

# CONTENTS

## CHAPTER 1. BASIC PRINCIPLES OF PHARMACOLOGY

Overview . . . . .	1
<b>Major Ways in Which Drugs Work</b>	
External and Internal Threats . . . . .	2
Endogenous Chemical Balance . . . . .	4
Modulate Physiologic Processes . . . . .	5
<b>Chemical Communication</b>	
Chemical Transmission at the Synapse . . . . .	6
Synapse Morphology . . . . .	7
<b>Pharmacodynamics</b>	
Receptors and Signaling . . . . .	8
Receptor Subtypes . . . . .	9
Agonists . . . . .	10
Antagonists . . . . .	11
Stereochemistry and 3-Dimensional Fit . . . . .	12
Receptor-Effector Coupling . . . . .	13
Signal Transduction and Cross Talk . . . . .	14
Second-Messenger Pathways . . . . .	15
Ligand-Gated Ion Channels . . . . .	16
G Protein-Coupled Receptors . . . . .	17
Trk Receptors . . . . .	18
Nuclear Receptors . . . . .	19
Up-regulation and Down-regulation of Receptors . . . . .	20
Dose-Response Curves . . . . .	21
Potency . . . . .	22
Efficacy . . . . .	22
Inverse Agonists . . . . .	23
Antagonists: Surmountable (Reversible) and Nonsurmountable (Irreversible) . . . . .	24

## Pharmacokinetics

Routes of Administration . . . . .	25
First-Pass Effect . . . . .	26
Membrane Transport . . . . .	27
Distribution . . . . .	28
Barriers . . . . .	29
Metabolism (Biotransformation) of Drugs . . . . .	30
Cytochrome P-450 (CYP450) Enzymes . . . . .	31
Metabolic Enzyme Induction and Inhibition . . . . .	32
Elimination . . . . .	33

## CHAPTER 2. DRUGS USED TO AFFECT THE AUTONOMIC AND SOMATIC NERVOUS SYSTEMS

Overview . . . . .	35
<b>Organization of the Nervous System</b>	
Organization of the Nervous System . . . . .	36
Action of Drugs on Nerve Excitability . . . . .	37

# CONTENTS

## Somatic Nervous System

Interface of the Central and Peripheral Nervous Systems and Organization of the Somatic Division . . . . .	38
Neuromuscular Transmission . . . . .	39
Nicotinic Acetylcholine Receptor . . . . .	40
Physiology of the Neuromuscular Junction . . . . .	41
Pharmacology of the Neuromuscular Junction . . . . .	42
Mechanism of Action of Acetylcholinesterase Inhibitors . . . . .	43
Neuromuscular Blocking Agents: Nondepolarizing and Depolarizing . . . . .	44

## Autonomic Nervous System

Autonomic Nervous System: Schema . . . . .	45
Sympathetic Fight or Flight Response . . . . .	46
Cholinergic and Adrenergic Synapses . . . . .	47
Example of Cholinergic and Adrenergic Drug Treatment: Glaucoma . . . . .	48
Cholinergic Receptors . . . . .	49
Cholinergic Drugs . . . . .	50
Example of Cholinergic Drug Treatment: Myasthenia Gravis . . . . .	52
Adrenergic Receptors . . . . .	53
Adrenergic Drugs . . . . .	54
Drugs That Act on the Autonomic Nervous System . . . . .	55
Drug Side Effects . . . . .	56

## CHAPTER 3. DRUGS USED IN DISORDERS OF THE CENTRAL NERVOUS SYSTEM AND TREATMENT OF PAIN

Overview . . . . .	57
--------------------	----

### Introduction to the CNS and Drug Action

Development of the Nervous System . . . . .	58
Anatomy of the Nervous System . . . . .	59
Functional Correlations and Visualization of Brain Structures . . . . .	60
Resting Membrane and Action Potentials . . . . .	61
Excitatory and Inhibitory Postsynaptic Potentials . . . . .	62
Central Nervous System Neurotransmitters, Receptors, and Drug Targets . . . . .	63

### Sedative-Hypnotic Drugs

GABA <sub>A</sub> Receptor Complex and Sedative-Hypnotic Drugs . . . . .	64
--	----

### Anxiolytic Agents

Clinical Anxiety . . . . .	65
Anxiolytic Agents . . . . .	66

### Antiepileptic Agents

Causes of Seizures and Their Treatment . . . . .	67
Epilepsy: Generalized Seizures and Status Epilepticus . . . . .	68
Epilepsy: Partial and Absence Seizures . . . . .	69

### Antidepressants

Clinical Depression . . . . .	71
Antidepressants: Mechanisms of Action . . . . .	72

### Drugs Affecting Bipolar Disorder and OCD

Bipolar Disorder and Compulsive Behavior . . . . .	73
--	----

**Antipsychotic Agents**

Psychosis and Dopamine Pathways . . . . .	74
---	----

**Drugs Affecting Movement Disorders and Other Neurodegenerative Disorders**

Motor Tracts, Basal Ganglia, and Dopamine Pathways . . . . .	75
Parkinsonism: Symptoms and Defect . . . . .	77
Parkinsonism: Levodopa, Carbidopa, and Other Drugs . . . . .	78
Huntington Disease and Tourette Syndrome . . . . .	79
Alzheimer Disease: Symptoms, Course, and Pathology . . . . .	80
Alzheimer Disease: Cholinergic Involvement and Drugs . . . . .	81
Stroke: Symptoms and Drug Treatment . . . . .	83

**CNS Skeletal Muscle Relaxants**

Motor Neurons and Drugs . . . . .	84
-----------------------------------	----

**Analgesics and Anesthetics**

Pain Pathways . . . . .	85
Local Anesthetics: Spinal Afferents and Local Anesthetic Mechanisms of Action . . . . .	86
General Anesthetics: Properties . . . . .	87
Opioids: Endogenous Opioid Pathway . . . . .	88
Opioids: Receptor-Transduction Mechanisms . . . . .	89
Nonopiods: NSAIDs, Selective Cyclooxygenase-2 Inhibitors, and Acetaminophen . . . . .	90
Sumatriptans and Reuptake Inhibitors . . . . .	91

**CHAPTER 4. DRUGS USED IN DISORDERS OF THE CARDIOVASCULAR SYSTEM**

Overview . . . . .	93
--------------------	----

**Cardiovascular System: Anatomy, Function, and Regulation of the Heart**

Cardiovascular Function: Anatomy . . . . .	94
Cardiovascular Function: Definition of Terms and Regulation . . . . .	95
Role of Catecholamines in Heart Function . . . . .	96
Sympathetic and Parasympathetic Regulation of Heart Function . . . . .	97
Synthesis and Storage of Catecholamines . . . . .	98
Regulation of Norepinephrine Release . . . . .	99
Inactivation of Norepinephrine . . . . .	100

**Hypercholesterolemia and Atherosclerosis**

Hypercholesterolemia: Causes . . . . .	101
Hypercholesterolemia: Pharmacologic Therapy . . . . .	102

**Angina**

Angina Overview . . . . .	103
Nitrates for Angina Treatment: Classes, Administration Routes, Pharmacology, and Adverse Effects . . . . .	104
Nitroglycerin in Angina Treatment . . . . .	105
Nitroglycerin: Mechanism of Action . . . . .	106
Calcium Channel Antagonists . . . . .	107
Drug Summary for Angina . . . . .	108

**Heart Failure**

Heart Failure Overview . . . . .	109
Heart Failure: Treatment . . . . .	110
Heart Failure Treatment: $\beta$ -Adrenergic Stimulators and Blockers . . . . .	111
Heart Failure Treatment: Cardiac Glycosides . . . . .	112

# CONTENTS

## Arrhythmias

Cardiac Arrhythmias: General . . . . .	113
Cardiac Arrhythmias: Treatment . . . . .	115
Cardiac Arrhythmias: Drug Classification . . . . .	117

## Hypertension

Hypertension Overview . . . . .	118
Hypertension: Causes . . . . .	119
Hypertension Treatment: Diuretics . . . . .	120
Hypertension Treatment: Angiotensin-Converting Enzyme Inhibitors . . . . .	121
Hypertension Treatment: $\beta$ and $\alpha$ Blockers . . . . .	122
Hypertension Treatment: Minoxidil . . . . .	123
Hypertension Treatment: Clonidine . . . . .	124
Hypertension in Elderly Patients . . . . .	125
Pheochromocytoma-Induced Hypertension . . . . .	126
Hypertension in Cushing Syndrome . . . . .	127

## Peripheral Vascular Disease

Peripheral Vascular Disease . . . . .	128
---------------------------------------	-----

# CHAPTER 5. DRUGS USED IN DISORDERS OF THE ENDOCRINE SYSTEM

Overview . . . . .	129
--------------------	-----

## Hypothalamic and Pituitary Disorders

Regulation of Hypothalamic and Pituitary Hormones . . . . .	130
Hypopituitarism . . . . .	132
Growth Hormone Deficiency and Treatment . . . . .	133
Growth Hormone Excess (Acromegaly) and Treatment . . . . .	134

## Thyroid Disorders

Thyroid Hormones . . . . .	135
Thyroid Hormones: Synthesis, Release, and Regulation . . . . .	136
Hypothyroidism . . . . .	137
Hypothyroidism: Treatment of Choice . . . . .	138
Liothyronine and T <sub>4</sub> /T <sub>3</sub> Combinations . . . . .	139
Hyperthyroidism . . . . .	140
Hyperthyroidism: Treatment . . . . .	141
Thioamides . . . . .	142
Thioamides: Adverse Effects . . . . .	143
Radioactive Iodine . . . . .	144
Iodide . . . . .	145
Adrenergic Antagonists . . . . .	146

## Corticosteroids and Adrenocortical Dysfunction

Regulation of Adrenal Hormones . . . . .	147
Mineralocorticoids and Glucocorticoids . . . . .	148
Corticosteroids . . . . .	149
Cushing Syndrome . . . . .	150
Ketoconazole . . . . .	151
Metyrapone . . . . .	152
Aminoglutethimide . . . . .	153
Addison Disease, or Primary Adrenal Insufficiency . . . . .	154

**Diabetes Mellitus**

The Pancreas and Insulin Production . . . . .	155
Insulin Secretion . . . . .	156
Lack of Insulin . . . . .	157
Type 1 Diabetes Mellitus . . . . .	158
Type 2 Diabetes Mellitus . . . . .	159
Insulin Therapy . . . . .	160
Reactions to Insulin: Hypoglycemia and Adipose Tissue Changes . . . . .	161
Sulfonylureas . . . . .	162
Biguanides . . . . .	163
Meglitinides . . . . .	164
$\alpha$ -Glucosidase Inhibitors . . . . .	165
Thiazolidinediones . . . . .	166
Thiazolidinediones: Clinical Rationale and Adverse Effects . . . . .	167

**CHAPTER 6. DRUGS USED IN DISORDERS OF THE GASTROINTESTINAL SYSTEM**

Overview . . . . .	169
--------------------	-----

**Function and Regulation of the GI System**

Enteric Nervous System . . . . .	170
Integration of the Autonomic and Enteric Nervous Systems . . . . .	171
Gastrointestinal Motility . . . . .	172
Control of Peristalsis . . . . .	174
Hormones of the Gastrointestinal Tract . . . . .	175
Parietal Cell Function Regulation . . . . .	176
Pancreatic Secretion . . . . .	177
Defecation . . . . .	178
Protein Digestion . . . . .	179
Fat Digestion . . . . .	180

**Disorders of Colonic Motility**

Colonic Motility and Treatment of Diarrhea . . . . .	181
Antidiarrheal Drugs and Their Adverse Effects . . . . .	182
Causes of Constipation . . . . .	183
Treatment of Constipation . . . . .	184

**Functional Disorder of the Large Intestine**

Treatment of Irritable Bowel Syndrome . . . . .	185
---	-----

**Protozoal GI Infection**

Giardiasis . . . . .	187
----------------------	-----

**Peptic Ulcer**

<i>Helicobacter pylori</i> Infection Overview . . . . .	188
Treatment of <i>Helicobacter pylori</i> Infection . . . . .	189
Peptic Ulcer Treatment . . . . .	190

**Gastroesophageal Reflux Disease**

Gastroesophageal Reflux Disease Overview . . . . .	191
Gastroesophageal Reflux Disease Treatment . . . . .	192

**Pancreatitis**

Treatment of Pancreatitis . . . . .	193
-------------------------------------	-----

# CONTENTS

## Cholelithiasis

Pathologic Features of Gallstones . . . . .	195
Gallstone Pathogenesis and Treatment . . . . .	196

## Liver Physiology and Pathology

Liver Function . . . . .	197
Bilirubin Production and Excretion . . . . .	198
Cirrhosis . . . . .	199
Ascites . . . . .	200

## Nausea and Vomiting

Physiology of Emesis . . . . .	202
Antiemetics . . . . .	204

## CHAPTER 7. DRUGS USED IN DISORDERS OF THE RESPIRATORY SYSTEM

Overview . . . . .	205
--------------------	-----

## Respiration: Physiology and Pathology

Respiration Overview . . . . .	206
Respiratory Diseases . . . . .	207

## Allergy

Allergy . . . . .	208
Leukocyte Function . . . . .	209
Allergic Rhinitis . . . . .	210

## Asthma

Introduction to Asthma . . . . .	211
Extrinsic and Intrinsic Asthma . . . . .	212
Asthma Pharmacotherapy . . . . .	214
Anti-IgE Antibodies . . . . .	215
Mast Cell Degranulation Blockers . . . . .	216
Bronchodilators . . . . .	217
Methylxanthines . . . . .	218
Methylxanthines: Adverse Effects . . . . .	219
$\beta$ -Adrenergic Agonists . . . . .	220
Nonselective $\beta$ -Adrenergic Agonists . . . . .	221
Selective $\beta_2$ -Adrenergic Agonists . . . . .	222
Antimuscarinic Antagonists . . . . .	223

## Antiinflammatory Agents: Corticosteroids

Corticosteroids . . . . .	224
Corticosteroids: Clinical Uses . . . . .	225
Corticosteroids: Adverse Effects . . . . .	226

## Antiinflammatory Agents: Leukotriene Antagonists

Leukotrienes . . . . .	227
Leukotriene Antagonists . . . . .	228

## Cough

Cough . . . . .	229
Cough Suppressants (Antitussive Agents) . . . . .	230

## Chronic Obstructive Pulmonary Disease

Chronic Obstructive Pulmonary Disease . . . . .	231
Emphysema . . . . .	232

Emphysema: Causes . . . . .	233
Inherited Emphysema . . . . .	234
Chronic Bronchitis . . . . .	235
COPD: General Treatment Measures . . . . .	236
COPD: Specific Drug Treatments . . . . .	237
<b>Restrictive Pulmonary Disease</b>	
Restrictive Pulmonary Disease . . . . .	238
<b>Pneumonia</b>	
Pneumonia . . . . .	239
Viral Pneumonia . . . . .	241
Bacterial Pneumonia . . . . .	243
<b>CHAPTER 8. DRUGS USED IN DISORDERS OF THE REPRODUCTIVE SYSTEM</b>	
Overview . . . . .	245
<b>Organization and Function of the Reproductive System</b>	
Organization of the Reproductive System . . . . .	246
Regulation of Estrogen and Testosterone . . . . .	247
Events of the Normal Menstrual Cycle . . . . .	248
<b>Contraception</b>	
Combination Oral Contraceptives . . . . .	249
Major Adverse Effects of Combination Oral Contraceptives . . . . .	250
Estrogen and Coagulation . . . . .	251
Progestin-Only Contraceptives . . . . .	252
The Morning-After Pill . . . . .	253
The Abortion Pill . . . . .	254
<b>Endometriosis and Treatment</b>	
Endometriosis . . . . .	255
Danazol . . . . .	256
Gonadotropin-Releasing Hormone Agonists, Combination Oral Contraceptives, and Progestin . . . . .	257
<b>Postmenopausal Hormone Changes and Therapy</b>	
Estrogen Decline . . . . .	258
Vasomotor Symptoms . . . . .	259
Genitourinary Atrophy . . . . .	260
Osteoporosis and Estrogen . . . . .	261
Role of Progestins in Hormone Replacement Therapy . . . . .	262
Route of Hormone Administration . . . . .	263
General Adverse Effects . . . . .	264
Cardiovascular and Neurologic Risks . . . . .	265
Cancer Risks . . . . .	266
<b>Selective Estrogen Receptor Modulators and Antiestrogens</b>	
Selective Estrogen Receptor Modulators . . . . .	267
Antiestrogens . . . . .	268
<b>Hypogonadism</b>	
Hypogonadism . . . . .	269
Hypogonadism Treatment and Adverse Effects . . . . .	270

# CONTENTS

<b>CHAPTER 9. DRUGS USED TO AFFECT RENAL FUNCTION</b>	
Overview . . . . .	271
<b>Organization and Functions of the Renal System</b>	
Macroscopic Anatomy . . . . .	272
The Nephron . . . . .	273
Blood Vessels Surrounding Nephrons . . . . .	274
The Glomerulus . . . . .	275
Practical Application: Measuring the Glomerular Filtration Rate . . . . .	276
Tubular Segments . . . . .	277
Ion and Water Reabsorption . . . . .	278
Bicarbonate Reabsorption . . . . .	279
Potassium Excretion . . . . .	280
<b>Volume Regulation</b>	
Antidiuretic Hormone . . . . .	281
Renin-Angiotensin-Aldosterone System . . . . .	282
<b>Diuretics</b>	
General Considerations: Volume Homeostasis . . . . .	283
Mercurial Diuretics . . . . .	285
Carbonic Anhydrase Inhibitors . . . . .	286
Thiazide Diuretics . . . . .	287
Potassium-Sparing Agents . . . . .	288
Loop (High-Ceiling) Diuretics . . . . .	289
Osmotic Agents . . . . .	290
Summary of Therapeutics . . . . .	291
<b>Urinary Incontinence</b>	
Urinary Incontinence . . . . .	293
<b>Urinary Tract Calculi</b>	
Urinary Tract Calculi (Kidney Stones) . . . . .	294
<b>Renal Insufficiency and Dialysis</b>	
Effect of Renal Insufficiency on Drug Action . . . . .	295
Effect of Hemodialysis on Drug Action . . . . .	296
<b>CHAPTER 10. DRUGS USED IN INFECTIOUS DISEASE</b>	
Overview . . . . .	297
<b>Bacterial Infections: Antibiotics</b>	
Classification of Antibiotics . . . . .	298
Definitions: Bacteriostatic Versus Bactericidal . . . . .	299
Spectrum of Activity . . . . .	300
Mechanisms of Resistance . . . . .	301
Examples of Resistance . . . . .	302
Natural Penicillins: Penicillin G and Penicillin V . . . . .	303
Aminopenicillins: Amoxicillin and Ampicillin . . . . .	304
Antipseudomonal Penicillins: Carbenicillin, Piperacillin, and Ticarcillin . . . . .	305
β-Lactamase Inhibitors . . . . .	306
β Lactamase-Resistant Penicillins: Cloxacillin, Dicloxacillin, Oxacillin, and Nafcillin . . . . .	307
Adverse Effects of Penicillins . . . . .	308
Cephalosporins . . . . .	309

Carbapenems: Imipenem-Cilastatin, Ertapenem, and Meropenem . . . . .	310
Monobactams: Aztreonam . . . . .	311
Vancomycin . . . . .	312
Vancomycin Treatment Difficulties: Resistance and Adverse Effects . . . . .	313
Tetracyclines . . . . .	314
Aminoglycosides . . . . .	315
Macrolides: Erythromycin, Azithromycin, and Clarithromycin . . . . .	316
Clindamycin . . . . .	317
Quinolones . . . . .	318
New-Generation Quinolones . . . . .	319
Quinupristin/Dalfopristin . . . . .	321
Linezolid . . . . .	322
Sulfonamides . . . . .	323
<b>Fungal Infections: Antifungal Drugs</b>	
Nature of Fungal Infections and Therapy . . . . .	324
Amphotericin B . . . . .	325
Azole Antifungal Agents and Other Antifungal Agents . . . . .	326
<b>Viral Infections and Antiviral Agents</b>	
Nature of Viral Infections . . . . .	327
Herpesviruses . . . . .	328
Acyclovir and Famciclovir . . . . .	329
Ganciclovir . . . . .	330
Influenza and Its Treatment . . . . .	331
<b>HIV Infection: Antiretroviral Agents</b>	
HIV Infection . . . . .	332
Nucleoside Reverse Transcriptase Inhibitors (NRTIs) and Non-NRTIs . . . . .	333
Protease Inhibitors . . . . .	334
Other Antiretroviral Agents for AIDS: Tenofovir and Enfuvirtide . . . . .	335
<b>CHAPTER 11. DRUGS USED IN NEOPLASTIC DISORDERS</b>	
Overview . . . . .	337
<b>Introduction to Chemotherapy</b>	
Cell Cycle . . . . .	338
Combination Chemotherapy . . . . .	339
Adverse Effects of Chemotherapy . . . . .	340
<b>Antimetabolites</b>	
Folate Analogs: Methotrexate . . . . .	341
Purine Analogs: Mercaptopurine and Thioguanine . . . . .	342
Pyrimidine Analogs: 5-Fluorouracil . . . . .	343
Pyrimidine Analogs: Capecitabine . . . . .	344
Pyrimidine Analogs: Cytarabine and Fludarabine . . . . .	345
Pyrimidine Analogs: Gemcitabine . . . . .	346
Substituted Ureas: Hydroxyurea . . . . .	347
<b>Alkylating Agents</b>	
Nitrogen Mustards: Mechlorethamine and Melphalan . . . . .	348
Cyclophosphamide and Ifosfamide . . . . .	349
Nitrosoureas: Carmustine and Lomustine . . . . .	350
Platinum Compounds: Cisplatin, Carboplatin, and Oxaliplatin . . . . .	351

# CONTENTS

## **Microtubule Inhibitors**

Vinca Alkaloids: Vincristine, Vinblastine, and Vinorelbine .....	352
Taxanes .....	353

## **Antibiotics**

Anthracyclines: Doxorubicin and Daunorubicin .....	354
--	-----

## **Hormonal Therapies**

Estrogen Antagonists: Tamoxifen and Toremifene .....	355
Aromatase Inhibitors: Anastrozole, Letrozole, and Exemestane .....	356
Gonadotropin-Releasing Hormone Analogs: Leuprolide and Goserelin .....	357
Antiandrogens: Flutamide, Bicalutamide, and Nilutamide .....	358

## **Monoclonal Antibodies**

Unconjugated Antibodies: Trastuzumab, Alemtuzumab, and Rituximab .....	359
Conjugated Antibodies: Ibritumomab Tiuxetan and Tositumomab and Iodine 131 Tositumomab .....	360

## **Newer Miscellaneous Agents**

Imatinib Mesylate .....	361
Gefitinib .....	362
Bortezomib .....	363

# **CHAPTER 12. DRUGS USED FOR SKIN DISORDERS**

Overview .....	365
----------------	-----

## **Organization of the Skin**

Anatomy of the Skin .....	366
---------------------------	-----

## **Hair Loss**

Alopecia .....	367
----------------	-----

## **Blister Diseases**

Bullous (Blister) Skin Diseases .....	368
---------------------------------------	-----

## **Eczema**

Common Dermatoses Including Eczema .....	369
--	-----

## **Psoriasis**

Psoriasis .....	370
-----------------	-----

## **Mite and Louse Infestations**

Scabies and Pediculosis .....	371
-------------------------------	-----

## **Hives**

Urticaria .....	372
-----------------	-----

# **CHAPTER 13. VITAMINS: DEFICIENCIES AND DRUG INTERACTIONS**

Overview .....	373
----------------	-----

## **Fat-Soluble Vitamins**

Deficiency of Vitamin A (Retinol) and Other Fat-Soluble Vitamins .....	374
--	-----

## **Water-Soluble Vitamins**

Deficiency of Thiamine (B <sub>1</sub> ) and Other B Vitamins .....	375
Niacin or Nicotinic Acid Deficiency (Pellagra) .....	376
Vitamin C Deficiency (Scurvy) .....	377

**Vitamin-Drug Interactions**

Fat-Soluble Vitamin-Drug Interactions . . . . .	378
Water-Soluble Vitamin-Drug Interactions . . . . .	379

**CHAPTER 14. DRUG ALLERGY, ABUSE, AND POISONING OR OVERDOSE**

Overview . . . . .	381
--------------------	-----

**Drug Allergy**

Allergic Reactions to Drugs . . . . .	382
Type I (Acute, Anaphylactic) Reactions . . . . .	383
Type II (Cytotoxic, Autoimmune) Reactions . . . . .	384
Type III (Immune Complex, Serum Sickness, Arthus) Reactions . . . . .	385
Type IV (Cell-Mediated, Delayed-Hypersensitivity, Contact Dermatitis) Reactions . . . . .	386

**Drug Abuse**

Brain Reward Circuit . . . . .	387
Ethanol: Deleterious Effects . . . . .	388
Ethanol Abuse: Treatment . . . . .	389
Withdrawal: Opioids, Benzodiazepines, and Barbiturates . . . . .	390

**Poisoning or Overdose**

Sympathomimetic Drugs . . . . .	392
Cholinergic Drugs . . . . .	393
Anticholinergic Drugs . . . . .	394
Serotonergics . . . . .	395
Opioids . . . . .	396
Over-the-Counter Products . . . . .	397
Management of Poisoning and Overdose . . . . .	398

**Index . . . . .**

congestive heart failure . . . . .	399
chronic myeloid leukemia . . . . .	399
cytomegalovirus . . . . .	399
central nervous system . . . . .	399
coenzyme A . . . . .	399
combination oral contraceptive . . . . .	399
chronic obstructive pulmonary disease . . . . .	399
cyclooxygenase . . . . .	399
corticotropin-releasing hormone . . . . .	399
cerebrospinal fluid . . . . .	399
chemoreceptor trigger zone . . . . .	399
diabetes mellitus . . . . .	399
deoxyribonucleic acid . . . . .	399
dose-response curve . . . . .	399
drug-resistant <i>Streptococcus pneumoniae</i> . . . . .	399
diarrhea, urination, miosis, bronchoconstriction, excitation (skeletal muscles and central nervous system), lacrimation, and salivation and sweating . . . . .	399
median effective dose . . . . .	399
ethylenediaminetetraacetic acid . . . . .	399
epidermal growth factor receptor . . . . .	399
epinephrine . . . . .	399
excitatory postsynaptic potential . . . . .	399