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# Preface

**E**very career in health care begins with learning the vast and challenging language of medical terminology. Without adequate learning and teaching resources, it can be an overwhelming challenge for students and faculty. This new edition of *Medical Terminology: An Illustrated Guide* meets that challenge with a clear organizational scheme, full-color illustrations with a strong clinical focus, a wide array of effective pedagogical features, a variety of activities, and useful ancillaries to make teaching and learning more effective. Because the content is so accessible and logically organized, the text can be used as part of classroom instruction, for independent study, or for distance learning.

## Organization and Approach

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*Medical Terminology: An Illustrated Guide* takes a stepwise approach to learning the language of medical terminology. Part 1 describes how medical terms are built, and Part 2 introduces body structure, disease, and treatment. These chapters should be studied before proceeding to Part 3, which describes each of the body systems. Individual chapters also build on knowledge in stages, with Key Terms sections listing those terms most commonly used and specialized terms included in a later section entitled Supplementary Terms. The latter terms may be studied according to time available and student needs.

Each chapter opens with a chapter outline and a list of student objectives—goals to be accomplished by the completion of the chapter. In Part 3, the chapters begin with an overview of the normal structure and function of the system under study, followed by a list of key terms with definitions (the roots used in the accompanying chapter exercises are included in these definitions). Word parts related to each topic are then presented and illustrated, along with exercises on the new material. Next, there is an overview of clinical information pertaining to the system, also followed by a list of key terms with definitions. Many chapters contain displays that unify and simplify material on specific topics.

New to this edition is information on complementary and alternative medicine and special interest boxes with information on word derivations and usage.

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# User's Guide

This User's Guide shows you how to put the features of *Medical Terminology: An Illustrated Guide*, 4th Edition to work for you.

## TERMINOLOGY

Terminology is presented in a consistent and logical manner. Phonetic pronunciations are included with all new terms.

**Key Terms**

**NORMAL STRUCTURE AND FUNCTION**

**Cardiovascular System**

<b>aorta</b> ā-OR-tā	The largest artery. It receives blood from the left ventricle and branches to all parts of the body (root <i>aort/o</i> ).
<b>aortic valve</b> ā-OR-tik	The semilunar valve at the entrance to the aorta
<b>apex</b> A-pĕks	The point of a cone-shaped structure (adjective, apical). The apex of the heart is formed by the left ventricle. It is inferior and pointed toward the left (see Fig. 9-2).
<b>artery</b>	A vessel that carries blood away from the heart. All except the pulmonary and umbilical arteries carry oxygenated blood (root <i>arter-</i> , <i>arteri/o</i> ).
<b>arteriole</b> ar-TĒ-rĕ-ol	A small artery (root <i>arteri/o</i> )
<b>atrioventricular (AV) node</b> ā-trĕ-ō-ven-TĒ-rik-ū-lar	A small mass in the lower septum of the right atrium that passes impulses from the sinoatrial (SA) node toward the ventricles
<b>AV bundle</b>	A band of fibers that transmits impulses from the atrioventricular (AV) node to the top of the interventricular septum. It divides into the right and left bundle branches, which descend along the two sides of the septum; the bundle of His.
<b>atrium</b> A-trĕ-um	An entrance chamber, one of the two upper receiving chambers of the heart (root <i>atri/o</i> )

Key Terms include the most commonly used words.

Supplementary Terms list more specialized words.

**Supplementary Terms**

**NORMAL STRUCTURE AND FUNCTION**

<b>bolus</b> BO-lus	A mass, such as the rounded mass of food that is swallowed
<b>cardia</b> KAR-dĕ-a	The part of the stomach near the esophagus, named for its closeness to the heart
<b>chyme</b> ĥĭ-m	The semiliquid partially digested food that moves from the stomach into the small intestine
<b>defecation</b> def-e-KĀ-shun	The evacuation of feces from the rectum
<b>deglutition</b> deg-lū-TĪSH-un	Swallowing
<b>duodenal bulb</b>	The part of the duodenum near the pylorus; the first bend (flexure) of the duodenum
<b>duodenal papilla</b>	The raised area where the common bile duct and pancreatic duct enter the duodenum (see Fig. 12-10); papilla of Vater ( <i>FA-ter</i> )
<b>greater omentum</b> ō-MĒN-tum	A fold of the peritoneum that extends from the stomach over the abdominal organs

Abbreviations for common terms.

**ABBREVIATIONS**

<b>ACh</b>	Acetylcholine	<b>ICP</b>	Intracranial pressure
<b>AD</b>	Alzheimer disease	<b>LMN</b>	Lower motor neuron
<b>ADHD</b>	Attention deficit-hyperactivity disorder	<b>LOC</b>	Level of consciousness
<b>ALS</b>	Amyotrophic lateral sclerosis	<b>LP</b>	Lumbar puncture
<b>ANS</b>	Autonomic nervous system	<b>MI</b>	Myocardial infarction
<b>BAEP</b>	Brainstem auditory evoked potentials	<b>MS</b>	Multiple sclerosis
<b>CBF</b>	Cerebral blood flow	<b>NICU</b>	Neurological intensive care unit
<b>CJD</b>	Creutzfeldt-Jakob disease	<b>NPH</b>	Normal-pressure hydrocephalus
<b>CNS</b>	Central nervous system	<b>NR</b>	Non-rapid eye movement (sleep)
<b>CP</b>	Cerebral palsy	<b>NREM</b>	Non-rapid eye movement (sleep)
<b>CSF</b>	Cerebrospinal fluid	<b>OC</b>	Obsessive-compulsive disorder
<b>CVA</b>	Cerebrovascular accident	<b>ONS</b>	Ophthalmic system
<b>CVD</b>	Cerebrovascular disease	<b>PNS</b>	Peripheral nervous system
<b>DSM</b>	Diagnostic and Statistical Manual of Mental Disorders	<b>RAS</b>	Reticular activating system
<b>DTR</b>	Deep tendon reflexes	<b>REM</b>	Rapid eye movement (sleep)
<b>EEG</b>	Electroencephalogram; electroencephalograph	<b>SSEP</b>	Somatosensory evoked potentials
<b>GAD</b>	Generalized anxiety disorder	<b>SSRI</b>	Selective serotonin reuptake inhibitor
		<b>TIA</b>	Transient ischemic attack
		<b>UNN</b>	Upper motor neuron
		<b>VEP</b>	Visual evoked potentials

Key Clinical Terms list medical terms pertinent to the body system under discussion.

**Key Clinical Terms**

**DISORDERS**

<b>AIDS</b>	Failure of the immune system caused by infection with HIV (human immunodeficiency virus). The virus infects certain T cells and thus interferes with immunity.
<b>allergen</b> AL-er-jĕn	A substance that causes an allergic response
<b>allergy</b> AL-er-jĕ	Hypersensitivity
<b>anaphylactic reaction</b> an-a-fĭ-LĀK-tĭk	An exaggerated allergic reaction to a foreign substance (root <i>phylak-</i> means "protection"). It may lead to death caused by circulatory collapse, and respiratory distress if untreated. Also called anaphylaxis.
<b>anemia</b> a-NĒ-mĕ-a	A deficiency in the amount of hemoglobin in the blood; may result from blood loss, malnutrition, a hereditary defect, environmental factors, and other causes
<b>angioedema</b> an-jĕ-ō-e-DE-ma	A localized edema with large hives (wheals) similar to urticaria but involving deeper layers of the skin and subcutaneous tissue



### SPECIAL INTEREST BOXES

Special interest boxes appear throughout the book and contain information on word derivations and usage.

**BOX 18-1 The Greek Influence**

Some of our most beautiful (and difficult to spell and pronounce) words come from Greek. The prefix *esthesi/o* means sensation. It appears in the word *anesthesia*, a state in which there is lack of sensation, particularly pain. It is found in the word *aesthetics*, which refers to beauty, artistry, and appearance. The prefix *presby-*, in the terms *presbycusis* and *presbyopia*, means "old," and these conditions appear with aging. The root *cyclo-*, pertaining to the ringlike ciliary body of the eye, is from the Greek word for circle or wheel. The same root appears in the words *bicycle* and *tricycle*. Also pertaining to the eye, the term *iris* means "rain-bow" in Greek, and the iris is the colored part of the eye.

The root *-sthen/o* means "strength," and occurs in the words *asthenia*, meaning lack of strength or weakness, and *neurasthenia*, an old term for vague "nervous exhaustion," now applied to conditions involving chronic symptoms of generalized fatigue, anxiety, and pain. The root also appears in the word *calisthenics* in root also appears in the word *calisthenics* in combination with the root *cali-*, meaning "beauty." So the rhythmic strengthening and conditioning exercises that are done in calisthenics literally give us beauty through strength.

The Greek word *chest/o* means "chest," although a stethoscope sounds in other parts of the body. A sphygmomanometer is used to measure blood pressure. The prefix *osteo-* means "bone," and the prefix *ortho-* means "straight."

**BOX 5-1 Cutting the Job in Half**

A beginning student in medical science may be surprised by the vast number of names and terms that he or she is required to learn. This responsibility is lightened somewhat by the fact that we are bilaterally symmetrical. That is, aside from some internal organs such as the liver, spleen, stomach, pancreas, and intestine, nearly everything on the right side can be found on the left as well. The skeleton can be figuratively split down the center, giving equal structures on both sides of the midline. Many blood vessels and nerves are paired. This cuts the learning in half.

In addition, many of the blood vessels and nerves in a region have the same name. The radial artery, radial vein, and radial nerve are parallel, and all are located along the radius of the forearm. Vessels are commonly named for the organ they supply: the hepatic artery and vein of the liver, the pulmonary artery and vein of the lungs, the renal artery and vein of the kidney.

No one could say that the learning of medical terminology is a snap, but it could be harder!

### DISPLAYS

Displays organize information on specific topics and serve as references and reviews.

**DISPLAY 7-1 Imaging Techniques**

METHOD	DESCRIPTION
cineradiography (sin-e-rah-dee-OG-ra-fe)	making of a motion picture of successive images appearing on a fluoroscopic screen
computed tomography (CT, CT scan) (si-MOG-ra-fe)	use of a computer to generate an image from a large number of x-rays passed at different angles through the body; a three-dimensional picture of a cross-section of the body is obtained; reveals more about soft tissues than does simple radiography (Fig. 7-7)
fluoroscopy (flu-ROS-kop-ee)	use of x-rays to examine deep structures; the shadows cast by x-rays passed through the body are observed on a fluorescent screen; the device used is called a fluoroscope
magnetic resonance imaging (MRI) (fi-ROS-kop-ee)	production of images through the use of a magnetic field and radio waves; the characteristics of soft tissue are revealed by differences in molecular properties; eliminates the need for x-rays and contrast media
positron emission tomography (PET) (pi-TON-ee-MOG-ra-fe)	production of sectional body images by administration of a natural substance, such as glucose, labeled with a positron-emitting isotope; the rays subsequently emitted are interpreted by computer to show the internal distribution of the substance administered; PET has been used to follow blood flow through an organ and to measure metabolic activity within an organ, such as the brain, under different conditions
radiography (rah-dee-OG-ra-fe)	use of x-rays passed through the body to make a visual record (radiograph) of internal structures on specially sensitized film
scintigraphy (sin-TIG-ra-fe)	production of an image of the distribution of radioactivity in tissues after internal administration of a radioactive substance (radionuclide); the images are obtained with a scintillation camera; the record produced is a scintiscan (SIN-ti-skan) and usually identifies the part examined or the isotope used for the test, as in bone scan, gallium scintigraphy, and myocardial perfusion scintigraphy
single photon emission computed tomography (SPECT) (sin-gul-ee-PHON-ee-MOG-ra-fe)	scintigraphic technique that permits visualization of the cross-sectional distribution of a radioisotope
ultrasonography (ul-tra-son-OG-ra-fe)	generation of a visual image from the echoes of high-frequency sound waves using a probe (ek-OG-ra-fe) (Fig. 7-8)

**DISPLAY 8-1 Common Drugs and Their Actions**

CATEGORY	ACTIONS; APPLICATIONS	GENERIC NAME	TRADE NAME	EXAMPLES
<b>adrenergics</b> ad-ren-ER-jiks	mimic the action of the sympathetic nervous system, which responds to stress	epinephrine	Bronkaid	
<b>analgesics</b> an-al-JEE-siks	alleviate pain	phenylephrine pseudoephedrine dopamine	Sudafed Intropin	
<b>antidepressants</b> nar-KO-tik	decrease pain sensation in central nervous system; chronic use may lead to physical dependence	meprobamate morphine	Demerol Duramorph	
<b>antipyretics</b> non-nar-KO-tik	act peripherally to inhibit prostaglandins (local hormones); they may also be anti-inflammatory and antipyretic (reduce fever)	aspirin (acetylsalicylic acid, ASA) acetaminophen (APAP)	Tylenol	
<b>antipsychotics</b> an-es-THET-iks	reduce or eliminate sensation	ibuprofen celecoxib	Motrin, Advil Celebrex, Vioxx	
<b>anticoagulants</b> an-ti-KO-uh-luh-nts	prevent blood clotting	warfarin heparin	Coumadin Heparin	
<b>antidotes</b> an-ti-DOE-nts	counteract the effects of a poison	flucloxacillin procaine general anesthesia	Xylocaine Novocain	
<b>antihistamines</b> an-ti-HIS-tuh-meen-eez	block histamine receptors	lorazepam midazolam	Ativan Versed	

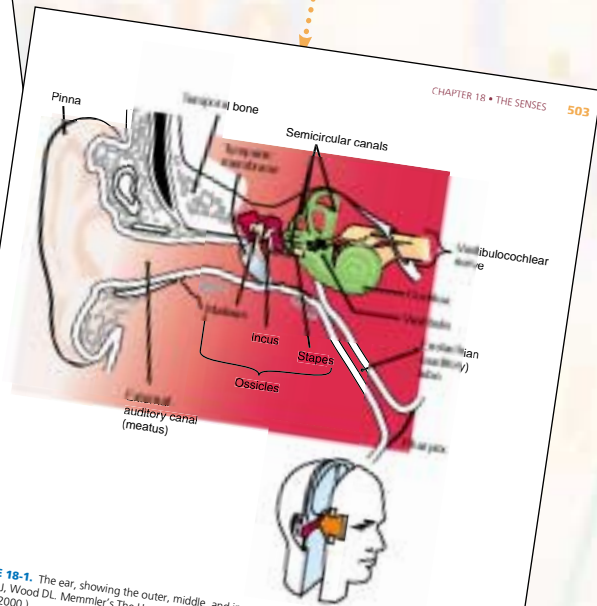
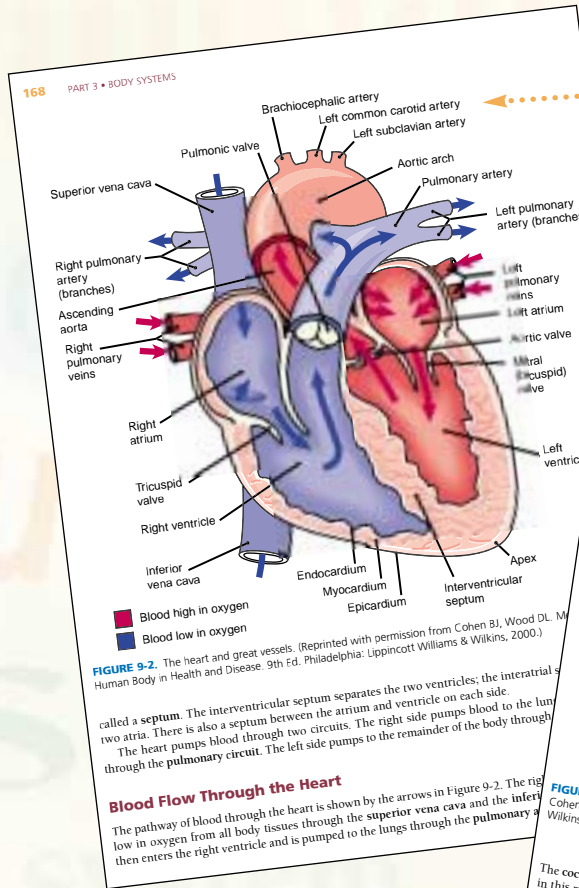
**DISPLAY 10-2 Common Blood Tests**

TEST	ABBREVIATION	DESCRIPTION
red blood cell count	RBC	number of red blood cells per $\mu\text{L}$ (cubic millimeter) of blood
white blood cell count	WBC	number of white blood cells per cubic millimeter of blood
differential count	Diff	relative percentage of the different types of leukocytes
hematocrit (Fig. 10-6)	Ht, Hct, crit	relative percentage of packed red cells in a given volume of blood
packed cell volume	PCV	hematocrit
hemoglobin	Hb, Hgb	amount of hemoglobin in $\text{g/dL}$ (100 mL) of blood
mean corpuscular volume	MCV	volume of an average red cell
mean corpuscular hemoglobin	MCH	average weight of hemoglobin in red cells
mean corpuscular hemoglobin concentration	MCHC	average concentration of hemoglobin in red blood cells
erythrocyte sedimentation rate	ESR	rate of settling of erythrocytes per unit of time; used to detect infection or inflammation
complete blood count	CBC	series of tests including cell counts, hematocrit, hemoglobin, and cell volume measurements

### FULL-COLOR ARTWORK AND PHOTOS

Beautiful full-color art throughout the book brings the content to life and illustrates the most important information.

Illustrations bring complex information to life.



The **cochlea**, shaped like the shell of a snail, has the specialized **organ of Corti** concerned with hearing. Cells in this receptor organ respond to sound waves traveling through the fluid-filled ducts of the cochlea. Sound waves enter the cochlea from the base of the stapes through an opening called the oval window. Sound waves enter through another opening called the round window.

The sense of equilibrium is localized in the **vestibular apparatus**. The vestibular apparatus consists of the **vestibule** and three projecting **semicircular canals**. Special cells within the vestibular apparatus respond to movement. (The senses of vision and proprioception are also important in maintaining balance.)

Nerve impulses are transmitted from the ear to the brain by way of the **vestibulocochlear nerve**. The cochlear branch of this nerve transmits impulses for hearing from the cochlea; the vestibular branch transmits impulses concerned with equilibrium from the vestibular apparatus.

Full-color photos add a clinical context.



## CASE STUDIES

Case studies illustrate terminology in the context of a medical report. These are followed by questions about terms used in the cases.

**Case Studies**

**Case Study 21-1: Basal Cell Carcinoma (BSC)**

K.B., a 32-year-old fitness instructor, had noticed a "tiny hard lump" at the base of her left nostril while cleansing her face. The lesion had been present for about 2 months when she consulted a dermatologist. She had recently moved north from Florida, where she had worked as a lifeguard. She thought the lump might have been triggered by the regular tanning salon sessions she had used to retain her tan because it did not resemble the acne pustules, blackheads, or resulting scars of her adolescent years. Although a dermatabrasion had removed the obvious acne scars and left several areas of dense skin, this lump was brown-pigmented and different. K.B. was afraid it might be a malignant melanoma. On examination, the dermatologist noted a small pearly-white nodule at the lower portion of the left ala (outer flared portion of the nostril). There were no other lesions on her face or neck.

A plastic surgeon excised the lesion and was able to re-approximate the wound edges without a full-thickness skin graft. The pathology report identified the lesion as a basal cell carcinoma with clean margins of normal skin and subcutaneous tissue and stated that the entire lesion had been excised. K.B. was advised to wear SPF 30 sun protection on her face at all times and to avoid excessive sun exposure and tanning salons.

**Case Study 21-2: Cutaneous Lymphoma**

L.C., a 52-year-old female research chemist, has had a history of T-cell lymphoma for 8 years. She was initially treated with systemic chemotherapy with methotrexate until she contracted stomatitis. Continued therapy with topical chemotherapeutic agents brought some measurable improvement. She also had a history of hidradenitis.

A recent physical examination showed diffuse erythroderma with scaling and hyperkeratosis, plus alopecia. She had painful leukoplakia and ulcerations of the mouth and tongue. L.C. was hospitalized and given two courses of topical chemotherapy. She was referred to Dental Medicine for treatment of the oral lesions and discharged in stable condition with an appointment for follow-up in 4 weeks. Her discharge medications included hydrocortisone ointment 2% to affected lesions q hs, Keralyt gel bid for the hyperkeratosis, and Dyclone and Benadryl for her mouth ulcers prn.

**Case Study 21-3: Pressure Ulcer**

L.N., an elderly woman in failing health, had recently moved in with her daughter after her hospitalization for a stroke. The daughter reported to the home care nurse that her mother had minimal appetite, was confused and disoriented, and had developed a blister on her lower back since she had been confined to bed. The nurse noted that L.N. had lost weight since her last visit and that her skin was dry with poor skin turgor. She was wearing an "adult diaper," which was wet. After examining L.N.'s sacrum, the nurse noted a nickel-sized open area, 2 cm in diameter and 1 cm in depth (stage II pressure ulcer), with a 0.5-cm reddened surrounding area with no drainage. L.N. moaned when the nurse palpated the lesion. The nurse also noted reddened areas on L.N.'s elbows and heels.

The nurse provided L.N.'s daughter with instructions for proper skin care, incontinence management, enhanced nutrition, and frequent repositioning to prevent pressure ischemia to the prominent body areas. However, 6 months later L.N.'s pressure ulcer had deteriorated to a class III. She was hospitalized under the care of a plastic surgeon and wound-ostomy care nurse. Surgery was scheduled to debride the sacral wound and close it with a full-thickness skin graft taken from her thigh. L.N. was

**Case Studies, continued**

discharged 8 days later to a long-term care facility with orders for an alternating pressure mattress, position change every 2 hours, supplemental nutrition, and meticulous wound care.

**CASE STUDY QUESTIONS**

Multiple choice: Select the best answer and write the letter of your choice to the left of each number.

- K.B.'s basal cell carcinoma may have been caused by chronic exposure to the sun and ultraviolet tanning bed use. The scientific explanation for this is the:
  - autoimmune response
  - actinic effect
  - allergic reaction
  - sun block tanning lotion theory
  - dermatophytosis
- The characteristic pimples of adolescent acne are whiteheads and blackheads. The medical terms for these lesions are:
  - vesicles and lymphotomes
  - pustules and bisters
  - pustules and comedones
  - vitiligo and macules
  - furuncle and sebaceous cyst
- Which skin cancer is an overgrowth of pigment-producing epidermal cells:
  - basal cell carcinoma
  - Kaposi sarcoma
  - cutaneous lymphoma
  - melanoma
  - basaloid carcinoma

**Case Studies, continued**

- Hydrocortisone is a(n):
  - vitamin
  - steroid
  - analgesic
  - lubricant
  - diuretic
- An example of a topical drug is a:
  - systemic chemotherapeutic agent
  - drug derived from rain forest plants
  - subdermal allergy test antigens
  - skin ointment
  - Benadryl capsule 25 mg
- Stomatitis, a common side effect of systemic chemotherapy, is an inflammatory condition of the:
  - mouth
  - colostomy
  - stomach
  - teeth and hair
  - nails
- Skin turgor is a measure of:
  - hydration
  - formation of yellow patches on the skin
  - formation of scales on the skin

**Case Studies, continued**

Write a term from the case studies with each of the following meanings:

- skin sanding procedure
- a solid raised lesion larger than a papule
- physician who cares for patients with skin diseases
- connective tissue and fat layer beneath the dermis
- diffuse redness of the skin
- increased production of keratin in the skin
- removal of dead or damaged skin
- reduced blood flow to the tissue

Abbreviations. Define the following abbreviations:

- FTSG \_\_\_\_\_
- STSG \_\_\_\_\_
- SPF \_\_\_\_\_
- hs \_\_\_\_\_
- bid \_\_\_\_\_

ca with a scalpel, whereas a STSG \_\_\_\_\_, which can cut a

## PRACTICE EXERCISES

Exercises are included throughout the book to help you understand the content, assess your progress, and review and prepare for quizzes and tests.

### Labeling Exercise 12-2

**Accessory Organs of Digestion**  
Write the name of each numbered part on the corresponding line of the answer sheet.

Common bile duct  
Common hepatic duct  
Cystic duct  
Diaphragm  
Duodenum  
Gallbladder  
Liver  
Pancreas  
Pancreatic duct  
Spleen

1 \_\_\_\_\_  
2 \_\_\_\_\_  
3 \_\_\_\_\_  
4 \_\_\_\_\_  
5 \_\_\_\_\_  
6 \_\_\_\_\_  
7 \_\_\_\_\_  
8 \_\_\_\_\_  
9 \_\_\_\_\_  
10 \_\_\_\_\_

### Exercise 13-1

Use the root *ren/o* to write a word that has the same meaning as each of the following definitions:

- near (para-) the kidney
- above (supra-) the kidney
- between the kidneys
- around the kidneys
- behind (post-) the kidney

\_\_\_\_\_ *pararenal*

Use the root *nephro* to write a word that has the same meaning as each of the following definitions:

- inflammation of the kidney
- any disease of the kidney
- softening of the kidney
- surgical removal of the kidney
- \_\_\_\_\_ of the kidney

Use the appropriate root to write a word that has the same meaning for each of the following definitions:

- \_\_\_\_\_ of a glomerulus
- \_\_\_\_\_ of a renal calyx
- \_\_\_\_\_ of the renal pelvis
- \_\_\_\_\_ of the renal pelvis

A Chapter Review concludes each chapter.

### Chapter 16 Crossword Endocrine System

**ACROSS**

- An islet is a small \_\_\_\_\_.
- Measurement used to diagnose diabetes: \_\_\_\_\_.
- Temperature: root \_\_\_\_\_.
- Sudden degeneration of the pituitary is pituitary \_\_\_\_\_.
- Diabetes affects the metabolism of \_\_\_\_\_.
- A form of hyperthyroidism is named for him: \_\_\_\_\_.
- Pituitary hormone that acts on the thyroid: \_\_\_\_\_.
- Pituitary hormone: \_\_\_\_\_.
- Test for measuring hormones in the blood: \_\_\_\_\_.
- Abbreviation \_\_\_\_\_.
- Alternate name for the pituitary \_\_\_\_\_.
- Any disease of the adrenal gland \_\_\_\_\_.

**DOWN**

- Pituitary hormone that controls water loss: \_\_\_\_\_.
- Abbreviation \_\_\_\_\_.
- Alternate name for growth hormone \_\_\_\_\_.
- Disorder caused by excess growth hormone in adults \_\_\_\_\_.
- A form of thyroid hormones in the blood \_\_\_\_\_.
- Excess sugar in the urine \_\_\_\_\_.
- The cells or tissues a hormone acts on \_\_\_\_\_.
- True, normal: prefix \_\_\_\_\_.
- Against: prefix \_\_\_\_\_.
- Over, abnormally high: prefix \_\_\_\_\_.

### Chapter Review 18-1

Match the following terms and write the appropriate letter to the left of each number:

- myesthesia
- parosmia
- nyctalopia
- hypergeusia
- hemianopia
- proprioception
- tactile
- vitreous body
- olfaction
- gustation
- lens
- sclera
- conjunctiva
- vestibular apparatus
- auditory tube
- myopia

- night blindness
- abnormal increase in the sense of taste
- muscular sensation
- abnormal smell perception
- blindness in half the visual field
- sense of smell
- sense of taste
- pertaining to touch
- awareness of body position
- material that fills the eyeball
- membrane that lines the eyelid
- structure that changes shape for near and far vision
- passage that connects the middle ear and pharynx
- part of the ear that contains the receptors for equilibrium
- outermost layer of the eye
- inner ear
- point of sharpest vision
- small bones of the middle ear
- receptors for vision
- muscular ring that regulates light entering the eye
- complete color blindness
- opacity of the lens
- nearsightedness
- sensation of noises in the ear
- total loss of hearing

## FLASHCARDS

A set of **flashcards** is included to help you maximize your study time. Expand your vocabulary by making additional flashcards as you work through the text.



## CD-ROM

The free **CD-ROM** includes practice tests, additional exercises to test your knowledge and assess your progress, and a pronunciation glossary. Have fun while you learn!

- The **practice tests** offer an opportunity for you to prepare for assessment.
- **Interactive labeling exercises** help you reinforce your understanding of anatomy.
- The **pronunciation glossary** allows you to hear accurate pronunciations of over 2,500 terms, drawn directly from *Stedman's Medical Dictionary*.



PART

# Introduction to Medical Terminology



Chapters 1 through 5, Part 1, present the basics of medical terminology and body structure. Chapters 6 through 8, Part 2, deal with disease and treatment. These beginning chapters form the basis for the chapters on the individual body systems, Part 3.

# Concepts of Medical Terminology

## Chapter Contents

Word Parts

Combining Forms

Word Derivations

Pronunciation

Symbols

Abbreviations

Words Ending In *x*

Suffixes Beginning With *rh*

Chapter Review

Case Study

Answer Section

## Objectives

After study of this chapter you should be able to:

1. Explain the purpose of medical terminology.
2. Define the terms *root*, *suffix*, and *prefix*.
3. Explain what combining forms are and why they are used.
4. Name the languages from which most medical word parts are derived.
5. Pronounce words according to the pronunciation guide used in this text.
6. Analyze a case study with regard to some concepts of medical terminology.

**M**edical terminology is a special vocabulary used by health care professionals for effective and accurate communication. Because it is based mainly on Greek and Latin words, medical terminology is consistent and uniform throughout the world. It is also efficient; although some of the terms are long, they often reduce an entire phrase to a single word. The one word *gastroduodenostomy*, for example, stands for “a communication between the stomach and the first part of the small intestine” (Fig. 1-1).

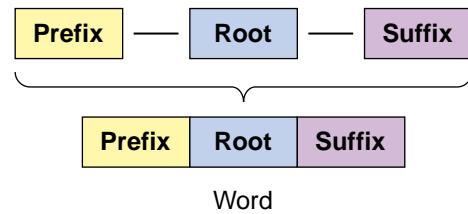
The medical vocabulary is vast, and learning it may seem like learning the entire vocabulary of a foreign language. Moreover, like the jargon that arises in all changing fields, it is always expanding. Think of the terms that have been added to our vocabulary with the development of computers, such as software, megabyte, search engine, e-mail, chat room. The task seems overwhelming, but there are methods that can aid in learning and remembering words and can even help in making informed guesses regarding the meanings of unfamiliar words. Most medical terms can be divided into component parts—roots, prefixes, and suffixes—that maintain the same meaning whenever they appear. By learning these meanings, you can analyze and remember many words.

## Word Parts

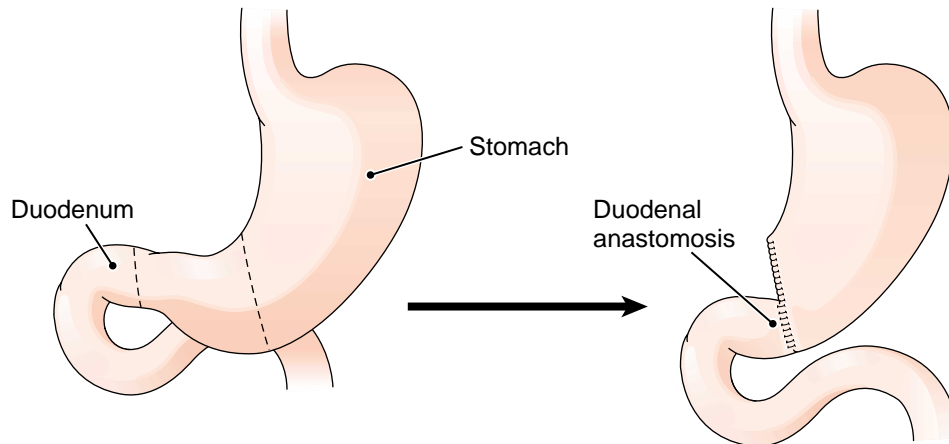
The fundamental unit of each medical word is the **root**. This establishes the basic meaning of the word and is the part to which modifying prefixes and suffixes are added.

A **suffix** is a short word part or series of parts added at the end of a root to modify its meaning. In this book suffixes are indicated by a dash before the suffix, such as *-itis*.

A **prefix** is a short word part added before a root to modify its meaning. In this book prefixes are indicated by a dash after the prefix, such as *pre-*. Shown diagrammatically:

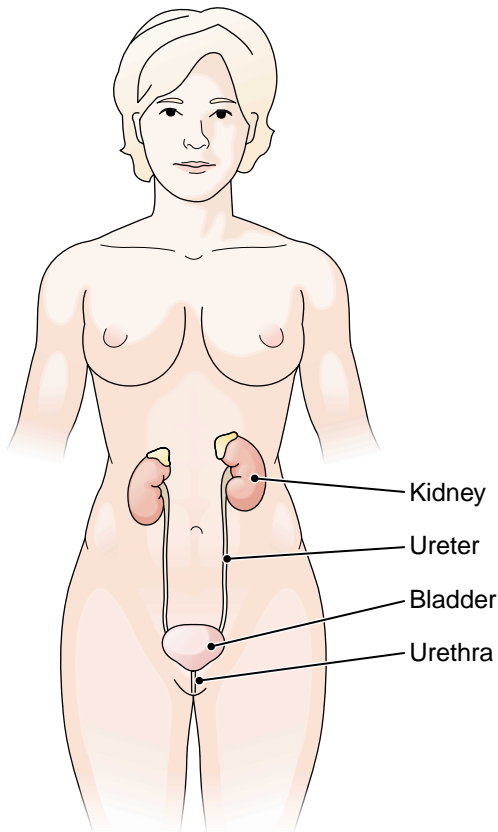


Words are formed from roots, prefixes, and suffixes.



**FIGURE 1-1.** Gastroduodenostomy





**FIGURE 1-2.** The Greek root *neph* and the Latin root *ren* are used to refer to the kidney, an organ of the urinary system.

The simple word *learn* can be used as a root to illustrate. If we add the suffix *-er* to form *learner*, we have “one who learns.” If we add the prefix *re-* to form *relearn*, we have “to learn again.”

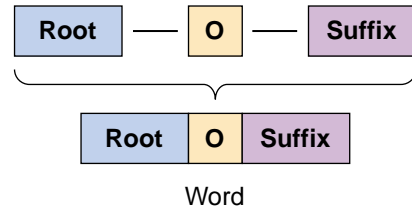
Not all roots are complete words. In fact, most medical roots are derived from other languages and are meant to be used in combinations. The Greek word *kardia*, for example, meaning “heart,” gives us the root *cardi*. The Latin word *pulmo*, meaning “lung,” gives us the root *pulm*. In a few instances, both the Greek and Latin roots are used. We find both the Greek root *neph* and the Latin root *ren* used in words pertaining to the kidney (Fig. 1-2).

Note that the same root may have different meanings in different fields of study. The root *myel* means “marrow” and may apply to either the bone marrow or the spinal cord. The root *scler* means “hard” but may also apply to the white of the eye. *Cyst* means “a filled sac or pouch” but also refers specifically to the urinary bladder. You will sometimes have to consider the context of a word before assigning its meaning.

Compound words contain more than one root. The words *eyeball*, *bedpan*, *frostbite*, and *wheelchair* are examples. Some compound medical words are *cardiovascular* (pertaining to the heart and blood vessels), *urogenital* (pertaining to the urinary and reproductive systems), and *lymphocyte* (a white blood cell found in the lymphatic system).

## Combining Forms

When a suffix beginning with a consonant is added to a root, a vowel (usually an *o*) is inserted between the root and the suffix to aid in pronunciation.

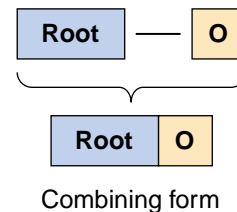


A combining vowel may be added between a root and a suffix.

Thus, when the suffix *-logy*, meaning “study of,” is added to the root *neur*, meaning “nerve or nervous system,” a combining vowel is added:

neur + o + logy = neurology (study of the nervous system)

Roots shown with a combining vowel are called **combining forms**.



A root with a combining vowel is often called a combining form.

In this text, roots are given with their most common combining vowels added after a slash and are referred to simply as roots, as in *neur/o*. A combining vowel usually is not used if the ending begins with a vowel.

The root *neur* is combined with the suffix *-itis*, meaning “inflammation of,” in this way:

neur + itis = neuritis (inflammation of a nerve)

There are some exceptions to this rule, particularly when pronunciation or meaning is affected, but you will observe these as you work.

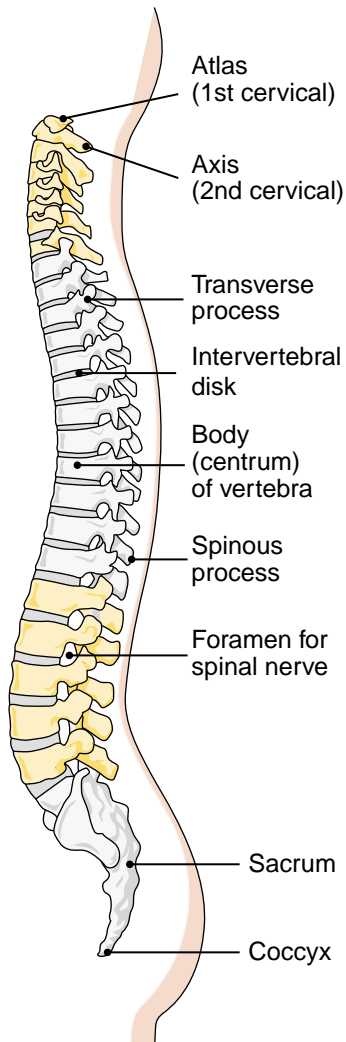
## Word Derivations

As mentioned, most medical word parts come from Greek (G) and Latin (L). The original words and their meanings are included in this text only occasionally. They are interesting, however, and may aid in learning. For example, *muscle* comes from a Latin word that means “mouse” because the movement of a muscle under the skin was thought to resemble the scampering of a mouse.

The coccyx, the tail end of the spine, is named for the cuckoo because it was thought to resemble the cuckoo’s bill (Fig. 1-3). For those interested in the derivations of medical words, a good medical dictionary will provide this information. Several such books are listed in the bibliography at the end of this text.

## Pronunciation

Phonetic pronunciations are provided in the text at every opportunity, even in the answer keys. Take advantage of these aids. Repeat the word aloud as you learn to recognize it in print. Be aware that word parts may change in pronunciation when they are combined in different ways. The following pronunciation guidelines apply throughout the text.



**FIGURE 1-3.** The coccyx of the spine looks like the bill of a cuckoo. (Reprinted with permission from Cohen BJ, Wood DL. Memmler's The Human Body in Health and Disease. 9th Ed. Philadelphia: Lippincott Williams & Wilkins, 2000.)

A vowel (a, e, i, o, u) gets a short pronunciation if it has no pronunciation mark over it, such as:

- a as in hat
- e as in met
- i as in bin
- o as in some
- u as in run

A short line over the vowel gives it a long pronunciation:

- $\bar{a}$  as in say
- $\bar{e}$  as in tea
- $\bar{i}$  as in lie
- $\bar{o}$  as in hose
- $\bar{u}$  as in sue

The accented syllable in each word is shown with capital letters.

Note that pronunciations may vary from place to place. Only one pronunciation for each word is given here, but be prepared for differences.

### BOX 1-1 Pronunciations

When pronunciations are included in a text, it is sometimes difficult to know which pronunciation of a term to use. Pronunciations may vary from country to country, even in different regions of the same country. Think how easy it is to distinguish a southern accent and one from the midwest or northeastern United States. The general rule is to include the most common pronunciation.

The word gynecology is usually pronounced with a hard *g* in the United States, but in many areas a soft *g* is used, as in *jin-e-KOL-ō-jē*. Words pertaining to the cerebrum (largest part of the brain) may have an accent on different

syllables. The adjective is usually pronounced with the accent on the second syllable (*se-RE-bral*), but in cerebrum (*SER-e-brum*) and cerebrospinal (*ser-e-brō-SPI-nal*), the accented syllable differs.

The name for the first part of the small intestine (duodenum) is often pronounced *dū-ō-DE-num*, although the pronunciation *dū-O-de-num* is also acceptable. When extreme, some alternate pronunciations can sound like a foreign language. The word we pronounce as *SKEL-e-tal* is pronounced in some other English-speaking countries as *ske-LE-tal*.

### Soft and Hard *c* and *g*

A soft *c*, as in *racer*, will be written as *s* (*RĀ-ser*). A hard *c*, as in *candy*, will be written as *k* (*KAN-dē*). A soft *g*, as in *page*, will be written as *j* (*pāj*). A hard *g*, as in *grow*, will be written as *g* (*grō*).

### Silent Letters and Unusual Pronunciations

A silent letter or unusual pronunciation can be a problem, especially if it appears at the start of a word that you are trying to look up in the dictionary. See Table 1-1 for some examples.

The combinations in Table 1-1 may be pronounced differently when they appear within a word, as in *apnea* (*AP-nē-a*), meaning cessation of breathing; *nephroptosis* (*nef-rop-TŌ-sis*), meaning dropping of the kidney; *prognosis* (*prog-NŌ-sis*), meaning prediction of the outcome of disease.

## Symbols

Symbols are commonly used in case histories as a form of shorthand. Some examples are  $\textcircled{L}$  and  $\textcircled{R}$  for left and right;  $\uparrow$  and  $\downarrow$  for increase and decrease. A list of common symbols appears in Chapter 7 and in Appendix 1.

## Abbreviations

Like symbols, abbreviations can save time, but they can also cause confusion if they are not universally understood. Usage varies in different institutions, and the same abbreviation may have different meanings in different fields. An **acronym** is an abbreviation formed from the first letter of each word in a phrase. Some

**TABLE 1-1 Silent Letters and Unusual Pronunciations**

LETTER(S)	PRONUNCIATION	EXAMPLE	DEFINITION OF EXAMPLE
ch	k	chemical <i>KEM-i-kl</i>	pertaining to chemistry
dys	dis	dystrophy <i>DIS-trō-fē</i>	poor nourishment of tissue
eu	u	euphoria <i>Ū-FOR-ē-a</i>	exaggerated feeling of well-being
gn	n	gnathic <i>NATH-ik</i>	pertaining to the jaw
ph	f	pharmacy <i>FAR-ma-sē</i>	a drug dispensary
pn	n	pneumonia <i>nŪ-MŌ-nē-a</i>	inflammation of the lungs
ps	s	pseudo- <i>SŪ-dō</i>	false
pt	t	ptosis <i>TŌ-sis</i>	dropping
rh	r	rheumatic <i>rŪ-MAT-ik</i>	pertaining to rheumatism, a disorder of muscles and joints
x	z	xiphoid <i>ZIF-oyd</i>	pertaining to cartilage attached to the sternum

everyday acronyms are ASAP (as soon as possible) and ATM (automated teller machine). In computerese, RAM stands for “random access memory.” Acronyms have become popular for saving time and space in naming objects, organizations, and procedures. Only the most commonly used abbreviations are given. These are listed at the end of each chapter, but a complete alphabetical list appears in Appendix 2. An abbreviation dictionary also is helpful.

## Words Ending In x

When a word ending in *x* has a suffix added, the *x* is changed to a *g* or a *c*. For example, *pharynx* (throat) becomes *pharyngeal* (*fa-RIN-jē-al*), to mean “pertaining to the throat”; *coccyx* (terminal portion of the vertebral column) becomes *coccygeal* (*kok-SIJ-ē-al*), to mean “pertaining to the coccyx”; *thorax* (chest) becomes *thoracotomy* (*thor-a-KOT-ō-mē*) to mean “an incision into the chest.”

## Suffixes Beginning With *rh*

When a suffix beginning with *rh* is added to a root, the *r* is doubled:

hem/o (blood) + -rhage (bursting forth) = hemorrhage (a bursting forth of blood)

men/o (menses) + -rhea (flow, discharge) = menorrhage (menstrual flow)