

Contents

Contributors ix
Preface xv
Acknowledgments xvii

Section I **General Principles 1**

1. Drug Discovery: From Medicinal Plants to Computer-Aided Drug Design	3
Michael K. Gilson and Laurence L. Brunton	
2. Pharmacokinetics: The Dynamics of Drug Absorption, Distribution, Metabolism, and Elimination	23
Iain L. O. Buxton	
3. Pharmacodynamics: Molecular Mechanisms of Drug Action	43
David R. Manning and Donald K. Blumenthal	
4. Membrane Transporters and Drug Response	79
Kathleen M. Giacomini and Yuichi Sugiyama	
5. Drug Metabolism	101
Frank J. Gonzalez and Michael Coughtrie	
6. The Gastrointestinal Microbiome and Drug Response	119
Shirley M. Tsunoda, Pieter C. Dorrestein, and Rob Knight	
7. Pharmacogenetics and Pharmacogenomics	131
Dan M. Roden and Sara L. Van Driest	
8. Postmarketing Drug Safety	145
C. Michael Stein and Wayne A. Ray	
9. Principles of Clinical Toxicology	155
Amberly R. Johnson and Kaitlyn M. Brown	

Section II **Neuropharmacology 171**

10. Neurotransmission: The Autonomic and Somatic Motor Nervous Systems	173
Rebecca Petre Sullivan, Steven R. Houser, and Walter J. Koch	
11. Muscarinic Receptor Agonists and Antagonists	207
Joan Heller Brown, Katharina Brandl, and Jürgen Wess	
12. Anticholinesterase Inhibitors and Reactivators	221
Palmer Taylor	
13. Neuromuscular Junction and Autonomic Ganglia; Nicotine, Muscle Relaxants, and Spasmolytics	235
Ryan E. Hibbs and Alexander C. Zambon	
14. Adrenergic Agonists and Antagonists	251
Douglas G. Tilley, Steven R. Houser, and Walter J. Koch	
15. 5-Hydroxytryptamine (Serotonin) and Dopamine	285
Charles D. Nichols, Susan G. Amara, and David R. Sibley	
16. Neurotransmission in the Central Nervous System	305
R. Benjamin Free, Suzanne M. Underhill, Susan G. Amara, and David R. Sibley	
17. The Blood-Brain Barrier and Its Influence on Drug Transport to the Brain	327
Richard Daneman, Margareta Hammarlund-Udenaes, and Eric V. Shusta	

18. Drug Therapy of Depression and Anxiety Disorders	343
James M. O'Donnell, Robert R. Bies, and Aislinn J. Williams	
19. Pharmacotherapy of Psychosis and Mania	357
Jonathan M. Meyer	
20. Pharmacotherapy of the Epilepsies	385
Cameron S. Metcalf, Misty D. Smith, and Karen S. Wilcox	
21. Treatment of Central Nervous System Degenerative Disorders	413
Erik D. Roberson and Talene A. Yacoubian	
22. Hypnotics and Sedatives	427
S. John Mihic and Jody Mayfield	
23. Opioid Analgesics	443
Emily M. Jutkiewicz and John R. Traynor	
24. General Anesthetics and Therapeutic Gases	471
Jerry Ingrande, Matthew L. Pearn, and Hemal H. Patel	
25. Local Anesthetics	489
William A. Catterall and Kenneth Mackie	
26. Cannabinoids	505
Matthew N. Hill and Kenneth Mackie	
27. Ethanol	519
Jody Mayfield and S. John Mihic	
28. Drug Use Disorders and Addiction	531
Christine Konradi and Yasmin L. Hurd	

Section III **Modulation of Pulmonary, Renal, and Cardiovascular 555**

29. Drugs Affecting Renal Excretory Function	557
Edwin K. Jackson	
30. Renin and Angiotensin	585
Krishna Sriram and Paul A. Insel	
31. Treatment of Ischemic Heart Disease	607
Thomas Eschenhagen	
32. Treatment of Hypertension	625
Thomas Eschenhagen	
33. Therapy of Heart Failure	647
Thomas Eschenhagen	
34. Antiarrhythmic Drugs	667
Bjorn C. Knollmann, Dan M. Roden, and Katherine T. Murray	
35. Treatment of Pulmonary Arterial Hypertension	695
Dustin R. Fraidenburg, Ankit A. Desai, Ayako Makino, and Jason X.-J. Yuan	
36. Blood Coagulation and Anticoagulant, Fibrinolytic, and Antiplatelet Drugs	709
Jeffrey I. Weitz	
37. Drug Therapy for Dyslipidemias	729
Natalia Ruiz-Negrón and Donald K. Blumenthal	

Section IV

**Inflammation, Immunomodulation,
and Hematopoiesis 747**

- 38. Introduction to Immunity and Inflammation..... 749
Michael David
- 39. Immunosuppressants, Immunomodulation, and Tolerance..... 769
Carla V. Rothlin and J. Silvio Gutkind
- 40. Immune Globulins and Vaccines 793
Roberto Tinoco and James E. Crowe, Jr.
- 41. Lipid-Derived Autacoids: Eicosanoids and Platelet-Activating Factor..... 815
Emanuela Ricciotti, Tilo Gresser, and Garret A. FitzGerald
- 42. Pharmacotherapy of Inflammation, Fever, Pain, and Gout..... 829
Tilo Gresser, Emanuela Ricciotti, and Garret A. FitzGerald
- 43. Histamine, Bradykinin, and Their Antagonists 857
Bruce L. Zuraw and Sandra C. Christiansen
- 44. Pulmonary Pharmacology 875
Peter J. Barnes
- 45. Hematopoietic Agents: Growth Factors, Minerals, and Vitamins..... 899
Michael Choi and Thomas J. Kipps

Section V

Endocrine Pharmacology 921

- 46. Introduction to Endocrinology: The Hypothalamic-Pituitary Axis..... 923
Dequina A. Nicholas and Mark A. Lawson
- 47. Thyroid and Antithyroid Drugs..... 941
Ronald J. Koenig and Gregory A. Brent
- 48. Estrogens, Progestins, and the Female Reproductive Tract..... 959
Ellis R. Levin, Wendy S. Vitek, and Stephen R. Hammes
- 49. Androgens and the Male Reproductive Tract 991
Peter J. Snyder
- 50. Adrenocorticotropic Hormone, Adrenal Steroids, and the Adrenal Cortex..... 1003
Christopher J. Hupfeld and Jorge Iñiguez-Lluhi
- 51. Endocrine Pancreas and Pharmacotherapy of Diabetes Mellitus and Hypoglycemia 1023
Alvin C. Powers and David D'Alessio
- 52. Agents Affecting Mineral Ion Homeostasis and Bone Turnover 1049
Thomas D. Nolin and Peter A. Friedman

Section VI

Gastrointestinal Pharmacology 1071

- 53. Pharmacotherapy for Gastric Acidity, Peptic Ulcers, and Gastroesophageal Reflux Disease..... 1073
Keith A. Sharkey and Wallace K. MacNaughton
- 54. Gastrointestinal Motility and Water Flux, Emesis, and Biliary and Pancreatic Disease..... 1085
Keith A. Sharkey and Wallace K. MacNaughton
- 55. Pharmacotherapy of Inflammatory Bowel Disease 1111
Wallace K. MacNaughton and Keith A. Sharkey

Section VII

Chemotherapy of Infectious Diseases 1125

Section Editor: Conan MacDougall

- 56. General Principles of Antimicrobial Therapy 1127
Conan MacDougall
- 57. DNA Disruptors: Sulfonamides, Quinolones, and Nitroimidazoles 1137
Conan MacDougall

- 58. Cell Envelope Disruptors: β -Lactam, Glycopeptide, and Lipopeptide Antibacterials..... 1147
Conan MacDougall
- 59. Miscellaneous Antibacterials: Aminoglycosides, Polymyxins, Urinary Antiseptics, Bacteriophages 1167
Conan MacDougall and Robert T. Schooley
- 60. Protein Synthesis Inhibitors 1179
Conan MacDougall
- 61. Antifungal Agents 1193
P. David Rogers and Damian J. Krysan
- 62. Antiviral Agents (Nonretroviral) 1211
Edward P. Acosta
- 63. Treatment of Viral Hepatitis (HBV/HCV) 1227
Jennifer J. Kiser
- 64. Antiretroviral Agents and Treatment of HIV Infection..... 1245
Charles W. Flexner
- 65. Chemotherapy of Tuberculosis and Nontuberculous Mycobacteria, Including Leprosy 1267
Elisa H. Ignatius and Kelly E. Dooley
- 66. Chemotherapy of Malaria 1289
Abdoulaye A. Djimdé and Steve M. Taylor
- 67. Chemotherapy of Protozoal Infections: Amebiasis, Giardiasis, Trichomoniasis, Trypanosomiasis, Leishmaniasis, and Other Protozoal Infections..... 1309
Dawn M. Wetzel and Margaret A. Phillips
- 68. Chemotherapy of Helminth Infections 1325
Jennifer Keiser, James McCarthy, and Peter Hotez

Section VIII

Pharmacotherapy of Neoplastic Disease 1335

Section Editor: Anton Wellstein

- 69. General Principles in the Pharmacotherapy of Cancer..... 1337
Anton Wellstein
- 70. Cytotoxics and Antimetabolites 1343
Anton Wellstein and Edward A. Sausville
- 71. Protein Kinase Inhibitors and Pathway-Targeted Small Molecules 1381
Anton Wellstein and Giuseppe Giaccone
- 72. Antibodies, CAR T Cells, and Proteins to Treat Cancer..... 1415
Anton Wellstein and Michael B. Atkins
- 73. Hormones, Hormone Receptor Antagonists, and Related Agents in the Therapy of Cancer 1435
Claudine Isaacs, Kerry L. Burnstein, and Anna T. Riegel

Section IX

Special Systems Pharmacology 1451

- 74. Ocular Pharmacology..... 1453
Upneet K. Bains, Zeba A. Syed, Jeffrey D. Henderer, and Christopher J. Rapuano
- 75. Dermatological Pharmacology..... 1475
Matthew J. Sewell and Dean S. Morrell
- 76. Environmental Toxicology..... 1507
Allison K. Ehrlich

Appendices

- I. Design and Optimization of Dosage Regimens: Pharmacokinetic Data..... 1533
Isabelle Ragueneau-Majlessi, Jingjing Yu, and Nina Isoherranen
- II. Drug-Drug Interactions 1591
Isabelle Ragueneau-Majlessi, Jingjing Yu, and Nina Isoherranen

Index 1595