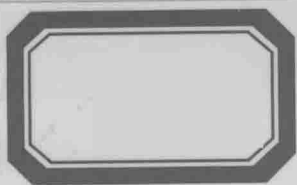


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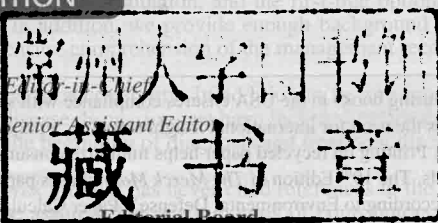
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Preface

At the beginning of the 2nd decade of the 21st century, the amount of information available to health care practitioners is immense. Medical websites and journals send daily messages announcing results of the latest studies. Within minutes, subspecialty data heretofore found only in university libraries can be unearthed, along with a vast array of information from academics, commercial organizations, advocacy groups, the government, and seemingly anyone with a computer and an internet connection.

What is the role of a general reference work such as *The Merck Manual* when seemingly the entire body of medical knowledge is at one's fingertips electronically? With such a vast body of knowledge available, finding a good starting place can be difficult. *The Manual* has always been intended as the first stop on the road to understanding for readers encountering a topic for the first time or for the first time in a long time. After digesting a *Merck Manual* topic, readers will be well prepared to understand and evaluate the wealth of more detailed information available elsewhere.

As it has for over 110 years, *The Merck Manual* focuses on discussions of specific disorders, organized by organ system or medical specialty. In its structured introductions to medical disorders, *The Manual* provides health care practitioners and students with straightforward, practical explanations of "what to do" to diagnose and treat those conditions. We discuss when to suspect a disease, the proper sequence of evaluation, and the first-line options for treatment along with selected alternatives. In addition, we provide enough background information on etiology and pathophysiology to ensure comprehension of the management recommendations.

The Manual continues to enhance its accessibility. In addition to having introductory "nutshells" at the beginning of each disease discussion, we have included bulleted lists in the text whenever possible, including at the beginning of diagnosis and treatment discussions.

In the interest of brevity, *The Merck Manual* has never cited references to the medical literature. Nonetheless, readers can be assured that our hundreds of contributors and dozens of peer reviewers are presenting the best current recommendations, soundly based on available evidence.

Although the printed *Merck Manual* has long since grown too big to be carried in a lab coat, it has returned to the pocket as content on many different handheld electronic devices. In addition, *The Merck Manual* continues to be available to all readers free of charge at www.merckmanuals.com. Although our electronic versions have a currency that a printed product cannot, the book still provides a better in-depth reading experience along with a tactile satisfaction and ease of perusal not possessed by electronic devices. Undoubtedly this will change as technology advances, but whatever the platform, we will continue to strive to keep *The Merck Manual* as useful as ever.

We thank the numerous contributors who have worked diligently with us to craft this edition, and we hope you will find it worthy of continued and frequent use. As always, suggestions for improvements will be warmly welcomed and carefully considered.

Robert S. Porter, MD
Editor-in-Chief

Committed to Providing Medical Information: Merck and The Merck Manuals

In 1899, the American drug manufacturer Merck & Co. first published a small book titled *Merck's Manual of the Materia Medica*. It was meant as an aid to physicians and pharmacists, reminding doctors that "Memory is treacherous." Compact in size, easy to use, and comprehensive, *The Merck Manual* (as it was later known) became a favorite of those involved in medical care and others in need of a medical reference. Even Albert Schweitzer carried a copy to Africa in 1913, and Admiral Byrd carried a copy to the South Pole in 1929.

By the 1980s, the book had become the world's largest selling medical text and was translated into more than a dozen languages. While the name of the parent company has changed somewhat over the years, the book's name has remained constant, known officially as *The Merck Manual of Diagnosis and Therapy* but usually referred to as *The Merck Manual* and sometimes "The Merck."

In 1990, the editors of *The Merck Manual* introduced *The Merck Manual of Geriatrics*. This new book quickly became the best-selling textbook of geriatric medicine, providing specific and comprehensive information on the care of older people. The 3rd edition was published in five languages.

In 1997, *The Merck Manual of Medical Information—Home Edition* was published. In this revolutionary book, the editors translated the complex medical information in *The Merck Manual* into plain language, producing a book meant for all those people interested in medical care who did not have a medical degree. The book received critical acclaim and sold over 2 million copies. *The Second Home Edition* was released in 2003. Merck's commitment to providing comprehensive, understandable medical information to all people continued with *The Merck Manual Home Health Handbook*, published in 2009.

The Merck Manual of Health & Aging, published in 2004, continued Merck's commitment to education and geriatric care, providing information on aging and the care of older people in words understandable by the lay public.

In 2008, *The Merck Manual of Patient Symptoms* was introduced to complement *The Merck Manual* and was intended to help newcomers to clinical diagnosis approach patients who present with certain common symptoms.

As part of its commitment to ensuring that all who need and want medical information can get it, Merck provides the content of these Merck Manuals on the web for free (www.merckmanuals.com). Registration is not required, and use is unlimited. The web publications are continuously updated to ensure that the information is as up-to-date as possible.

Merck also supports the community of chemists and others with the need to know about chemical compounds with *The Merck Index*. First published in 1889, this publication actually predates *The Merck Manual* and is the most widely used text of its kind. *The Merck Veterinary Manual* was first published in 1955. It provides information on the health care of animals and is the preeminent text in its field.

Merck & Co., Inc., is one of the world's largest pharmaceutical companies. Merck is committed to providing excellent medical information and, as part of that effort, continues to proudly provide all of The Merck Manuals as a service to the community.

Guide For Readers

The **Contents** (p. vii) shows the pages on which readers can find the Editors and Editorial Board members, consultants, additional reviewers, and contributors, as well as titles of sections, appendixes, and the index. Thumb tabs with appropriate abbreviations and section numbers mark each section and the index.

Each **Section** begins with its own table of contents, listing chapters and topics in that section. Chapters are numbered serially from the beginning to the end of the book.

The **Index** is highly detailed and contains many cross-entries. In addition, readers will find many **cross-references** throughout the text to specific pages where additional or related information can be found.

Running heads carry the section number and title on left-hand pages and the chapter number and title on right-hand pages.

Abbreviations and symbols, used throughout the text as essential space savers, are listed on pages ix and x. Other abbreviations in the text are expanded at first mention in the chapter or topic.

Tables and figures are referenced in the index but are not listed in a separate table of contents. An insert of color plates contains photographs of many eye, ear, endocrine, skin, and gynecologic disorders as well as infectious diseases.

Laboratory values in the book are given in conventional units. In most cases, SI units follow in parentheses. Appendix II contains several tables listing normal laboratory values for many tests conducted on blood, plasma, serum, urine, CSF, and stool.

Drugs are designated in the text by generic (nonproprietary) names. In Appendix III, many of the drugs mentioned in the book are listed alphabetically, with each generic name followed by one or more trade names.

Section 23, **Special Subjects**, has discussions on clinical decision making, radiologic imaging, complementary and alternative medicine, dietary supplements, genetics, smoking cessation, rehabilitation, care of the surgical patient, financial issues in health care, and care of the dying patient, among others.

Important: The authors, reviewers, and editors of this book have made extensive efforts to ensure that treatments, drugs, and dosage regimens are accurate and conform to the standards accepted at the time of publication. However, constant changes in information resulting from continuing research and clinical experience, reasonable differences in opinions among authorities, unique aspects of individual clinical situations, and the possibility of human error in preparing such an extensive text require that the reader exercise individual judgment when making a clinical decision and, if necessary, consult and compare information from other sources. In particular, the reader is advised to check the product information provided by the manufacturer of a drug product before prescribing or administering it, especially if the drug is unfamiliar or is used infrequently.

Note: Readers can find up-to-date information, additional tables and figures, as well as multimedia enhancements at www.merckmanuals.com. Visit the web site frequently for new enhancements and the latest information on clinical developments.

Abbreviations

The following abbreviations are used throughout the text; other abbreviations are expanded at first mention in the chapter or subchapter.

ABG	arterial blood gas	EEG	electroencephalogram, electroencephalography
ACE	angiotensin converting enzyme	ENT	ear, nose, and throat
ACTH	adrenocorticotrophic hormone	ERCP	endoscopic retrograde cholangiopancreatography
ADH	antidiuretic hormone	ESR	erythrocyte sedimentation rate
AIDS	acquired immunodeficiency syndrome	F	Fahrenheit
ALT	alanine transaminase (formerly SGPT)	FDA	US Food and Drug Administration
AST	aspartate transaminase (formerly SGOT)	ft	foot; feet (measure)
ATP	adenosine triphosphate	FUO	fever of unknown origin
BCG	bacille Calmette-Guérin	g	gram
bid	2 times a day (only in dosages)	GFR	glomerular filtration rate
BMR	basal metabolic rate	GI	gastrointestinal
BP	blood pressure	G6PD	glucose-6-phosphate dehydrogenase
BSA	body surface area	GU	genitourinary
BUN	blood urea nitrogen	Gy	gray
C	Celsius; centigrade	h	hour
Ca	calcium	Hb	hemoglobin
cAMP	cyclic adenosine monophosphate	HCl	hydrochloric acid; hydrochloride
CBC	complete blood count	HCO₃	bicarbonate
cGy	centigray	Hct	hematocrit
Ci	curie	Hg	mercury
CK	creatine kinase	HIV	human immunodeficiency virus
CK-MB	creatine kinase of muscle band	HLA	human leukocyte antigen
Cl	chloride; chlorine	HMG-CoA	hydroxymethyl glutaryl coenzyme A
cm	centimeter	Hz	hertz (cycles/second)
CNS	central nervous system	ICF	intracellular fluid
CO₂	carbon dioxide	ICU	intensive care unit
COPD	chronic obstructive pulmonary disease	IgA, etc	immunoglobulin A, etc
CPR	cardiopulmonary resuscitation	IL-1, etc	interleukin-1, etc
CSF	cerebrospinal fluid	IM	intramuscular(ly)
CT	computed tomography	INR	international normalized ratio
cu	cubic	IU	international unit
D & C	dilation and curettage	IV	intravenous(ly)
dL	deciliter (= 100 mL)	IVU	intravenous urography
DNA	deoxyribonucleic acid	K	potassium
DTP	diphtheria-tetanus-pertussis (toxoids/vaccine)	kcal	kilocalorie (food calorie)
D/W or D	dextrose	kg	kilogram
ECF	extracellular fluid	L	liter
ECG	electrocardiogram, electrocardiography	lb	pound

LDH	lactic dehydrogenase	pH	hydrogen ion concentration
M	molar	PMN	polymorphonuclear leukocyte
m	meter	po	orally
MAOI	monoamine oxidase inhibitor	Po₂	oxygen partial pressure (or tension)
MCH	mean corpuscular hemoglobin	PPD	purified protein derivative (tuberculin)
MCHC	mean corpuscular hemoglobin concentration	ppm	parts per million
mCi	millicurie	prn	as needed
MCV	mean corpuscular volume	PT	prothrombin time
mEq	milliequivalent	PTT	partial thromboplastin time
Mg	magnesium	q	every (only in dosages)
mg	milligram	qid	4 times a day (only in dosages)
MI	myocardial infarction	RA	rheumatoid arthritis
MIC	minimum inhibitory concentration	RBC	red blood cell
min	minute	RNA	ribonucleic acid
mIU	milli-international unit	SaO₂	arterial oxygen saturation
mL	milliliter	sc	subcutaneous
mm	millimeter	sec	second
mmol	millimole	SI	International System of Units
mo	month	SIDS	sudden infant death syndrome
mOsm	milliosmole	SLE	systemic lupus erythematosus
MRI	magnetic resonance imaging	sp	species (when referring to the singular) [eg, <i>Clostridium</i> sp]
N	nitrogen; normal (strength of solution)	spp	species (when referring to the plural) [eg, <i>Nocardia</i> and <i>Mycardia</i> spp]
Na	sodium	sp gr	specific gravity
NaCl	sodium chloride	sq	square
ng	nanogram (= millimicrogram)	SSRI	selective serotonin reuptake inhibitor
NGT	nasogastric tube	TB	tuberculosis
nm	nanometer (= millimicron)	tid	3 times a day (only in dosages)
nmol	nanomole	TNF	tumor necrosis factor
npo	nothing by mouth	TPN	total parenteral nutrition
NSAID	nonsteroidal anti- inflammatory drug	TSH	thyroid-stimulating hormone
O₂	oxygen	URI	upper respiratory infection
OTC	over-the-counter (pharmaceuticals)	UTI	urinary tract infection
oz	ounce	vs	versus
P	phosphorus	WBC	white blood cell
PACO₂	alveolar carbon dioxide partial pressure	WHO	World Health Organization
Paco₂	arterial carbon dioxide partial pressure	wk	week
PAO₂	alveolar oxygen partial pressure	wt	weight
Pao₂	arterial oxygen partial pressure	yr	year
PCO₂	carbon dioxide partial pressure (or tension)	μ	micro-; micron
PCR	polymerase chain reaction	μCi	microcurie
PET	positron emission tomography	μg	microgram
pg	picogram (= micromicrogram)	μL	microliter
		μm	micrometer (= micron)
		μmol	micromole
		μOsm	micro-osmole
		μμ	millimicron

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