes Meaning “Abnormal Condition or Disease”

In medical terminology, many suffixes, such as **-osis**, mean “abnormal condition or disease.” For example,

gastrosis (gas-TROH-sis) means any disease of the stomach (**gastr** means stomach, and **-osis** means abnormal condition or disease). Commonly used suffixes meaning abnormal condition or disease are shown in Table 1.5.

Suffixes Related to Pathology

Pathology (pah-THOL-oh-jee) is the study of all aspects of diseases (**path** means disease, and **-ology** means study of). Suffixes related to pathology describe specific disease conditions.

- **-algia** means pain and suffering. **Gastralgia** (gas-TRAL-jee-ah), also known as a **stomachache**, means pain in the stomach (**gastr** means stomach, and **-algia** means pain).
- **-dynia** is another suffix meaning pain. **Gastrodynia** (gas-troh-DIN-ee-ah) also means pain in the stomach (**gastr/o** means stomach, and **-dynia** means pain). Although **gastrodynia** has the same meaning as **gastralgia**, it is not used as commonly (Figure 1.4).
- **-itis** means inflammation. **Gastritis** (gas-TRY-tis) is an inflammation of the stomach (**gastr** means stomach, and **-itis** means inflammation).
- **-megaly** means enlargement. **Hepatomegaly** (hep-ah-toh-MEG-ah-lee) is abnormal enlargement of

TABLE 1.3

Suffixes as Noun Endings

-a	-um	-y
-e	-us	

TABLE 1.4

Suffixes Meaning “Pertaining To”

-ac	-eal	-ior
-al	-ical	-ory
-an	-ial	-ous
-ar	-ic	-tic
-ary	-ine	

TABLE 1.5

Suffixes Meaning “Abnormal Condition or Disease”

-ago	-iasis	-osis
-esis	-ion	-pathy
-ia	-ism	



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FIGURE 1.4 *Gastralgia* and *gastrodynia* are both terms meaning stomach pain.

the liver (**hepat/o** means liver, and **-megaly** means enlargement).

- **-malacia** means abnormal softening. **Arterio-malacia** (ar-tee-ree-oh-mah-LAY-shee-ah) is the abnormal softening of the walls of an artery or arteries (**arteri/o** means artery, and **-malacia** means abnormal softening). Notice that **-malacia** is the opposite of **-sclerosis**.
- **-necrosis** means tissue death. **Arterionecrosis** (ar-tee-ree-oh-neh-KROH-sis) is the tissue death of an artery or arteries (**arteri/o** means artery, and **-necrosis** means tissue death).
- **-sclerosis** means abnormal hardening. **Arterio-sclerosis** (ar-tee-ree-oh-skleh-ROH-sis) is the abnormal hardening of the walls of an artery or arteries (**arteri/o** means artery, and **-sclerosis** means abnormal hardening). Notice that **-sclerosis** is the opposite of **-malacia**.
- **-stenosis** means abnormal narrowing. **Arteriostenosis** (ar-tee-ree-oh-steh-NOH-sis) is the abnormal narrowing of an artery or arteries (**arteri/o** means artery, and **-stenosis** means abnormal narrowing).

Suffixes Related to Procedures

Some suffixes identify the procedure that is performed on the body part indicated by the word root.

- **-centesis** is a surgical puncture to remove fluid for diagnostic purposes or to remove excess fluid.

Abdominocentesis (ab-dom-ih-noh-sen-TEE-sis) is the surgical puncture of the abdominal cavity to remove fluid (**abdomin/o** means abdomen, and **-centesis** means a surgical puncture to remove fluid).

- **-graphy** means the process of producing a picture or record. **Angiography** (an-jee-OG-rah-fee) is the process of producing an x-ray, or radiographic study, of blood vessels after the injection of a contrast medium to make these blood vessels visible (**angi/o** means blood vessel, and **-graphy** means the process of recording).
- **-gram** means a picture or record. An **angiogram** (AN-jee-oh-gram) is the resulting film that is produced by angiography (**angi/o** means blood vessel, and **-gram** means a picture or record).
- **-plasty** means surgical repair. **Myoplasty** (MY-oh-plas-tee) is the surgical repair of a muscle (**my/o** means muscle, and **-plasty** means surgical repair).
- **-scopy** means visual examination. **Arthroscopy** (ar-THROS-koh-pee) is the visual examination of the internal structure of a joint (**arthr/o** means joint, and **-scopy** means visual examination).

The “Double R” Suffixes

Medical terminology suffixes beginning with two of the letter *r*, often referred to as the *double Rs*, can be particularly confusing. These word parts are of Greek rather than Latin origin. They are grouped together here to help you understand them and to remember the differences.

- **-rrhage** and **-rrhagia** mean bleeding; however, they are most often used to describe sudden, severe bleeding. A **hemorrhage** (HEM-or-idj) is the loss of a large amount of blood in a short time (**hem/o** means blood, and **-rrhage** means bleeding or abnormal excessive fluid discharge).
- **-rrhaphy** means surgical suturing to close a wound and includes the use of sutures, staples, or surgical glue. **Tenorrhaphy** (ten-OR-ah-fee) is the surgical suturing of a tendon (**ten/o** means tendon, and **-rrhaphy** means surgical suturing).
- **-rrhea** means flow or discharge and refers to the flow of most body fluids. **Diarrhea** (dye-ah-REE-ah) is the frequent flow of loose or watery stools (**dia-** means through, and **-rrhea** means flow or discharge).

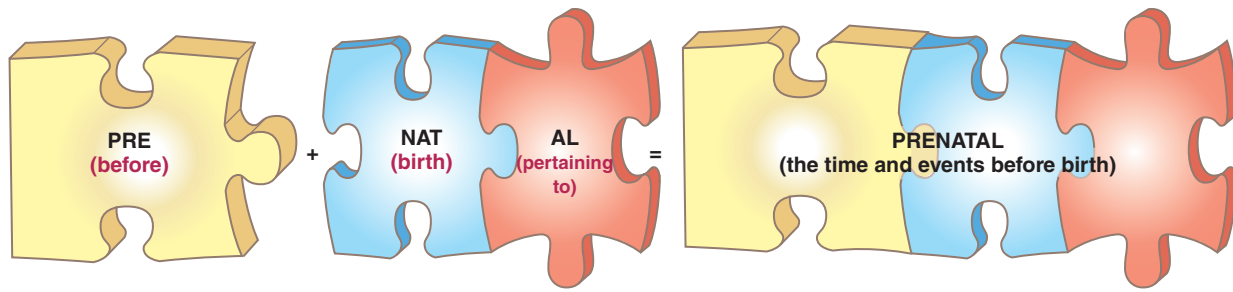


FIGURE 1.5 The term *prenatal* is created by joining the suffix **-al** to the word root **nat** and then adding the prefix **pre-**.

PREFIXES

A prefix is sometimes added to the beginning of a word to influence the meaning of that term. Prefixes usually, *but not always*, indicate location, time, or number. See Table 1.6 for a list of prefixes describing direction, quantity, size, and amount. The term **natal** (**NAY**-tal) means pertaining to birth (**nat** means birth, and **-al** means pertaining to). The following examples show how prefixes change the meaning of this term (Figures 1.5–1.8).

- **Prenatal** (pre-**NAY**-tal) means the time and events before birth (**pre-** means before, **nat** means birth, and **-al** means pertaining to).
- **Perinatal** (pehr-ih-**NAY**-tal) refers to the time and events surrounding birth (**peri-** means surrounding, **nat** means birth, and **-al** means pertaining to). This is the time just before, during, and just after birth.

TABLE 1.6

Prefixes Describing Direction, Quantity, Size, and Amount

ab- away from, negative, absent	ad- toward, to, in the direction of
dextro- right side	sinistro- left side
ex- out of, outside, away from	in- in, into, not, without
macro- large, abnormal size, long	micro- small
mega- , megalo- large, great	oligo- scanty, few
pre- before	post- after, behind



iStock.com/Chris Downie

FIGURE 1.6 The *prenatal* development of a fetus (baby).



Szrasz-Fabian Jozsef/Shutterstock.com

FIGURE 1.7 A *perinatal* event of the umbilical cord being cut immediately after the baby is born.



FIGURE 1.8 A happy *postnatal* moment as the parents bond with their new baby.

- **Postnatal** (pohst-NAY-tal) refers to the time and events after birth (**post-** means after, **nat** means birth, and **-al** means pertaining to).

Memory aid: you may know some prefixes already by using your prior knowledge and experiences. For example, a postgame press conference happens *after* a game, and a preshow reception happens *before* a performance.

Contrasting and Confusing Prefixes

Some prefixes are confusing because they are similar in spelling but opposite in meaning. The more common prefixes of this type are summarized in Table 1.7.

DETERMINING MEANINGS ON THE BASIS OF WORD PARTS

Knowing the meaning of the word parts often makes it possible to figure out the definition of an unfamiliar medical term.

Taking Terms Apart

To determine a word's meaning by looking at the component pieces, you must first separate it into word parts.

- Always start at the end of the word, with the suffix, and work toward the beginning.

- As you separate the word parts, identify the meaning of each. Identifying the meaning of each part should give you a definition of the term.
- Because some word parts have more than one meaning, it also is necessary to determine the context in which the term is being used. As used here, **context** means to determine which body system this term is referring to.
- If you have any doubt, use your medical dictionary or a trusted online resource to double-check your definition.
- Be aware that not all medical terms are made up of word parts.

An Example to Take Apart

Look at the term **otorhinolaryngology** (oh-toh-rye-noh-lar-in-GOL-oh-jee) as shown in Figure 1.9. It is made up of two combining forms, a word root, and a suffix. This is how it looks when the word parts have been separated by working from the end to the beginning.

- The suffix **-ology** means the study of.
- The word root **laryng** means larynx or throat. The combining vowel *is not used* here because the word root is joining a suffix that begins with a vowel.
- The combining form **rhin/o** means nose. The combining vowel *is used* here because the word root **rhin** is joining another word root beginning with a consonant.

TABLE 1.7

Contrasting Prefixes: Opposites

ab- means away from.

Abnormal means not normal or away from normal.

dys- means bad, difficult, or painful.

Dysfunctional means an organ or body part that is not working properly.

hyper- means excessive or increased.

Hypertension is higher-than-normal blood pressure.

inter- means between or among.

Interstitial means between, but not within, the parts of a tissue.

sub- means under, less, or below.

Subcostal means below a rib or ribs.

ad- means toward or in the direction of.

Addiction means being drawn toward or having a strong dependence on a drug or substance.

eu- means good, normal, well, or easy.

Eupnea means easy or normal breathing.

hypo- means deficient or decreased.

Hypotension is lower-than-normal blood pressure.

intra- means within or inside.

Intramuscular means within the muscle.

super-, supra- mean above or excessive.

Supracostal means above or outside the ribs.