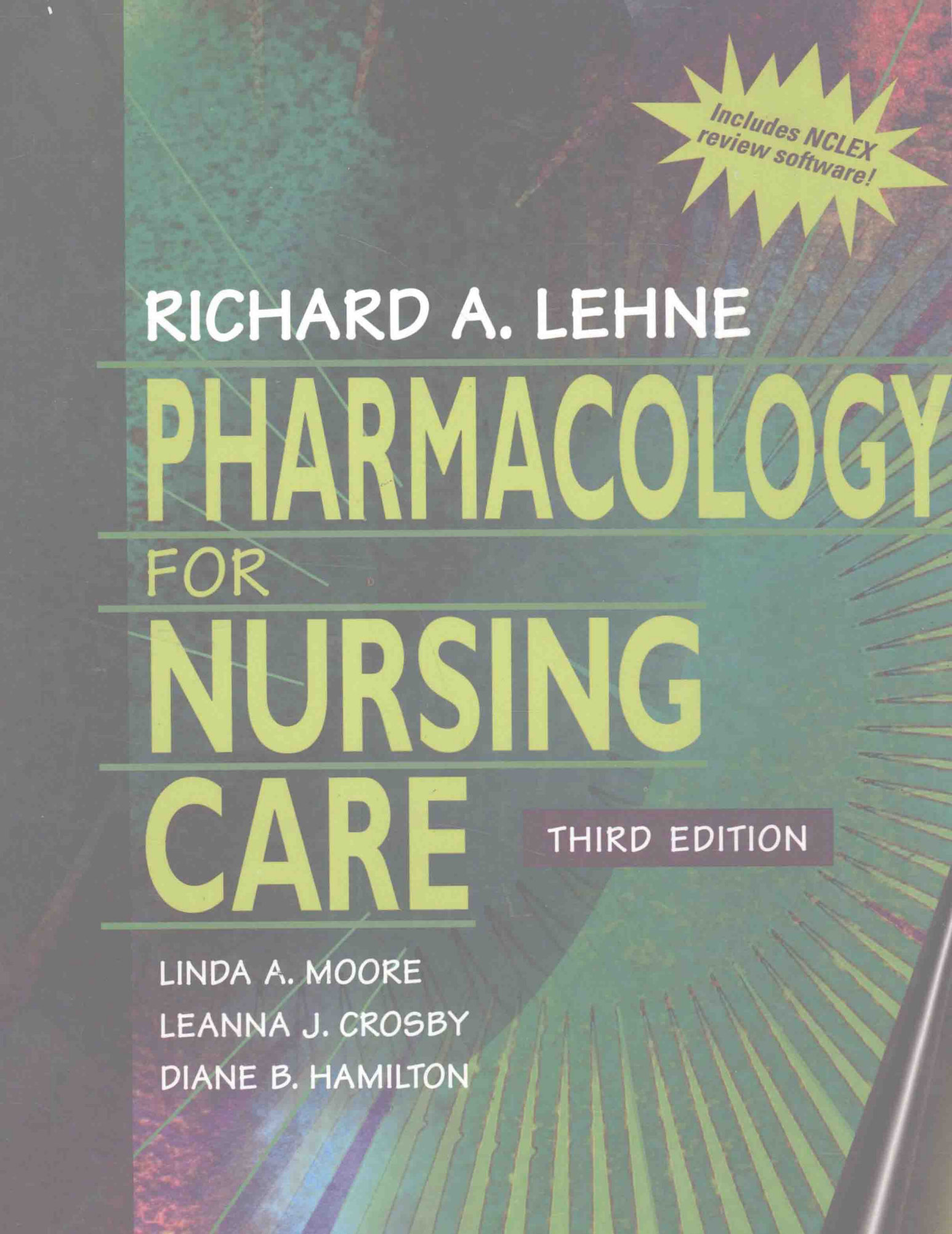
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PHARMACOLOGY
FOR
NURSING
CARE
THIRD EDITION
LINDA A. MOORE
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Pharmacology *for* Nursing Care

THIRD EDITION

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W. B. SAUNDERS COMPANY
A Division of Harcourt Brace & Company
PHILADELPHIA LONDON TORONTO MONTREAL SYDNEY TOKYO

W.B. SAUNDERS COMPANY
A Division of Harcourt Brace & Company

The Curtis Center
Independence Square West
Philadelphia, Pennsylvania 19106

Library of Congress Cataloging-in-Publication Data

Lehne, Richard A.
Pharmacology for nursing care / Richard A. Lehne; in consultation with Linda A. Moore, Leanna J. Crosby, Diane B. Hamilton.—3rd ed.
p. cm.
Includes bibliographical references and index.
ISBN 0-7216-7150-0
1. Pharmacology. 2. Nursing. I. Title.
[DNLM: 1. Pharmacology—nurses' instruction. 2. Drug Therapy—nurses' instruction. QV 4 L523p 1998]
RM301.P457 1998
615'.1—dc21
DNLM/DLC 97-39758

PHARMACOLOGY FOR NURSING CARE ISBN 0–7216–7150–0

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Printed in the United States of America

Last digit is the print number: 9 8 7 6 5 4 3 2

Pharmacology *for* Nursing Care

THIRD EDITION

Dedicated to the memory of
Elmer and Rellen Perry

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Biographic Information

Richard A. Lehne, PhD, received his BA from Drew University and his doctorate in pharmacology from George Washington University. His involvement in nursing education began 19 years ago at the University of Virginia School of Nursing, where he taught undergraduate and graduate courses and was voted best teacher by his students. He has also taught at the University of Arizona in both the School of Nursing and School of Pharmacy. Today, Dr. Lehne lives in Charlottesville, VA, where he is occupied with writing, giving the occasional guest lecture, and dancing as often as possible.

Linda A. Moore, EdD, RN, is an Associate Professor at the University of North Carolina at Charlotte. She received her BSN from Duke University and her MSN and EdD from the University of Virginia. Her teaching responsibilities encompass courses for undergraduate (RN to BSN) and graduate students. Her major clinical and research interests are cardiovascular nursing and gerontologic nursing. Dr. Moore is a member of the North Carolina Nurses' Association and Sigma Theta Tau.

Leanna J. Crosby, DNSc, RN, GNP-C, received her diploma in nursing from St. Luke's Hospital School of Nursing, her baccalaureate and master's degrees from the University of Virginia, and her doctorate in nursing science from Catholic University of America. Also, she completed the adult nurse practitioner program at the University of Virginia and the gerontologic nurse practitioner program at the University of Arizona. Dr. Crosby has done extensive research in chronic rheumatoid disease, and has taught physiology and pathophysiology to a generation of appreciative graduate and undergraduate students. Currently, she is working as a nurse practitioner within the Department of Veteran Affairs, Tucson VA Medical Center, and is an Adjunct Associate Professor at the University of Arizona College of Nursing.

Dr. Crosby is a member of the American Nurses Association, Sigma Theta Tau, and the Arizona Nurses' Association, and serves on the Arizona State Board of Nursing Advanced Practice Committee. In addition, she is chair of the Advanced Practice Nursing Council at the Tucson VA and serves as the VISN 18 (Arizona, Texas, and New Mexico) coordinator for the Advanced Practice Nursing Network. At the local level, she is chairperson for the Tucson VA IACUC Animal Research Committee and serves on the Research and Development Committee, Research Panel, of the Nurse Professional Standards Board, and the Pharmacy and Therapeutics Committee.

Diane B. Hamilton, PhD, RN, received her BA from Northwestern University, her BSN from West Texas State University, her MA in Community Mental Health and Gerontologic Nursing from the University of Iowa, and her PhD in Psychosocial Nursing and Nursing History from the University of Virginia. She has extensive experience in psychiatric nursing, including serving as attending nurse at the Institute of Psychiatry of the Medical University of South Carolina. She has taught psychiatry and behavioral science to medical students, and gerontology, community health, psychiatric nursing, and nursing history to nursing students. Currently, she is an Associate Professor in the School of Nursing at Western Michigan University, where she teaches psychiatric nursing and nursing history and does nursing history research.

Dr. Hamilton is a member of the American Nurses Association, the American Association of the History of Nursing, the American Association for the History of Medicine, the American Association of University Women, and Sigma Theta Tau. In addition, she is an Associate of the Susan B. Anthony Center. Dr. Hamilton is a recipient of the Best of *Image* Award in nursing history, the Lavinia Dock Award for historical scholarship, the Best Investigator Award from the University of Rochester, and the Golden Apple Teaching Award from the Medical University of South Carolina.

Preface to the Third Edition

Overview of the Book

Welcome to the third edition of *Pharmacology for Nursing Care*, the pharmacology text that students *like* to read. This edition, like the first and second, was written to be a true textbook—that is, a book that focuses on essentials and downplays secondary details. To give the book its focus, three principal techniques are employed: (1) teaching through prototypes, (2) use of large print for essential information and small print for secondary information, and (3) limiting discussion of adverse effects and drug interactions to ones that are of particular clinical significance. To reinforce the relationship between pharmacologic knowledge and nursing practice, nursing implications are integrated into the body of each chapter. In addition, to provide rapid access to nursing content, nursing implications are summarized at the end of most chapters, using a nursing process format. As in the prior two editions, this edition emphasizes conceptual material, thereby reducing rote memorization, promoting comprehension, and increasing reader friendliness. For a more detailed description of the book's distinguishing features, please refer to the preface to the first edition, which is reprinted herein.

New in This Edition

All chapters have been revised, some extensively. Topics with significantly expanded coverage include asthma, osteoporosis, hormone replacement therapy, attention-deficit/hyperactivity disorder, Alzheimer's disease, and HIV infection.

Over 100 new drugs have been added. These include angiotensin II receptor antagonists (for hypertension), protease inhibitors (for HIV infection), bisphosphonates (for osteoporosis), low-molecular-weight heparins (for thrombosis), 6 new drugs for diabetes, and 10 new drugs for cancer.

In addition to undergoing general revision, the book contains seven new chapters, two new appendices, a new unit on life span issues, a summary of key points for each chapter, and computer software for students. Also, we will offer updates on the World Wide Web.

New Chapters

In response to developments in pharmacotherapy and suggestions from students and teachers, I have added seven new chapters:

- *Drug Therapy During Pregnancy and Breast Feeding*
- *Drugs for Other Psychologic Disorders* (drugs for panic disorder, obsessive-compulsive disorder, and Alzheimer's disease)
- *Review of Hemodynamics*
- *Review of the Immune System*
- *Pediatric Immunization*
- *Drugs for HIV Infection and Related Opportunistic Infections*
- *Miscellaneous Noteworthy Drugs* (drugs for obesity, respiratory distress syndrome, benign prostatic hyperplasia, cystic fibrosis, and amyotrophic lateral sclerosis [Lou Gehrig's disease])

New Unit: Drug Therapy Across the Life Span

In prior editions, information on life span issues was spread throughout the introductory chapters. In this edition, life span–related content has been consolidated into its own unit. In addition, discussion of several life span topics (e.g., teratogenesis) has been greatly expanded. The new unit has three chapters:

- *Drug Therapy During Pregnancy and Breast-Feeding*
- *Drug Therapy in Pediatric Patients*
- *Drug Therapy in Geriatric Patients*

New Appendices

This edition contains two new appendices. One addresses gender-related content and one addresses drug-related information on the Internet.

- *Guide to Gender-Related Drugs.* Because this book is structured largely on the basis of pharmacologic drug classes, information on drugs employed for gender-related therapy is scattered throughout the book. This guide is intended as a quick reference to these

drugs. Topics addressed in the guide include eclampsia, suppression of preterm labor, hormone replacement therapy, emergency postcoital contraception, impotence, and benign prostatic hyperplasia.

- *Drug-Related Information on the Internet.* The Internet offers a vast amount of information on pharmacology and therapeutics. This appendix provides a directory of selected Internet sites where you can find reliable drug-related information.

Key Points

A list of key points has been added to each chapter, providing a concise summary of chapter content. The list is intended to give additional guidance regarding content to focus on.

Computer Software

The enclosed software consists of (1) NCLEX-style review questions plus (2) a data base of the 200 most commonly used drugs, from which students can generate their own drug cards. The information on the software comes from *Saunders Nursing Drug Handbook.*

Updates on the Web

Pharmacology undergoes steady and sometimes rapid evolution. Important new drugs are introduced every year; uses for older drugs change; and previously unknown toxicities of available drugs may be revealed. As a result, a pharmacology text can quickly become outdated. Accordingly, in order to keep this text current, we will provide periodic updates on the World Wide Web. For details on these updates, please contact your W.B. Saunders Educational Sales Representative or our sales support staff (1-800-544-0292).

Ancillaries

Teaching Aids: Transparencies, Instructor's Manual, Test Bank

A Transparency Set, Instructor's Manual, and Test Bank are available at no charge to teachers using this text. The Transparency Set (ISBN no. 0-7216-7152-7) contains 100 color transparencies of figures from the text. The Instructor's Manual (0-7216-7151-9) contains suggestions for setting up a pharmacology course, case studies, lecture notes, and more. The Test Bank consists of NCLEX-style questions and is available in two formats: computerized ExaMaster (0-7216-7153-5) and print (0-7216-7404-6). To obtain these teaching aids, contact your W.B. Saunders Educational Sales Representative. If you don't know who your representative is, you can find out by calling W.B. Saunders sales support at 1-800-544-0292.

Student Study Guide

The Study Guide (ISBN no. 0-7216-7069-5) is new with this edition and features critical thinking exercises along with various review and learning activities.

Your Comments are Welcome

I would like to hear from you. All feedback is welcome. Suggestions for improving the book are especially helpful, as are reports of mistakes (small or large) that you may spot. Of course, I also like to hear from readers who simply have something nice to say. You can reach me via the Internet at *lehne@adelphia.net* or *ral4f@virginia.edu* or via U.S. mail care of W.B. Saunders Company.

RICHARD A. LEHNE

Preface to the First Edition

Pharmacology pervades all phases of nursing practice and relates directly to patient care and patient education. Despite its pervasiveness and importance, pharmacology remains an area in which students, practitioners, and teachers are often uneasy. Much of this uneasiness stems from traditional approaches to the subject, in which memorization of details takes precedence over understanding. In this text, the opposite approach is taken. Here, the guiding principle is to establish a basic understanding of drugs, after which secondary details can be learned as needed.

This text was written with two major objectives. The first is to help nursing students establish a knowledge base in the basic science of drugs. The second is to demonstrate how that knowledge can be directly applied in providing patient care and patient education. To achieve these goals, several innovative techniques are employed. These are described below.

Laying Foundations in Basic Principles. Understanding drugs requires a strong foundation in basic pharmacologic principles. To establish this foundation, major chapters are dedicated to the following topics: basic principles that apply to all drugs (Chapters 5 through 9), basic principles of neuropharmacology (Chapter 13), basic principles of antimicrobial chemotherapy (Chapter 77), and basic principles of cancer chemotherapy (Chapter 95).

Reviewing Physiology and Pathophysiology. To understand the actions of a drug, we must first understand the biologic systems that the drug influences. For all major drug families, relevant physiology and pathophysiology are reviewed. Reviews are presented at the beginning of each chapter, rather than in a systems review at the beginning of a unit. For example, in the unit on cardiovascular drugs, which includes separate chapters on hypertension, angina pectoris, heart failure, myocardial infarction, and dysrhythmias, reviews of relevant physiology and pathophysiology begin *each chapter*. This juxtaposition of pharmacology, physiology, and pathophysiology is designed to facilitate understanding of the interrelationships among these subjects.

Teaching Through Prototypes. Within each drug family, we can usually identify one agent that embodies the features that characterize all members of the group. Such a drug can be viewed as a prototype. Since other family members are generally very similar to the prototype, to know the prototype is to know the basic properties of all group members.

The benefits of teaching through prototypes can best be appreciated with an example. Let's consider the nonsteroidal anti-imflammatory drugs (NSAIDs), a family that includes aspirin, ibuprofen [Motrin, others], naproxen [Naprosyn, Anaprox], indomethacin [Indocin], and more than 20 other drugs. Traditionally, information on these drugs is presented in a series of paragraphs describing each drug in turn. When attempting to study from such a list, students are likely to learn many drug names and little else; the important concept of similarity among family members is easily lost. In this text, the family prototype—aspirin—is discussed first and in depth. After this, instruction is completed by pointing out the relatively minor ways in which individual NSAIDs differ from aspirin. Not only is this approach more efficient than the traditional approach, it is also more effective in that similarities among family members are emphasized.

Large Print and Small Print: A Way to Focus on Essentials. Pharmacology is exceptionally rich in detail. There are many drug families, each with multiple members and each member with its own catalogue of indications, contraindications, adverse effects, and drug interactions. This abundance of detail confronts the teacher with the difficult question of what to teach, and confronts the student with the equally difficult question of what to study. Attempts to answer these questions can frustrate teacher and student alike. Even worse, in the presence of myriad details, basic concepts can become obscured.

To help establish a focus on essentials, this text employs two type sizes. Large print is intended to say, "On your first exposure to this topic, this is the core of information that you should learn." Small print is intended to say, "Here is additional information that you may want to learn after mastering the material in large print." As a rule, large print is reserved for prototypes, basic principles of pharmacology, and reviews of physiology and pathophysiology. Small print is used for secondary information about the prototypes and for discussion of drugs that are not prototypes. By employing this technique, we have been able to incorporate a large body of detail into this book without having that detail cloud the big picture. Furthermore, because the technique highlights essentials, it minimizes questions about what to teach and what to study.

The use of large and small print is especially valuable for discussing adverse effects and drug interactions. Most drugs are associated with many adverse effects and interactions. As a rule, however, only a few of these are note-

worthy. In traditional texts, practically all adverse effects and interactions are presented, creating long and tedious lists. In this text, those few adverse effects and interactions that are especially characteristic are highlighted through presentation in large print; the remainder are noted briefly in small print. As a result, rather than overwhelming students with a long and forbidding list, which can impede comprehension, the approach employed here, by delineating a moderate body of important information, serves to promote comprehension.

Nursing Implications: Demonstrating the Application of Pharmacology to Nursing Practice. The principal reason for asking a nursing student to learn pharmacology is to enhance his or her ability to care for and educate patients. To show students how they can apply pharmacologic knowledge to nursing practice, nursing implications are *integrated into the body of each chapter.* That is, as specific drugs and drug families are discussed, the nursing implications inherent in the pharmacologic information are discussed side-by-side with the basic science. To facilitate access to nursing information, nursing implications are also *summarized at the end of most chapters.* These summaries should serve to reinforce the information presented in the main text.

In chapters that are especially brief or that address drugs that are infrequently used, summaries of nursing implications have been omitted. However, even in these chapters, nursing implications are incorporated into the chapter body.

A Note About Drug Therapy. Throughout this text, as we discuss specific drug families (e.g., beta-adrenergic blockers), we discuss the clinical applications of those drugs. Similarly, in chapters that focus on specific diseases (e.g., Parkinson's disease, hypertension), we indicate which drugs are generally considered most appropriate for treatment. However, it is important to note that clinical applications of individual drugs may change over time: a drug may acquire new indications that are not discussed here, or it may cease to be used for indications that *are* discussed here. Likewise, drug therapy of specific diseases is continually evolving: as superior drugs are developed, they tend to replace older, less desirable agents. Accordingly, although the drug therapies presented in this text reflect a general consensus on what is considered best *today*, these therapies may not be considered best a few years from now—and, in therapeutic areas where there is controversy or where change is especially rapid, the treatments discussed here may be considered inappropriate by some clinicians right now.

About Dosage Calculations. Unlike many nursing pharmacology texts, this one has no section on dosage calculation. The reasons for this departure from tradition are twofold. First, adequate presentation of this important subject simply isn't feasible in a text dedicated to the basic science of drugs; the amount of space that can be allotted is too small. Second, thanks to the availability of several excellent publications on the subject (e.g., *Clinical Calculations*, W.B. Saunders Company), the need to include this information in pharmacology texts has been obviated.

Ways to Use This Textbook. Because of its focus on essentials, this text is especially well suited to serve as the primary text for courses dedicated specifically to pharmacology. In addition, the book's focused approach makes it a valuable resource for pharmacologic instruction within integrated curriculums and for self-directed learning by students and practitioners.

RICHARD A. LEHNE

Acknowledgments

I want to begin by thanking everyone involved at W.B. Saunders Company for the unconditional support they've given this book over the past 12 years—despite having to deal with an occasionally (some might say notoriously) cantankerous author. For this edition, it has been my good fortune to work with Maura Connor, my editor at Saunders. Maura brought to the project a refreshing blend of warmth, energy, enthusiasm, and attention to detail, along with an exemplary work ethic and remarkable ability to jump start the procrastinating soul (usually). In addition, I would like to express long-overdue public appreciation to the Educational Sales Representatives at Saunders, whose professionalism and hard work have contributed immeasurably to the success of this book.

In writing this edition, as in the first and second, I have enjoyed the wise counsel, good humor, and warm friendship of Drs. Linda A. Moore, Diane B. Hamilton, and Leanna J. Crosby. Special appreciation is due Dr. Moore for updating the Instructor's Manual and creating the new Study Guide that accompanies this edition.

It has been my pleasure to work closely with Boris Starosta, the artist who rendered the elegant new illustrations for this edition. Boris routinely made adjustments to my rough sketches that greatly improved both their visual appeal and power of communication.

I want to thank two contributors: Dr. Theodore G. Tong, who produced the new appendix on drug-related Internet resources, and Dr. Alfred J. Rémillard, who updated the appendix on Canadian drug information, which he wrote originally for the first edition of this text.

I am grateful to Dr. David Benjamin, whose careful review and detailed comments greatly improved Chapter 62 (*Review of the Immune System*). Likewise, I am grateful to Dr. Denis O'Brien for both his critique of Chapter 88 (*Drugs for HIV Infection and Related Opportunistic Infections*) as well as years of friendship and enthusiastic support.

Once the writing is done, a manuscript must be made into a book—a process that can be an author's worst nightmare. However, for this edition, the process was a dream—thanks to the all-star team assembled by Berta Steiner. In addition to Berta herself, I have the highest praise and gratitude for my copy editor—Megan Westerfeld—who did the painstaking job of transmuting the manuscript into its final form, and for Bob Elliott and his colleagues who did a flawless job of transforming the copy-edited manuscript into the book you hold in your hands.

I am deeply grateful to Dr. Alan Agins, friend and colleague, who adopted this text for his class at the University of Virginia and has since shamelessly promoted it while teaching updates in pharmacology to advanced practice nurses throughout the country. Apparently, association with me has not convinced Alan that writing is a hard way to earn a living, given that he has just completed a book of his own.

To conclude, I want to thank the friends and associates who have provided comfort, encouragement, and diversion over the past 20 months as this revision took form. Heading the list are Jean Gratz and Bill Curtis, two longtime friends whose love and humor have buoyed my spirits through three editions of this book. As in the past, Bill continues to find time for frequent and prolonged commiserations, despite the demands of maintaining the formularies at his two dispensaries—C.S.T. and Tastings—where members of his amiable staff, notably Tom Bjornsen and Gordon Maxwell, have catered to my pharmacologic needs for years. At the same venue, I have enjoyed the camaraderie of the LB Club, whose distinguished members include Petie and the Bobs (Sorry. Club rules prohibit disclosing surnames.) as well as Dr. Christopher Perry, our astute, albeit absentee, club physician. Finally, I want to thank my friends in the Charlottesville dance community—most especially my new and very dear partner.

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CONTENTS

Unit I Introduction

1 Orientation to Pharmacology 3

2 Application of Pharmacology in Nursing Practice 7

3 Pharmacology and the Nursing Process 12

4 Drug Legislation, Development, Names, and Information 18

Unit II Basic Principles of Pharmacology

5 Pharmacokinetics 29

6 Pharmacodynamics 49

7 Drug-Drug and Drug-Food Interactions 61

8 Adverse Drug Reactions 67

9 Individual Variation in Drug Responses 71

Unit III Drug Therapy across the Life Span

10 Drug Therapy during Pregnancy and Breast-Feeding 79

11 Drug Therapy in Pediatric Patients 85

12 Drug Therapy in Geriatric Patients 89

Unit IV Peripheral Nervous System Drugs

Introduction

13 Basic Principles of Neuropharmacology 97

14 Physiology of the Peripheral Nervous System 103

Cholinergic Drugs

15 Muscarinic Agonists and Antagonists 121

16 Cholinesterase Inhibitors 129

17 Neuromuscular Blocking Agents and Ganglionic Blocking Agents 137

Adrenergic Drugs

18 Adrenergic Agonists 151

19 Adrenergic Antagonists 164

20 Indirect-Acting Antiadrenergic Agents 176

Unit V Central Nervous System Drugs

Introduction

21 Introduction to Central Nervous System Pharmacology 187

Neurologic Drugs

22 Drugs for Parkinson's Disease 193

23 Drugs for Epilepsy 204

24 Drugs for Muscle Spasm and Spasticity 221

Analgesics and Anesthetics

25 Opioid (Narcotic) Analgesics 229

26 Local Anesthetics 253

27 General Anesthetics 260

28 Drugs for Headache 270

Psychotherapeutic Drugs

29 Antipsychotic Agents and Their Use in Schizophrenia 279

30 Antidepressants 297

31 Drugs for Bipolar Disorder 314

32 Benzodiazepines and Other Drugs for Anxiety and Insomnia 321

33 Central Nervous System Stimulants and Their Use in Attention-Deficit/Hyperactivity Disorder 340

34 Other Psychologic Disorders: Panic Disorder, Obsessive-Compulsive Disorder, and Alzheimer's Disease 349

Drug Abuse

35 Drug Abuse: Basic Considerations 359

36 Drug Abuse: Alcohol 365

37 Drug Abuse: Opioids, Depressants, Psychostimulants, Marijuana, Psychedelics, Inhalants, and Nicotine 374

Unit VI Drugs That Affect Fluid and Electrolyte Balance

38 Diuretics 393

39 Agents Affecting the Volume and Ion Content of Body Fluids 406

Unit VII Cardiovascular Drugs

40 Review of Hemodynamics 413

41 Drugs Acting on the Renin-Angiotensin System 420

42 Calcium Channel Blockers 429

43 Vasodilators 438

44 Drugs for Hypertension 445

45 Drugs for Angina Pectoris 462

46 Drugs for Heart Failure 475

47 Management of Myocardial Infarction 490

48 Antidysrhythmic Drugs 496

49 Prophylaxis of Coronary Artery Disease: Drugs That Lower LDL-Cholesterol Levels 517

Unit VIII Drugs That Affect the Blood

50 Anticoagulants, Antiplatelet Drugs, and Thrombolytics 533

51 Drugs for Deficiency Anemias 552

52 Hematopoietic Growth Factors 566

Unit IX Endocrine Drugs

53 Drugs for Diabetes Mellitus 575

54 Drugs for Thyroid Disorders 596

55 Drugs Related to Hypothalamic and Pituitary Function 608

56 Drugs for Disorders of the Adrenal Cortex 616

57 Estrogens and Progestins 624

58 Birth Control 635

59 Drug Therapy of Infertility 649

60 Uterine Stimulants and Relaxants 659

61 Androgens 666

Unit X Anti-inflammatory, Antiallergic, and Immunologic Drugs

62 Review of the Immune System 675

63 Antihistamines 686

64 Aspirin-Like Drugs: Nonsteroidal Anti-inflammatory Drugs and Acetaminophen 695

65 Glucocorticoids in Nonendocrine Diseases 709

66 Drug Therapy of Rheumatoid Arthritis and Gout 720

67 Immunosuppressants 729

68 Pediatric Immunization 735

Unit XI Respiratory Tract Drugs

69 Drugs for Asthma 749

70 Drugs for Rhinitis, Cough, and Colds 765

Unit XII Gastrointestinal Drugs

71 Drugs for Peptic Ulcer Disease 773

72 Laxatives 787

73 Other Gastrointestinal Drugs 794

Unit XIII Metabolic Drugs

74 Vitamins 807

75 Drugs Affecting Calcium Levels and Bone Mineralization 814

76 Enteral and Parenteral Nutrition 830

Unit XIV Chemotherapy of Infectious Diseases

77 Basic Principles of Antimicrobial Therapy 837

78 Drugs That Weaken the Bacterial Cell Wall I: Penicillins 849

79 Drugs That Weaken the Bacterial Cell Wall II: Cephalosporins, Imipenem, Aztreonam, Vancomycin, and Teicoplanin 860

80 Bacteriostatic Inhibitors of Protein Synthesis: Tetracyclines, Macrolides, Clindamycin, Chloramphenicol, and Spectinomycin 870

81 Aminoglycosides: Bactericidal Inhibitors of Protein Synthesis 883

82 Sulfonamides and Trimethoprim 890

83 Drug Therapy of Urinary Tract Infections 899

84 Antimycobacterial Agents: Drugs for Tuberculosis, Leprosy, and *Mycobacterium avium* Complex Infection 906

85 Miscellaneous Antibacterial Drugs: Fluoroquinolones, Rifampin, Metronidazole, Polymyxins, and Bacitracin 920

86 Antifungal Agents 924

87 Antiviral Agents I: Drugs for Non-HIV Viral Infections 936

88 Antiviral Agents II: Drugs for HIV Infection and Related Opportunistic Infections 945

89 Drug Therapy of Sexually Transmitted Diseases 970

90 Antiseptics and Disinfectants 976

Unit XV Chemotherapy of Parasitic Diseases

91 Anthelmintics 983

92 Antiprotozoal Drugs I: Antimalarial Agents 988

93 Antiprotozoal Drugs II: Miscellaneous Agents 995

94 Ectoparasiticides 1001

Unit XVI Cancer Chemotherapy

95 Basic Principles of Cancer Chemotherapy 1007

96 Anticancer Drugs 1021

Unit XVII Additional Important Drugs

97 Drugs for the Eye 1045

98 Drugs for the Skin 1054

99 Miscellaneous Noteworthy Drugs 1064

Unit XVIII Toxicology

100 Management of Poisoning 1075

Appendices

A Guide to Gender-Related Drugs 1081

B Weights and Measures 1082

C Normal Laboratory Values 1083

D Commonly Used Abbreviations 1088

E Techniques of Drug Administration 1090
Linda A. Moore, MSN, EdD, RN

F Certified Regional Poison Control Centers 1096

G Canadian Drug Information 1101
Alfred J. Rémillard, PharmD

H Drug- and Health-Related Resources on the Internet 1119
Theodore G. Tong, PharmD

Index 1123

DETAILED CONTENTS

Unit I Introduction

1 Orientation to Pharmacology 3

Four Basic Terms 3
Properties of an Ideal Drug 4
The Therapeutic Objective 5
Factors That Determine the Intensity of Drug Responses 5

2 Application of Pharmacology in Nursing Practice 7

Evolution of Nursing Responsibilities Regarding Drugs 7
Application of Pharmacology in Patient Care 8
Application of Pharmacology in Patient Education 10

3 Pharmacology and the Nursing Process 12

Review of the Nursing Process 12
Application of the Nursing Process in Drug Therapy 13
Use of a Modified Nursing Process Format to Summarize Nursing Implications in This Text 16

4 Drug Legislation, Development, Names, and Information 18

Drug Regulation 18
New Drug Development 19
Drug Names 20
Sources of Drug Information 23

Unit II Basic Principles of Pharmacology

5 Pharmacokinetics 29

Application of Pharmacokinetics in Therapeutics 29
A Note to Chemophobes 30
Passage of Drugs Across Membranes 30
Absorption 33
Distribution 38
Metabolism 41
Excretion 42
Time Course of Drug Responses 44

6 Pharmacodynamics 49

Dose-Response Relationships 49
Drug-Receptor Interactions 51
Drug Responses That Do Not Involve Receptors 57
Interpatient Variability in Drug Responses 57
The Therapeutic Index 58

7 Drug-Drug and Drug-Food Interactions 61

Drug-Drug Interactions 61
Drug-Food Interactions 64

8 Adverse Drug Reactions 67

Scope of the Problem 67
Definitions 67
Identifying Adverse Drug Reactions 68
Adverse Reactions to New Drugs 70
Ways to Minimize Adverse Drug Reactions 70

9 Individual Variation in Drug Responses 71

Body Weight and Composition 71
Age 71
Pathophysiology 71
Tolerance 73
Placebo Effect 74
Genetics 74
Variability in Absorption 74
Failure to Take Medicine as Prescribed 75
Drug Interactions 75
Diet 75

Unit III Drug Therapy Across the Life Span

10 Drug Therapy during Pregnancy and Breast-Feeding 79

Drug Therapy during Pregnancy: Basic Considerations 79
Drug Therapy during Pregnancy: Teratogenesis 80
Drug Therapy during Breast-Feeding 83

11 Drug Therapy in Pediatric Patients 85

Pharmacokinetics: Neonates and Infants 85
Pharmacokinetics: Children 1 Year and Older 87
Adverse Drug Reactions 87
Dosage Determination 87
Promoting Compliance 88

12 Drug Therapy in Geriatric Patients 89

Pharmacokinetic Changes in the Elderly 89
Pharmacodynamic Changes in the Elderly 90
Adverse Drug Reactions and Drug Interactions 90
Promoting Compliance 91

Unit IV Peripheral Nervous System Drugs

Introduction

13 Basic Principles of Neuropharmacology 97

How Neurons Regulate Physiologic Processes 97
Basic Mechanisms by Which Neuropharmacologic Agents Act 98
Multiple Receptor Types and Selectivity of Drug Action 100
An Approach to Learning about Peripheral Nervous System Drugs 101

14 Physiology of the Peripheral Nervous System 103

Divisions of the Nervous System 103
Overview of Autonomic Nervous System Functions 103
Basic Mechanisms by Which the Autonomic Nervous System Regulates Physiologic Processes 104
Anatomic Considerations 105
Introduction to Transmitters of the Peripheral Nervous System 106
Introduction to Receptors of the Peripheral Nervous System 107
Exploring the Concept of Receptor Subtypes 108
Locations of Receptor Subtypes 109
Functions of Cholinergic and Adrenergic Receptor Subtypes 110
Receptor Specificity of the Adrenergic Transmitters 113
Transmitter Life Cycles 113

Cholinergic Drugs

15 Muscarinic Agonists and Antagonists 121

Muscarinic Agonists 121
Muscarinic Antagonists 123

16 Cholinesterase Inhibitors 129

Reversible Cholinesterase Inhibitors 129
"Irreversible" Cholinesterase Inhibitors 134

17 Neuromuscular Blocking Agents and Ganglionic Blocking Agents 137

Neuromuscular Blocking Agents 137
Ganglionic Blocking Agents 144

Adrenergic Drugs

18 Adrenergic Agonists 151

Mechanisms of Adrenergic Receptor Activation 151
Overview of the Adrenergic Agonists 152
Therapeutic Applications and Adverse Effects of Adrenergic Receptor Activation 154
Properties of Representative Adrenergic Agonists 157
Discussion of Adrenergic Agonists in Other Chapters 161

19 Adrenergic Antagonists 164

Alpha-Adrenergic Antagonists I: Therapeutic and Adverse Responses to Alpha Blockade 164
Alpha-Adrenergic Antagonists II: Properties of Individual Alpha Blockers 166
Beta-Adrenergic Antagonists I: Therapeutic and Adverse Responses to Beta Blockade 167
Beta-Adrenergic Antagonists II: Properties of Individual Beta Blockers 169

20 Indirect-Acting Antiadrenergic Agents 176

Adrenergic Neuron Blocking Agents 176
Centrally Acting Alpha$_2$ Agonists 178

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