

Contents

<i>Preface to the Eighth Edition</i>	<i>vii</i>
<i>Competencies</i>	<i>xxi</i>
<i>Abbreviations</i>	<i>xxvii</i>

SECTION I: GENERAL PHARMACOLOGY

1. Principles of Pharmacology, Evidence-based Medicine and Routes of Drug Administration	2
Historical Aspects	2
Terminology	3
Sources of Drugs	4
Natural Sources	5
Synthetic	5
Biotechnology	5
Evidence-based Medicine (EBM)	5
Drug Formulations and Dosage Forms	6
Routes of Drug Administration	9
Systemic Routes	9
Local/Topical Application	15
2. Pharmacokinetics	16
Transport of Drugs across Biological Membranes	17
Absorption	18
Bioavailability	21
Equivalence	22
Distribution	22
Volume of Distribution (V)	24
Biotransformation (Metabolism)	25
Enzymes in Biotransformation	27
Phases of Biotransformation Reactions	27
Enzyme Induction	30
Excretion	32
Clinical Pharmacokinetics	33
Drug Dosage	35
Therapeutic Drug Monitoring	36
Methods of Prolonging Drug Action	37
3. Pharmacodynamics	38
Mechanisms of Drug Action	38
Receptor	39
Dose Response Relationship	45
Drug Synergism and Antagonism	47
Antagonism	48
Factors that Modify the Effects of Drugs	50
Patient Compliance	56
4. Adverse Drug Reactions, Pharmacovigilance and Drug Interactions	57
Adverse Drug Reactions	57
Drug Allergy	58
Hepatotoxicity	60
Treatment of Drug Overdosage	62
Pharmacovigilance	62
Counterfeit Drugs	64
Drug Interactions	64
5. Drug Nomenclature, Drug Development, Drug Regulations, Essential Medicines, Prescriptions and Related Topics	66
Drug Nomenclature	66
Drug Development	66
Drug Information Sources	69
Pharmacoeconomics	70
Chronopharmacology	70
Essential Medicines	71
Rational Drug Use	71
P-drugs	72
Drug Regulations	73
Prescription Writing	73
Parts of the Prescription	74
Types of Prescriptions	75

SECTION II: AUTONOMIC NERVOUS SYSTEM

6. Adrenergic Agonists and Antagonists	78
Overview	78
Autonomic Innervation	79
Adrenergic Transmission	80
Adrenergic Drugs	82
Adrenaline	83

- Noncatecholamines 88
- Alpha Receptor Agonists 90
- β 2 Stimulants 91
- β 3 Agonists 92
- Anorectic Agents (Anorexiant) 92
- Catecholamine Reuptake Inhibitors 92
- Adrenergic Antagonists 93
- α -adrenergic blocking agents 93
- Selective α 1 blockers 94
- Selective α 2 blocker 95
- β -Adrenergic Blocking Agents 97
- Drugs Used in Treatment Of Glaucoma 102

7. Cholinergic and Anticholinergic Drugs 106

- Cholinergic Drugs 108
- Cholinomimetic Alkaloids 110
- Indirectly Acting Cholinergic Drugs 110
- Treatment of Myasthenia Gravis 115
- Anticholinergic Drugs 117

8. Skeletal Muscle Relaxants 124

- Peripherally Acting Skeletal Muscle Relaxants 124
- Directly Acting Muscle Relaxants 129
- Centrally Acting Muscle Relaxants 130

SECTION III: AUTACOIDS AND RELATED DRUGS

9. Drugs Modulating Autacoids 134

- Histamine 134
- Histamine Antagonists (Antihistamines) 135
- 5-HT and Drugs Modulating 5-HT 139
- 5-Hydroxytryptamine (Serotonin) 139
- Ergot Alkaloids 141
- Drugs Used in the Treatment of Migraine 141
- Prostaglandins and Thromboxanes 143
- Leukotrienes 146
- Platelet Activating Factor 147

10. Nonsteroidal Anti-inflammatory Drugs (NSAIDs) 148

- Salicylates 149
- Propionic Acid Derivatives 154
- Acetic Acid Derivatives 154
- Fenamates 155
- Pyrazolone Derivatives 155
- Oxicams (Enolic Acid Derivatives) 155
- Preferential COX-2 inhibitors 155
- Selective COX-2 inhibitors 157
- Analgesic Antipyretic with Weak Anti-inflammatory Actions 158

11. Drugs Used in Rheumatoid Arthritis and Gout 161

- Nonsteroidal Anti-inflammatory Drugs 161
- Glucocorticoids 161
- Disease Modifying Anti-rheumatic Drugs (DMARDs) 162
- Pharmacotherapy of Gout 164

UNIT IV: ANAESTHETICS

12. Local Anaesthetics 170

- Introduction 170
- Chemistry 170
- Actions 172
- Adverse Effects 173
- Important Individual Compounds 174
- Uses of Local Anaesthetics 176

13. General Anaesthetics 180

- Introduction 180
- Stages of General Anaesthesia 180
- Mechanism of Action of General Anaesthetics 181
- Inhalational Anaesthetics 181
- Individual Anaesthetics 182
- Newer Anaesthetic 185
- Intravenous Anaesthetics 185
- Slower-acting Agents 188
- Preanaesthetic Medication (PAM) 190

SECTION V: CENTRAL NERVOUS SYSTEM

14. Sedative Hypnotics 194

- Introduction to CNS 194
- Excitatory Neurotransmitters 194
- Inhibitory Neurotransmitters 195
- Sedative hypnotics 196
- Benzodiazepines (BZDs) 197
- Newer Agents 202
- Barbiturates 203

15. Antiepileptic Drugs 206

- Types of Epilepsy 206
- Antiepileptics 207
- Phenytoin 209
- Phenobarbitone 212
- Carbamazepine 212
- Valproic Acid/Valproate 213
- Ethosuximide 214
- Benzodiazepines 214
- Newer Antiepileptics 214

16. Drugs Used in Neurodegenerative Disorders—Parkinsonism and Alzheimer's Disease 219

- Antiparkinsonian Drugs 219
- Dopamine Precursor 220
- Dopamine Receptor Agonists 222
- Drugs that inhibit DA metabolism 222
- Drugs that Release Dopamine 223
- Anticholinergics 224
- Drug-induced Parkinsonism 224
- Drugs Used in Alzheimer's Disease 225

17. Drugs Used in Psychiatric Disorders: Antipsychotics and Antianxiety Agents 226

- Antipsychotics (Neuroleptics) 227
- Chlorpromazine (CPZ) 228
- Individual Antipsychotics 232
- Antianxiety Drugs (Anxiolytics) 234

18. Antidepressants and Mood Stabilizers 236

- Reuptake Inhibitors 237
- Tricyclic Antidepressants 239
- Serotonin Norepinephrine Reuptake Inhibitors (SNRIs) 240
- Atypical Antidepressants 240
- MAO Inhibitors (MAOI) 241
- Newer Antidepressants 242
- Mood Stabilizers 243

19. Opioid Analgesics and Antagonists 247

- Analgesics 247
- Opioid Analgesics 248
- Morphine 248
- Pethidine (Meperidine) 254
- Mixed Agonists and Antagonists 259
- Opioid Antagonists 259

20. Alcohols 261

- Ethyl alcohol (Ethanol) 261
- Methyl alcohol (Methanol, Wood Alcohol) 264

21. CNS Stimulants and Drugs of Abuse 266

- Respiratory Stimulants 266
- Psychomotor Stimulants 266
- Convulsants 267
- Nootropics 267
- Drugs of Abuse and Addiction 268

SECTION VI: DRUGS ACTING ON THE KIDNEY

22. Diuretics and Antidiuretics 272

- Physiology of Urine Formation 272
- Diuretics 273

- Diuretics Acting on Proximal Tubule 274
- Drugs Acting on Loop of Henle 275
- Osmotic Diuretics 278
- Thiazides and Thiazide-like Diuretics 279
- Drugs Acting on Late DT and CD 281
- Potassium-Sparing Diuretics 281
- Antidiuretics 284

SECTION VII: BLOOD

23. Drugs Used in the Disorders of Coagulation 288

- Heparin 288
- Direct Thrombin Inhibitors (DTI) 292
- Oral Anticoagulants 292
- Thrombolytics (Fibrinolytics) 295
- Antifibrinolytics 297
- Antiplatelet Drugs 298
- COX Inhibitor 299
- Phosphodiesterase Inhibitor 299
- Coagulants 301
- Sclerosing Agents 303
- Plasma Expanders 303

SECTION VIII: CARDIOVASCULAR SYSTEM

24. Drugs Modulating Renin–Angiotensin–Aldosterone System 308

- Angiotensin 308
- Direct Renin Inhibitors 309
- Angiotensin-converting Enzyme Inhibitors (ACEI) 309
- Angiotensin Receptor Blockers (ARBs) 311
- Other Vasoactive Substances 313
- Vasoconstrictors 313
- Vasodilators 314

25. Calcium Channel Blockers 315

- Calcium Channels 315

26. Antihypertensive Drugs and Drugs Used in Shock 320

- Classification 320
- Diuretics 320
- Drugs acting on Renin-Angiotensin-Aldosterone System (RAAS) 322
- Sympatholytics 323
- Centrally Acting Sympatholytics 323
- Adrenergic Receptor Blockers 325
- Calcium Channel Blockers (CCBs) 326

Vasodilators 327
 Treatment of Hypertension 329
 Pulmonary hypertension 331
 Pharmacotherapy of Shock 331
 Intravenous Fluids 333

27. Treatment of Heart Failure and Pharmacology of Cardiac Glycosides 334

Physiological Considerations 334
 Drugs Used in Heart Failure 335
 Pharmacology of Cardiac Glycosides 339

28. Drugs Used in Ischaemic Heart Disease 343

Angina Pectoris 343
 Antianginal Drugs 344
 Nitrates 344
 Calcium Channel Blockers 347
 Other Drugs Used in Angina 348
 Pharmacotherapy of Angina 349
 Drugs Used in Myocardial Infarction 350
 Treatment of Peripheral Vascular Diseases 351

29. Antiarrhythmic Drugs 353

Antiarrhythmics 355
 Other Antiarrhythmics 360

30. Hypolipidaemic Drugs 362

Hypolipidaemics 363
 Drugs Used in the Treatment of Obesity 369

SECTION IX: RESPIRATORY SYSTEM

31. Drugs Used in the Treatment of Bronchial Asthma, COPD and Cough 372

Bronchial Asthma 372
 Bronchodilators 373
 Anti-inflammatory Drugs 378
 Anti-IgE Antibody 381
 Other Newer Drugs in Asthma 381
 Treatment of Bronchial Asthma 382
 Drugs Used in Treatment of Cough 383
 Drugs Used in Allergic Rhinitis 386

SECTION X: DRUGS ACTING ON GASTROINTESTINAL TRACT

32. Drugs Used in Peptic Ulcer and GERD 388

Antacids 389
 Drugs that Reduce Gastric Acid Secretion 391
 Muscarinic Antagonists 396

Ulcer Protectives 396
 Treatment of *H. pylori* Infection 397

33. Emetics, Antiemetics and Prokinetic Agents 399

Physiology of Vomiting 399
 Emetics 399
 Antiemetics 400
 Prokinetic Agents 403

34. Drugs for Constipation, Diarrhoea, Irritable Bowel Disease, Inflammatory Bowel Disorders, Biliary and Pancreatic Diseases 407

Laxatives 407
 Other Laxatives 410
 Enema 410
 Drugs Used in the Treatment of Diarrhoea 411
 Irritable Bowel Syndrome 415
 Inflammatory Bowel Diseases 415
 Biliary Diseases 416
 Pancreatic Diseases 416

SECTION XI: DRUGS USED IN HAEMATOLOGICAL DISORDERS

35. Haematinics 418

Drugs Used in Anemias 418
 Iron 418
 Vitamin B₁₂ and Folic Acid 421
 Haematopoietic Growth Factors 423

SECTION XII: DRUGS USED IN ENDOCRINE DISORDERS

36. Hypothalamus and Anterior Pituitary Hormones 426

Hypothalamic Hormones 427
 Anterior Pituitary Hormones 429

37. Thyroid Hormones and Antithyroid Drugs 433

Thyroid hormones 433
 Hyperthyroidism and Antithyroid Drugs 436
 Inhibitors of Hormone Synthesis 436

38. Corticosteroids 441

Glucocorticoids 442
 Adverse Effects of Glucocorticoids 446
 Mineralocorticoids 450
 Inhibitors of Adrenal Steroids Synthesis 450

39. Estrogens, Progestins, Hormonal Contraceptives and Drugs Used in Infertility	452		
Physiological Consideration	452		
Estrogens	452		
Selective Estrogen Receptor Modulators (SERMs) and Anti-estrogens	455		
Estrogen Synthesis Inhibitors	457		
Progestins	457		
Antiprogestins and Selective Progesterone Receptor Modulators (SPRM)	459		
Drugs Used in the Treatment of Menopausal Symptoms	461		
Hormonal Contraceptives	462		
Oral Pills	462		
Drugs for Infertility	467		
Drugs Used in Erectile Dysfunction	467		
40. Uterine Stimulants and Relaxants	469		
Uterine Stimulants	469		
Uterine Relaxants (Tocolytics)	471		
41. Androgens and Anabolic Steroids	473		
Anabolic Steroids	474		
Antiandrogens	475		
Male Contraceptives	476		
42. Insulin and Oral Antidiabetic Drugs	477		
Diabetes Mellitus	477		
Insulin	478		
Oral and Other Antidiabetic Drugs	484		
Insulin Secretagogues	484		
Biguanides	487		
Thiazolidinediones (TZDs)	488		
α -Glucosidase Inhibitors (AGI)	489		
Amylin Analogs	489		
SGLT-2 Inhibitors	490		
Treatment of Diabetes Mellitus	490		
Glucagon	491		
43. Agents Affecting Bone Mineral Turnover and Osteoporosis	492		
Calcium	492		
Parathyroid Hormone (Parathormone—PTH)	493		
Vitamin D	494		
Calcitonin	496		
Drugs Used in the Disorders of Bone	497		
Agents Used in the Prevention and Treatment of Osteoporosis	499		
Drugs of Abuse in Sports	499		
SECTION XIII: CHEMOTHERAPY			
44. General Considerations	502		
Resistance to Antimicrobial Agents	504		
Antibiotic Stewardship Program	506		
Combination of Antimicrobials	508		
Chemoprophylaxis	509		
Superinfection	511		
45. Sulfonamides, Cotrimoxazole, Quinolones and Fluoroquinolones	516		
Sulfonamides	516		
Cotrimoxazole	518		
Quinolones	519		
Fluoroquinolones	520		
46. Beta-lactam Antibiotics	525		
Penicillins	525		
Natural Penicillins	527		
Penicillin G (Benzyl Penicillin)	527		
Repository Penicillins	527		
Semisynthetic Penicillins	529		
Acid-resistant Penicillins	529		
Penicillinase-resistant Penicillins	529		
Extended Spectrum Penicillins	530		
Antipseudomonal Penicillins	532		
Amidinopenicillins	532		
Beta-Lactamase Inhibitors (BLI)	532		
Cephalosporins	533		
Carbapenems	537		
Carbacephems	538		
Monobactams	538		
47. Broad-spectrum Antibiotics	540		
Tetracyclines	540		
Tigecycline	545		
Chloramphenicol	545		
48. Aminoglycosides	548		
Common Properties of Aminoglycosides	548		
49. Macrolides and Other Antibacterial Agents	553		
Erythromycin	553		
Ketolides	557		
Miscellaneous Antibiotics	557		
Lincosamides	557		
Glycopeptide Antibiotics	558		
Polypeptide Antibiotics	560		
Other Antimicrobial Agents	560		
Treatment of Urinary Tract Infections	564		
Drugs Used in the Treatment of Sexually Transmitted Diseases	565		

50. Chemotherapy of Tuberculosis and Leprosy	567	55. Anthelmintics	625
Drugs used in Tuberculosis 567		Benzimidazoles 625	
First-line Drugs 567		Pyrantel Pamoate 628	
Second-line Drugs 572		Piperazine Citrate 628	
Treatment of Tuberculosis 574		Levamisole 629	
Drugs used in the Treatment of Leprosy 578		Niclosamide 629	
51. Antifungal Drugs	581	Praziquantel 629	
Drugs Acting on Cell Wall 581		Diethylcarbamazine (DEC) 629	
Drugs Acting on Cell Membrane 583		Ivermectin 630	
Azoles 585		56. Cancer Chemotherapy	632
Allylamines 588		Common Adverse Effects to Anticancer Drugs 633	
Drugs Acting on Nucleus 589		Alkylating Agents 634	
Other Topical Antifungal Agents 590		Anticancer Drugs 634	
52. Antiviral Drugs	591	Platinum Analogs 637	
Anti-herpes Virus Agents 591		Antimetabolites 637	
Drugs Used in Cytomegalovirus (CMV) Infections 593		Natural and Semisynthetic Products 640	
Anti-influenza Virus Agents 595		Topoisomerase 2 Inhibitors 641	
ANTI-Hepatitis Agents 595		Topoisomerase 1 Inhibitors 642	
Other Antiviral Drugs 597		Miscellaneous 643	
Pharmacotherapy of COVID-19 597		Targeted Drugs 643	
Anti-retroviral Agents 599		Hormones in Cancer Chemotherapy 644	
Nucleoside Reverse Transcriptase Inhibitors (NRTIs) 599		57. Antiseptics and Disinfectants	648
Non-nucleoside Reverse Transcriptase Inhibitors 601		Acids 648	
Protease Inhibitors (PI) 602		Alcohols 649	
Entry Inhibitors 603		Aldehydes 649	
Integrase Inhibitors 604		Surfactants 649	
53. Antimalarial Drugs	606	Phenol Derivatives 650	
Life Cycle of the Malaria Parasite 607		Halogens 651	
Chloroquine 607		Oxidizing Agents 651	
Quinine 610		Dyes 652	
Mefloquine 611		Metallic Salts 652	
Halofantrine and Lumefantrine 611		<hr/> SECTION XIV: MISCELLANEOUS TOPICS <hr/>	
Artemisinin and Derivatives 613		58. Immunopharmacology	654
Primaquine 614		Immunosuppressants 654	
Folate Antagonists 615		Management of Organ Transplant Rejection 657	
Proguanil (Chloroguanide) 616		Immunostimulants 657	
Atovaquone 616		Immunization 658	
Malaria in Pregnancy 616		59. Toxicology	664
54. Drugs used in Amoebiasis, Pneumocystosis and Leishmaniasis (Kala-azar)	618	Heavy Metal Poisoning 664	
Drugs Used in Amoebiasis 618		Chelating Agents 665	
Treatment of Pneumocystosis 622		Treatment of Common Drug Poisoning 668	
Treatment of Leishmaniasis 622		General Management 669	
Treatment of Trypanosomiasis 623		Treatment of Common Stings and Bites 673	
		Dog Bite 674	
		Food Poisoning 674	
		Cardiopulmonary Resuscitation (CPR) 676	

60. Drug Administration in Special Situations: Pregnancy, Lactation, Paediatrics, Geriatrics, Renal and Hepatic Diseases	677	Glucocorticoids 689	
Drugs in Pregnancy	677	Drugs Used in Acne	689
Drug Prescription and Lactation	678	Drugs Used in Psoriasis	690
Paediatric Pharmacology	678	62. Drugs Used in Ocular Diseases	692
Geriatric Pharmacology	681	63. Vitamins and Enzymes in Therapy	694
Pharmacokinetic Changes	682	Vitamins	694
Pharmacodynamic Changes	683	Minerals	697
Administration of Drugs In Renal Diseases	684	Sodium	698
Drug Administration in Liver Diseases	685	Potassium	698
Gene Therapy	686	Magnesium	699
61. Drugs Used in Skin Disorders	687	Zinc	699
Drugs Used in Scabies and Pediculosis	687	Manganese	699
Pediculosis	688	Enzymes in Therapy	700
Keratolytics	688	Plant Enzymes	702
Sunscreens	688	Nutraceuticals	702
Antimicrobials	689	64. Important Drug Interactions	704
		<i>Bibliography</i>	<i>707</i>
		<i>Index</i>	<i>709</i>