

Saunders **DICTIONARY &
ENCYCLOPEDIA OF
LABORATORY
MEDICINE
AND TECHNOLOGY**

JAMES L. BENNINGTON, M.D.

Saunders **DICTIONARY & ENCYCLOPEDIA OF LABORATORY MEDICINE AND TECHNOLOGY**

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Preface

During the last several decades there has been an explosive growth in the field of laboratory medicine due to the combination of an insatiable demand by physicians for new and improved diagnostic procedures and an infinite capacity of modern technology to supply this demand through creation of increasingly sophisticated laboratory methods and instruments.

The advances in laboratory medicine that have made possible its rapid growth have also been responsible for revolutionary changes in the size, scope, and complexity of its vocabulary. Just a few years ago, the full lexicon of laboratory medicine occupied a relatively small portion of the standard medical dictionary. Today, the terminology of laboratory medicine is fully as great as that of nonlaboratory medicine and is of paramount importance for effective medical communication.

The *Dictionary and Encyclopedia of Laboratory Medicine and Technology* was created to provide in a single source comprehensive and authoritative definitions of the terms used in this field. By concentrating on this vocabulary, we have endeavored to produce a reference work that meets the exacting demands of specialists in the various disciplines of laboratory medicine and technology, as well as the needs of those outside the laboratory who use its services. This work was prepared to serve laboratorians, clinicians, nurses, allied health and public health personnel, basic scientists, and students preparing for careers in health care fields.

We have attempted to provide comprehensive coverage of currently used methods and techniques for laboratory analysis in the areas of clinical chemistry, biochemistry, toxicology, hematology, blood banking, bacteriology, virology, mycology, parasitology, immunology, cytology, histology, immunohistochemistry, electron microscopy, electrocardiography, electromyography, ultrasonography, radiology, nuclear medicine, and respiratory medicine. For each test, assay, or examination, the basic principles of the method or instrumentation, or both, used for analysis are discussed, along with the conditions that affect the accuracy and precision of detection and measurement, fundamentals of quality control, reference values, pathophysiologic alterations that produce abnormal values, and the clinical use of some applications of the procedures.

Terms related to other important aspects of laboratory medicine are also covered in detail, and include biostatistics, laboratory safety, normal gross and microscopic anatomy and physiology, diseases, syndromes, important toxic agents, frequently prescribed drugs, physiologic mechanisms, laboratory computers, electronics and instrumentation, quality control, taxonomy of microorganisms, dyes and stains, bacteriologic media, laboratory physics, biochemistry, oncology, and radiation therapy.

Notes on the Use of This Book

INTRODUCTION

SCOPE

The scope of this dictionary covers the medical fields of particular interest to laboratorians and others who need to be familiar with the technology of modern medical laboratories. Many anatomic terms and diseases and conditions have also been included for the convenience of those who would seek further explication of a specific anatomic site or pathologic condition referred to in a technical definition.

An encyclopedic approach was used to define certain terms considered basic to a particular field or whose complexity demanded more than a concise dictionary definition.

STYLE

We have tried to follow accepted conventions regarding such matters as abbreviation and nomenclature style for the specific fields defined in the dictionary, although readers will note that what is standard usage in one field may not be in another. For example, adoption of SI units (International Units), certain abbreviations (e.g., PCO_2 , PA_{CO_2}), and nomenclature such as nonproprietary names, chemical names, and trademarks are not consistently used by nor are familiar to all workers in all fields.

Terms are given in the singular form, with the plural spelling occasionally following the pronunciation. However, when a term is most commonly used in the plural form it is defined there; for example, the definition appears at *mitochondria* rather than on the singular form, *mitochondrion*. Also, when a term is referred to by its initials or acronym, the primary definition is found at the abbreviation; thus, *VDRL test* is at *VDRL*, not *Venereal Disease Research Laboratory*.

FORMAT

ALPHABETIZATION

The dictionary's alphabetic style is based on a strict letter sequence that disregards spaces or hyphens occurring between words, as, for example, in the following sequence: *analog*, *analog computer*, *analog data*, *analog multiplexer*, *analogous*, *analogous structures*, *analog signal*, *analog-to-digital converter*, *analogue*, *analogy*.

An exception is found with eponymic terms, when the apostrophe ('s) is disregarded in considering the alphabetic sequence; thus, *Fick's law* precedes *Fick principle*.

When the spelling of two words is identical, proper names (capitalized entries) precede the common noun (lower-cased entry), as when *Bacterium* precedes *bacterium*.

ARRANGEMENT OF TERMS

Following the lead of many biomedical dictionaries, terms are defined herein primarily where logic dictates; that is, most terms composed of a noun modified by a descriptive or eponymic designation are defined at the adjective or eponym. In those instances in which current usage dictates otherwise, or when placement is less clear, a cross-reference has been inserted to guide the reader; our primary aim was not uniformity but rather reader convenience and assistance. Thus, for example, the definition for *thymic tumors* appears at *thymic*, not *tumors*, and that for *Romanowsky's stain* is at *Romanowsky's*, not *stain*.

FORM

Primary entries generally contain the following elements: name of term (in bold-face type), pronunciation (in parentheses), plural form, etymology (in brackets), descriptive definition, and any synonyms, applicable trademarks, cross-references, and subentries.

[NA] identifies anatomic terms that are listed in the *Nomina Anatomica*, and [USP] identifies drugs listed in the *United States Pharmacopeia*. Coded numbers are given for enzymes (assigned by the Enzyme Commission) and for dyes (assigned by the *Colour Index*).

COMPOUND TERMS

Compound terms are usually listed separately rather than clustered under the first word; for example, there are separate entries for *linear attenuation coefficient*, *linear energy transfer*, and *linear equation*. When compound words are clustered under the first word, it is to facilitate access to related information; thus, entries such as *heat of combustion*, *heat of reaction*, and *heat of solution* are subentries under the primary word *heat*, as is also the term *molar heat capacity*. Such arrangements allow the reader access to related terms that would otherwise be scattered alphabetically throughout the book.

CROSS-REFERENCES

The many cross-references in this dictionary are in part a consequence of the multiplicity of abbreviations, acronyms, trademarks of generic drugs and products, and synonyms that seem to particularly characterize laboratory medicine. At such entries the reader is directed to the primary term by the word "See."

The reader will also find cross-references to definitions of related information at the end of the primary term. These are indicated by use of the cross-referenced term in italics, as for example, at the end of *genetic code*: "See also *mutation*, *nucleic acid*, *protein synthesis*, and *wobble hypothesis*." "Also called" information includes both italicized and nonitalicized terms: if the term is not italicized, it is included in the dictionary as a point of information but does not have a separate entry. Cross-references listed as part of "See under" indicate that the term is defined elsewhere, but only within the definition to which the reader is being directed: thus, at the term *erythrocytein*, the reader is directed to "see under *copper storage protein*," where *erythrocytein* is defined.

PRONUNCIATION

Indicated in parentheses after the name of the term, pronunciation employs the use of simple phonetic respelling. Diacritical markings to distinguish vowel sounds are used sparingly; occasionally an alternate pronunciation is also provided.

An unmarked vowel ending a syllable is long (gra'dē-ent).

An unmarked vowel in a syllable ending with a consonant is short (sek'shun).

A long vowel in a syllable that must end with a consonant is indicated by a macron (nōz'pēs).

A short vowel that constitutes or ends a syllable is marked with a breve (ep'yī-nef'rin).

The syllable *ah* is used for the sound of *a* in open, unaccented syllables (ah-fer'ē-sis).

The primary accent in a word is indicated by a single accent; the secondary accent is indicated by a double accent.

ABBREVIATIONS

An effort has been made to keep the use of abbreviations to a minimum. Ones that are found, primarily as part of the etymology, include:

Ar.	Arabic	L.	Latin
A.S.	Anglo Saxon	M.W.	molecular weight
dim.	diminutive	N.A.	Nomina Anatomica
cf.	compare (L. <i>confer</i>)	N.L.	New Latin
C.I.	Colour Index	O.E.	Old English
E.C.	Enzyme Commission	pl.	plural
e.g.	for example (L. <i>exempli gratia</i>)	Port.	Portuguese
Fr.	French	p.p.	past participle
Ger.	German	sing.	singular
Gr.	Greek	Sp.	Spanish
i.e.	that is (L. <i>id est</i>)	Swed.	Swedish
It.	Italian	USP	United States Pharmacopeia

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The terms included in the *Dictionary and Encyclopedia of Laboratory Medicine and Technology* were selected by medical editors from an exhaustive search of textbooks, glossaries, and journal publications in each area defined in the book. They also come from two other Saunders dictionaries, *Dorland's Illustrated Medical Dictionary* and the Miller and Keane *Encyclopedia and Dictionary of Medicine, Nursing, and Allied Health*, whose definitions formed the basis of many terms included in the present volume. The definitions were written by the dictionary staff, the medical editors, and leading authorities. Every definition was reviewed by two or more editors before approval for inclusion.

Completion of this dictionary required more than six years and represents a vast number of hours of research, writing, review, and mechanical preparation by the staff at Saunders and the medical editors. Suggestions, contributions, and corrections are welcomed for preparation of the second edition.

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A

A symbol for *absorbance*, *activity* (radiation), *adenosine*, *admittance*, *alanine*, *alveolar gas*, *ampere*, *area*, *mass number*.

Å abbrev. See *ångström*.

Ā abbrev. for cumulated activity. See under *dose estimate*.

A_{1m} an obsolete expression; see *absorptivity*.

AI abbrev. See *a. I* under *angiotensin*.

AII abbrev. See *a. II* under *angiotensin*.

AIII abbrev. See *a. III* under *angiotensin*.

a symbol for *absorptivity*, *acceleration*, *activity* (chemical), *arterial blood*, *atto-*.

a- (a) [Gr. *a-* (before vowels, *an-*) without, not] a prefix word element to denote no, not, or without, e.g., *apnea*. See also *an-*.

α the Greek lower case letter alpha; symbol for: (1) optical rotation, (2) angular acceleration, (3) the heavy chain of IgA, (4) solubility coefficient.

α- a designator for: (1) an anomer of a carbohydrate, e.g., *α-D-glucose*; (2) one constituent of the plasma globulin fraction or other proteins migrating electrophoretically with this fraction, e.g., *α-fetoprotein*; (3) a substituent group of a steroid that projects below the plane of the ring, e.g., *3α-hydroxy-5α-androstan-17-one* (androsterone).

AA abbrev. See *amino acid*, *arachidonic acid*, *atomic absorption*.

AAA abbrev. See *American Association of Anatomists*.

AAAS abbrev. See *American Association for the Advancement of Science*.

AAB abbrev. See *American Association of Bioanalysts*.

AABB abbrev. See *American Association of Blood Banks*.

AACC abbrev. See *American Association for Clinical Chemistry*.

AACIA abbrev. See *American Association for Clinical Immunology and Allergy*.

AAEE abbrev. See *American Association of Electromyography and Electrodagnosis*.

AAI abbrev. See *American Association of Immunologists*.

AAM abbrev. See *American Academy of Microbiology*.

AAMI abbrev. See *Association for the Advancement of Medical Instrumentation*.

AAN abbrev. See *American Association of Neuropathologists*.

AAP abbrev. See *American Association of Pathologists*.

(A-a)P_{CO₂} abbrev. See *alveolar-arterial carbon dioxide difference*.

AAPA abbrev. See *American Association of Pathologist Assistants*.

AAV abbrev. for *adeno-associated virus*.

ab- (ab) [L. *ab* away from] a prefix word element to denote off, or away from, e.g., *abnormal*.

abacterial (a"bak-te're-al) free from bacteria.

A band the dark-staining zone of a striated muscle sarcomere. It is formed by parallel myosin myofilaments, and by actin myofilaments that penetrate the A band to a depth that varies with the state of contraction of the myofibril. The central portion of the A band not occupied by actin myofilaments is the H zone, with the M line at its center. The A band is so named because it is anisotropic in polarized light. Its length does not alter when the myofibril contracts. See also *skeletal m.* under *muscle*.

abarognosis (a"bar-og-no'sis) [*a-* neg. + Gr. *baros* weight + *gnōsis* knowledge] loss of ability to perceive differences in weight or pressure.

abasia (a-ba'ze-ah) [*a-* neg. + Gr. *basis* step + *-ia*] an inability to walk.

abatement (ah-bāt'ment) a decrease in the severity of a pain or symptom.

ABB abbrev. See *American Board of Bioanalysis*.

Abbé test plate (ab'a) [Ernst Karl Abbé, German physicist, 1840–1905] a glass slide used to examine optical lenses and microscope objectives for their adequacy of correction of spherical or chromatic aberration, sharpness or definition, and flatness of field. The slide is ruled with several series of fine parallel lines and has a wedge-shaped coverglass for determination of optimal coverslip thickness.

ABC abbrev. See *American Blood Commission*.

abdomen (ab-do'men) [L., possibly from *abdere* to hide] the portion of the body that lies between the thorax and the pelvis. It contains the abdominal cavity, which is separated from the chest by the diaphragm, and is lined by the peritoneum. The cavity holds the stomach, large and small intestines, liver, spleen, pancreas, kidneys, appendix, gallbladder, urinary bladder, and other structures.

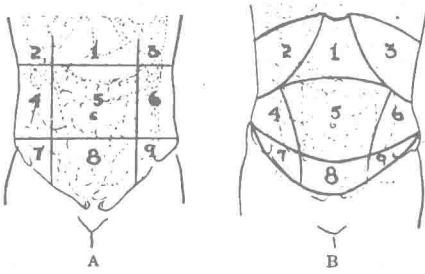
abdomin/o (ab-dom'i-no) [L. *abdomen* the belly] a word element used in combining form to denote a relationship to the abdomen, e.g., *abdominal*.

abdominal (ab-dom'i-nal) [L. *abdominalis*] pertaining to the abdomen.

abdominal regions 1. nine regions that are subdivisions of the surface of the abdomen (see the accompanying illustration).

2. nine regions into which the abdomen is divided by four of Addison's planes. The upper transverse plane is the transpyloric plane, the lower is the transtuberular plane, and the two vertical planes are the lateral sagittal planes. See also *Addison's planes*.

abdominal scan a procedure in nuclear medicine for examining the stomach and small intestine, which employs a scintillation camera or rectilinear scanner. The scan is used primarily for the detection and localization of Meckel's diverticulum. In the procedure, sodium pertechnetate Tc 99m is injected intravenously and is actively taken up by the gastric mucosa, including any ectopic gastric mucosa found in Meckel's diverticulum. The radionuclide also localizes some intestinal intussusceptions, obstructions, and duplications.



Abdominal regions. Regions of the abdomen bounded according to the standard (A) and a variant (B) system: 1 indicates the epigastric region; 2, right hypochondriac; 3, left hypochondriac; 4, right lateral (lumbar); 5, umbilical; 6, left lateral (lumbar); 7, right inguinal (iliac); 8, pubic (hypogastric); and 9, left inguinal (iliac). (From Dorland's Illustrated Medical Dictionary. 26th ed. Philadelphia, W. B. Saunders Co., 1981).

abdominal zones three zones into which the surface of the abdomen is divided by transverse planes: the epigastric zone, above the transpyloric plane; the hypogastric zone, below the transtubercular plane; and the umbilical (mesogastric) zone, which is in between the two.

abducent (ab-du'sent) [L. *abducens*, from *abducere* to draw away] abducting; drawing away from.

abducent nerve cranial nerve VI; a slender motor nerve that arises in the pons and runs forward in the lateral wall of the cavernous sinus into the orbit. It innervates the lateral rectus muscle. See also *cranial nerves*.

abduet (ab-dukt') [L. *abducere* to draw away] to move a part away from the median plane (central axis) of the body or, in the case of the fingers and toes, away from the axial line of a limb.

abduction (ab-duk'shun) [L. *abductio*] the act of abducting or the state of being abducted.

abductor (ab-duk'tor) [L.] a muscle, such as the deltoid, that moves a bone away from another part (away from the median plane).

Abell method see under *cholesterol assays*.

aberrant (ab-er'ant) [L. *aberrans*, from *ab* from + *errare* to wander] wandering or deviating from the usual or normal course; an atypical element, group of elements, or characteristic.

aberrant rest see *choristoma*.

aberration (ab'er-a'shun) [L. *aberratio*, from *ab* + *errare* to wander] 1. deviation from the usual course or condition.

2. in an optical system, any deviation from a perfect image; see *chromatic aberration* and *spherical aberration*.

3. see *chromosomal aberration*.

abetalipoproteinemia (a-ba'tah-lip'o-pro-tèn-e'-me-ah) [*a*-neg. + *beta* + *lipoprotein* + Gr. *haima* blood + *-ia*] a rare genetic disorder, transmitted as an autosomal recessive trait, that is characterized by an absolute deficiency of beta lipoproteins (LDLs), prebeta lipoproteins (VLDLs), and chylomicrons. It is thought to be due to deficient synthesis of apoprotein B. Onset occurs in the first year of life,

with steatorrhea, growth failure, acanthocytosis, retinitis pigmentosa, hereditary ataxia, severe fat malabsorption, distal sensory loss, and visual disturbances.

Diagnosis is based on demonstration of very low serum cholesterol concentrations (<50 mg/100 ml) and virtually absent blood plasma triglycerides (<10 mg/100 ml). Electrophoresis and ultracentrifugation reveal no LDLs, VLDLs, or chylomicrons. There is no specific treatment, although massive doses of vitamins E or A may delay or retard the neurologic sequelae. There is significant disability with skeletal and muscular deformities and the prognosis is poor. Also called *Bassen-Kornzweig syndrome*.

ABG abbrev. for arterial blood gases.

ablate (ab-lāt') [L. *ablatus* removed] to remove, especially by cutting; to destroy wholly.

ablatio (ab-la'she-o) [L.] detachment.

a. *placentae*, premature detachment of the placenta; see also a. *placentae* under *abruptio*.

ablation (ab-la'shun) [L. *ablatio*] the removal of a tissue by cutting, burning, or other means.

abnormal (ab-nor'mal) [*ab* + L. *norma* rule] not normal; a deviation from the usual structure, position, condition, behavior, or rule.

ABO abbrev. for the three major blood systems. See under *blood groups* and *blood typing*.

Abopon (ah'bo-pon) trademark for a water-soluble (gum or crystalline solid) mounting medium used in histology in the form of a saturated solution in pH 7 phosphate buffer. This medium preserves crystal violet amyloid stains and acetic orcein stains.

abort (ah-bort') [L. *abortus*, from *aboriri* to mis-carry] 1. to halt the progress of a disease.

2. to halt the progress of a pregnancy. See also *abortion*.

abortion (ah-bor'shun) [L. *abortio*] the termination of pregnancy at any point in fetal development; more precisely, the termination of pregnancy before the twenty-first week of gestation. Termination after this time and before the twenty-ninth week is called premature labor. Before the twelfth week, abortion is usually performed by progressive dilation of the cervical opening and scraping or suctioning out of the uterine lining. After the sixteenth week and up to the twenty-first week, injections of saline, glucose, or prostaglandin solutions into the amniotic sac is the technique of choice.

complete a., an abortion in which the uterus is emptied completely of the fetus, placenta, and decidua lining. With spontaneous abortion this usually occurs only during the first 6 wk of pregnancy or after the fourteenth week.

habitual a., the spontaneous termination of three or more pregnancies in the same patient. It may be the result of organic or psychiatric disease.

incomplete a., an abortion in which fragments of placental tissue remain in the uterus. The retained tissue often becomes infected and is liable to hemorrhage, posing a severe danger to the patient.

Incomplete abortions are most likely to occur between the sixth and fourteenth weeks of pregnancy. Treatment is removal of the retained tissue and initiation of therapy for any infection or bleeding.

induced a., the deliberate termination of pregnancy by mechanical or chemical means.

missed a., a spontaneous abortion in which the