

Edition

28

Dorland's *Illustrated* Medical Dictionary

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Dorland's
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Preface

During what is now nearly a century of existence, *Dorland's Illustrated Medical Dictionary* has been the outstanding authoritative guide to the language and usage of medicine and related health care fields. The explosive growth of knowledge and the attendant need for a rapidly evolving vocabulary, the increasing speed at which this knowledge can be disseminated, and the progressively complex set of concepts and relationships that arise from the ever-expanding knowledge base demand an agreed-upon body of terminology for the fruitful interchange of ideas. Throughout its history, *Dorland's Illustrated Medical Dictionary* has served the needs of students, practitioners, and researchers as an up-to-date source of the vocabulary of medicine. This 28th edition has been carefully and thoroughly revised with one purpose in mind: to continue to fulfill the role that its predecessors have so admirably played throughout the twentieth century.

As always, the vocabulary has been reviewed, with obsolete terms being discarded, new terms being added, and the remainder being thoroughly revised. These changes have been made across the entire spectrum of specialties and have affected tens of thousands of entries throughout the entire book. As a part of this process, the list of consultants has been greatly expanded from previous editions and encompasses authorities representing a wide range of specialties.

In addition to the revision of entries, we have undertaken a number of changes designed to make the Dictionary more accessible (or in current jargon, "user-friendly"). The most readily apparent of these is in the format of the subentries. The long paragraphs of subentries have been broken up so that each subentry begins on its own line, eliminating the need to search through strings of run-in entries. This has been accompanied by a change in typeface, both for the boldface entry words and for the text of the entries, in order to increase the readability of the Dictionary.

Another obvious change is in the presentation of the main entries. A system of syllable breaks, indicated by bullets inserted at places acceptable for word division, has been added. The method used for indicating pronunciation has been revised (although still kept simple), and inconsistencies that have crept in over the years have been resolved. The addition of a single character, the schwa, familiar to most people from the time when they first learned to use a dictionary, has enabled us to reflect more accurately the pronunciation of unstressed syllables.

Nearly all of the text illustrations have been redrawn for this edition in order to give them a cleaner, more modern, more consistent appearance. The number of illustrations has also been greatly increased. Two new plates have been added and several others have been revised to reflect current knowledge and to increase their usefulness. The appendix has been expanded by the addition of two new appendices. One is a list of abbreviations for the user who needs to find a common abbreviation and doesn't feel like searching through the vocabulary. The other is a set of anatomical tables that present some of the larger categories of anatomical terminology (arteries, bones, muscles, nerves, and veins) in a format different from that of the anatomical tables in the vocabulary; the familiar tables in the vocabulary, with the terms listed in their normal alphabetical places, have, of course, been retained.

This edition of the Dictionary is the result of a tremendous amount of work and incorporates not only a thorough-going revision of the vocabulary but also a major transformation in the way that the information is presented. During the entire process, we have been guided by the same time-honored principles that have been followed by previous generations of editors. Our aim has been to reflect current usage while showing preference for etymologically sound and unambiguous terms, in the belief that a vocabulary consisting of such terms is the best vehicle for clear and productive communication. It has not been our purpose to set ourselves up as arbiters of style and to prescribe in such things as the use of hyphens in compound words or the use of the possessive form of eponyms. These are stylistic matters best left to the individual. Rather it has been our purpose to provide you, the user, with an authoritative and current guide to the vocabulary of medicine; we hope that you will agree that this Dictionary realizes that purpose.

Acknowledgments

This dictionary is the fruit of the labors of many individuals. We are mightily indebted to our consultants for their work in reviewing the vocabulary and for their invaluable expert guidance in the selection of new terms, the deletion of obsolete terms, and the revision of existing entries. We are especially grateful to William Z. Borer, MD, who has graciously permitted us to include the "Reference Values for the Interpretation of Laboratory Tests" in the Appendix. We are also profoundly grateful to the users of the Dictionary who have made innumerable suggestions for its improvement; although the individuals are far too many to mention, we would like particularly to thank Adam G.N. Moore, MD, FAAFP, for the many suggestions he has made during a correspondence that has continued during almost the entire life of the 27th edition.

As in previous editions, we have defined anatomical terms on the NA terms, that is, on the terms as they appear in the *Nomina Anatomica* as approved by the Twelfth International Conference of Anatomists at London, 1985.

In enzyme nomenclature, we have relied heavily on the Recommendations of the Nomenclature Committee of the International Union of Biochemistry and Molecular Biology on the Nomenclature and Classification of Enzymes.

In bacteriology, we have used as a guide *Bergey's Manual of Systemic Bacteriology*, Vols. 1–4 (1989).

For psychiatric terms, we have been guided in many instances by *Diagnostic and Statistical Manual of Mental Disorders*, 3rd Edition-Revised (DSM-III-R) (1987), published by the American Psychiatric Association.

In pharmacology, as noted on the copyright page, we have made use of portions of the text of the *United States Pharmacopeia*, the *National Formulary*, and *USAN and the USP Dictionary of Drug Names*, all publications of the United States Pharmacopeial Convention, Inc.

In acknowledging our indebtedness to the compilers, editors, and publishers of the aforementioned publications, we emphasize that any inaccuracies that may have arisen from our transcription or interpretation of this material are our sole responsibility.

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Notes on the Use of This Dictionary

Main Entries and Subentries

Main entries appear in boldface type, with bullets indicating syllabication. Terms consisting of two or more words are ordinarily given as subentries under the noun, as is traditional in medical dictionaries; subentries are also set in boldface type, and each is set on a new line and followed by a comma. Although this arrangement may be confusing at first to those accustomed to general dictionaries, it has the advantage of allowing related terms to be grouped together (for example, all of the *lymphocyte* entries appear under the main entry *lymphocyte*).

According to this scheme, *Howell-Jolly bodies*, *ketone bodies*, and *pineal body* are all to be found under the main entry *body*, and *carotid pulse*, *dicrotic pulse*, and *paradoxical pulse* are to be found under the main entry *pulse*. It is important for the user to bear in mind that it is impossible to provide entries for every variation of every term, so that a phrase that is not found under one main entry should be sought under a synonymous main entry. For example, the same entity may be described as a disease or a syndrome (as *Fabry's disease*—*Fabry's syndrome*, which is to be found under *disease*) or as a sign or phenomenon (as *Gowers' sign*—*Gowers' phenomenon*, which appears under *sign*). In such cases, the main entry should be consulted for references to synonymous terms under which the desired phrase may be found.

Example:

treat-ment . . . the management and care of a patient for the purpose of combating disease or disorder. See also under *maneuver*, *method*, *technique*, *tests*, and *therapy*.

In subentries, the main entry word is represented only by the initial letter, e.g., *cogwheel r.* under *respiration*, unless it occurs in the plural form. Regular English plurals are represented by the initial letter followed by 's, as *b's* for *bones* under *bone*. Irregular plurals, such as *teeth* under *tooth*, and Latin plurals, as *foramina* under *foramen*, are spelled out in full.

Chemical Compounds

Exceptions to the use of subentries are made for specific acids and for enzymes and enzyme deficiencies. Names of specific acids will be found as main entries under the first word of the name, e.g., *sulfuric acid* under *S*, as will enzyme names, e.g., *alkaline phosphatase* under *A*. Enzyme deficiencies will be found as main entries immediately following the entry for the enzyme in question, e.g., *carbamoyl-phosphate synthetase deficiency* after *carbamoyl-phosphate synthetase*.

Chemical compounds embodying the name of an element will be found as subentries under the element; for example, *aluminum acetate*, *aluminum hydroxide*, and *aluminum sulfate* are all located under *aluminum*. Chemical compounds that begin with the adjectival form denoting valence will be found under the salt or ester (e.g., *ferric citrate* under *citrate*).

Drug Names

Drugs are to be found under the active moiety, if that is a main entry. For example, *prednisolone acetate*, *prednisolone hemisuccinate*, and *prednisolone sodium phosphate* all appear under *prednisolone*. If the active moiety is not itself a main entry, then the entire drug name appears as a main entry, e.g., *methadone hydrochloride* under *H*.

Syllabication

Acceptable word divisions are indicated for main entries by the use of bullets within the entry word; syllabication is based on pronunciation. Not all syllable breaks are given; for example, the separation of a single vowel from the beginning or end of a word is not allowed and is not shown. Likewise, single letters should not be separated from the word elements to which they

belong in compound words. In many cases a word may be broken at places other than the ones indicated; for example, different pronunciations imply different sets of breaks, so that *melanocyte* could be divided *mel·a·no·cyte* or *me·lano·cyte*, depending on which syllable, the first or second, is stressed. In any case, breaks that could confuse a reader as to the meaning of a word are to be avoided.

Sequence of Entries

Main Entries

Main entries will be found alphabetized on the sequence of letters, regardless of spaces or hyphens that may occur between them. (Special rules govern terms that begin with proper names, which are mainly eponyms; see below.) Thus the following sequences will be found:

formboard	heart
form-class	heartbeat
forme	heart block
form-family	heartburn

Subentries

Subentries, like main entries, are alphabetized letter by letter. The main entry word, whether it is represented by the initial letter, the initial plus 's, or a spelled-out plural, is ignored in alphabetizing subentries, as are prepositions, conjunctions, and articles. Inflected forms, such as genitives and plurals of Latin words, are treated as if they were nominative singular. (For what is meant by "inflected forms," see "Presentation of Plurals and Other Inflections," page xvii.) The following forms, all from *os craniale* "cranial bone," are considered equivalent for purposes of alphabetization: *os craniale*, *ossis cranialis*, *ossa cranialia*, and *ossium cranialium*.

In accordance with the above rules, the following sequences of subentries are found under *lamina* and *prolapse*:

lam-i-na	pro-lapse
l. affixa	anal p.
alar l.	p. of anus
l. alaris	p. of cord
laminae albae cerebelli	frank p.
anterior limiting l.	p. of iris

Proper Names

A number of main entries are included for terms beginning with a proper name, usually eponymic terms; these give information about the term's origin (most often a bit of biographical information) and cross references to entries where definitions may be found. These cross references can be helpful in giving an indication of where to look for an entry that may go by more than one name (such as disease or syndrome). Entries of this sort are alphabetized as entries for the proper name only, following this set of rules:

- (1) The 's, if one occurs, is never counted for alphabetization. *Addison's planes* precedes *addisonian*.
- (2) Words following the name are not counted for alphabetical order unless the names are the same.
- (3) Only the first name in a term containing more than one proper name is counted for alphabetization unless the entries are the same in all other respects. *Babinski's phenomenon*, *Babinski-Fröhlich syndrome*, *Babinski-Nageotte syndrome*, *Babinski-Vaquez syndrome* appear in that order.
- (4) Umlauts (ö, ü) are ignored for purposes of alphabetization. *Löwe's ring*, *Lowe's syndrome*, *Lowe-Terry-MacLachlan syndrome*, *Löwenberg's canal*, *Löwenthal's tract*, *Lower's rings* appear in that order.
- (5) Names beginning *Mac* or *Mc* are alphabetized as if spelled *Mac*.

Subentries that begin with a proper name also follow the above rules for sequencing.

Proper nouns (or capitalized entries) appear before common nouns (or lower case entries). Thus *Diplococcus* precedes *diplococcus*.

Chemical Terms

In the alphabetization of chemical names, italic prefixes (e.g., *o*-, *p*-, *m*-, *trans*-, *cis*-) are ignored, as are numbers, Greek letters, and the prefixes *D*-, *L*-, *d*-, *l*-, (+)-, and (-)-. When a prefix is spelled out, however, the term is to be found under the fully spelled out form, for example, *levodopa* under *L*, *orthocresol* under *O*, and *beta-oxybutyric acid* under *B*.

Indication of Pronunciation

A phonetic spelling of a term appears in parentheses after the boldface entry word. The pronunciation is given for all main entries; it is generally not given for subentries but does appear in some subentries that are foreign phrases. As a rule, the most common pronunciation is given, with no effort to list the variants, although exceptions to this do occur. The phonetic spelling is kept as simple as possible, with few diacritical marks; the only special character used is ə, the schwa, used to represent the unstressed vowel sound heard at the end of *sofa*.

There are four basic rules:

- (1) An unmarked vowel ending a syllable (an "open" syllable) is long. Thus *ma* represents the pronunciation of *may*.
- (2) An unmarked vowel in a syllable ending in a consonant (a "closed" syllable) is short. Thus *not* represents the pronunciation of *knot*.
- (3) A long vowel in a closed syllable is indicated by a macron. Thus *māt* represents the pronunciation of *mate*.
- (4) A short vowel that ends or itself constitutes a syllable is indicated by a breve. Thus *ĩ-mũn'* represents the pronunciation of *immune*.

Primary (') and secondary (") stresses are shown in polysyllabic words, with unstressed syllables followed by hyphens, as in *rep"lĩ-kā'shən*. Monosyllables, even when part of a compound term, have no stress mark, as in *bens jōnz*. Primary stresses are also given as part of the bold face subentries for foreign phrases.

It is impossible with *Dorland's* simplified phonetics to represent the native pronunciations of many foreign words and proper names. These are shown as closely as possible in English phonetics.

Pronunciation Guide

Vowels

(For the use of breves and macrons, see the four rules above.)

ə	<i>sofa</i>	ě	<i>met</i>	ö	<i>got</i>	oi	<i>boil</i>
ā	<i>mate</i>	ī	<i>bite</i>	ū	<i>fuel</i>	ōō	<i>boom</i>
ă	<i>bat</i>	ĩ	<i>bit</i>	ũ	<i>but</i>	öö	<i>book</i>
ē	<i>beam</i>	ō	<i>home</i>	aw	<i>all</i>	ou	<i>fowl</i>

Consonants

b	<i>book</i>	m	<i>mouse</i>	ch	<i>chin</i>
d	<i>dog</i>	n	<i>new</i>	ks	<i>six</i>
f	<i>fog</i>	p	<i>park</i>	kw	<i>quote</i>
g	<i>get</i>	r	<i>rat</i>	ng	<i>sing</i>
h	<i>heat</i>	s	<i>sigh</i>	sh	<i>should</i>
j	<i>jewel, gem</i>	t	<i>tin</i>	th	<i>thin, than</i>
k	<i>cart, pick</i>	w	<i>wood</i>	zh	<i>measure</i>
l	<i>look</i>	z	<i>size, phase</i>		

Presentation of Plurals and Other Inflections

In main entries for foreign (nearly always Greek or Latin) nouns, the original and anglicized plurals are given after the phonetic spelling; irregular plurals of English nouns are also given.

Example:

sto·ma (sto'mə) pl. *stomas* or *sto'mata* . . .

tooth (tooth) pl. *teeth* . . .

The original foreign plural is often given a separate boldface listing in its proper alphabetical place in the vocabulary.

Example:

sto·ma·ta (sto'mə-tə) [Gr.] plural of *stoma*.

Latin is used, especially in anatomy, to form phrases of the type "the X of Y," for example, *arcus aortae*, "the arch of the aorta." The prepositional phrase introduced by "of" corresponds to the Latin genitive case (*aortae* "of the aorta," from *aorta*). For this reason, the genitive case (= English "of") for Latin nouns is also frequently given, introduced by the abbreviation *gen*.

Examples:

pa·pil·la . . . gen. and pl. *papil'lae* . . .

os¹ . . . gen. *o'ris*, pl. *o'ra* . . .

os² . . . gen. *os'sis*, pl. *os'sa* . . .

Latin and Greek (and a number of other languages, such as German and Russian, for that matter) are said to be inflected, that is, words change form to show how they are related to other words in a sentence. An example of this is the "aortae" phrase given above, where the change in the ending of the word corresponds to the use of the English preposition "of." Other Latin inflected forms are found in subentries; these forms will be the objects in a prepositional phrase. For example, under the main entry *fissura*, there is the subentry *f. in ano*; *ano* is the object of the preposition *in* and is one of the half dozen or so different inflected forms of *anus*, which is a main entry in the Dictionary and has listed with it the genitive and plural form *ani*. As in all subentries, differences in singular and plural forms do not count for alphabetizing, nor do prepositions or conjunctions (e.g., *et* "and," *in* "in"); thus under the main entry *fissura*, the subentry *f. in ano* precedes *f. antitragohelicina*.

Etymology

Information on the origin of a word appears in brackets after the phonetic spelling or a plural form of the entry when that is given. The information is necessarily brief, and the reader must often reason from the etymon, the original word from which other words are derived, to the meaning. For example, for the main entry *dualism* the etymological section reads [L. *duo* two]. L. stands for Latin (languages are either abbreviated or spelled out; see "Abbreviations Used in This Dictionary," p. xx). The word *duo* is the etymon, and "two" is the English translation of the etymon, not of the entry. The reader proceeds from *duo* to *dual* to *dualism*. Furthermore, space limitations preclude the listing of all the stages in the passage from the etymon to the modern derivative (i.e., the entry). For example, the etymological part of the entry for *vein* is simply [L. *vena*]; in full, it would be [Middle English *veine*, from Old Fr., from L. *vena*].

For those foreign words or phrases taken into English entire, only the language is given, with a translation given within quotation marks, for example,

déjà vu [Fr. "already seen"] . . .

If the meaning of the foreign word or phrase is the same as that of the entry word, no translation is given.

There are four further additions:

- (1) As a guide to related vocabulary, especially for anatomical terms, the main entry may be followed in brackets by its Greek or Latin equivalent (or both).

Example:

kid-ney . . . [L. *ren*; Gr. *nephros*]

- (2) Many technical terms of Greek or Latin derivation are listed twice as main entries (and both times with etymology, meaning, and cross references), first as an independent word, then as a combining form, e.g., *metra* and *metra-*.
- (3) There is an essay "Fundamentals of Medical Etymology" (see p. xxi), which explains the basic rules for the derivation and composition of Greek, Latin, and Greco-Latin terms in medicine. At the end of the essay there is an analytical word list of Greek and Latin roots, prefixes, and combining forms; the list is an aid for the analysis of existing medical terms and the creation of new ones.
- (4) The prefixes (e.g., *hyper-*, *hypo-*), suffixes (e.g., *-ia*, *-oid*), and combining forms (e.g., *actino-*, *-emia*) from the analytical word list are also listed as main entries in the vocabulary.

Official Publications

Certain terms listed in official publications are identified by an abbreviation in brackets. In main entries, these abbreviations usually appear after the etymology (or after the phonetic spelling if no etymology is given). In subentries, they appear immediately after the boldface subentry word. When a term has more than one meaning, the abbreviation is placed at the beginning of the definition to which it applies. The following abbreviations are used:

[DSM-III-R]	<i>Diagnostic and Statistical Manual of Mental Disorders of the American Psychiatric Association, 3rd edition-Revised (1987)</i>
[EC]	Enzyme Commission number (e.g., citrate (<i>si</i>)-synthase . . . [EC 4.1.3.7]) from the Recommendations of the Nomenclature Committee of the International Union of Biochemistry and Molecular Biology on the Nomenclature and Classification of Enzymes published in <i>Enzyme Nomenclature</i> (1992)
[NA]	<i>Nomina Anatomica</i> , 6th edition (1989)
[NF]	<i>The National Formulary</i> , 17th edition (1990)
[USP]	<i>The United States Pharmacopeia</i> , 22nd edition (1990)

Placement of Definitions and Cross References

With few exceptions, a definition is given in only one place for two or more synonymous terms. Entries for the synonyms provide cross references to the term where the definition is to be found. Such cross references are in place of a definition and are set in roman type:

mas-to-plas-ty (mas'to-plas'te) mammaplasty.

The definition will be found at mammaplasty. In many cases, a list of synonyms is given at the end of the entry where the definition appears. This list is introduced by the phrase "called also" and the synonyms are set in italic type.

Cross references from one subentry to another subentry under the same main heading use the abbreviated form of the main entry:

syndrome

hypersomnia-bulimia s., Klein-Levin s.

Cross-referencing has also been used for earlier terms that have been supplanted and for variant spellings of a term. In such instances, the definition is attached to the term that is currently the preferred term. A word of warning is, however, warranted here. In some instances, preference for one term over another may be slight or even nonexistent, while in others, different spellings or terms may be preferred by different authorities, by different specialties, or in different regions. In such cases, the practice of defining words only at one place has been adhered to as a means of keeping down the size of the Dictionary by avoiding duplication of definitions, and the user should remember that the appearance of a cross reference or definition does not always indicate a preference for one form or synonym over another.

Related Entries

Cross references to related entries or to entries where additional information may be found are also given. They are identified by “see also,” “cf.,” and “q.v.” (or “qq. v.”). (For the abbreviations, see “Abbreviations Used in This Dictionary,” page xx). Cross references introduced by “see also” or “cf.” are set in italic type.

Official Terminology

In general, when a term is part of one of the official publications listed in the preceding section (“Official Publications”), its definition appears at the official term. Thus the definition for “pelvic bone” is found at *os coxae*; a cross reference to the official term is found at the subentry under *bone*. Exceptions have been made in a few cases where the nonofficial term is so common or important that it makes the most sense to put the definition on the unofficial term (for example, *heart* is defined, not *cor*).

Entries Containing a Proper Name

Entries containing a proper name are generally entered twice. The definition for the entity is given in a subentry under the appropriate main entry, as *Down syndrome* under *syndrome*. Biographical, geographical, or other information attached to the proper name is given in a main entry (see “Proper Names” in the section “Sequence of Entries,” p. xv). A cross reference is given from the main entry for the proper name to the subentry where the term is defined. For example:

Down syndrome (disease) (down) [John Langdon Haydon *Down*, English physician, 1828–1896] see under *syndrome*.

Form of Eponyms

The use of the possessive form ending in ‘s for eponyms is becoming progressively less common, and the entries for eponymic terms in this Dictionary reflect this ongoing change in usage. The Dictionary therefore presents an inconsistent mixture of forms. The user should be aware that although the use of the nonpossessive form is increasingly common, it is by no means universal. (The user should also be aware that some terms, such as *Apgar score*, have never had an ‘s and that for some terms, such as *Christmas disease* and *Down syndrome*, the possessive form is never used.) The variation in forms seen in the Dictionary is thus only a reflection of change and *not* a prescription for the use of possessive and nonpossessive forms.

Symbols and Abbreviations

Symbols, abbreviations, and acronyms are included as main entries; definitions consist of the term for which the symbol or the abbreviation stands, with a translation if the term is in a foreign language. These terms will usually be found at the appropriate places in the vocabulary; some terms, however, are self-explanatory and have no entry, such as the names of organizations and phrases like the following:

q.h. abbreviation for L. *qua'que ho'ra*, every hour.

In a few cases, the definition is placed at the abbreviation or acronym instead of at the term for which it stands, e.g., *ELISA*; in such cases, the abbreviation, not the term, is what is actually in use.

Abbreviations appear both with and without periods. This should not be taken to denote proper usage, since abbreviations may appear either way; at the present the trend is away from the use of the period for most abbreviations.

A list of selected abbreviations also appears in Appendix 1.

Abbreviations Used in This Dictionary

a.	artery (L. <i>arteria</i>); agar	m.	muscle (L. <i>musculus</i>)
aa.	arteries (L. <i>arteriae</i>)	med.	medial; median
ant.	anterior	mm.	muscles (L. <i>musculi</i>)
Ar.	Arabic	n.	nerve (L. <i>nervus</i>)
A.S.	Anglo-Saxon	NA	Nomina Anatomica
c.	about (L. <i>circa</i>)	neg.	negative
cf.	compare (L. <i>confer</i>)	NF	National Formulary
def.	definition	nn.	nerves (L. <i>nervi</i>)
dim.	diminutive	obs.	obsolete
EC	Enzyme Commission	pl.	plural
e.g.	for example (L. <i>exempli gratia</i>)	Port.	Portuguese
Fr.	French	post.	posterior
gen.	genitive	qq. v.	which (things) see (L. <i>quae vide</i>)
Ger.	German	q.v.	which see (L. <i>quod vide</i>)
Gr.	Greek	sing.	singular
i.e.	that is (L. <i>id est</i>)	Sp.	Spanish
inf.	inferior	sup.	superior
It.	Italian	USAN	United States Adopted Names
L.	Latin	USP	United States Pharmacopeia
l.	ligament (L. <i>ligamentum</i>)	v.	vein (L. <i>vena</i>)
ligg.	ligaments (L. <i>ligamenta</i>)	vv.	veins (L. <i>venae</i>)
lat.	lateral		