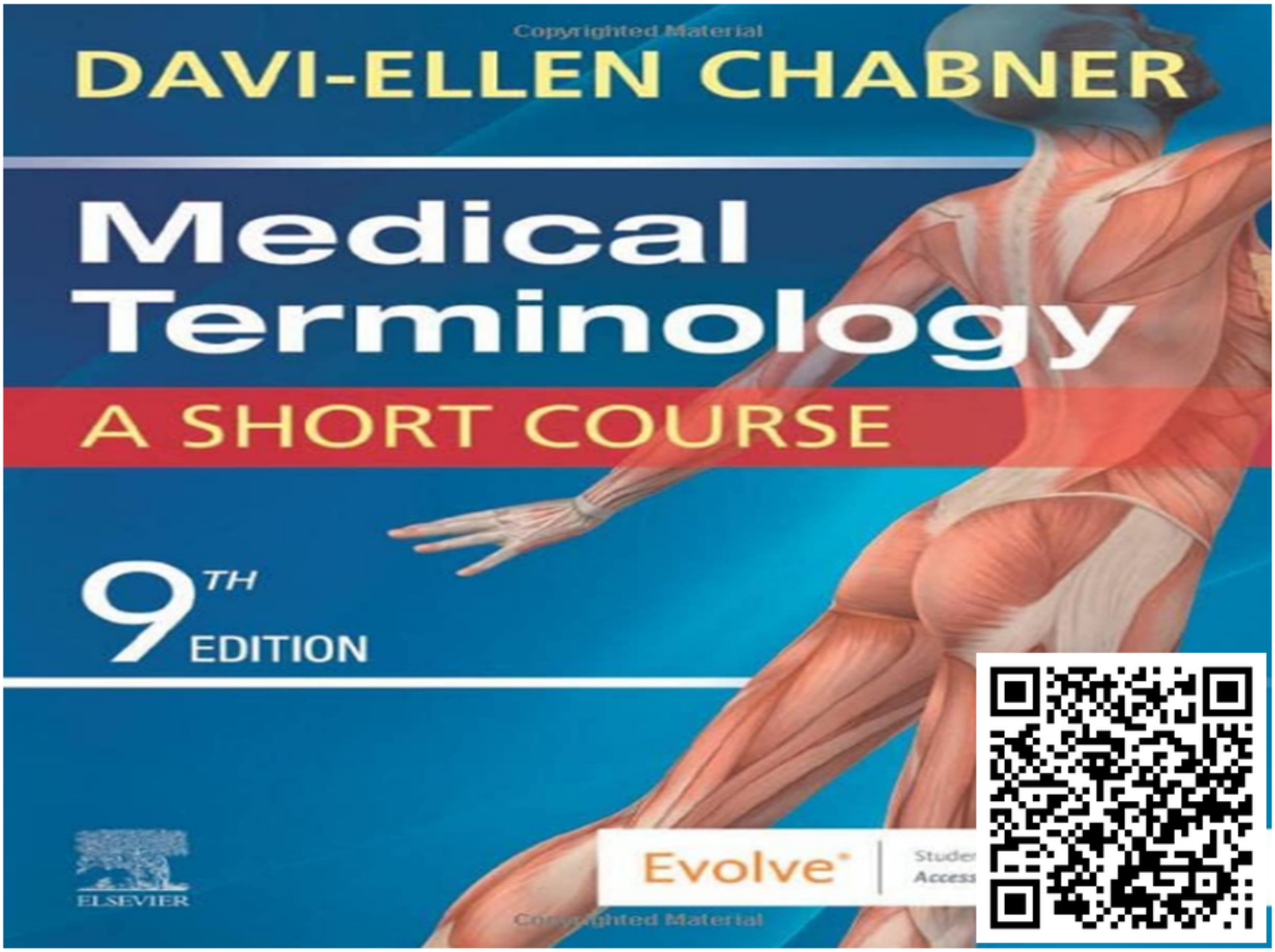
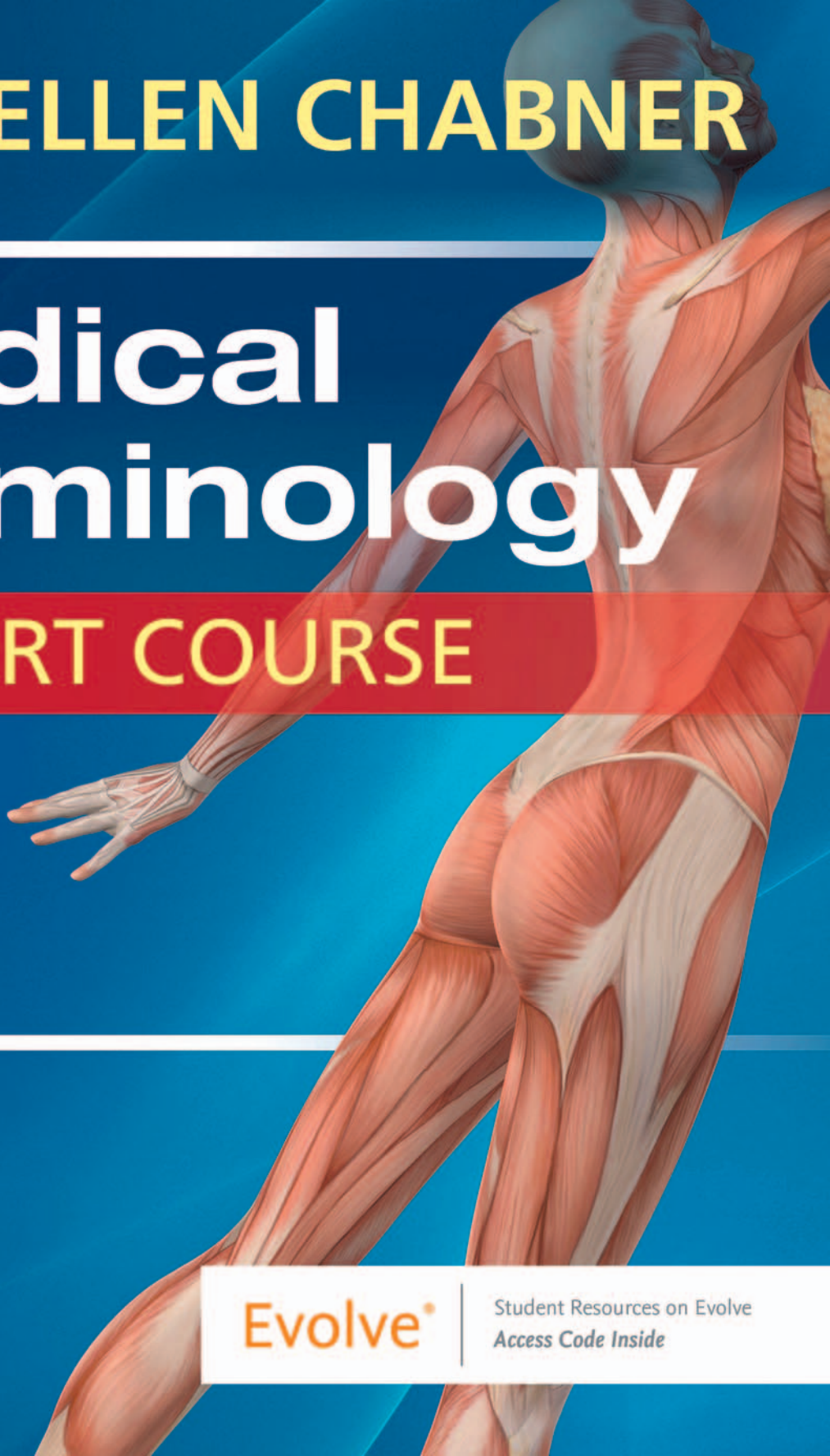


DAVI-ELLEN CHABNER

Medical Terminology

A SHORT COURSE

9TH EDITION



ELSEVIER

Evolve®

Student Resources on Evolve

Access Code Inside

Evolve®

YOU'VE JUST PURCHASED MORE THAN A TEXTBOOK!

Enhance your learning with Evolve Student Resources.

These online study tools and exercises can help deepen your understanding of textbook content so you can be more prepared for class, perform better on exams, and succeed in your course.

Activate the complete learning experience that comes with each NEW textbook purchase by registering with your scratch-off access code at

http://evolve.elsevier.com/Chabner/MedTermShort/

If your school uses its own Learning Management System, your resources may be delivered on that platform. Consult with your instructor.

If you rented or purchased a used book and the scratch-off code at right has already been revealed, the code may have been used and cannot be re-used for registration. To purchase a new code to access these valuable study resources, simply follow the link above.

Place Sticker Here

REGISTER TODAY!

ELSEVIER

You can now purchase Elsevier products on Evolve!
Go to evolve.elsevier.com/shop to search and browse for products.

2019v1.0

DAVI-ELLEN CHABNER

Medical Terminology

A SHORT COURSE

9TH EDITION

ELSEVIER

Elsevier
3251 Riverport Lane
St. Louis, Missouri 63043

MEDICAL TERMINOLOGY: A SHORT COURSE, NINTH EDITION ISBN: 978-0-323-47991-2

Library of Congress Control Number: 2022931120

Senior Content Strategist: Linda Woodard
Senior Content Development Manager: Luke Held
Content Development Specialist: Rae Robertson
Publishing Services Manager: Julie Eddy
Senior Project Manager: Abigail Bradberry
Design Direction: Amy Buxton

Printed in Canada

Last digit is the print number: 9 8 7 6 5 4 3 2 1

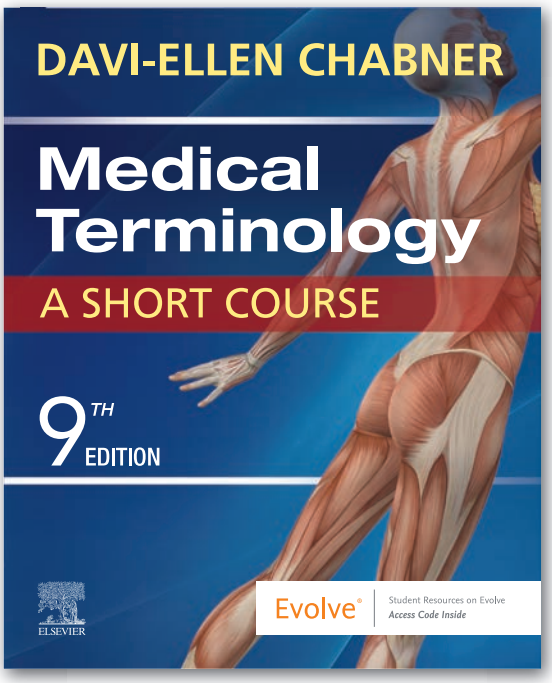
To Solomon, Louisa, Gus, Amari, Ben, and Bebe
You are my hope for the future!

This page intentionally left blank

Preface to the 9th Edition

I wrote the first edition of *Medical Terminology: A Short Course* almost 35 years ago with the hope that it would fill a specific niche in the education of allied health professionals. My goal was to present a comprehensive introduction and overview of medical terminology in a straightforward and easy manner for students who had no previous background in biology or medicine.

It is gratifying to know that this book is now widely used in colleges, career schools, universities, hospitals, and other medical settings in the United States and abroad, where allied health workers use medical language and interpret it for patients and their families.

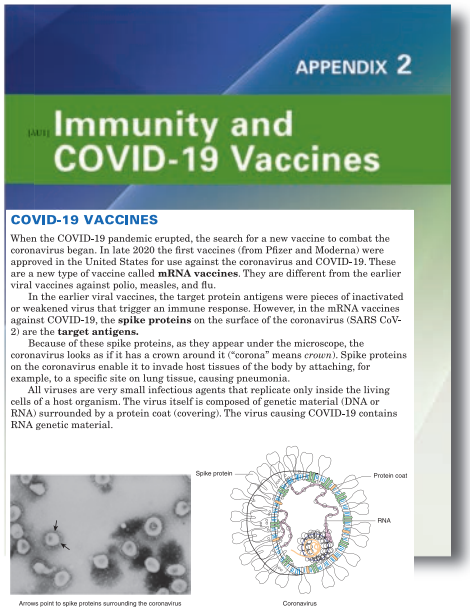


There is no doubt that the method used in *Medical Terminology: A Short Course* takes potentially complicated subject matter and makes it manageable and understandable. In this ninth edition, the text has been updated and carefully reviewed for clarity, simplicity, and practicality, but its essential elements remain. Here are its important features:

WORKBOOK-TEXT FORMAT. In this book, you learn by doing. On nearly every page you are writing and interacting with medical terminology. You complete exercises (and check your answers), label diagrams, test your understanding with review sheets, and practice pronunciation. The best path to success is to write terms and their meanings as you test yourself. I really believe this method of learning will work for you!

NEW

CURRENT MEDICAL TOPICS EXPLAINED. Complex topics, such as immunity and vaccines, are presented in clear and simple langage. A new appendix teaches the basics of immunology and explains how different types of vaccines work in the body. Spotlights throughout the book provide insight and explantion on current and essential issues in medicine.


APPENDIX 2

Immunity and COVID-19 Vaccines

COVID-19 VACCINES

When the COVID-19 pandemic erupted, the search for a new vaccine to combat the coronavirus began. In late 2020 the first vaccines (from Pfizer and Moderna) were approved in the United States for use against the coronavirus and COVID-19. These are a new type of vaccine called **mRNA vaccines**. They are different from the earlier viral vaccines against polio, measles, and flu.

In the earlier viral vaccines, the target protein antigens were pieces of inactivated or weakened virus that trigger an immune response. However, in the mRNA vaccines against COVID-19, the **spike proteins** on the surface of the coronavirus (SARS CoV-2) are the **target antigens.**

Because of these spike proteins, as they appear under the microscope, the coronavirus looks as if it has a crown around it ("corona" means *crown*). Spike proteins on the coronavirus enable it to invade host tissues of the body by attaching, for example, to a specific site on lung tissue, causing pneumonia.

All viruses are very small infectious agents that replicate only inside the living cells of a host organism. The virus itself is composed of genetic material (DNA or RNA) surrounded by a protein coat (covering). The virus causing COVID-19 contains RNA genetic material.

Spike protein
Protein coat
RNA
Arrows point to spike proteins surrounding the coronavirus
Coronavirus

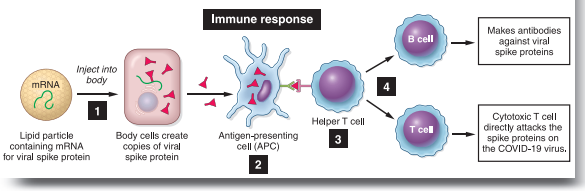
What is a symptom?

A symptom is an indication of disease observed by the patient (such as abdominal pain, fatigue, or loss of appetite.) Both SYM- and SYN- mean "with" or "together" and -PTOM means "a happening." The medical term **asymptomatic** means without symptoms. Often COVID-19 patients can transmit the coronavirus even if they are asymptomatic.

What is a fecal transplant?

A fecal transplant is a procedure in which feces are taken from a healthy donor and transferred to the colon of a patient with a serious bacterial infection. The fecal transplant is introduced via colonoscopy or in pill form. Symptoms improve within days of fecal transplant but usually need several weeks to become permanent.

The figure below illustrates how the mRNA vaccine works, while the following figure, page 305, compares viral vaccines and mRNA vaccines.



EASY TO READ AND UNDERSTAND. Explanations of terms are worded simply and clearly, and repetition reinforces learning throughout the text. Answers to questions are located easily so that you can check and correct your responses while gaining additional explanation of terminology.

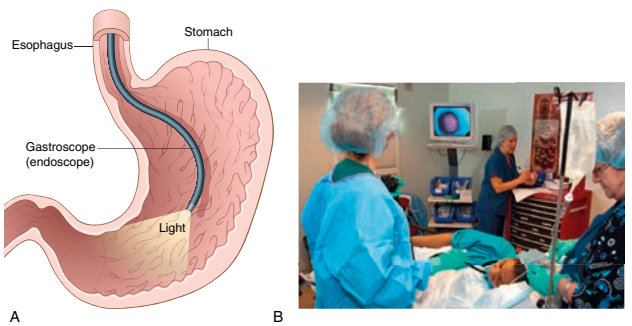
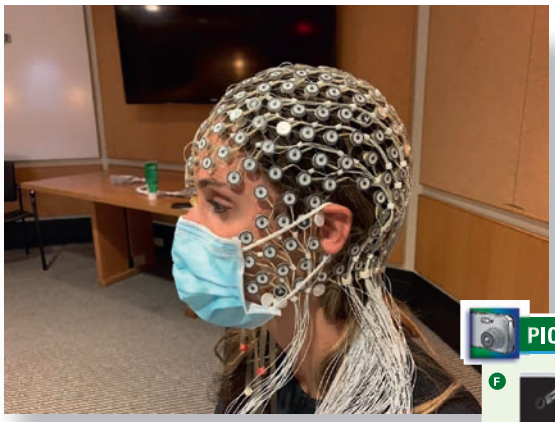


FIGURE 1-6 **A. Gastroscope** inserted into stomach. **B. Gastroscopy procedure** performed in a medical setting.

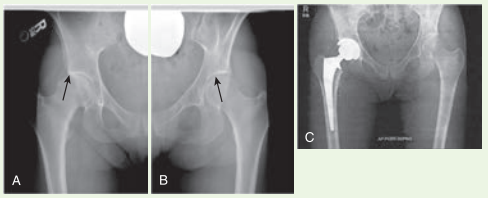
gastr/o	stomach	gastroscopy -SCOPY *means process of visual examination with an instrument, or "scope." Pronunciation is gas-TROS-ko-pe. A gastroscope is passed through the mouth, throat, and esophagus into the stomach. See Figure 1-6.*



DYNAMIC ILLUSTRATIONS AND PHOTOGRAPHS. Medical terms come alive with images on nearly every page! Learning is reinforced by seeing parts of the body diseases, conditions and real medical procedures. At the end of each chapter, "Picture Shows" highlight key images and allow you to apply your knowledge of terminology.

PICTURE SHOW

F



1. The image in *A* shows degeneration of the hip (pelvic) joint with narrowed joint spaces (see arrow). The image in *B* shows a normal hip for comparison (see arrow). The patient with the hip changes has arthralgia, stiffness, and joint tenderness. Your diagnosis?
   a. osteoarthritis
   b. gastroenteritis
   c. hyperthyroidism
   d. osteogenic sarcoma

NOTE: The image in C shows a **THR (total hip replacement)** as treatment for this condition.

INTRODUCTION TO BODY SYSTEMS. The Body Systems Resource, beginning on page 217, begins with the following five sections:

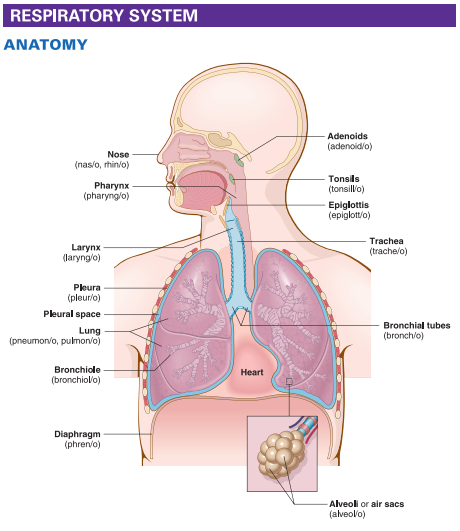
Anatomy—shows full-color images of each body system, labeled for easy reference with combining forms for each body part.

Terminology—repeats each combining form and gives a medical term illustrating the use of the combining form. Definitions are in the *Mini-Dictionary* at the end of the book.

Pathology—presents explanations of disease conditions related to each body system.

Diagnostic and Treatment Procedures— explains and defines common examples for each body system.

Matching Exercises—tests your understanding of the material, with answers included.



PRACTICAL APPLICATIONS. Throughout the text, and on the Student Evolve website, you will find exciting images, medical case reports, and vignettes that illustrate terminology in the context of stories about patients and procedures.

CASE REPORTS

CASE 2 *Gynecology*

Ms. Sessions has had **dysmenorrhea** and **menorrhagia** for several months. She is also **anemic.** Because of the presence of a **large fibroid,** as seen on a pelvic **ultrasound** (**sonogram**) (see Figure 5-7, *A*), a **hysterectomy** was recommended. After it was removed, the uterus was opened to reveal multiple fibroids (**leiomyomas**) bulging into the uterine cavity and displaying a firm, white appearance. See Figure 5-7, *B*.

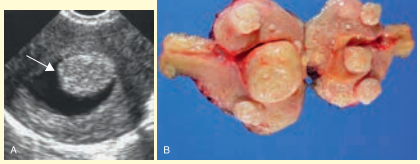


FIGURE 5-7 A, Pelvic sonogram. B, Fibroids (leiomyomas). These are benign tumors of the uterus.

anemic _____

dysmenorrhea _____

fibroids _____

hysterectomy _____

PRACTICAL APPLICATIONS

MEDICAL CONDITIONS AND SPECIALISTS

Match the following physician specialists with the condition each would treat.

cardiologist, dermatologist, endocrinologist, gastroenterologist, gynecologist, hematologist, neurologist, oncologist, ophthalmologist, urologist

1. Cerebrovascular accident _____
2. Skin cancer _____
3. Dysentery _____
4. Anemia _____
5. Lung cancer _____
6. Prostate gland enlargement _____
7. Hyperglycemia _____
8. Cataract (clouding of the lens of the eye) _____
9. Heart attack _____
10. Abnormal bleeding of the uterus from the vagina _____

WHAT'S YOUR DIAGNOSIS?

Case Study

This 7 year-old boy presents with fever, sore throat, runny nose, and persistent fatigue [feeling of being tired all the time]. Physical examination reveals multiple bruises [contusions] of his lower extremities and arms, an erythematous [red] pharynx [throat] with white plaques on the tonsils, and pale gums, lips, and nail beds. CBC [complete blood count] was performed. Increasing fever prompted immediate admission to the children's ward of the hospital.

During the course of admission, the patient's pharyngitis was monitored and subsided. Tonsillitis was ruled out. Fatigue and contusions on his arms and legs were noted and addressed with the parents while taking his social history. A lab hematologist reviewed the high WBC [white blood cell] count, and a WBC differential [percentages of the various types of these cells] shows immature cells. A bone marrow biopsy confirms the diagnosis of WBC malignancy.

IN PERSON: GALLBLADDER STONES

This first-person narrative describes the symptoms and treatment of a 46-year-old woman with gallbladder stones.

Everyone enjoys a little dessert after dinner, but when the ice cream or a creamy tart leads to pain, most would avoid it. I loved sweets, and despite the revenge they took on my waistline, I still would not pass up an ice cream cone—until my gallbladder decided it had had enough. After several late nights spent doubled over in pain, I tried to steer clear of fatty foods but could not resist the temptation of frozen yogurt.

With one hand I pushed my cart through the supermarket; with the other hand I fed myself some delicious low-fat (not nonfat) frozen yogurt. I never dreamed that the attendant at the quick-service window actually gave me soft-serve ice cream. Within 10 minutes of eating the questionable yogurt, I broke out into a sweat; a wave of nausea took me over, and a knifelike pain stabbed me in my right upper quadrant. It hurt even more when I pressed my hand on the area in an attempt to brace the pain.

Several months earlier, after a similar painful episode, I had undergone an ultrasound of my gallbladder, and the surgeon then recommended cholecystectomy. The US showed multiple stones in my gallbladder. Most of the stones were just the right size to lodge in the common bile duct and cause blockage of the outflow of bile that occurs after a fatty meal. When I heard the ultrasound results, I swore off all fatty foods.

I just did not imagine that ice cream masquerading as "low-fat yogurt" would be the straw that broke the camel's back! Soon enough, I abandoned my shopping cart and apologized to the manager of the store for vomiting all over aisle 4. The unrelenting pain did not cease when I vomited—it only intensified. I have no idea how I made it home and into bed. I managed to call my surgeon and arrange for "semiemergent" surgery the next morning.

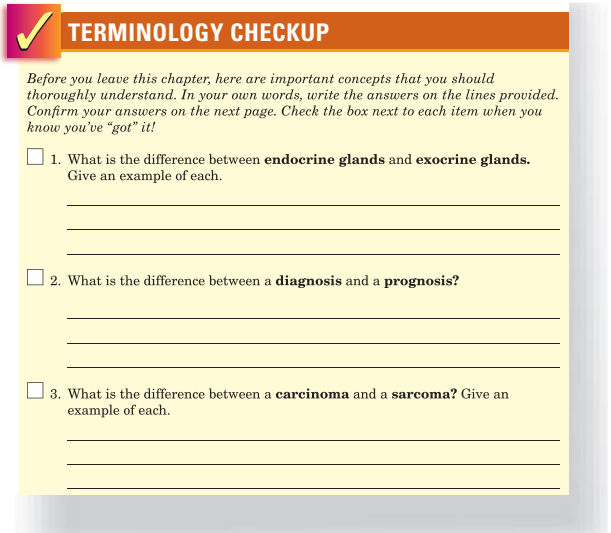
Dr. Fernandez and his team performed a laparoscopic cholecystectomy and relayed to me as I came out of anesthesia that I no longer had a "bag of marbles" for a gallbladder. I had a gassy, distended feeling in my abdomen over the 2 weeks after surgery (carbon dioxide gas is injected into the abdomen before surgery to allow space between abdominal organs). I felt "tight as a drum" for the first few days, and then day by day it went away. My four tiny incisions healed just fine, and in about 2 weeks I was feeling back to normal. Now I can eat ice cream to my heart's content, only suffering the padding on my waistline, not the stabbing pain just above. Without missing a beat, my liver now delivers the bile into my small intestine right after I eat a fatty meal. The bile emulsifies (breaks down) the fat. I just don't have a storage bag to hold bile in reserve.

I've had an appendectomy, my wisdom teeth removed, and now I gave up my gallbladder! How many more "useless" body parts are there to go?

Elizabeth Chabner is the CEO/founder of Masthead, a company devoted to bringing innovative products to patients with breast cancer. She is a physician, swimmer, cross country skier, and the proud mother of four children ages 18-23.

IN PERSON. These compelling first-person narratives describe procedures and conditions from a uniquely personal perspective. After reading each story, medical terms take on new meaning as you experience intimately how it feels to be in a patient's "shoes," living through a diagnosis, disease, and treatment.

TERMINOLOGY CHECKUP. This interactive and enhanced feature recaps and reinforces key concepts and easily confused terms in each chapter.

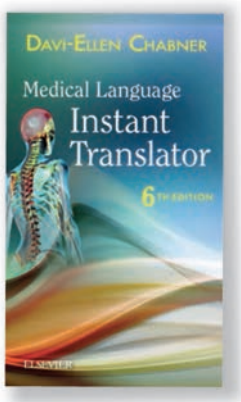


REFERENCE GUIDE FOR MEDICAL AND HOSPITAL WORK. This book is also a useful resource. Diagnostic Tests and Procedures (radiological imaging, nuclear medicine scans, clinical procedures, and laboratory tests) are found in *Appendix 3*. Abbreviations, symbols, acronyms, and eponyms are located in *Appendix 4*. A handy Quick Drug Reference *is located in Appendix 5*. The *Mini-Dictionary* helps you study each chapter and also will be a reference for you in the workplace. Each definition has been crafted carefully to explain terms using plain, nontechnical language.

ALSO AVAILABLE

Student Evolve Website (access included with text purchase)

The Evolve website included with this new edition contains additional exercises and activities to test and expand your understanding. In the Audio Resource section you can hear the proper pronunciation with each medical term in the book.



Medical Language Instant Translator (for sale separately)

My *Medical Language Instant Translator* is a uniquely useful resource for all allied health professionals and students of medical terminology. It is a pocket-sized medical terminology reference with convenient information at your fingertips!

Medical Terminology: A Short Course is exactly what you need to begin your medical career—whether in an office, hospital, or other medical setting. Use this handy book in a classroom with an instructor, or study it on your own. The combination of visually reinforced hands-on learning plus easily accessible reference material will mean success for you in your allied health career.

My more comprehensive workbook-text, *The Language of Medicine, 12th edition,* may be of interest to you as you continue your study of medical terminology. It can also serve as a valuable reference in the workplace.

I still experience the thrill and joy of teaching new students. I love being in the classroom (in person or virtually) and feel privileged to continue to write this text. I am available for help at any time. Please communicate your comments, questions, and suggestions to me at chabner.medterm@gmail.com. For technical assistance, please contact technical.support@elsevier.com.

Most of all, I hope this book brings you excitement and enthusiasm for the medical language. It can ignite your imagination for new challenges and make your job more interesting. Work hard and have fun learning medical terminology!

Davi-Ellen Chabner

Acknowledgments

It is impossible to publish another edition of this book without the assistance and hard work of my extraordinary and exceptional editor, Maureen Pfeifer. On virtually every aspect of this edition, she has listened, advised, and delivered the best possible solutions … with great intelligence, thoughtfulness, and careful attention to detail. We are a TEAM! Thank you, Maureen, for not only being a superb cross-country working partner, but my loyal friend, as well.

I appreciate the support and advocacy of Linda Woodard, Senior Content Strategist at Elsevier. She is always responsive to my concerns and willing to find solutions! Luke Held, Senior Content Development Manager, continues to be a reliable resource and support for my books. Thanks, Luke, for being "in my corner." I am also grateful to Rae Robertson, Content Development Specialist, for her coordination and oversight of this edition.

Abigail Bradberry, Senior Project Manager, facilitated the complex production of this edition. I appreciate her hard work and flexibility in all aspects of the project. Thank you, Abbie! Special thanks to Amy Buxton for directing the design and Kim Denando for creating the layout and cover for this edition! I appreciate your expertise, creativity, and responsiveness.

Thanks also to other members of the Elsevier team: Julie Eddy, Publishing Services Manager, Book Production; and Kevin Herrin, Team Manager, Multimedia. Thank you to the sales team for your continued support and promotion of my projects.

Jim Perkins, assistant professor of medical illustration, Rochester Institute of Technology, was responsible for the excellent, first-rate individual drawings that illustrate this edition. As always, he has done an outstanding job.

I am particularly grateful to the In Person contributors who shared their personal medical stories. Thanks so much to Ruthellen Sheldon, Cathy Ward, Elizabeth Chabner, Sidra DeKoven Ezrahi, and Nancy J. Brandwein.

I appreciate the valuable suggestions of the instructors who reviewed *Medical Terminology: A Short Course* for this new edition. They are listed with their credentials on page xv. Their helpful comments are incorporated in this text.

My class at Partners in Career and Workforce Development (PCWD), Partners Healthcare System has been an important resource for this edition. My students' enthusiasm and questions continue to inspire me. I appreciate them, and their commitment to a career in healthcare.

Teachers and students worldwide continue to contact me with insights and questions. Thank you!

My husband, Bruce A. Chabner, MD, and my daughter, Elizabeth Chabner, MD, MPH, are always available for expert medical advice and consultation. I am grateful for their availability no matter what else is going on in their busy lives and work. Special thanks for Dan L. Longo, MD, whom I continue to rely on for his infallible medical knowledge as well as his unwavering friendship.

Bruce and I think continuously of our friends and family who are in the throes of medical issues ... real time. Their positive attitudes and courage give deeper meaning to our daily lives.

Davi-Ellen Chabner

Reviewers

Bruce A. Chabner, MD
Clinical Director, Emeritus
Allen Distinguished Investigator
Massachusetts General Hospital
Cancer Center
Professor of Medicine
Harvard Medical School
Boston, Massachusetts

Elizabeth Chabner, MD, MPH
CEO/Founder Masthead Inc.
Scarsdale, New York

Dan L. Longo, MD
Deputy Editor
New England Journal of Medicine
Professor of Medicine
Harvard Medical School
Boston, Massachusetts

Darci Brown, PAC, MSPAS
Director of Clinical Education, Assistant Professor
Misericordia University Physician Assistant Program
Misericordia University
Dallas, Pennsylvania

Rosalie Griffith, MSN, RN, MAEd
Nursing Success Coordinator
Chesapeake College
Wye Mills, Maryland

Emily L. McClung, RN, MSN
Instructor
Hiram College
Hiram, Ohio

Deborah Harris O' Brien, PhD, Licensed Psychologist
Associate Professor
Trinity Washington University
Washington, DC

Sean F. Peck, MEd, EMT-P
Associate Faculty-Allied Health
Arizona Western College
Yuma, Arizona

Constance Phillips, MA, MPH
Director, Biomedical Laboratory and Clinical Sciences
Boston University School of Medicine/ Metropolitan College
Boston, Massachusetts

Dona Powell, BS in Education
Instructor
Technical Education Center, Osceola
Kissimmee, Florida

Mary M. Prorok, RN, MSN
Instructor
South Hills School of Business & Technology
Altoona, Pennsylvania

Julie M. Weldon, RN, MSN
Education Coordinator and Adjunct Faculty
Mercy Medical Center—Des Moines
Mercy College of Health Sciences
Des Moines, Iowa

Contents

This page intentionally left blank

CHAPTER 1

Basic Word Structure

Chapter Sections

CHAPTER OBJECTIVES

- To divide medical terms into component parts
- To analyze, pronounce, and spell medical terms using common combining forms, suffixes, and prefixes

WORD ANALYSIS

If you work in a medical setting, you use medical words every day. In addition, you hear medical terms spoken in your doctor's office, read about health issues, and make daily decisions about your own health care and the health care of your family. Terms such as arthritis, electrocardiogram, hepatitis, and anemia describe conditions and tests that are familiar. Other medical words are more complicated, but as you work in this book, you will begin to understand them even if you have never studied biology or science.

Medical words are like individual jigsaw puzzles. Once you divide the terms into their component parts and learn the meaning of the individual parts, you can use that knowledge to understand many other new terms.

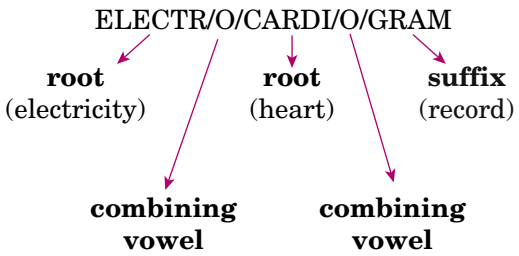
For example, the term HEMATOLOGY is divided into three parts:

When you analyze a medical term, begin at the *end* of the word. The ending is called a **suffix.** All medical terms contain suffixes. The suffix in HEMATOLOGY is -LOGY, which means study of. Next, look at the beginning of the term. HEMAT is the word **root.** The root gives the essential meaning of the term. The root HEMAT means blood.

The third part of this term, which is the letter O, has no meaning of its own but is an important connector between the root (HEMAT) and the suffix (-LOGY). It is called a **combining vowel.** The letter O is the combining vowel usually found in medical terms.

Now put together the meanings of the suffix and the root: HEMATOLOGY means study of blood.

Another familiar medical term is ELECTROCARDIOGRAM. You probably know this term, often abbreviated as ECG (or sometimes EKG). This is how you divide it into its parts:



Start with the **suffix** at the end of the term. The suffix -GRAM means a record.

Now look at the beginning of the term. ELECTR is a word **root,** and it means electricity.

This medical term has two roots. The second root is CARDI, meaning heart. Whenever you see CARDI in other medical terms, you will know that it means heart.

Read the meaning of medical terms from the suffix, back to the beginning of the term, and then across. Broken down this way, ELECTROCARDIOGRAM means record of the electricity in the heart. It is the electrical current flowing within the heart that causes the heart muscle to contract, pumping blood throughout the body. The sound made by contraction and relaxation of the heart muscle is called the heartbeat.

Notice the two combining vowels in ELECTROCARDIOGRAM. Looking for the O in medical terms will help you divide the term into its parts. One combining vowel (O) lies between two roots (ELECTR and CARDI) and another between the root (CARDI) and the suffix (-GRAM).

The combining vowel *plus* the root is called a **combining form.** For example, there are two combining forms in the word ELECTROCARDIOGRAM. These combining forms are ELECTR/O, meaning electricity, and CARDI/O, meaning heart.

Notice how the following medical term is analyzed. Can you locate the two combining forms in this term?

GASTR/O/ENTER/O/LOGY

root	**root**	**suffix**
(stomach)	(intestines)	(study of)

The two combining forms are GASTR/O and ENTER/O. The entire word (reading from the suffix, back to the beginning of the term, and across) means study of the stomach and the intestines. Here are other words that are divided into component parts:

GASTR/O/SCOPE

combining form	**suffix**
(stomach)	(instrument to visually examine)

means **instrument to visually examine the stomach.**

GASTR/IC

root	**suffix**
(stomach)	(pertaining to)

means **pertaining to the stomach.** Notice that the combining vowel is dropped when the suffix (-IC) begins with a vowel. -IC means pertaining to. Words ending with -IC are adjectives that modify a noun (e.g., gastric pain, gastric cancer).

CARDI/AC

root	**suffix**
(heart)	(pertaining to)

means **pertaining to the heart.** Again, the combining vowel (O) is dropped when the suffix (-AC) begins with a vowel. Words ending in -AC are adjectives (e.g., cardiac care, cardiac arrest).

ENTER/ITIS
root (intestines) **suffix** (inflammation)

means **inflammation of the intestines.** Notice again that the combining vowel (O) is dropped because the suffix (-ITIS) begins with a vowel.

GASTR/O/ENTER/ITIS
root (stomach) **root** (intestines) **suffix** (inflammation)

means **inflammation of the stomach and intestines.** Notice that the combining vowel (O) remains between the two roots here, even though the second root (ENTER) begins with a vowel.

In addition to roots, suffixes, combining forms, and combining vowels, many medical terms have a word part attached to the *beginning* of the term. This is called a **prefix,** and it can change the meaning of a term in important ways. For example, watch what happens to the meaning of the following medical terms when the prefix changes:

SUB/gastr/ic
prefix (below)

means **pertaining to *below* the stomach.**

TRANS/gastr/ic
prefix (across)

means **pertaining to *across* the stomach.**

RETRO/gastr/ic
prefix (behind)

means **pertaining to *behind* the stomach.**

Let's **REVIEW** the important word parts:

1. **Root**—gives the essential *meaning* of the term.
2. **Suffix**—is the word *ending.*
3. **Prefix**—is a small part added to the *beginning* of a term.
4. **Combining vowel**—*connects* roots to suffixes and roots to other roots.
5. **Combining form**—is the combination of the *root* and the *combining vowel.*

Some important rules to **REMEMBER** are:

1. **Read** the meaning of medical words from the suffix to the beginning of the word and then across.
2. **Drop** the combining vowel before a suffix that starts with a vowel.
3. **Keep** the combining vowel between word roots, even if the second root begins with a vowel.

COMBINING FORMS, SUFFIXES, AND PREFIXES

Presented in this section are lists of combining forms, suffixes, and prefixes that are commonly found in medical terms. Write the meaning of the medical term on the line that is provided. Some terms will be more difficult to understand even after you know the meanings of individual word parts. For these, more extensive explanations are given in *italics*. To check your work, see the **Mini-Dictionary** beginning on page 363, which contains meanings of all terms used in this book.

In your study of medical terminology, you will find it helpful to practice writing terms and their meanings many times. You'll succeed when you follow these simple steps:

1. Complete **Exercises** beginning on page 23 for this chapter, and faithfully check your answers on pages 31 to 33.
2. Fill in the meanings in the **Pronunciation of Terms** list on pages 34 to 37.
3. Apply your knowledge in the **Practical Applications** and **Picture Show** features beginning on page 38.
4. Complete the **Review** of word parts beginning on page 44, and check your answers.
5. Make sure you understand the key medical terminology concepts in the **Terminology CheckUp** on page 47.

COMBINING FORMS

Notice that the **combining form** is in **bold** type, while the root in the medical term is underlined.

Combining Form	Meaning	Medical Term	Meaning
aden/o	gland	adenoma	
		-OMA *means tumor or mass.*	
		adenitis	
		-ITIS *means inflammation.*	
arthr/o	joint	arthritis	
bi/o	life	biology	
		-LOGY *means study of.*	
		biopsy	
		-OPSY *means (process of) viewing. Living tissue is removed and viewed under a microscope.*	
carcin/o	cancer, cancerous	carcinoma	
cardi/o	heart	cardiology	

cephal/o head

cephalic _____

-IC *means pertaining to. If an infant is born with the head delivered first, it is a* ***cephalic*** *presentation.*

cerebr/o cerebrum, largest part of the brain

cerebral _____

-AL *means pertaining to. Figure 1-1 shows the cerebrum and its functions.*

cerebrovascular accident (CVA) _____

-VASCULAR *means pertaining to blood vessels; a CVA is commonly known as a* ***stroke.***

What happens in a stroke?

Blood, containing oxygen and nutrients that are necessary to keep cells alive and functioning, is prevented from reaching areas of the cerebrum, and brain cells die. Depending on the location and extent of reduced blood flow, signs and symptoms may include loss of movement (paralysis), loss of speech (aphasia), weakness, and changes in sensation.

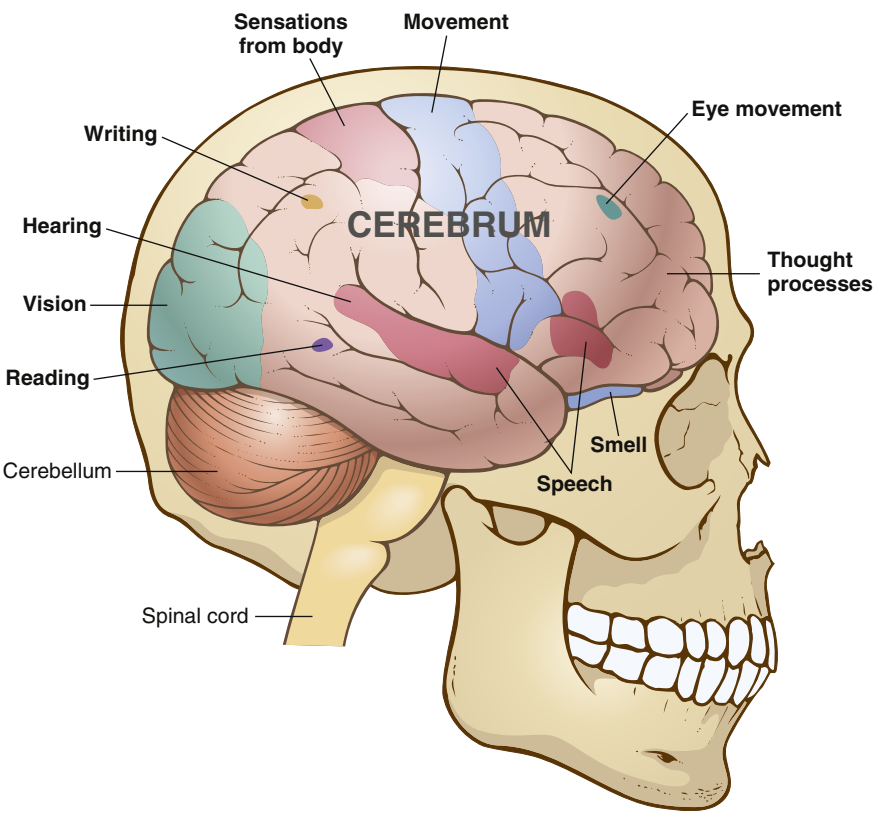


FIGURE 1-1 **Functions of the cerebrum.**

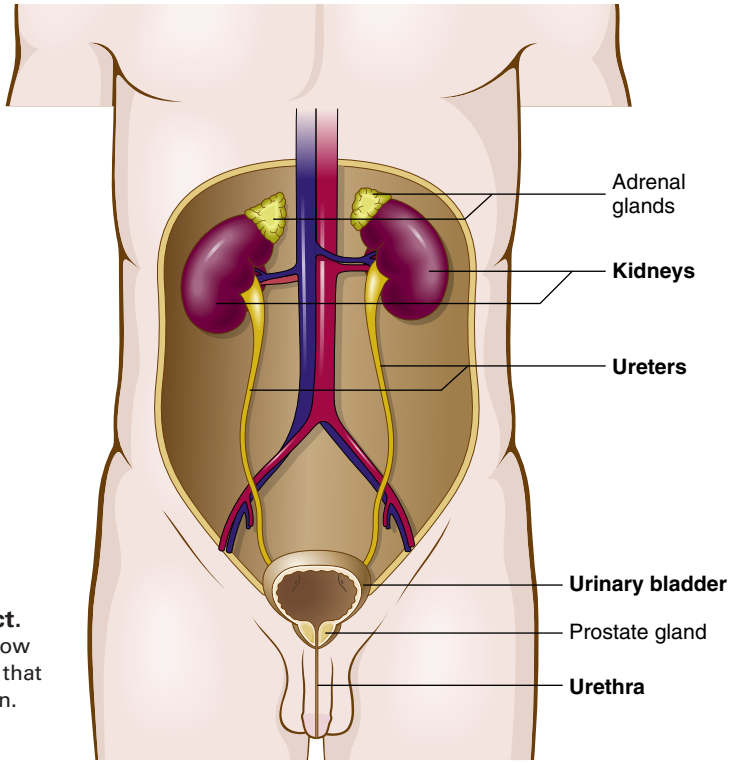


FIGURE 1-2 Male urinary tract. Note that the prostate gland lies below the urinary bladder. It secretes fluid that combines with sperm to form semen. Semen leaves the body through the urethra during ejaculation.

cyst/o	urinary bladder	cystoscope

-SCOPE *means instrument to visually examine. Figure 1-2 shows the urinary bladder and urinary tract in a male. Figure 1-3 shows a cystoscope placed through the urethra into the urinary bladder of a female during cystoscopy.*

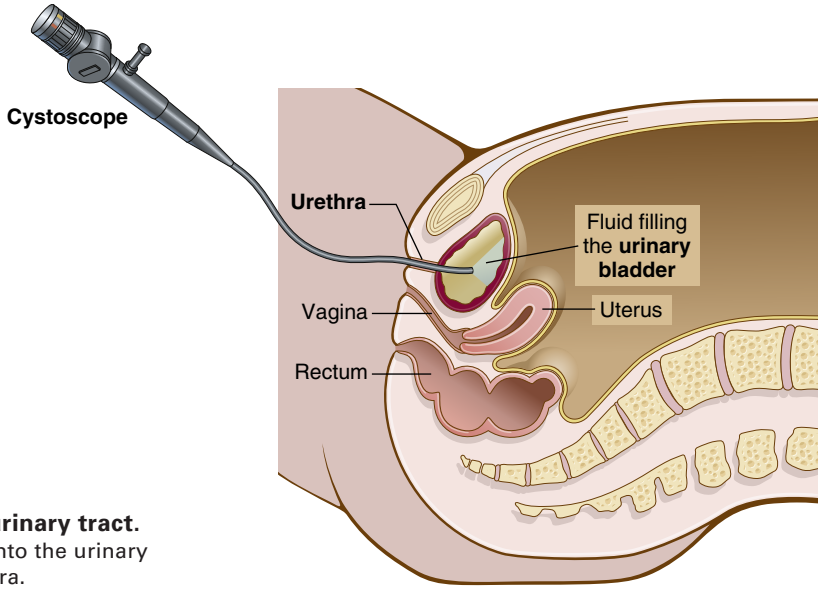


FIGURE 1-3 Female urinary tract. A **cystoscope** is placed into the urinary bladder through the urethra.

cyt/o	cell	cytology _____
derm/o	skin	dermal _____
dermat/o	skin	dermatitis _____
electr/o	electricity	electrocardiogram (ECG) _____ -GRAM *means record. EKG is an older abbreviation for this test.*

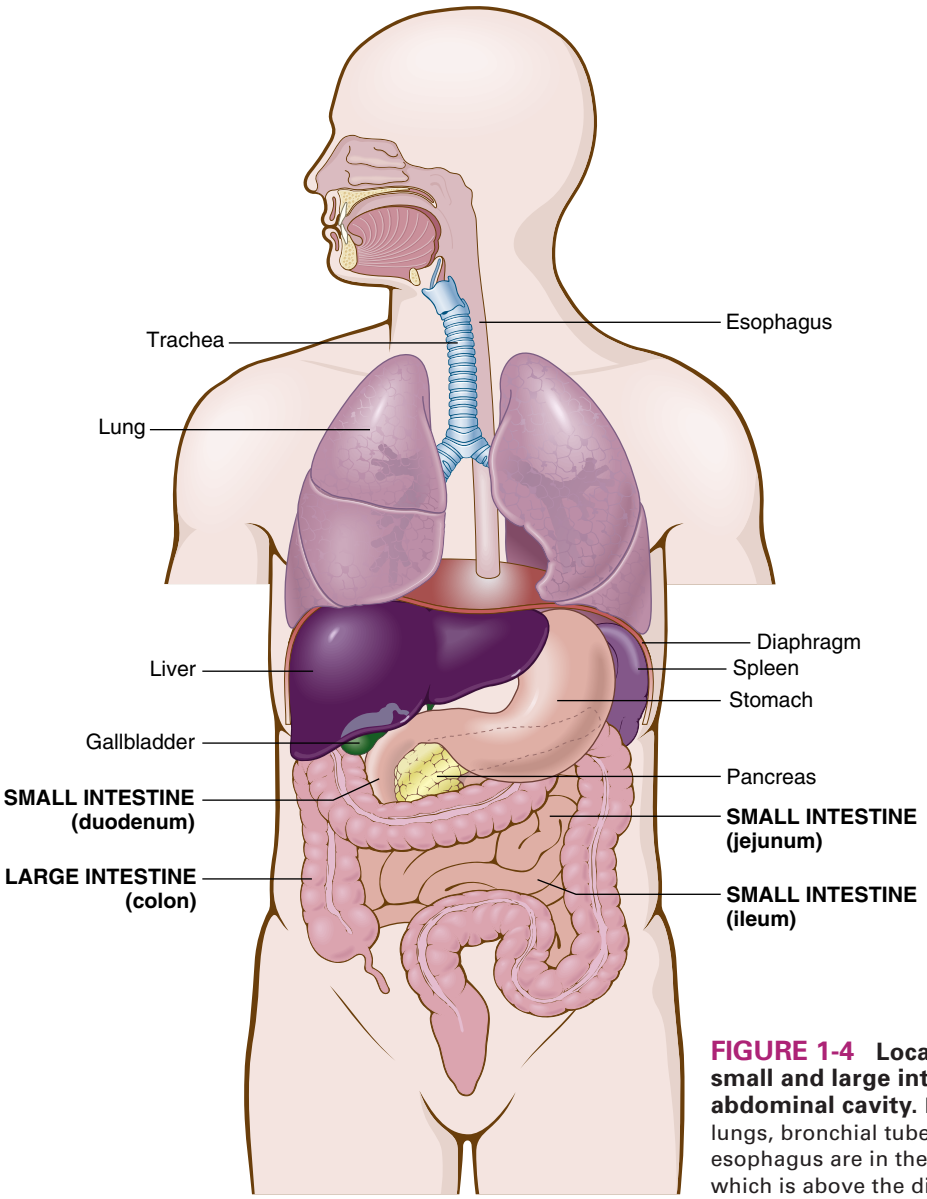


FIGURE 1-4 Location of the small and large intestines in the abdominal cavity. Note that the lungs, bronchial tubes, trachea, and esophagus are in the chest cavity, which is above the diaphragm.

encephal/o	brain	electroencephalogram (EEG) _____ *This record is helpful in determining whether a patient has a seizure disorder, such as epilepsy.*
enter/o	intestines (often the small intestine)	enteritis _____ *Figure 1-4 shows the small and large intestines.* ENTER/O *describes the small intestine and sometimes intestines in general.* COL/O *and* COLON/O *are combining forms for the large intestine (colon).*
erythr/o	red	erythrocyte _____ -CYTE *means cell. Figure 1-5 shows the three major types of blood cells.*

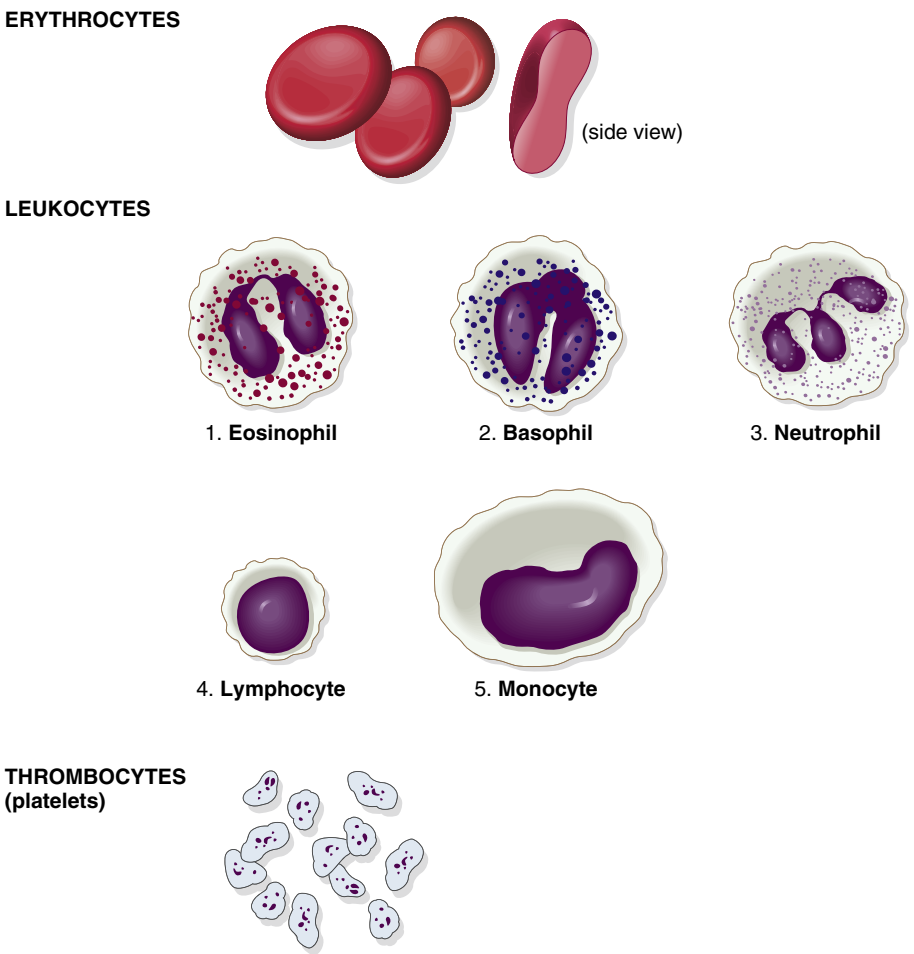
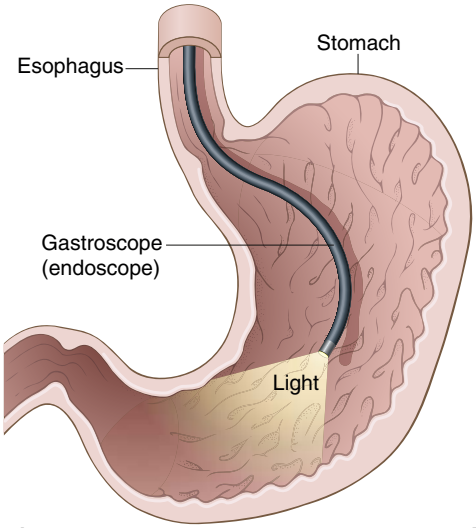


FIGURE 1-5 **Blood cells: *erythrocytes*** (carry oxygen), ***leukocytes*** (five different types help fight disease), and ***thrombocytes*** or ***platelets*** (help blood to clot).



A

B

FIGURE 1-6 **A. Gastroscope** inserted into stomach. **B. Gastroscopy procedure** performed in a medical setting.

gastr/o stomach

gastroscopy _____

-SCOPY *means process of visual examination with an instrument, or "scope." Pronunciation is gas-TROS-ko-pe. A gastroscope is passed through the mouth, throat, and esophagus into the stomach. See Figure 1-6.*

gnos/o knowledge

diagnosis _____

-SIS *means state of;* DIA- *means complete. A diagnosis is the complete knowledge gained after testing and examining the patient. The plural of diagnosis is diagnoses.*

prognosis _____

PRO- *means before. A prognosis is a prediction (before knowledge) that is made after the diagnosis. It forecasts the outcome of treatment.*

Plurals

Terms ending in -is (diagnosis, prognosis) form their plural by dropping the -is and adding -es. See Appendix 4, page 346, for other rules on formation of plurals.

Gynecology: Be careful about spelling this term!

The combining form is **gynec/o**. A **gynecologist** specializes in diseases of the female reproductive organs. Gynecology involves both surgical and internal medicine expertise, and is often practiced with **obstetrics** (care of pregnant women and delivery of a fetus).

FIGURE 1-7 Hematoma from broken ribs.

gynec/o	woman, female	gynecology _____
hem/o, hemat/o	blood	hemoglobin _____ -GLOBIN *means protein. Hemoglobin is the protein in red blood cells (erythrocytes) that helps carry oxygen in the blood.* hematoma _____ -OMA *means mass or tumor. In this term, -oma indicates a mass or swelling containing blood. A hematoma is a mass of blood trapped in tissues of the skin or in an organ. It often results from trauma and is commonly called a bruise, or "black-and-blue" mark. Figure 1-7 shows a hematoma.*
hepat/o	liver	hepatitis _____ *This condition is often caused by different types of viruses: hepatitis A virus, hepatitis B virus, or hepatitis C virus.*

What is a virus?

A virus is a very small particle containing genetic material surrounded by a protein coat. Viruses infect cells and use the components of the host cell to make copies of themselves. Because viruses are different from bacteria, they cannot be killed by antibiotics. This is why the development of vaccines is crucial to the elimination of viral diseases. Examples of viral diseases are hepatitis, AIDS (caused by human immunodeficiency virus), and COVID-19 (caused by coronavirus). See Figure 1-8.

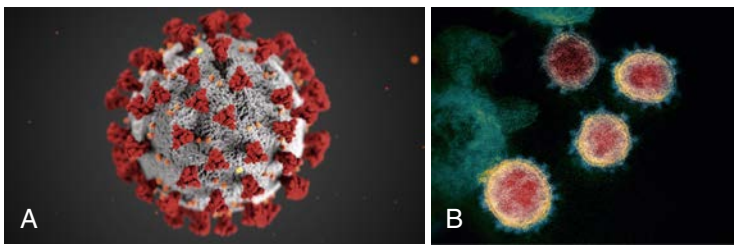


FIGURE 1-8 **A. Representation of a coronavirus** with protruding spikes. The name corona means crown and describes a group of viruses that have crown-like spikes on their surfaces. **B. Electron micrograph of coronaviruses.**

lapar/o	abdomen (area between the chest and hip)	laparotomy _____ -TOMY *means cutting into. In an* ***exploratory laparotomy*** *the surgeon makes a large incision in the abdominal wall to inspect organs for evidence of disease. See Figure 1-9A.* ***Laparoscopy*** *is visual examination of the abdomen using several small incisions for a* ***laparoscope*** *and other instruments. See Figure 1-9B. Another combining form for abdomen is* ABDOMIN/O, *as in abdominal.*
leuk/o	white	leukocyte _____ *Figure 1-5 on page 9 shows five different types of leukocytes.*
nephr/o	kidney	nephrectomy _____ -ECTOMY *means cutting out—an excision or resection of an organ or other part of the body.*
neur/o	nerve	neurology _____
onc/o	tumor (cancerous)	oncologist _____ -IST *means a specialist.*

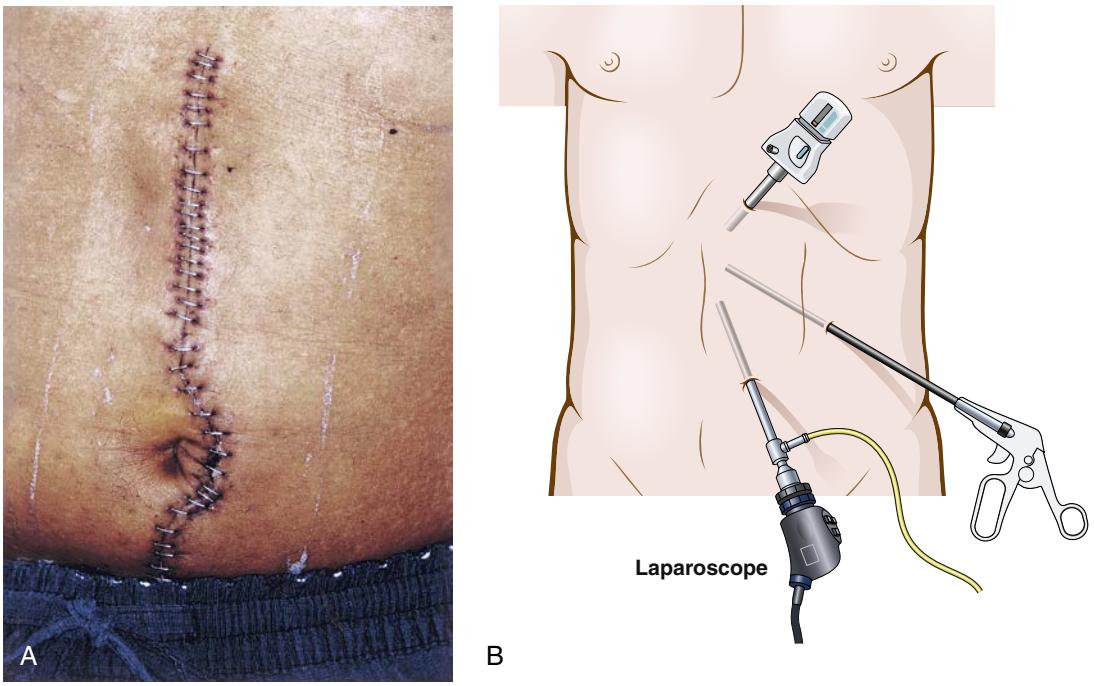


FIGURE 1-9 **A, Laparotomy.** This large incision was closed with surgical staples. **B, Laparoscopy.** The abdomen is examined making small incisions and using a **laparoscope.**

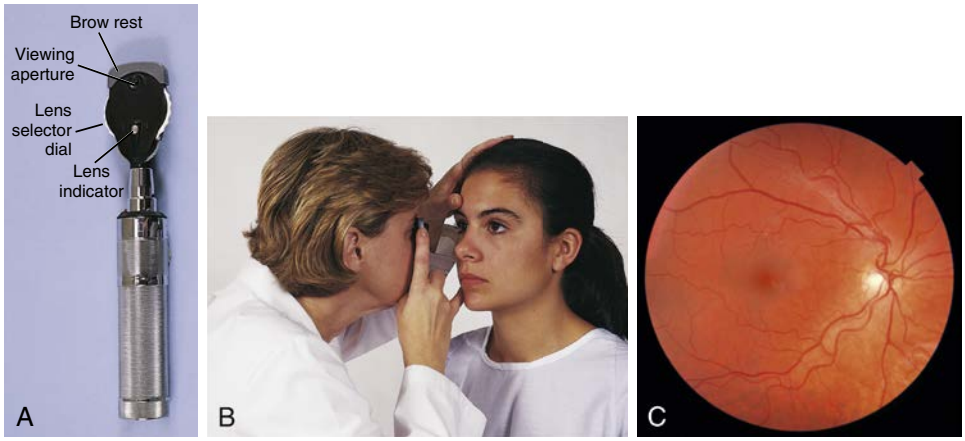


FIGURE 1-10 **A, Ophthalmoscope.** This instrument allows the ophthalmologist to view both the outer and inner areas of the eye. **B, Ophthalmoscopic examination. C, The inner or back area (retina) of a normal eye** as seen through an ophthalmoscope.

ophthalm/o eye

ophthalmoscope

Figure 1-10A is an image of an ophthalmoscope. Figure 1-10B shows an ophthalmologist, a medical doctor, examining a patient's eye. Figure 1-10C shows the retina, lining the back of the eye (fundus), as seen through an ophthalmoscope.

oste/o bone

osteoarthritis

Figure 1-11 shows a normal knee joint and a knee joint with osteoarthritis. Degenerative changes with thinning and loss of cartilage occur. Inflammation of the joint membrane occurs late in the disease.

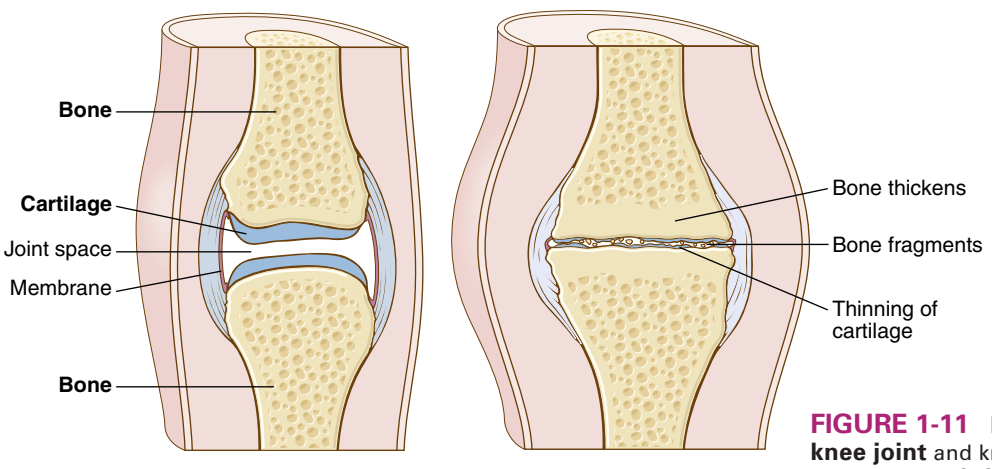


FIGURE 1-11 **Normal knee joint** and knee joint with **osteoarthritis.**

path/o disease

pathologist _____

A pathologist is a medical doctor who views biopsy samples to make a diagnosis and examines dead bodies (in autopsies) to determine the cause of death. AUT- *means self, and* -OPSY *means (process of) viewing. Thus, an autopsy is an opportunity to see for oneself what caused a patient's death.*

psych/o mind

psychosis _____

-OSIS *means abnormal condition. In this serious mental condition, the patient loses touch with reality. Psychotic symptoms include* ***hallucinations*** *(unreal sensory perceptions, such as hearing voices when none are present) and* ***delusions*** *(fixed, false beliefs that can't be changed by logical reasoning).*

ren/o kidney

renal _____

Sometimes there are two combining forms for the same part of the body. Often, one comes from Latin and the other from Greek. REN- *is the Latin root meaning "kidney," and* NEPHR- *is the Greek root meaning "kidney." The Greek root describes abnormal conditions and procedures, whereas the Latin root is used with* -AL, *meaning "pertaining to."*

rhin/o nose

rhinitis _____

sarc/o flesh

sarcoma _____

Sarcomas and carcinomas are both cancerous (malignant) tumors. See Figure 1-12. ***Sarcomas*** *grow from the fleshy (connective) tissues of the body, such as muscle, fat, bone, and cartilage, whereas* ***carcinomas*** *arise from skin tissue and the linings of internal organs.*

Pathologist/medical examiner/coroner

A **medical examiner** (**M.E.**) is a **pathologist** who specializes in forensic (legal) medicine related to criminal issues. A **coroner,** however, is an elected official (administrator) who investigates any suspicious death. This official may or may not be a medical examiner.

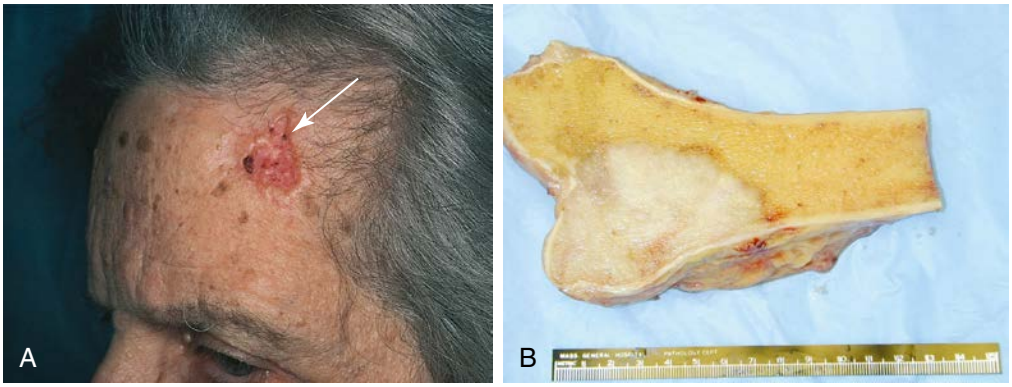


FIGURE 1-12 **A. Basal cell carcinoma.** This type of skin cancer grows from lining or epithelial cells of the skin. Other carcinomas come from cells that line internal organs and glands within the body. **B. Sarcoma of the bone (osteosarcoma).** Sarcomas grow from connective (supportive) tissue such as bone, fat, or muscle.

thromb/o clotting

thrombocyte _____

*A thrombocyte (**platelet**) is a small cell that helps blood to clot. Platelets are shown in Figure 1-5 (see page 9).*

thrombosis _____

*Formation of a **thrombus** (blood clot) occurs when thrombocytes and other clotting factors combine. See Figure 1-13. **Thrombosis** describes the condition of forming a clot (thrombus).*

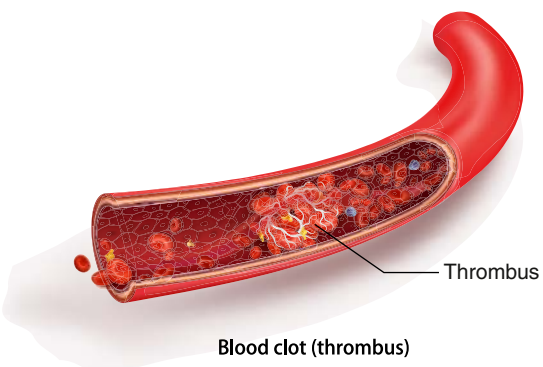


FIGURE 1-13 **Thrombus** (blood clot). (Courtesy iStock #1172668129, urfinguss.)

B

C

D

E

F