



THE
MERCK
MANUAL

FOURTEENTH
EDITION

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THE
MERCK
MANUAL

OF
DIAGNOSIS AND THERAPY

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FOREWORD

THE MERCK MANUAL first appeared in 1899 as a slender 262-page text titled *MERCK'S MANUAL OF THE MATERIA MEDICA*. It was expressly designed to meet the needs of general practitioners in selecting medications, noting that "memory is treacherous" and even the most thoroughly informed physician needs a reminder "to make him at once master of the situation and enable him to prescribe exactly what his judgment tells him is needed for the occasion." It was well received and, by the 6th Edition (1934), THE MERCK MANUAL had become highly valued by medical students and house staff also; by the end of World War II the pocket-sized manual was an established favorite ready-reference. Today THE MANUAL is the most widely used medical text in the world. While the book has grown to about 2500 pages, its primary purpose remains the same—to provide useful information to practicing physicians, medical students, interns, residents, and other health professionals.

Fewer physicians now attempt to manage the whole range of medical disorders that can occur in infants, children, and adults, but those who do must have available a broad spectrum of current and accurate information. The specialist requires precise information about subjects outside his area of expertise. All physicians need more and more information for study and examination purposes as well as for patient care. THE MERCK MANUAL continues to try to meet these needs, excluding only details of surgical procedures.

Precisely how do we attempt to meet these needs? First, from a disease orientation, THE MANUAL covers all but the most obscure disorders of mankind, not only those that a general internist might expect to encounter, but also problems of pregnancy and delivery, the more common and serious disorders of neonates, infants, and children, and many special situations. Disorders are mainly organized according to the organ systems primarily affected, on the basis of their etiology (as with most of the infectious diseases and disorders due to physical agents), or on the basis of disciplines (e.g., gynecology, obstetrics, pediatrics, genetics, psychiatry). In addition, THE MANUAL contains information for special circumstances, such as radiation reactions and injuries, problems encountered in deep-sea diving, or dental emergencies. New subjects continue to be added, such as discussions of the principles of clinical biostatistics, Legionnaires' disease, toxic shock syndrome, and geriatric disorders. In fact, this edition has about 400 pages (approximately 20%) more text than the preceding edition. We therefore urge you to check the Index whenever you require information, even on unusual subjects or those not commonly found in other texts.

A completely disease-oriented compendium, however, would have serious limitations. Since patients usually present with complaints or concerns that must be meticulously described, sorted, and deciphered, many chapters are devoted to discussions of symptoms and signs and how to elicit the historical and physical data required for diagnosis. Common clinical procedures and laboratory tests used as diagnostic and management aids are described and are supplemented with information on proper specimen collection and handling. As new and sophisticated laboratory and technologic procedures come forth (e.g., computerized tomography, isotope scanning, ultrasound, mediastinoscopy), they are also described, with comments on their uses, interpretations, and limitations.

Current therapy is presented for each disorder and supplemented with a separate section on clinical pharmacology that describes general principles, new advances (e.g., the role of drug receptors, plasma concentration monitoring), details of pharmacologic groups and specific agents, and even suggestions for prescription writing and the use of placebos. When complex equipment (e.g., respirators,

dialyzers) is involved, it is also described. Prophylaxis is emphasized wherever possible. Finally, reference guides are provided for checking normal values, calculating dosages, and converting weights, measures, and volumes to metric equivalents.

Can so many subjects be covered adequately in a single book? You, the reader, must make the ultimate judgment, but we believe the answer is in the affirmative. This edition required a concerted effort by many people, beginning with an internal analysis and critique of the previous edition, even though it enjoyed highly favorable reviews and outstanding reader acceptance. Almost every section of that book was then sent to outside experts, who had had nothing to do with its preparation, to solicit their most candid criticism. Published reviews and letters received from readers were analyzed. Next, the Editorial Board met to compare reviews and critiques and to plan this 14th Edition. Distinguished special consultants were enlisted to provide additional expertise. Then, 272 authors with outstanding qualifications, experience, and knowledge were engaged. Their manuscripts were edited repeatedly in-house to retain every valuable morsel of knowledge while eliminating sometimes elegant, but unneeded, words. Each manuscript was then reviewed by a member of the Editorial Board or a consultant. In many cases, additional special reviewers were invited to comment. Every mention of a drug and its dosage was reviewed by a separate outside consultant. The objectives of all these reviews were to ensure adequate and relevant coverage of each subject, accuracy, and simple and clean exposition. The authors then reworked, modified, and polished their manuscripts. Almost all of the manuscripts were revised at least 6 times; 15 to 20 revisions were not uncommon. We believe that no other medical text undergoes as many reviews and revisions as THE MERCK MANUAL.

Owing to the extensive subject matter covered and a successful tradition, the style and organization of THE MANUAL have some unique characteristics. Readers are urged to spend a few minutes reviewing the Guide for Readers (p. viii), the Table of Contents *at the beginning of each section*, and the Index (p. 2463). Scrutiny of the arrangement of subject headings within each section, of internal headings within a subject discussion, and of boldfaced terms in the text will reveal a pattern of outlining intended to aid study of the text.

The foregoing is a simplified review of the complex, arduous, and rewarding 4½-year enterprise that culminates in the presentation of this 14th Edition of THE MERCK MANUAL. The members of the Editorial Board, special consultants, contributing authors, and in-house editorial staff and their affiliations are listed on the pages that follow. They deserve a degree of gratitude that cannot be adequately expressed here, but we know they will feel sufficiently rewarded if their efforts serve your needs.

We hope this edition of THE MERCK MANUAL will be a welcome aid to you, our readers—compatible with your needs and worthy of frequent use. Suggestions for improvements will be warmly welcomed and carefully considered.

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GUIDE FOR READERS

- The **Contents** (p. vii) shows the pages where readers will find lists of Editorial Board members, consultants, and contributors, as well as abbreviations and symbols, titles of sections (groupings of related chapters), and the index. **Thumb-tabs** with appropriate abbreviations and section numbers mark each section and the index.
- Each **Section**, designated by the symbol §, begins with its own table of contents, listing chapters and subchapters in that section.
- **Chapters** are numbered serially from the beginning to the end of the book.
- The **Index** contains many cross-entries; page numbers in bold type signify major discussions of the topics. In addition, the text in **THE MANUAL** gives numerous cross-references to other sections and chapters.
- Each **Page Head** carries (1) the page number (page numbers run serially from the beginning to the end of the book); (2) if space permits, the titles of the relevant chapter and the last subchapter on that page; and (3) the section identification number (on left-hand pages) or chapter number (on right-hand pages).
- **Abbreviations and Symbols**, used liberally as essential space savers, are listed on pp. ix and x.
- The **Tables** and **Figures** found throughout the text are referenced appropriately in the index but are not listed in a table of contents.
- Section 22, **Special Subjects**, contains discussions new to **THE MANUAL**, such as **Biostatistics for Clinicians**, **Geriatric Medicine**, and **Office Clinical Records**, as well as commonly used **Clinical Procedures**, **Laboratory Medicine**, and **Ready Reference Guides**.
- **Drugs** are designated in the text by generic (nonproprietary) names. In the last chapter of the Clinical Pharmacology section, many of the drugs mentioned in the book are listed alphabetically, with each generic term followed by one or more trademarks.
- The authors, reviewers, editors, and publisher 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 included in each package of a drug product before prescribing or administering it, especially if the drug is unfamiliar or is used infrequently.

ABBREVIATIONS AND SYMBOLS

ACTH	adrenocorticotrophic hormone	ft	foot; feet (measure)
ADH	antidiuretic hormone	FUO	fever of unknown origin
ADP	adenosine diphosphate	GFR	glomerular filtration rate
ASO	antistreptolysin O (titer)	GI	gastrointestinal
ATP	adenosine triphosphate	gm	gram
BCG	Bacillus Calmette-Guerin (vaccine)	G6PD	glucose-6-phosphate dehydrogenase
b.i.d.	2 times a day	GU	genitourinary
BMR	basal metabolic rate	h	hour
BP	blood pressure	HA	hemagglutination, hemagglutinating
BSA	body surface area	Hb	hemoglobin
BSP	sulfobromophthalein	HCl	hydrochloric acid; hydrochloride
BUN	blood urea nitrogen	HCO₃	bicarbonate
C	Celsius; centigrade; complement	Hct	hematocrit
Ca	Calcium	Hg	mercury
CBC	complete blood count	HI	hemagglutination-inhibition, inhibiting
CF	complement fixation, fixating	HLA	human leukocyte group A
Ch.	chapter	Hz	hertz (cycles/second)
Ci	curie	ICF	intracellular fluid
Cl	chloride; chlorine	IgA, etc.	immunoglobulin A, etc.
cm	centimeter	IM	intramuscular(ly)
CNS	central nervous system	IPPB	inspiratory positive pressure breathing
CO	carbon monoxide; cardiac output	IU	international unit
CO₂	carbon dioxide	IV	intravenous(ly)
CPK	creatine phosphokinase	IVP	intravenous pyelogram
CPR	cardiopulmonary resuscitation	K	potassium
CSF	cerebrospinal fluid	kcal	kilocalorie (food calorie)
CT	computed tomography	kg	kilogram
cu	cubic	17-KGS	17-ketogenic steroids
cu mm	cubic millimeter	17-KS	17-ketosteroids
D & C	dilation and curettage	L	liter
dl	deciliter (= 100 ml)	lb	pound
DNA	deoxyribonucleic acid	LDH	lactic dehydrogenase
DTP	diphtheria-tetanus-pertussis (toxoids/vaccine)	LE	lupus erythematosus
D/W	dextrose in water	m	meter
ECF	extracellular fluid	M	molar
ECG	electrocardiogram	mCi	millicurie
EEG	electroencephalogram	MCH	mean corpuscular hemoglobin
ENT	ear, nose, and throat	MCHC	mean corpuscular hemoglobin concentration
ESR	erythrocyte sedimentation rate	MCV	mean corpuscular volume
F	Fahrenheit	mEq	milliequivalent
FDA	U.S. Food and Drug Administration	mg	milligram
		Mg	magnesium

x Abbreviations and Symbols

MIC	minimum inhibitory concentration	RF	rheumatic fever; rheumatoid factor
min	minute	RNA	ribonucleic acid
miU	milli-international unit	SaO₂	arterial oxygen saturation
ml	milliliter	SBE	subacute bacterial endocarditis
MLD	minimum lethal dose	s.c.	subcutaneous(ly)
mm	millimeter	SGOT	serum glutamic oxaloacetic transaminase
mM	millimole	SGPT	serum glutamic pyruvic transaminase
mo	month	SLE	systemic lupus erythematosus
mol wt	molecular weight	sp gr	specific gravity
mOsm	milliosmole	sq	square
MRC	Medical Research Council (units)	sq m	square meter
N	nitrogen; normal (strength of solution)	STS	serologic test(s) for syphilis
Na	sodium	TB	tuberculosis
ng	nanogram (= millimicrogram)	tbsp	tablespoon
nm	nanometer (= millimicron)	t.i.d.	3 times a day
17-OHCS	17-hydroxycorticosteroids	tsp	teaspoon
OTC	over-the-counter (pharmaceuticals)	u.	unit
oz	ounce	URI	upper respiratory infection
P	phosphorus; pressure	USPHS	United States Public Health Service
P_{CO₂}	carbon dioxide pressure (or tension)	UTI	urinary tract infection
P_{O₂}	oxygen pressure (or tension)	WBC	white blood cell
P_{aCO₂}	arterial carbon dioxide pressure	WHO	World Health Organization
P_{aO₂}	arterial oxygen pressure	wk	week
P_{AO₂}	alveolar oxygen pressure	wt	weight
pg	picogram (= micromicrogram)	yr	year
pH	hydrogen-ion concentration	μ	micro-
p o	orally	μm	micrometer; micron
PPD	Purified Protein Derivative (tuberculin)	mμ	millimicron (= nanometer)
ppm	parts per million	μCi	microcurie
p.r.n.	as needed	μg	microgram
psi	pounds per square inch	μmol	micromole
PSP	phenolsulfonphthalein	μOsm	micro-osmole
q	every	/	per
q 4 h, etc.	every 4 hours, etc.	<	less than
q.i.d.	4 times a day	>	more than
R, r	roentgen	≈	equal to or less than
RA	rheumatoid arthritis	≥	equal to or more than
RBC	red blood cell	≅	approximately equal to
		±	plus or minus
		§	section

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Leprosy

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Hypothalamic-Pituitary Relationships; Pituitary; Reproductive Endocrinology; Uterine Bleeding Disorders

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Ultrasound

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Streptococcal Infections; Biostatistics for Clinicians

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Staphylococcal Infections

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Leukopenia

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Osteitis Deformans

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Pneumococcal Infections; Pneumonia; Mycoplasma Pneumonia

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Laboratory Evaluation of the Liver and Biliary System; Fatty Liver; Fibrosis and Cirrhosis; Liver Disease Due to Alcohol; Vascular Lesions of the Liver

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Approach to the Pulmonary Patient

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Drug Absorption and Bioavailability; Drug Distribution; Antiemetics

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Pericardial Disease

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Renal and Urologic Disorders—Congenital Anomalies; Neoplasms; Lower Urinary Tract and Male Genital Tract Infections; Obstructive Uropathies; Myoneurogenic Disorders; Urinary Incontinence; Intersex States; Male Genital Lesions; Genitourinary Trauma

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Lymphoma

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Anemias

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Immunologically Mediated Renal Disease

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Neonatal Hepatitis B Virus Infection

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Diuretics

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