

Understanding
**MEDICAL
TERMINOLOGY**

Tenth Edition



Sr. Agnes Clare Frenay, FSM, RN, MS (deceased)
Sr. Rose Maureen Mahoney, FSM, RRA, MA

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The tenth edition of *Understanding Medical Terminology* offers a structured approach to learning medical terms and an ongoing reference work for both professionals and adjunct personnel in all health care fields. Few specialized vocabularies in our culture are as important as medical terminology, given the life-and-death implications inherent in the enormously complex world of modern medicine and health care.

In addition to the traditional fields of medical practice and nursing, specialties and subspecialties are constantly proliferating within the health care field. Health care is one of the fastest growing “umbrella areas” in higher education and includes programs in physical and occupational therapy, paramedical action and support specialties, health information management, and medical-technical assistance in a growing number of areas.

As programs have developed to meet this growing network of interests and needs, the need for a shared working vocabulary becomes a more urgent priority and is reflected in the number of people taking medical terminology courses.

The best comprehensive texts for courses in medical terminology, and for ongoing reference for those active in medicine, nursing, and allied health fields, differ primarily in quality and approach. *Understanding Medical Terminology* is set apart by its experience, rigorous research, breadth and depth of coverage, pedagogic approach, ease of use for both beginning and advanced student, and usefulness as a reference for the practicing health care professional. The two key words here are experience and research. The first edition of *Understanding Medical Terminology* was a pioneering text in this field in 1958. In the succeeding years, it has been expanded and revised continually to reflect the constantly changing and expanding vocabulary of the health care professions. This combination of experience over the past decades and constant research and revision has resulted in a text of unique quality and practicality.

CHAPTER ORGANIZATION—GENERAL

The text is divided into three parts. Part I (chapters 1–16) provides background and context. Clinical laboratory tests and values are listed where appropriate. Part II (chapters 17–20) concentrates on specialty areas. Part III contains answers to multiple-choice questions found in the chapter review guides, the references and bibliography, the credits, and the index.

CHAPTER ORGANIZATION—DETAILS

PART I

The first chapter, which covers background and context, introduces the student to the basic concepts that underlie medical terminology. It includes examples of base or root elements, prefixes, suffixes, compounding elements and combining-form elements, all of which are useful when analyzing terms. It is important to emphasize that not all medical terms can be broken down exactly or even consistently in this manner and that there are many exceptions to the general rules of word formation. The student is introduced to basic terms and systems of measurement used in the clinical laboratory. A medical terminology text is a guide to usage, and as such it must be combined with experience to achieve the ultimate goal of understanding.

Chapters 2 through 16 cover disorders of the major body systems. Within chapters 2–15, medical terms are divided into several pedagogical categories:

Origin of terms offers the student an orientation to key word elements that pertain to the body system or disorder.

Phonetic pronunciation of selected terms lists specific medical terms, divided into phonetic syllables with inflections indicated. For example, the phonetic pronunciation of the term *pyoderma* would be PIE-o-DER'mah. The syllables in capital letters receive more emphasis than those in small letters; and when capital letters are followed by an apostrophe ('), that syllable receives greater emphasis than syllables in capital letters alone.

Anatomic terms designate body system structure.

Diagnostic terms deal with specific clinical disorders.

General terms relate closely, although are not identical to, the body system or disorder.

Where appropriate, general terms appear instead of anatomic terms (e.g., see chapter 3, "Psychiatric Disorders," p. 41), or in addition to the anatomic terms (e.g., see Chapter 12, "Obstetrical, Fetal, and Neonatal Conditions," p. 299).

Operative terms relate to methods of surgical intervention employed to relieve or cure the impact of the clinical disorder, trauma, or other conditions on the system.

Symptomatic terms describe the presence of subjective evidence or symptoms experienced by the patient that characterize system disorders or conditions. In this text, we also extend the meaning of *symptomatic terms* to include any evidence of disturbed physiology perceived by either the patient or physician.

Abbreviations are shortened forms of words or phrases used to represent the full form.

Abbreviations are distributed throughout each chapter.

Verbalized terms can be found in boldface type in the oral reading practices at the end of each chapter. Pronunciation of medical terms may vary drastically, and some of the most widely accepted pronunciations have little validity linguistically. In addition to the sections on phonetic pronunciation of selected medical terms, this text offers oral reading practices, which are brief discussions of medical topics. The readings provide students with opportunities to pronounce terms within a particular scientific-medical context and to help them overcome inhibitions that limit the effective use of medical terminology.

Surgery-related terms are detailed in tabular listings (see specific chapter tables regarding conditions amenable to surgery). Each table lists anatomic sites involved, specific diagnoses, type of surgery performed, and a description of the operative procedures employed.

Clinical laboratory studies represent common clinical laboratory tests and values listed where appropriate throughout the core chapters (chapters 1–16).

Special-procedure terms relate to the type of method or mechanism employed for further investigation or utilized to cure or relieve impending disorders or conditions.

The final chapter in Part I (chapter 16, "Multisystem Disorders"), introduces the student to a threefold topical classification of infectious diseases, immunologic diseases, and diseases of connective tissue. Each of these topics has its own expository subcategories; the first of these always concerns the origin of terms. In outline form, the triad of disorder types, with subcategories, would read as follows:

Infectious Diseases

Origin of Terms

Phonetic Pronunciation of Selected Terms

General Terms

Infections Caused by Various Agents

Immunologic Diseases

Origin of Terms
 Phonetic Pronunciation of Selected Terms
 General Terms
 Diagnostic Terms

Diseases of Connective Tissue

Origin of Terms
 Phonetic Pronunciation of Selected Terms
 Anatomic Terms
 Diagnostic Terms

This chapter also contains abbreviations and an Oral Reading Practice passage.

PART II

Chapters 17 through 20 deal with medical terminology in several specialty areas, including oncology, imaging technology, nuclear medicine, and physical therapy. This systematic approach, which begins with fundamental terms relating to the disorders of the major body systems and then moves to specialty area terms, acknowledges the widely accepted logic of moving from general medical practice to specialization.

PEDAGOGY

Special pedagogical aids and strategies have been incorporated into the text.

Review guides at the end of each chapter offer the students the opportunity to review learned terms, as well as to practice newly acquired spelling skills.

Illustrations organize terminology primarily with regard to anatomic structures and significant procedures. These elements assist the student with overall integration of material, and general comprehension of the subject matter.

Phonetic assistance (discussed previously) enables the student to cope with the challenge of pronunciation.

In addition, external learning aids are available.

Transparencies for use in the classroom link anatomical illustrations with lectures and text material.

Instructor's Manual with Test Item File provides the instructor with systematic testing materials.

The Life Science Living Lexicon CD-ROM by William Marchuk contains a complete lexicon of life science terminology. Conveniently assembled on an easy-to-use CD-ROM are components such as a glossary of common biological roots, prefixes, and suffixes (Word Parts); a categorized glossary of common biological terms; and a section describing the classification system.

SYLLABUS STRUCTURE

Ideally, the course in medical terminology should be taught in forty-eight- to fifty-minute hours (three semester credits) to ensure adequate coverage of the subject. This schedule also gives the learner the opportunity to digest and assimilate the material. The more common practice, however, is to cover this material in thirty-two- to fifty-minute hours (two semester credits). This arrangement necessitates selective elimination of several key areas or chapters. Whatever the time constraints, it is recommended that chapters 1 through 16 be considered "core curriculum." The instructor can select material from the specialty chapters on the basis of student needs and amount of time available.

The thorough student will make a point of reading all the material and would be well advised to keep the text at hand as a ready reference.

ACKNOWLEDGMENTS

A special note of appreciation is extended to the late Sr. Agnes Clare Frenay, FSM, RN, MS, who was a pioneer in the field of medical terminology. She single-handedly prepared the first six editions of this text in a monumental labor of love. The present author was blessed with Sr. Frenay's friendship and guidance during collaboration on the seventh edition. The eighth through tenth editions continue and complement the work of Sr. Agnes Clare. Although content has changed, I am indebted to her, for her contributions to the text structure and for her leadership in the field of health care education.

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16. Multisystem Disorders

1

Orientation to Medical Terminology

OBJECTIVES AND VALUES

Medical terminology is the professional language of those who are directly or indirectly engaged in the art of healing. Its strangeness may seem bewildering at first to students, and its complexity may tax their powers of concentration. These difficulties gradually disappear as students assimilate a working knowledge of the elements of medical terms, which, in turn, enables them to analyze words etymologically and according to their meaning. Memorization may be somewhat annoying to the beginner, but memory work is only a stepping-stone to a keener understanding of the professional language. It is obvious that the intellect is constantly engaged in the study of medical terms in various types of mental processes: analysis, interpretation, and, to a moderate degree, transfer of knowledge by uniting word roots synthetically with prefixes, suffixes, combining-form elements, and compound words.

The primary goal of introducing students to medical terminology is to help them develop the ability to read and understand the language of medicine. Efforts are directed at promoting knowledge of the elements of medical terms, understanding standard abbreviations, being able to spell medical terms, and appreciating the logical method found in analyzing medical terms.

BASIC CONCEPTS

The majority of medical terms claim Greek and Latin ancestry. Some have been adopted from modern languages, especially German and French. The study of medical terminology can enrich one's understanding of history, language, and medicine. As time goes on, additional scientific advances will herald new terms and evoke usage of previously coined terms.

The pronunciation of medical terms follows no rigid rules; flexibility is one of its outstanding characteristics. Students will sometimes be faced with common usage of an unfamiliar pronunciation. This is a result of the different traditions of these languages. For instance, the German tradition of instruction uses a pronunciation of Latin words that would have been unfamiliar to ancient Romans or even their modern Italian counterparts. Nevertheless, the powerful influence of

German scholarship in medicine helped to entrench these linguistically bizarre pronunciations of Latin and Greek terms; their ancient meaning, grammatical usage, and modern application all contribute to the medical terminology of today.

Many medical terms are combinations of components from these ancient languages. As the student's vocabulary grows, he or she begins to notice patterns that employ some of these components. Over time, increased knowledge of the more common components will enable him or her to recognize more quickly or recall more easily the modern meaning of the term. Sometimes this process of recognition is called *word building*, which is a well-meaning but misleading term. Actually, students must take apart rather than build words to discover, remember, and use their meaning. Breaking words apart to arrive at their inner meaning helps students develop a knowledge of word form and usage that eventually will enable them to read modern medical terminology intelligently. Students should not expect to develop this analytic perception overnight—it comes only after extensive vocabulary study. One day students may use these building blocks to fashion new words for the medical vocabulary.

In this tenth edition, the text seeks to develop an analytic attitude in the student. Becoming aware of the structural design of words and developing the habit of analyzing terms leads to a better understanding of definitions throughout the book. To help students learn to speak the language of medicine, Oral Reading Practice passages, brief discussions of medical topics, have been included. As students study the various categories of disorders, they will note the recurrence of certain prefixes, suffixes, roots, combining-form elements, and compound words. A review of key terms is found in the Origin of Terms section at the beginning of each chapter. It is through learning terms and speaking them that students begin to understand their definitions.

Located at the end of each chapter is a revised and enlarged *review guide*, which reinforces concepts and terms learned and provides students with the opportunity to practice newly acquired spelling skills. The answers to the multiple-choice questions are found in part 3 (see p. 508).

The updated chapter references and bibliography also are found in part 3 (see pp. 509–544). Reference numbers are noted in parentheses throughout the text.

In analyzing terms, students need to understand the key concepts that will enable them to break terms into their component elements (e.g., identifying roots, prefixes, suffixes, combining-form elements, and compound words). The following list presents these key concepts:

1. Root or base word element—refers to the main body of the word. It may be accompanied by a prefix or suffix.
Example: adenoma
 aden- (base or root) = gland
 -oma (suffix) = tumor
 adenoma = gland tumor
2. Prefix—refers to one or two syllables or word parts placed before a word to modify or alter its meaning.
Example: hemigastrectomy
 hemi- (prefix) = half
 gastr- (base or root) = stomach
 -ectomy (suffix) = removal or excision of
 hemigastrectomy = removal of half the stomach
3. Suffix—one or two syllables or word parts attached to the end of a word to modify or alter its meaning.

Example: hysterectomy

hyster- (base or root) = uterus
 -ectomy (suffix) = removal or excision of
 hysterectomy = removal of uterus

- a. Suffix meaning *pertaining to*—selected suffixes meaning *pertaining to* include *-ac*, *-ic*, *-al*, *-eal*, *-ary*, and *-ous*

Example: hemic

hem- (base or root) = blood
 -ic (suffix) = pertaining to
 hemic = pertaining to blood

- b. Suffix meaning *one who*—selected suffixes meaning *one who* include *-er* and *-ist*.

Example: pathologist

path- (root or base) = disease or morbid condition
 o (combining-form element, vowel)
 -logy (suffix) = science or study of
 -ist (suffix) = one who
 pathologist = one who studies disease or morbid conditions

4. Combining-form element—results when a vowel, usually *a*, *i*, *e*, or *o*, is added to a word root or base. The vowels used most commonly as combining-form elements are *a*, *i*, or *o*. The vowel is usually deleted from a combining form when the next letter that follows is also a vowel.

Example: proctitis

procto- (combining form) = denoting relationship to the rectum
 -itis (suffix) = inflammation of
 proctitis = correct combination
 proctoitis = incorrect combination (o should be dropped)
 proctitis = inflammation of the rectum

5. Compound words—result when two or more root or base-word elements are used to form a word. Usually adjectives or nouns are added to a root word to form compound words. Compound words may include a combining form, a root or base-word element, and a suffix or word ending.

Example: myocardial pathology

myo- (combining-form element) = relationship to muscle
 cardio- (combining-form element) = relationship to heart
 -pathy (suffix) = disease or morbid condition
 myocardial pathology = disease of the heart muscle

Caution and flexibility are required in breaking down terms.

Example: anemia

-emia (suffix) = blood
 an- (prefix) = without, not
 anemia = without blood

In the strict sense, the term “anemia” might seem to mean no blood (absence or total lack of blood) rather than the attenuated quality of blood. This example shows that an exact correspondence does not usually exist between the meaning of a modern term and the ancient language roots from which the term derives.

When breaking down terms, it is more helpful to start the process by beginning with the suffix, then proceed to the root or root and prefix. This strategy provides a clue as to how the root is being used. There are numerous prefixes, suffixes, roots, and combining-form elements. In tables 1.1 and 1.2, some of the most commonly used and basic elements appear.

TABLE 1.1 Suffixes, Roots, and Prefixes**Diagnostic Suffixes**

Suffix	Term	Analysis	Definition
-cele (G) hernia, tumor, protrusion	cystocele gastrocele hydrocele myelocele	kystis: bladder kele: hernia gaster: stomach; -; hydor: water, fluid kele: tumor myelos: marrow kele: protrusion	Hernia of the bladder Hernia of the stomach Collection of fluid in the tunica vaginalis of the testicle Protrusion of spinal cord through the vertebrae
-ectasis (G) dilatation, expansion	angiectasis bronchiectasis	angeion: vessel ektasis: dilatation bronchos: bronchus; -;	Abnormal dilatation of a blood vessel Abnormal dilatation of a bronchus or bronchi
-emia (G) blood	hyperglycemia hyperglycosemia polycythemia	hyper: excessive glykys: sweet, sugar haima: blood polys: many, excessive kytos: cell; -;	Abnormally high blood sugar Abnormal increase of red blood cells and hemoglobin in the blood
-iasis (G) condition, formation of, presence of	lithiasis cholelithiasis nephrolithiasis	lithos: stone, calculi iasis: presence of chole: bile, gall; -; -; nephros: kidney; -; -;	Presence of stones Presence of calculi in the gallbladder Stones present in the kidney
-itis (G) inflammation	carditis iritis poliomyelitis	kardia: heart itis: inflammation iris: rainbow, iris; -; polios: gray myelos: marrow; -;	Inflammation of the heart Inflammation of the iris Inflammation of the gray matter of the spinal cord
-malacia (G) softening	encephalomalacia osteomalacia splenomalacia	enkephalos: brain malakia: softening osteon: bone; -; splen: spleen; -;	Softening of the brain Softening of the bones Softening of the spleen
-megaly (G) enlargement, big	hepatomegaly splenomegaly	megas: big, enlargement hepat: liver splen: spleen; -;	Enlargement of liver Enlargement of spleen
-oma (G) neoplasm, tumor	adenoma carcinoma sarcoma	aden: gland oma: tumor karkinos: cancer sark: flesh; -;	Glandular tumor Malignant tumor of epithelial tissue Malignant tumor of connective tissue

NOTE: Throughout table 1.1 (G) means that the suffix, root, or prefix is a Greek derivative, (L) a Latin. A dash and semicolon in the analysis column represent the suffix, root, or prefix that has already been given. In the analysis, Greek and Latin words are used to show the derivation, but the student needs only to learn the English version.

TABLE 1.1 (continued)

Suffix	Term	Analysis	Definition
-pathy (G) disease	adenopathy	<i>aden</i> : gland	Any glandular disease
	myelopathy	<i>pathos</i> : disease <i>myelos</i> : marrow; -;	Any pathologic disorder of the spinal cord
	myopathy	<i>mys</i> : muscle; -;	Any disease of a muscle
-ptosis (G) falling, downward displacement	blepharoptosis	<i>blepharon</i> : eyelid	Drooping of the eyelid
	gastroptosis	<i>ptosis</i> : a falling <i>gaster</i> : stomach; -;	Downward displacement of the stomach
	nephroptosis	<i>nephros</i> : kidney; -;	Downward displacement of kidney
-rhexis (G) rupture	angiorrhesis ¹	<i>angeion</i> : vessel	Rupture of a vessel (blood or lymphatic)
	cardiorrhesis ¹	<i>rhexis</i> : rupture <i>kardia</i> : heart; -;	Rupture of the heart
	hysterorrhesis ¹	<i>hysteria</i> : uterus; -;	Rupture of the uterus

Operative Suffixes

Suffix	Term	Analysis	Definition
-centesis (G) puncture	paracentesis	<i>para</i> : beside	Puncture of a cavity
	abdominal paracentesis	<i>kentesis</i> : a puncture <i>abdomen</i> : belly; -;	Puncture of abdominal cavity for aspiration of peritoneal fluid
-desis (G) binding, fixation	arthrodesis	<i>arthron</i> : joint	Surgical fixation of a joint
	tenodesis	<i>desis</i> : fixation <i>tenon</i> : tendon; -;	Fixation of a tendon to a bone
-ectomy (G) excision, removal	myomectomy	<i>mys</i> : muscle	Excision of a tumor of the muscle
	oophorectomy	<i>oma</i> : tumor	Removal of an ovary
	tonsillectomy	<i>ektome</i> : excision <i>oophor</i> : ovary; -; <i>tonsilla</i> : tonsil; -;	Removal of tonsils
-lithotomy (G) incision for removal of stone(s)	cholelithotomy	<i>chole</i> : bile, gall; -;	Incision into gallbladder for removal of gallstones
	nephrolithotomy	<i>nephros</i> : kidney; -;	Incision into kidney for removal of stones
	sialolithotomy	<i>sialon</i> : saliva; -;	Incision into salivary gland for removal of stones
-pexy (G) fixation, suspension	hysteropexy	<i>hystera</i> : uterus	Abdominal fixation or suspension of uterus
	mastopexy	<i>pexis</i> : fixation <i>mastos</i> : breast; -;	Fixation of a pendulous breast
	orchiopexy	<i>orchis</i> : testis; -;	Fixation of an undescended testis

¹The "rr rule": Use a double r (rr) with rh when preceded by a vowel.

TABLE 1.1 (continued)

Suffix	Term	Analysis	Definition
-plasty (G) surgical correction, plasty repair of	arthroplasty hernioplasty proctoplasty	<i>arthron</i> : joint <i>plassein</i> : to form <i>hernios</i> : a young shoot; -; <i>proktos</i> : anus, rectum; -;	Reconstruction operation on joint Plastic repair of hernia Surgical repair of rectum
-rhaphe (G) suture	perineorrhaphy ¹ staphylorrhaphy ¹	<i>perinaion</i> : perineum <i>rhaphe</i> : suture <i>staphyle</i> : uvula; -;	Suture of a lacerated perineum Suture of a cleft palate
-scopy (G) inspection, examination	bronchoscopy cystoscopy	<i>bronchos</i> : windpipe <i>skopein</i> : to examine <i>kystis</i> : bladder; -;	Examination of the bronchi with an endoscope Inspection of the bladder with a cystoscope
-stomy (G) creation of an artificial opening	colostomy cystostomy	<i>kolon</i> : colon <i>stoma</i> : opening <i>kystis</i> : bladder; -;	Creation of an opening into the colon through the abdominal wall Creation of an opening into the urinary bladder through the abdomen
-tomy (G) incision into	antrotomy neurotomy	<i>antron</i> : antrum <i>tome</i> : incision <i>neuron</i> : nerve; -;	Incision into an antrum to establish drainage Dissection of a nerve
-tripsy (G) crushing, friction	cholelithotripsy lithotripsy phrenicotripsy	<i>chole</i> : bile, gall <i>lithos</i> : stone <i>tripsis</i> : crushing <i>phren</i> : diaphragm; -;	Crushing of gallstones Crushing of a stone Crushing of the phrenic nerve

Symptomatic Suffixes

Suffix	Term	Analysis	Definition
-algia (G) pain	gastralgia nephralgia neuralgia	<i>gaster</i> : stomach <i>algos</i> : pain <i>nephros</i> : kidney; -; <i>neuron</i> : nerve; -;	Epigastric pain Renal pain Nerve pain
-genic (G) origin	bronchogenic neurogenic osteogenic pathogenic	<i>bronchos</i> : windpipe <i>gennan</i> : to originate <i>neuron</i> : nerve; -; <i>osteon</i> : bone; -; <i>pathos</i> : disease; -;	Originating in the bronchi Originating in the nerves Originating in the bones Disease producing
-lysis (G) dissolution, breaking down	hemolysis myolysis neurolysis	<i>haima</i> : blood <i>lysis</i> : breaking down <i>mys</i> : muscle; -; <i>neuron</i> : nerve; -;	Breaking down of red blood cells Destruction of muscular tissue Disintegration of nerve tissue

¹The "rr rule": Use a double r (rr) with rh when preceded by a vowel.

TABLE 1.1 (continued)

Suffix	Term	Analysis	Definition
-oid (G) like	fibroid lipoid lymphoid	<i>fibra</i> : fiber <i>eidos</i> : resembling <i>lipos</i> : fat; -; <i>lymph</i> : lymph; -;	Tumor of fibrous tissue, resembling fibers Fatlike Resembling lymph
-osis (G) increase, excess, disease or condition	anisocytosis lymphocytosis	<i>anisos</i> : unequal <i>kytos</i> : cell <i>osis</i> : condition <i>lymph</i> : lymph; -;	Inequality of size of cells Excess of lymph cells
-penia (G) deficiency, decrease	leukopenia neutropenia	<i>leukos</i> : white <i>penia</i> : decrease <i>neuter</i> : neutral; -;	Abnormal decrease of leukocytes in the blood Abnormal decrease of neutrophils in the blood
-spasm (G) involuntary contractions	chirospasm dactylospasm	<i>cheir</i> : hand <i>spasmos</i> : spasm or contraction of muscles <i>dactylos</i> : digit (finger or toe)	Spasm or contraction of the hand (writer's cramp) Spasm or cramp in fingers or toes
-stasis (G) arrest, halt, standing still	hemostasis	<i>haima</i> : blood <i>stasis</i> : halt	Arrest or halting of bleeding

Roots

Root	Term	Analysis	Definition
aden- (G) gland	adenectomy adenoma adenocarcinoma	<i>aden</i> : gland <i>ektome</i> : excision -; <i>oma</i> : tumor -; <i>karkinos</i> : cancer	Excision of a gland Glandular tumor Malignant tumor of glandular epithelium
aer- (G) air	aerated aerobic aeroneurosis	<i>aer</i> : air -; <i>bios</i> : life -; <i>neuron</i> : nerve <i>osis</i> : condition, disease, process	Filled with air Pertaining to an organism that lives only in the presence of air Functional nervous disorder affecting airplane pilots
arthr- (G) joint	arthralgia arthritis	<i>arthron</i> : joint <i>algos</i> : pain -; <i>itis</i> : inflammation	Pain in the joints Inflammation of joints
blephar- (G) eyelid	blepharoptosis blepharoplasty	<i>blepharon</i> : eyelid <i>ptosis</i> : a falling -; <i>plassein</i> : to form	Drooping of the upper eyelid Plastic operation on the eyelid