

21st Edition

HARRISON'S PRINCIPLES OF INTERNAL MEDICINE

INTERNATIONAL EDITION

ILOILO DOCTORS' COLLEGE
LIBRARY



IDCM0000001128

LOSCALZO

FAUCI

KASPER

HAUSER

LONGO

JAMESON

VOLUME 2

Mc
Graw
Hill

PATIENT MANAGEMENT ALGORITHMS

AGING

- FIG. 477-6** Algorithm depicting assessment and management of falls in older patients 3748
FIG. 477-8 Algorithm depicting assessment and management of delirium in hospitalized older patients 3752

ALLERGY, IMMUNOLOGY, RHEUMATOLOGY

- FIG. 352-4** Algorithm for the diagnosis and management of rhinitis 2726
FIG. 356-2 Algorithm for diagnosis and initial therapy of systemic lupus erythematosus 2742
FIG. 362-2 Algorithm for the diagnosis or exclusion of axial spondyloarthritis 2795
FIG. 363-1 Algorithm for the approach to a patient with suspected diagnosis of vasculitis 2805
FIG. 367-8 Proposed approach to management of patient with possible sarcoidosis 2834
FIG. 367-9 The management of acute sarcoidosis is based on level of symptoms and extent of organ involvement 2835
FIG. 367-10 Approach to chronic disease 2836
FIG. 370-1 Algorithm for the diagnosis of musculoskeletal complaints 2845
FIG. 370-2 Algorithm for consideration of the most common musculoskeletal conditions 2846
FIG. 370-6 Algorithmic approach to the use and interpretation of synovial fluid aspiration and analysis 2852

ALTERATIONS IN CIRCULATORY AND RESPIRATORY FUNCTIONS

- FIG. 41-1** Clinical conditions in which a decrease in cardiac output and systemic vascular resistance cause arterial underfilling with resulting neurohumoral activation and renal sodium and water retention 276
FIG. 42-5 Differential diagnosis of a holosystolic murmur 282

CARDIOLOGY

- FIG. 42-9** Strategy for evaluating heart murmurs 286
FIG. 236-1 Approach to the evaluation of a heart murmur 1798
FIG. 247-3 Evaluation and treatment of sinus tachycardia 1892
FIG. 248-3 Clinical approach and treatment algorithm for management of focal atrial tachycardia 1894
FIG. 249-6 Treatment algorithm for patients presenting with hemodynamically stable paroxysmal supraventricular tachycardia 1899
FIG. 256-4 Management algorithm for electrical storm 1929
FIG. 259-18 Treatment algorithm for hypertrophic cardiomyopathy 1971

- FIG. 261-4** Management strategy for patients with aortic stenosis 1983
FIG. 262-1 Management of patients with aortic regurgitation 1989
FIG. 263-1 Management of rheumatic mitral stenosis 1993
FIG. 264-1 Management of primary mitral regurgitation 1997
FIG. 264-2 Management of secondary mitral regurgitation 1998
FIG. 266-1 Management of tricuspid regurgitation 2003
FIG. 273-3 Evaluation of the patient with known or suspected ischemic heart disease 2035
FIG. 273-4 Algorithm for management of a patient with ischemic heart disease 2043
FIG. 480-1 Composite algorithm for cardiac risk assessment and stratification in patients undergoing noncardiac surgery 3770

CLINICAL GENETICS

- FIG. 71-6** Algorithm for genetic testing in a family with cancer predisposition 505
FIG. 466-17 Approach to genetic disease 3660
FIG. 467-2 Approach to genetic testing 3664
FIG. 468-9 Clinical and laboratory investigation of a suspected mitochondrial DNA disorder 3676

CORONARY AND PERIPHERAL VASCULAR DISEASE

- FIG. 275-5** Reperfusion therapy for patients with ST-segment elevation myocardial infarction 2058

DISORDERS OF THE URINARY TRACT

- FIG. 51-1** Proposed management paradigm for the treatment of interstitial cystitis/bladder pain syndrome 329
FIG. 313-2 A typical algorithm for early posttransplant care of a kidney recipient 2329

EMERGENCY AND CRITICAL CARE

- FIG. 300-2** Approach to the patient in shock 2219
FIG. 301-5 Algorithm for the initial management of acute respiratory distress syndrome 2229
FIG. 302-4 Algorithm for discontinuing mechanical ventilation 2234
FIG. 305-3 Emergency management of patients with cardiogenic shock complicating acute myocardial infarction 2253
FIG. 306-3A Algorithm for approach to cardiac arrest due to VT or VF (shockable rhythm) 2262
FIG. 306-3B Algorithm for approach to cardiac arrest due to bradycardias/asystole and pulseless electrical activity 2262

FIG. S5-1	General guidelines for treatment of radiation casualties	S5-4
FIG. S5-2	Algorithm for evacuation in a multicasualty radiologic event	S5-5

ENDOCRINOLOGY AND METABOLISM

FIG. 379-1	Management of adult growth hormone deficiency	2901
FIG. 380-5	Management of prolactinoma	2910
FIG. 380-8	Management of acromegaly	2914
FIG. 380-9	Management of Cushing's disease	2916
FIG. 380-10	Management of a nonfunctioning pituitary mass	2917
FIG. 383-2	Evaluation of hypothyroidism	2936
FIG. 384-2	Evaluation of thyrotoxicosis	2940
FIG. 385-5	Approach to the patient with a thyroid nodule	2953
FIG. 386-10	Management of the patient with suspected Cushing's syndrome	2962
FIG. 386-12	Management of patients with suspected mineralocorticoid excess	2966
FIG. 386-13	Management of the patient with an incidentally discovered adrenal mass	2968
FIG. 386-16	Management of the patient with suspected adrenal insufficiency	2974
FIG. 391-6	Evaluation of gynecomastia	3018
FIG. 391-7	Evaluation of hypogonadism	3020
FIG. 394-2	Algorithm for the evaluation and treatment of hirsutism	3041
FIG. 397-3	Algorithm for the evaluation and management of patients with erectile dysfunction	3059
FIG. 402-2	Treatment algorithm—chronic disease management model for primary care of patients with overweight and obesity	3090
FIG. 404-2	Essential elements in comprehensive care of type 2 diabetes	3109
FIG. 404-3	Glycemic management of type 2 diabetes	3113
FIG. 406-2	Hypoglycemia-associated autonomic failure in insulin-deficient diabetes	3131
FIG. 410-6	Algorithm for the evaluation of patients with hypercalcemia	3183
FIG. 414-3	Algorithm for screening for <i>HFE</i> -associated hemochromatosis	3234

GASTROENTEROLOGY AND HEPATOLOGY

FIG. 44-2	Approach to the patient with dysphagia	290
FIG. 46-3	Algorithm for the management of acute diarrhea	301
FIG. 46-4	Algorithm for management of chronic diarrhea	305
FIG. 46-5	Algorithm for the management of constipation	307
FIG. 48-1	Suggested algorithm for patients with acute upper gastrointestinal bleeding based on endoscopic findings	312
FIG. 48-2	Suggested algorithm for patients with acute lower gastrointestinal bleeding	314

FIG. 49-1	Evaluation of the patient with jaundice	317
FIG. 50-3	Algorithm for the diagnosis of ascites according to the serum-ascites albumin gradient	323
FIG. 324-13	Approach to selecting antibiotics for patients with <i>H. pylori</i> infection	2448
FIG. 324-14	Overview of new-onset dyspepsia	2450
FIG. 336-1	Algorithm for evaluation of abnormal liver tests	2551
FIG. 337-1	Algorithm for the evaluation of chronically abnormal liver tests	2554
FIG. 342-1	Treatment algorithm for alcoholic hepatitis	2619
FIG. 344-3	Management of recurrent variceal hemorrhage	2630
FIG. 344-5	Treatment of refractory ascites	2632
FIG. 347-2	A stepwise diagnostic approach to the patient with suspected chronic pancreatitis	2655

HEMATOLOGY AND ONCOLOGY

FIG. 63-17	The physiologic classification of anemia	437
FIG. 63-18	An approach to the differential diagnosis of patients with an elevated hemoglobin (possible polycythemia)	439
FIG. 74-2	Algorithm for the diagnosis and treatment of fever and neutropenia	563
FIG. 75-2	Management of cancer patients with back pain	569
FIG. 75-4	Management of patients at high risk for tumor lysis syndrome	574
FIG. 77-1	Evaluation of a patient with cervical adenopathy	591
FIG. 78-5	Algorithm for management of non-small-cell lung cancer	603
FIG. 78-6	Approach to the solitary pulmonary nodule	604
FIG. 78-7	Approach to targeted therapy in non-small-cell lung cancer	607
FIG. 78-8	Approach to first-line therapy in a patient with stage IV, driver mutation-negative non-small-cell lung cancer	608
FIG. 78-9	Algorithm for management of small-cell lung cancer	609
FIG. 92-2	Treatment algorithm for adenocarcinoma and poorly differentiated adenocarcinoma of unknown primary	719
FIG. 92-3	Treatment algorithm for squamous cell carcinoma of unknown primary	720
FIG. 104-2	Algorithm for the therapy of newly diagnosed acute myeloid leukemia	815
FIG. 111-6	Treatment algorithm for multiple myeloma	874
FIG. 112-1	Algorithm for the diagnosis of amyloidosis and determination of type	879
FIG. 115-2	Algorithm for evaluating the thrombocytopenic patient	905

INFECTIOUS DISEASES

FIG. 128-3	The diagnostic use of transesophageal and transtracheal echocardiography	1027
FIG. 132-3	Algorithm for the management of patients with intraabdominal abscesses by percutaneous drainage	1058

FIG. 133-1	Clinical algorithm for the approach to patients with community-acquired infectious diarrhea or bacterial food poisoning.....	1063
FIG. 135-4	Diagnostic approach to urinary tract infection.....	1074
FIG. 152-1	Clinical and pathologic progression of tetanus.....	1213
FIG. 163-1	Schematic of the relationships between colonization with <i>Helicobacter pylori</i> and diseases of the upper gastrointestinal tract	1280
FIG. 163-2	Algorithm for the management of <i>Helicobacter pylori</i> infection	1282
FIG. 185-3	Algorithm for treatment of relapsing fever	1424
FIG. 186-2	Algorithm for the treatment of the various early or late manifestations of Lyme borreliosis.....	1430
FIG. 202-33	Algorithm for the acute HIV syndrome.....	1562
FIG. 202-37	Algorithm for the evaluation of diarrhea in a patient with HIV infection.....	1570
FIG. 208-6	Algorithm for rabies postexposure prophylaxis.....	1623
FIG. S6-1	Syndromic approach to the differential diagnosis of suspected infection in a veteran who has returned from a foreign war	S6-8

NEPHROLOGY

FIG. 52-1	Approach to the patient with azotemia.....	333
FIG. 52-2	Approach to the patient with hematuria.....	335
FIG. 52-3	Approach to the patient with proteinuria.....	336
FIG. 52-4	Approach to the patient with polyuria.....	337
FIG. 53-5	The diagnostic approach to hyponatremia.....	342
FIG. 53-6	The diagnostic approach to hypernatremia.....	346
FIG. 53-7	The diagnostic approach to hypokalemia.....	351
FIG. 53-8	The diagnostic approach to hyperkalemia.....	354
FIG. 313-2	A typical algorithm for early posttransplant care of a kidney recipient	2329
FIG. 316-1	Algorithm for the treatment of allergic and other immune-mediated acute interstitial nephritis.....	2358
FIG. 319-1	Diagnostic approach for urinary tract obstruction in unexplained renal failure	2375

NEUROLOGY AND PSYCHIATRY

FIG. 138-1	The pathophysiology of the neurologic complications of bacterial meningitis.....	1102
FIG. 425-2	Evaluation of the adult patient with a seizure	3313
FIG. 425-5	Pharmacologic treatment of generalized tonic-clonic status epilepticus in adults	3322

FIG. 426-1	Medical management of stroke and TIA	3325
FIG. 427-2	Management of acute stroke.....	3336
FIG. 435-7	Treatment options for the management of Parkinson's disease.....	3400
FIG. 446-1	Approach to the evaluation of peripheral neuropathies.....	3480
FIG. 448-2	Algorithm for the management of myasthenia gravis	3514
FIG. 449-1	Diagnostic evaluation of intermittent weakness	3518
FIG. 449-2	Diagnostic evaluation of persistent weakness	3518
FIG. 452-1	A guideline for the medical management of major depressive disorder.....	3549

PULMONOLOGY

FIG. 37-2	Possible algorithm for the evaluation of the patient with dyspnea	266
FIG. 39-1	Approach to the management of hemoptysis	271
FIG. 279-7	How to decide whether diagnostic imaging is needed	2095
FIG. 279-11	Imaging tests to diagnose deep-venous thrombosis and pulmonary embolism	2098
FIG. 279-12	Acute management of pulmonary thromboembolism.....	2098
FIG. 294-1	Approach to the diagnosis of pleural effusions.....	2197

SYSTEMIC CONDITIONS

FIG. 20-1	Structured approach to patients with fever of unknown origin	148
FIG. 24-3	An algorithm for the initial workup of a patient with weakness	167
FIG. 34-2	An algorithm for the approach to hearing loss	240
FIG. 61-1	Algorithm for the diagnosis of a patient with photosensitivity.....	423
FIG. 393-2	Algorithm for evaluation of amenorrhea.....	3035
FIG. 492-1	Approach to the patient with an undiagnosed disease	3855

21st Edition



HARRISON'S®
PRINCIPLES OF
**INTERNAL
MEDICINE**

21st Edition

HARRISON'S® PRINCIPLES OF INTERNAL MEDICINE

the definitive internal medicine textbook written for the 21st century
and based on the most recent clinical guidelines and research findings.

Editors

Joseph Loscalzo, MD, PhD
Hersey Professor of the Theory and Practice of Medicine, Harvard Medical School; Chairman, Department of Medicine; Soma Weiss MD Distinguished Chair in Medicine; Physician-in-Chief, Brigham and Women's Hospital, Boston, Massachusetts

Dennis L. Kasper, MD

William Ellery Channing Professor of Medicine and Professor of Immunology, Department of Immunology, Harvard Medical School; Division of Infectious Diseases, Brigham and Women's Hospital, Boston, Massachusetts

Dan L. Longo, MD

Professor of Medicine, Harvard Medical School; Senior Physician, Brigham and Women's Hospital; Deputy Editor, *New England Journal of Medicine*, Boston, Massachusetts

the definitive internal medicine textbook written for the 21st century and based on the most recent clinical guidelines and research findings.

Anthony S. Fauci, MD

Chief, Laboratory of Immunoregulation; Director, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, Maryland

Stephen L. Hauser, MD

Robert A. Fishman Distinguished Professor, Department of Neurology; Director, UCSF Weill Institute for Neurosciences, University of California, San Francisco, San Francisco, California

J. Larry Jameson, MD, PhD

Robert G. Dunlop Professor of Medicine; Dean, Raymond and Ruth Perelman School of Medicine; Executive Vice President, University of Pennsylvania for the Health System, Philadelphia, Pennsylvania

3289m



VOLUME I



New York Chicago San Francisco Athens London Madrid Mexico City
New Delhi Milan Singapore Sydney Toronto

Contributors	xviii
Preface	xxxix
Harrison's Related Resources	xl

PART 1 The Profession of Medicine

1 The Practice of Medicine	1
<i>The Editors</i>	
2 Promoting Good Health	8
<i>Donald M. Lloyd-Jones, Kathleen M. McKibbin</i>	
3 Vaccine Opposition and Hesitancy	13
<i>Julie A. Bettinger, Hana Mitchell</i>	
4 Decision-Making in Clinical Medicine.....	21
<i>Daniel B. Mark, John B. Wong</i>	
5 Precision Medicine and Clinical Care	30
<i>The Editors</i>	
6 Screening and Prevention of Disease	37
<i>Katrina A. Armstrong, Gary J. Martin</i>	
7 Global Diversity of Health System Financing and Delivery	42
<i>Richard B. Saltman</i>	
8 The Safety and Quality of Health Care.....	50
<i>David W. Bates</i>	
9 Diagnosis: Reducing Errors and Improving Quality.....	54
<i>Gordon Schiff</i>	
10 Racial and Ethnic Disparities in Health Care.....	59
<i>Lenny López, Joseph R. Betancourt</i>	
11 Ethical Issues in Clinical Medicine.....	67
<i>Christine Grady, Bernard Lo</i>	
12 Palliative and End-of-Life Care	72
<i>Ezekiel J. Emanuel</i>	

PART 2 Cardinal Manifestations and Presentation of Diseases

SECTION 1 Pain

13 Pain: Pathophysiology and Management	91
<i>James P. Rathmell, Howard L. Fields</i>	
14 Chest Discomfort	100
<i>David A. Morrow</i>	
15 Abdominal Pain.....	108
<i>Danny O. Jacobs</i>	
16 Headache.....	112
<i>Peter J. Goadsby</i>	
17 Back and Neck Pain	117
<i>John W. Engstrom</i>	

SECTION 2 Alterations in Body Temperature

18 Fever	130
<i>Neeraj K. Surana, Charles A. Dinarello, Reuven Porat</i>	
19 Fever and Rash	133
<i>Elaine T. Kaye, Kenneth M. Kaye</i>	
20 Fever of Unknown Origin	145
<i>Chantal P. Bleeker-Rovers, Catharina M. Mulders-Manders, Jos W. M. van der Meer</i>	

SECTION 3 Nervous System Dysfunction

21 Syncope	152
<i>Roy Freeman</i>	
22 Dizziness and Vertigo.....	159
<i>Mark F. Walker, Robert B. Daroff</i>	
23 Fatigue	162
<i>Jeffrey M. Gelfand, Vanja C. Douglas</i>	
24 Neurologic Causes of Weakness and Paralysis.....	165
<i>Stephen L. Hauser</i>	
25 Numbness, Tingling, and Sensory Loss	168
<i>Stephen L. Hauser</i>	
26 Gait Disorders, Imbalance, and Falls	173
<i>Jessica M. Baker</i>	
27 Confusion and Delirium	178
<i>S. Andrew Josephson, Bruce L. Miller</i>	
28 Coma.....	183
<i>S. Andrew Josephson, Allan H. Ropper, Stephen L. Hauser</i>	
29 Dementia.....	189
<i>William W. Seeley, Gil D. Rabinovici, Bruce L. Miller</i>	
30 Aphasia, Memory Loss, and Other Cognitive Disorders.....	195
<i>M.-Marsel Mesulam</i>	
31 Sleep Disorders.....	204
<i>Thomas E. Scammell, Clifford B. Saper, Charles A. Czeisler</i>	

SECTION 4 Disorders of Eyes, Ears, Nose, and Throat

32 Disorders of the Eye.....	215
<i>Jonathan C. Horton</i>	
33 Disorders of Smell and Taste	232
<i>Richard L. Doty, Steven M. Bromley</i>	
34 Disorders of Hearing.....	238
<i>Anil K. Lalwani</i>	
35 Upper Respiratory Symptoms, Including Earache, Sinus Symptoms, and Sore Throat.....	247
<i>Rachel L. Amdur, Jeffrey A. Linder</i>	
36 Oral Manifestations of Disease	256
<i>Samuel C. Durso</i>	

SECTION 5 Alterations in Circulatory and Respiratory Functions

37 Dyspnea	263
<i>Rebecca M. Baron</i>	
38 Cough	267
<i>Christopher H. Fanta</i>	
39 Hemoptysis	270
<i>Carolyn M. D'Ambrosio</i>	
40 Hypoxia and Cyanosis.....	272
<i>Joseph Loscalzo</i>	
41 Edema	275
<i>Joseph Loscalzo</i>	
42 Approach to the Patient with a Heart Murmur	278
<i>Patrick T. O'Gara, Joseph Loscalzo</i>	
43 Palpitations.....	286
<i>Joseph Loscalzo</i>	

SECTION 6 Alterations in Gastrointestinal Function

44 Dysphagia.....	287
<i>Ikuo Hirano, Peter J. Kahrilas</i>	
45 Nausea, Vomiting, and Indigestion	291
<i>William L. Hasler</i>	
46 Diarrhea and Constipation.....	297
<i>Michael Camilleri, Joseph A. Murray</i>	
47 Unintentional Weight Loss	309
<i>J. Larry Jameson</i>	
48 Gastrointestinal Bleeding.....	311
<i>Loren Laine</i>	
49 Jaundice.....	315
<i>Savio John, Daniel S. Pratt</i>	
50 Abdominal Swelling and Ascites	321
<i>Lawrence S. Friedman</i>	

SECTION 7 Alterations in Renal and Urinary Tract Function

51 Interstitial Cystitis/Bladder Pain Syndrome.....	325
<i>R. Christopher Doiron, J. Curtis Nickel</i>	
52 Azotemia and Urinary Abnormalities.....	331
<i>David B. Mount</i>	
53 Fluid and Electrolyte Disturbances	338
<i>David B. Mount</i>	
54 Hypercalcemia and Hypocalcemia.....	356
<i>Sundeep Khosla</i>	
55 Acidosis and Alkalosis.....	359
<i>Thomas D. DuBose, Jr.</i>	

SECTION 8 Alterations in the Skin

56 Approach to the Patient with a Skin Disorder	369
<i>Kim B. Yancey, Thomas J. Lawley</i>	
57 Eczema, Psoriasis, Cutaneous Infections, Acne, and Other Common Skin Disorders.....	374
<i>Leslie P. Lawley, Justin T. Cheeley, Robert A. Swerlick</i>	
58 Skin Manifestations of Internal Disease	383
<i>Jean L. Bolognia, Jonathan S. Leventhal, Irwin M. Braverman</i>	
59 Immunologically Mediated Skin Diseases	400
<i>Kim B. Yancey, Benjamin F. Chong, Thomas J. Lawley</i>	
60 Cutaneous Drug Reactions	407
<i>Robert G. Micheletti, Misha Rosenbach, Bruce U. Wintrob, Kanade Shinkai</i>	
61 Photosensitivity and Other Reactions to Sunlight.....	417
<i>Alexander G. Marneros, David R. Bickers</i>	

SECTION 9 Hematologic Alterations

62 Interpreting Peripheral Blood Smears.....	424
<i>Dan L. Longo</i>	
63 Anemia and Polycythemia.....	431
<i>John W. Adamson, Dan L. Longo</i>	
64 Disorders of Granulocytes and Monocytes	439
<i>Steven M. Holland, John I. Gallin</i>	
65 Bleeding and Thrombosis.....	450
<i>Barbara A. Konkle</i>	
66 Enlargement of Lymph Nodes and Spleen.....	457
<i>Dan L. Longo</i>	

PART 3 Pharmacology

67 Principles of Clinical Pharmacology	465
<i>Dan M. Roden</i>	
68 Pharmacogenomics	474
<i>Dan M. Roden</i>	

PART 4 Oncology and Hematology**SECTION 1 Neoplastic Disorders**

69 Approach to the Patient with Cancer	481
<i>Dan L. Longo</i>	
70 Prevention and Early Detection of Cancer.....	490
<i>Jennifer M. Croswell, Otis W. Brawley, Barnett S. Kramer</i>	
71 Cancer Genetics.....	498
<i>Fred Bunz, Bert Vogelstein</i>	
72 Cancer Cell Biology	508
<i>Jeffrey W. Clark, Dan L. Longo</i>	
73 Principles of Cancer Treatment	529
<i>Edward A. Sausville, Dan L. Longo</i>	
74 Infections in Patients with Cancer	556
<i>Robert W. Finberg</i>	
75 Oncologic Emergencies.....	565
<i>Rasim Gucalp, Janice P. Dutcher</i>	
76 Cancer of the Skin.....	578
<i>Brendan D. Curti, John T. Vetto, Sancy A. Leachman</i>	
77 Head and Neck Cancer	590
<i>Everett E. Vokes</i>	
78 Neoplasms of the Lung	594
<i>Leora Horn, Wade T. Iams</i>	
79 Breast Cancer	611
<i>Daniel F. Hayes, Marc E. Lippman</i>	
80 Upper Gastrointestinal Tract Cancers.....	626
<i>David Kelsen</i>	
81 Lower Gastrointestinal Cancers	636
<i>Robert J. Mayer</i>	
82 Tumors of the Liver and Biliary Tree	643
<i>Josep M. Llovet</i>	
83 Pancreatic Cancer	657
<i>Daniel D. Von Hoff</i>	
84 Gastrointestinal Neuroendocrine Tumors.....	663
<i>Matthew H. Kulke</i>	
85 Renal Cell Carcinoma	673
<i>Robert J. Motzer, Martin H. Voss</i>	
86 Cancer of the Bladder and Urinary Tract.....	676
<i>Noah M. Hahn</i>	
87 Benign and Malignant Diseases of the Prostate.....	681
<i>Howard I. Scher, James A. Eastham</i>	
88 Testicular Cancer	689
<i>David J. Vaughn</i>	
89 Gynecologic Malignancies	695
<i>David Spriggs</i>	
90 Primary and Metastatic Tumors of the Nervous System	701
<i>Lisa M. DeAngelis, Patrick Y. Wen</i>	
91 Soft Tissue and Bone Sarcomas and Bone Metastases	712
<i>Shreyaskumar R. Patel</i>	

SECTION 10 Diseases Caused by Rickettsiae, Mycoplasmas, and Chlamydiae		
187 Rickettsial Diseases.....	1431	
<i>David H. Walker, J. Stephen Dumler, Lucas S. Blanton, Chantal P. Bleeker-Rovers</i>		
188 Infections Due to Mycoplasmas	1441	
<i>R. Doug Hardy</i>		
189 Chlamydial Infections.....	1444	
<i>Charlotte A. Gaydos, Thomas C. Quinn</i>		
SECTION 11 Viral Diseases: General Considerations		
190 Principles of Medical Virology	1453	
<i>David M. Knipe</i>		
191 Antiviral Chemotherapy, Excluding Antiretroviral Drugs	1460	
<i>Jeffrey I. Cohen, Eleanor Wilson</i>		
SECTION 12 Infections Due to DNA Viruses		
192 Herpes Simplex Virus Infections	1470	
<i>Lawrence Corey</i>		
193 Varicella-Zoster Virus Infections.....	1479	
<i>Richard J. Whitley</i>		
194 Epstein-Barr Virus Infections, Including Infectious Mononucleosis	1483	
<i>Jeffrey I. Cohen</i>		
195 Cytomegalovirus and Human Herpesvirus Types 6, 7, and 8.....	1487	
<i>Camille Nelson Kotton, Martin S. Hirsch</i>		
196 Molluscum Contagiosum, Monkeypox, and Other Poxvirus Infections	1492	
<i>Inger K. Damon</i>		
197 Parvovirus Infections	1495	
<i>Kevin E. Brown</i>		
198 Human Papillomavirus Infections.....	1498	
<i>Darron R. Brown, Aaron C. Ermel</i>		
SECTION 13 Infections Due to DNA and RNA		
Respiratory Viruses		
199 Common Viral Respiratory Infections, Including COVID-19.....	1504	
<i>James E. Crowe, Jr.</i>		
200 Influenza	1515	
<i>Kathleen M. Neuzil, Peter F. Wright</i>		
SECTION 14 Infections Due to Human Immunodeficiency Virus and Other Human Retroviruses		
201 The Human Retroviruses.....	1521	
<i>Dan L. Longo, Anthony S. Fauci</i>		
202 Human Immunodeficiency Virus Disease: AIDS and Related Disorders.....	1527	
<i>Anthony S. Fauci, Gregory K. Folkers, H. Clifford Lane</i>		
SECTION 15 Infections Due to RNA Viruses		
203 Viral Gastroenteritis	1597	
<i>Umesh D. Purashar, Roger I. Glass</i>		
204 Enterovirus, Parechovirus, and Reovirus Infections	1602	
<i>Jeffrey I. Cohen</i>		
205 Measles (Rubeola).....	1608	
<i>Kaitlin Rainwater-Lovett, William J. Moss</i>		
SECTION 16 Fungal Infections		
206 Rubella (German Measles).....	1612	
<i>Laura A. Zimmerman, Susan E. Reef</i>		
207 Mumps.....	1615	
<i>Jessica Leung, Mariel Marlow</i>		
208 Rabies and Other Rhabdovirus Infections	1618	
<i>Alan C. Jackson</i>		
209 Arthropod-Borne and Rodent-Borne Virus Infections	1624	
<i>Jens H. Kuhn, Ian Crozier</i>		
210 Ebola virus and Marburgvirus Infections.....	1645	
<i>Jens H. Kuhn, Ian Crozier</i>		
SECTION 17 Protozoal and Helminthic Infections: General Considerations		
211 Pathogenesis, Diagnosis, and Treatment of Fungal Infections	1652	
<i>Michail S. Lionakis, John E. Edwards Jr.</i>		
212 Histoplasmosis.....	1658	
<i>Chadi A. Hage, L. Joseph Wheat</i>		
213 Coccidioidomycosis	1661	
<i>Neil M. Ampel</i>		
214 Blastomycosis	1664	
<i>Gregory M. Gauthier, Bruce S. Klein</i>		
215 Cryptococcosis.....	1668	
<i>Arturo Casadevall</i>		
216 Candidiasis	1671	
<i>Michail S. Lionakis, Shakti Singh, Ashraf S. Ibrahim, John E. Edwards, Jr.</i>		
217 Aspergillosis	1677	
<i>David W. Denning</i>		
218 Mucormycosis.....	1681	
<i>Brad Spellberg, Ashraf S. Ibrahim</i>		
219 Less Common Systemic Mycoses and Superficial Mycoses.....	1686	
<i>Carol A. Kauffman</i>		
220 <i>Pneumocystis</i> Infections.....	1691	
<i>Alison Morris, Henry Masur</i>		
SECTION 18 Protozoal Infections		
223 Amebiasis and Infection with Free-Living Amebae.....	1714	
<i>Rosa M. Andrade, Sharon L. Reed</i>		
224 Malaria.....	1720	
<i>Nicholas J. White, Elizabeth A. Ashley</i>		
225 Babesiosis	1736	
<i>Edouard Vannier, Jeffrey A. Gelfand</i>		
226 Leishmaniasis	1741	
<i>Shyam Sundar</i>		
227 Chagas Disease and African Trypanosomiasis.....	1748	
<i>François Chappuis, Yves Jackson</i>		
228 <i>Toxoplasma</i> Infections.....	1757	
<i>Kami Kim</i>		
229 Protozoal Intestinal Infections and Trichomoniasis.....	1764	
<i>Peter F. Weller</i>		

SECTION 19 Helminthic Infections

230 Introduction to Helminthic Infections.....	1768
Peter F. Weller	
231 Trichinellosis and Other Tissue Nematode Infections	1770
Peter F. Weller	
232 Intestinal Nematode Infections	1773
Thomas B. Nutman, Peter F. Weller	
233 Filarial and Related Infections.....	1778
Thomas B. Nutman, Peter F. Weller	
234 Schistosomiasis and Other Trematode Infections.....	1784
Birgitte Jyding Vennervold	
235 Cestode Infections	1790
A. Clinton White, Jr., Peter F. Weller	

PART 6 Disorders of the Cardiovascular System**SECTION 1 Introduction to Cardiovascular Disorders**

236 Approach to the Patient with Possible Cardiovascular Disease	1797
Joseph Loscalzo	
237 Basic Biology of the Cardiovascular System	1799
Joseph Loscalzo, John F. Keaney, Jr., Calum A. MacRae	
238 Epidemiology of Cardiovascular Disease	1810
Thomas A. Gaziano, J. Michael Gaziano	

SECTION 2 Diagnosis of Cardiovascular Disorders

239 Physical Examination of the Cardiovascular System.....	1815
Patrick T. O'Gara, Joseph Loscalzo	
240 Electrocardiography.....	1824
Ary L. Goldberger	
241 Noninvasive Cardiac Imaging: Echocardiography, Nuclear Cardiology, and Magnetic Resonance/Computed Tomography Imaging.....	1832
Marcelo F. Di Carli, Raymond Y. Kwong, Scott D. Solomon	
242 Diagnostic Cardiac Catheterization and Coronary Angiography	1859
Jane A. Leopold, David P. Faxon	

SECTION 3 Disorders of Rhythm

243 Principles of Clinical Cardiac Electrophysiology.....	1866
William H. Sauer, Bruce A. Koplan, Paul C. Zei	
244 The Bradyarrhythmias: Disorders of the Sinoatrial Node.....	1873
William H. Sauer, Bruce A. Koplan	
245 The Bradyarrhythmias: Disorders of the Atrioventricular Node	1880
William H. Sauer, Bruce A. Koplan	
246 Approach to Supraventricular Tachyarrhythmias	1888
William H. Sauer, Paul C. Zei	
247 Physiologic and Nonphysiologic Sinus Tachycardia.....	1891
William H. Sauer, Paul C. Zei	
248 Focal Atrial Tachycardia.....	1893
William H. Sauer, Paul C. Zei	
249 Paroxysmal Supraventricular Tachycardias	1894
William H. Sauer, Paul C. Zei	

250 Common Atrial Flutter and Macroreentrant and Multifocal Atrial Tachycardias.....	1899
William H. Sauer, Paul C. Zei	
251 Atrial Fibrillation.....	1903
William H. Sauer, Paul C. Zei	
252 Approach to Ventricular Arrhythmias.....	1910
William H. Sauer, Usha B. Tedrow	
253 Premature Ventricular Contractions, Nonsustained Ventricular Tachycardia, and Accelerated Idioventricular Rhythm.....	1915
William H. Sauer, Usha B. Tedrow	
254 Sustained Ventricular Tachycardia	1919
William H. Sauer, Usha B. Tedrow	
255 Polymorphic Ventricular Tachycardia and Ventricular Fibrillation	1923
William H. Sauer, Usha B. Tedrow	
256 Electrical Storm and Incessant Ventricular Tachycardia.....	1927
William H. Sauer, Usha B. Tedrow	

SECTION 4 Disorders of the Heart, Muscles, Valves, and Pericardium

257 Heart Failure: Pathophysiology and Diagnosis.....	1930
Michael M. Givertz, Mandeep R. Mehra	
258 Heart Failure: Management	1940
Akshay S. Desai, Mandeep R. Mehra	
259 Cardiomyopathy and Myocarditis.....	1954
Neal K. Lakdawala, Lynne Warner Stevenson, Joseph Loscalzo	
260 Cardiac Transplantation and Prolonged Assisted Circulation	1973
Mandeep R. Mehra	
261 Aortic Stenosis.....	1978
Patrick T. O'Gara, Joseph Loscalzo	
262 Aortic Regurgitation.....	1986
Patrick T. O'Gara, Joseph Loscalzo	
263 Mitral Stenosis	1991
Patrick T. O'Gara, Joseph Loscalzo	
264 Mitral Regurgitation.....	1995
Patrick T. O'Gara, Joseph Loscalzo	
265 Mitral Valve Prolapse	1999
Patrick T. O'Gara, Joseph Loscalzo	
266 Tricuspid Valve Disease.....	2001
Patrick T. O'Gara, Joseph Loscalzo	
267 Pulmonic Valve Disease.....	2004
Patrick T. O'Gara, Joseph Loscalzo	
268 Multiple and Mixed Valvular Heart Disease.....	2005
Patrick T. O'Gara, Joseph Loscalzo	
269 Congenital Heart Disease in the Adult	2008
Anne Marie Valente, Michael J. Landzberg	
270 Pericardial Disease	2019
Joseph Loscalzo	
271 Atrial Myxoma and Other Cardiac Tumors.....	2025
Eric H. Awtry	
272 Cardiac Trauma	2028
Eric H. Awtry	

SECTION 5 Coronary and Peripheral Vascular Disease

273 Ischemic Heart Disease.....	2030
Elliott M. Antman, Joseph Loscalzo	

274 Non-ST-Segment Elevation Acute Coronary Syndrome (Non-ST-Segment Elevation Myocardial Infarction and Unstable Angina)	2046
Robert P. Giugliano, Christopher P. Cannon, Eugene Braunwald	
275 ST-Segment Elevation Myocardial Infarction	2053
Elliott M. Antman, Joseph Loscalzo	
276 Percutaneous Coronary Interventions and Other Interventional Procedures	2066
David P. Faxon, Deepak L. Bhatt	
277 Hypertension.....	2072
Theodore A. Kotchen	
278 Renovascular Disease.....	2088
Stephen C. Texler	
279 Deep-Venous Thrombosis and Pulmonary Thromboembolism	2091
Samuel Z. Goldhaber	
280 Diseases of the Aorta.....	2101
Mark A. Creager, Joseph Loscalzo	
281 Arterial Diseases of the Extremities.....	2107
Mark A. Creager, Joseph Loscalzo	
282 Chronic Venous Disease and Lymphedema	2115
Mark A. Creager, Joseph Loscalzo	
283 Pulmonary Hypertension	2121
Bradley A. Maron, Joseph Loscalzo	

PART 7 Disorders of the Respiratory System

SECTION 1 Diagnosis of Respiratory Disorders

284 Approach to the Patient with Disease of the Respiratory System	2131
Bruce D. Levy	
285 Disturbances of Respiratory Function	2133
Edward T. Naureckas, Julian Solway	
286 Diagnostic Procedures in Respiratory Disease	2140
George R. Washko, Hilary J. Goldberg, Majid Shafiq	

SECTION 2 Diseases of the Respiratory System

287 Asthma.....	2147
Elliot Israel	
288 Hypersensitivity Pneumonitis and Pulmonary Infiltrates with Eosinophilia.....	2160
Praveen Akuthota, Michael E. Wechsler	
289 Occupational and Environmental Lung Disease	2166
John R. Balmes	
290 Bronchiectasis.....	2173
Rebecca M. Baron, Beverly W. Baron, Miriam Baron Barshak	
291 Cystic Fibrosis	2176
Eric J. Sorscher	
292 Chronic Obstructive Pulmonary Disease.....	2180
Edwin K. Silverman, James D. Crapo, Barry J. Make	
293 Interstitial Lung Disease	2190
Gary M. Hunninghake, Ivan O. Rosas	
294 Disorders of the Pleura.....	2197
Richard W. Light	
295 Disorders of the Mediastinum.....	2200
Richard W. Light	
296 Disorders of Ventilation	2201
John F. McConville, Julian Solway, Babak Mokhlesi	

297 Sleep Apnea	2204
Andrew Wellman, Daniel J. Gottlieb, Susan Redline	
298 Lung Transplantation	2209
Hilary J. Goldberg, Hari R. Mallidi	
299 Interventional Pulmonary Medicine.....	2214
Lonny Yarmus, David Feller-Kopman	

PART 8 Critical Care Medicine

SECTION 1 Respiratory Critical Care

300 Approach to the Patient with Critical Illness.....	2217
Rebecca M. Baron, Anthony F. Massaro	
301 Acute Respiratory Distress Syndrome	2225
Rebecca M. Baron, Bruce D. Levy	
302 Mechanical Ventilatory Support	2230
Scott Schissel	

SECTION 2 Shock and Cardiac Arrest

303 Approach to the Patient with Shock	2235
Anthony F. Massaro	
304 Sepsis and Septic Shock	2241
Emily B. Brant, Christopher W. Seymour, Derek C. Angus	
305 Cardiogenic Shock and Pulmonary Edema	2250
David H. Ingbar, Holger Thiele	
306 Cardiovascular Collapse, Cardiac Arrest, and Sudden Cardiac Death	2257
Christine Albert, William H. Sauer	

SECTION 3 Neurologic Critical Care

307 Nervous System Disorders in Critical Care	2267
J. Claude Hemphill, III, Wade S. Smith, S. Andrew Josephson, Daryl R. Gress	

PART 9 Disorders of the Kidney and Urinary Tract

308 Approach to the Patient with Renal Disease or Urinary Tract Disease	2279
Julian L. Seifter	
309 Cell Biology and Physiology of the Kidney	2287
Alfred L. George, Jr., Eric G. Neilson	
310 Acute Kidney Injury	2296
Sushrut S. Waikar, Joseph V. Bonventre	
311 Chronic Kidney Disease	2309
Joanne M. Bargman, Karl Skorecki	
312 Dialysis in the Treatment of Kidney Failure	2320
Kathleen D. Liu, Glenn M. Chertow	
313 Transplantation in the Treatment of Renal Failure	2325
Jamil Azzi, Naoka Murakami, Anil Chandraker	
314 Glomerular Diseases	2331
Julia B. Lewis, Eric G. Neilson	
315 Polycystic Kidney Disease and Other Inherited Disorders of Tubule Growth and Development	2350
Jing Zhou, Martin R. Pollak	
316 Tubulointerstitial Diseases of the Kidney	2357
Laurence H. Beck Jr., David J. Salant	
317 Vascular Injury to the Kidney	2364
Ronald S. Go, Nelson Leung	

318 Nephrolithiasis	2368
<i>Gary C. Curhan</i>	
319 Urinary Tract Obstruction	2373
<i>Julian L. Seifter</i>	
320 Interventional Nephrology.....	2377
<i>Dirk M. Hentschel</i>	

PART 10 Disorders of the Gastrointestinal System

SECTION 1 Disorders of the Alimentary Tract

321 Approach to the Patient with Gastrointestinal Disease	2381
<i>William L. Hasler, Chung Owyang</i>	
322 Gastrointestinal Endoscopy	2387
<i>Louis Michel Wong Kee Song, Mark Topazian</i>	
323 Diseases of the Esophagus.....	2423
<i>Peter J. Kahrilas, Ikuo Hirano</i>	
324 Peptic Ulcer Disease and Related Disorders.....	2434
<i>John Del Valle</i>	
325 Disorders of Absorption.....	2458
<i>Deborah C. Rubin</i>	
326 Inflammatory Bowel Disease.....	2469
<i>Sonia Friedman, Richard S. Blumberg</i>	
327 Irritable Bowel Syndrome.....	2490
<i>Chung Owyang</i>	
328 Diverticular Disease and Common Anorectal Disorders	2497
<i>Susan L. Gearhart</i>	
329 Mesenteric Vascular Insufficiency.....	2506
<i>Maryam Ali Khan, Jaideep Das Gupta, Mahmoud Malas</i>	
330 Acute Intestinal Obstruction.....	2508
<i>Danny O. Jacobs</i>	
331 Acute Appendicitis and Peritonitis	2513
<i>Danny O. Jacobs</i>	

SECTION 2 Nutrition

332 Nutrient Requirements and Dietary Assessment.....	2517
<i>Johanna T. Dwyer</i>	
333 Vitamin and Trace Mineral Deficiency and Excess.....	2523
<i>Paolo M. Suter</i>	
334 Malnutrition and Nutritional Assessment	2534
<i>Gordon L. Jensen</i>	
335 Enteral and Parenteral Nutrition.....	2539
<i>L. John Hoffer, Bruce R. Bistrian, David F. Driscoll</i>	

SECTION 3 Liver and Biliary Tract Disease

336 Approach to the Patient with Liver Disease	2546
<i>Marc G. Ghany, Jay H. Hoofnagle</i>	
337 Evaluation of Liver Function.....	2553
<i>Emily D. Bethea, Daniel S. Pratt</i>	
338 The Hyperbilirubinemias	2557
<i>Allan W. Wolkoff</i>	
339 Acute Viral Hepatitis	2562
<i>Jules L. Dienstag</i>	
340 Toxic and Drug-Induced Hepatitis.....	2584
<i>William M. Lee, Jules L. Dienstag</i>	
341 Chronic Hepatitis	2591
<i>Jules L. Dienstag</i>	
342 Alcohol-Associated Liver Disease	2617
<i>Bernd Schnabl</i>	
343 Nonalcoholic Fatty Liver Diseases and Nonalcoholic Steatohepatitis.....	2619
<i>Manal F. Abdelmalek, Anna Mae Diehl</i>	
344 Cirrhosis and Its Complications	2624
<i>Alex S. Befeler, Bruce R. Bacon</i>	
345 Liver Transplantation.....	2633
<i>Raymond T. Chung, Jules L. Dienstag</i>	
346 Diseases of the Gallbladder and Bile Ducts.....	2641
<i>Norton J. Greenberger, Gustav Paumgartner, Daniel S. Pratt</i>	

SECTION 4 Disorders of the Pancreas

347 Approach to the Patient with Pancreatic Disease.....	2652
<i>Somashekhar G. Krishna, Darwin L. Conwell, Phil A. Hart</i>	
348 Acute and Chronic Pancreatitis	2657
<i>Phil A. Hart, Darwin L. Conwell, Somashekhar G. Krishna</i>	

PART 11 Immune-Mediated, Inflammatory, and Rheumatologic Disorders

SECTION 1 The Immune System in Health and Disease

349 Introduction to the Immune System.....	2671
<i>Barton F. Haynes, Kelly A. Soderberg, Anthony S. Fauci</i>	
350 Mechanisms of Regulation and Dysregulation of the Immune System	2701
<i>Barton F. Haynes, Kelly A. Soderberg, Anthony S. Fauci</i>	
351 Primary Immune Deficiency Diseases	2709
<i>Alain Fischer</i>	

SECTION 2 Disorders of Immune-Mediated Injury

352 Urticaria, Angioedema, and Allergic Rhinitis.....	2719
<i>Katherine L. Tuttle, Joshua A. Boyce</i>	
353 Anaphylaxis	2727
<i>David Hong, Joshua A. Boyce</i>	
354 Mastocytosis.....	2729
<i>Matthew P. Giannetti, Joshua A. Boyce</i>	
355 Autoimmunity and Autoimmune Diseases	2731
<i>Betty Diamond, Peter E. Lipsky</i>	
356 Systemic Lupus Erythematosus.....	2736
<i>Bevra Hannahs Hahn, Maureen McMahon</i>	
357 Antiphospholipid Syndrome	2749
<i>Haralampos M. Moutsopoulos, Clio P. Mavragani</i>	
358 Rheumatoid Arthritis.....	2751
<i>Ankoor Shah, E. William St. Clair</i>	
359 Acute Rheumatic Fever.....	2766
<i>Joseph Kado, Jonathan Carapetis</i>	
360 Systemic Sclerosis (Scleroderma) and Related Disorders	2771
<i>John Varga</i>	
361 Sjögren's Syndrome	2787
<i>Haralampos M. Moutsopoulos, Clio P. Mavragani</i>	
362 Spondyloarthritis	2790
<i>Joel D. Taurog, Lianne S. Gensler, Nigel Haroon</i>	
363 The Vasculitis Syndromes	2802
<i>Carol A. Langford, Anthony S. Fauci</i>	
364 Behçet Syndrome.....	2817

365	Inflammatory Myopathies..... Steven A. Greenberg, Anthony A. Amato	2819
366	Relapsing Polychondritis..... Carol A. Langford	2826
367	Sarcoidosis..... Robert P. Baughman, Elyse E. Lower	2829
368	IgG4-Related Disease..... John H. Stone	2837
369	Familial Mediterranean Fever and Other Hereditary Autoinflammatory Diseases..... Daniel L. Kastner	2840

SECTION 3 Disorders of the Joints and Adjacent Tissues

370	Approach to Articular and Musculoskeletal Disorders..... John J. Cush	2844
371	Osteoarthritis David T. Felson, Tuhina Neogi	2854
372	Gout and Other Crystal-Associated Arthropathies..... Hyon K. Choi	2862
373	Fibromyalgia..... Leslie J. Crofford	2868
374	Arthritis Associated with Systemic Disease, and Other Arthritides Carol A. Langford, Brian F. Mandell	2871
375	Periarticular Disorders of the Extremities	2878
	Carol A. Langford	

PART 12 Endocrinology and Metabolism

SECTION 1 Endocrinology

376	Approach to the Patient with Endocrine Disorders	2881
	J. Larry Jameson	
377	Mechanisms of Hormone Action	2884
	J. Larry Jameson	
378	Physiology of Anterior Pituitary Hormones	2891
	Shlomo Melmed, J. Larry Jameson	
379	Hypopituitarism	2896
	Shlomo Melmed, J. Larry Jameson	
380	Pituitary Tumor Syndromes	2902
	Shlomo Melmed, J. Larry Jameson	
381	Disorders of the Neurohypophysis	2918
	Gary L. Robertson, Daniel G. Bichet	
382	Thyroid Gland Physiology and Testing.....	2926
	J. Larry Jameson, Susan J. Mandel, Anthony P. Weetman	
383	Hypothyroidism.....	2933
	J. Larry Jameson, Susan J. Mandel, Anthony P. Weetman	
384	Hyperthyroidism and Other Causes of Thyrotoxicosis	2938
	J. Larry Jameson, Susan J. Mandel, Anthony P. Weetman	
385	Thyroid Nodular Disease and Thyroid Cancer.....	2946
	J. Larry Jameson, Susan J. Mandel, Anthony P. Weetman	
386	Disorders of the Adrenal Cortex.....	2955
	Wiebke Arlt	
387	Pheochromocytoma	2976
	Hartmut P. H. Neumann	
388	Multiple Endocrine Neoplasia Syndromes	2983

390 R. V. Thakker

389	Autoimmune Polyendocrine Syndromes	2992
	Peter A. Gottlieb, Aaron W. Michels	

SECTION 2 Sex- and Gender-Based Medicine

390	Sex Development	2997
	Courtney Finlayson, J. Larry Jameson, John C. Achermann	
391	Disorders of the Testes and Male Reproductive System	3006
	Shalender Bhasin, J. Larry Jameson	
392	Disorders of the Female Reproductive System	3027
	Janet E. Hall, Anuja Dokras	
393	Menstrual Disorders and Pelvic Pain	3033
	Janet E. Hall, Anuja Dokras	
394	Hirsutism	3039
	David A. Ehrmann	
395	Menopause and Postmenopausal Hormone Therapy	3043
	JoAnn E. Manson, Shari S. Bassuk	
396	Infertility and Contraception	3050
	Anuja Dokras, Janet E. Hall	
397	Sexual Dysfunction	3055
	Kevin T. McVary	
398	Women's Health	3063
	Emily Nosova, Andrea Dunaif	
399	Men's Health	3069
	Shalender Bhasin	
400	Lesbian, Gay, Bisexual, and Transgender (LGBT) Health	3078
	Baligh R. Yehia, Zachary B. R. McClain	

SECTION 3 Obesity, Diabetes Mellitus, and Metabolic Syndrome

401	Pathobiology of Obesity	3080
	Stephen O'Rahilly, I. Sadaf Farooqi	
402	Evaluation and Management of Obesity	3087
	Robert F. Kushner	
403	Diabetes Mellitus: Diagnosis, Classification, and Pathophysiology	3094
	Alvin C. Powers, Kevin D. Niswender, Carmella Evans-Molina	
404	Diabetes Mellitus: Management and Therapies	3104
	Alvin C. Powers, Michael J. Fowler, Michael R. Rickels	
405	Diabetes Mellitus: Complications	3120
	Alvin C. Powers, John M. Stafford, Michael R. Rickels	
406	Hypoglycemia	3129
	Stephen N. Davis, Philip E. Cryer	
407	Disorders of Lipoprotein Metabolism	3135
	Daniel J. Rader	
408	The Metabolic Syndrome	3150
	Robert H. Eckel	

SECTION 4 Disorders of Bone and Mineral Metabolism

409	Bone and Mineral Metabolism in Health and Disease	3157
	F. Richard Bringhurst, Henry M. Kronenberg, Eva S. Liu	
410	Disorders of the Parathyroid Gland and Calcium Homeostasis	3169
	John T. Potts, Jr., Harald Jüppner	
411	Osteoporosis	3191

<i>Robert Lindsay, Blossom Samuels</i>	xx
412 Paget's Disease and Other Dysplasias of Bone	3209
<i>Rajesh K. Jain, Tamara J. Vokes</i>	
SECTION 5 Disorders of Intermediary Metabolism	
413 Heritable Disorders of Connective Tissue.....	3217
<i>Joan C. Marini, Fransiska Malfait</i>	
414 Hemochromatosis.....	3230
<i>Lawrie W. Powell, David M. Frazer</i>	
415 Wilson's Disease	3235
<i>Stephen G. Kaler</i>	
416 The Porphyrias	3237
<i>Robert J. Desnick, Manisha Balwani</i>	
417 Disorders of Purine and Pyrimidine Metabolism	3248
<i>John N. Mechlenga, Christopher M. Burns</i>	
418 Lysosomal Storage Diseases	3254
<i>Robert J. Hopkin, Gregory A. Grabowski</i>	
419 Glycogen Storage Diseases and Other Inherited Disorders of Carbohydrate Metabolism.....	3261
<i>Priya S. Kishnani</i>	
420 Inherited Disorders of Amino Acid Metabolism in Adults.....	3268
<i>Nicola Longo</i>	
421 Inherited Defects of Membrane Transport	3274
<i>Nicola Longo</i>	
PART 13 Neurologic Disorders	
SECTION 1 Diagnosis of Neurologic Disorders	
422 Approach to the Patient with Neurologic Disease	3277
<i>Daniel H. Lowenstein, S. Andrew Josephson, Stephen L. Hauser</i>	
423 Neuroimaging in Neurologic Disorders	3282
<i>William P. Dillon</i>	
424 Pathobiology of Neurologic Diseases	3293
<i>Stephen L. Hauser, Arnold R. Kriegstein, Stanley B. Prusiner</i>	
SECTION 2 Diseases of the Central Nervous System	
425 Seizures and Epilepsy.....	3305
<i>Vikram R. Rao, Daniel H. Lowenstein</i>	
426 Introduction to Cerebrovascular Diseases	3324
<i>Wade S. Smith, S. Claiborne Johnston, J. Claude Hemphill, III</i>	
427 Ischemic Stroke	3335
<i>Wade S. Smith, S. Claiborne Johnston, J. Claude Hemphill, III</i>	
428 Intracranial Hemorrhage.....	3348
<i>Wade S. Smith, J. Claude Hemphill, III, S. Claiborne Johnston</i>	
429 Subarachnoid Hemorrhage	3353
<i>J. Claude Hemphill, III, Wade S. Smith, Daryl R. Gress</i>	
430 Migraine and Other Primary Headache Disorders	3357
<i>Peter J. Goadsby</i>	
431 Alzheimer's Disease	3370
<i>Gil D. Rabinovici, William W. Seeley, Bruce L. Miller</i>	
432 Frontotemporal Dementia	3378
<i>William W. Seeley, Bruce L. Miller</i>	
433 Vascular Dementia	3381
<i>Steven M. Greenberg, William W. Seeley</i>	
434 Dementia with Lewy Bodies.....	3385
SECTION 3 Nerve and Muscle Disorders	
446 Peripheral Neuropathy	3480
<i>Anthony A. Amato, Richard J. Barohn</i>	
447 Guillain-Barré Syndrome and Other Immune-Mediated Neuropathies.....	3501
<i>Stephen L. Hauser, Anthony A. Amato</i>	
448 Myasthenia Gravis and Other Diseases of the Neuromuscular Junction	3509
<i>Anthony A. Amato</i>	
449 Muscular Dystrophies and Other Muscle Diseases	3516
<i>Anthony A. Amato, Robert H. Brown, Jr.</i>	
SECTION 4 Myalgic Encephalomyelitis/Chronic Fatigue Syndrome	
450 Myalgic Encephalomyelitis/Chronic Fatigue Syndrome	3532
<i>Elizabeth R. Unger, Jin-Mann S. Lin, Jeanne Bertoli</i>	
SECTION 5 Psychiatric and Addiction Disorders	
451 Biology of Psychiatric Disorders	3534
<i>Robert O. Messing, Eric J. Nestler, Matthew W. State</i>	
452 Psychiatric Disorders	3540
<i>Victor I. Reus</i>	
453 Alcohol and Alcohol Use Disorders	3556
<i>Marc A. Schuckit</i>	
454 Nicotine Addiction	3563
<i>David M. Burns</i>	
455 Marijuana and Marijuana Use Disorders	3567
<i>Nora D. Volkow, Aidan Hampson, Ruben Baler</i>	
456 Opioid-Related Disorders	3569
<i>Thomas R. Kosten, Colin N. Haile</i>	
457 Cocaine, Other Psychostimulants, and Hallucinogens.....	3573
<i>Karran A. Phillips, Wilson M. Compton</i>	

PART 14 Poisoning, Drug Overdose, and Envenomation

458 Heavy Metal Poisoning	3579
Howard Hu	
459 Poisoning and Drug Overdose	3582
Mark B. Mycyk	
460 Disorders Caused by Venomous Snakebites and Marine Animal Exposures.....	3596
Erik Fisher, Alex Chen, Charles Lei	
461 Ectoparasite Infestations and Arthropod Injuries	3608
Richard J. Pollack, Scott A. Norton	

PART 15 Disorders Associated with Environmental Exposures

462 Altitude Illness	3617
Buddha Basnyat, Geoffrey Tabin	
463 Hyperbaric and Diving Medicine	3623
Michael H. Bennett, Simon J. Mitchell	
464 Hypothermia and Peripheral Cold Injuries	3630
Daniel F. Danzl	
465 Heat-Related Illnesses	3635
Daniel F. Danzl	

PART 16 Genes, the Environment, and Disease

466 Principles of Human Genetics.....	3639
J. Larry Jameson, Peter Kopp	
467 The Practice of Genetics in Clinical Medicine	3662
Susan M. Domchek, J. Larry Jameson, Susan Miesfeldt	
468 Mitochondrial DNA and Heritable Traits and Diseases.....	3668
Karl L. Skorecki, Bruce H. Cohen	
469 Telomere Disease	3680
Rodrigo T. Calado, Neal S. Young	
470 Gene- and Cell-Based Therapy in Clinical Medicine	3685
Katherine A. High, Marcela V. Maus	
471 The Human Microbiome	3690
Neeraj K. Surana, Dennis L. Kasper	

PART 17 Global Medicine

472 Global Issues in Medicine	3703
Joseph J. Rhatigan, Paul Farmer	
473 Emerging and Reemerging Infectious Diseases.....	3713
George W. Rutherford, Jaime Sepúlveda	
474 Primary Care and Global Health	3718
Tim Evans, Kumanan Rasanathan	
475 Health Effects of Climate Change	3726
Eugene T. Richardson, Maxine A. Burkett, Paul E. Farmer	

PART 18 Aging

476 Biology of Aging.....	3733
Rafael de Cabo, David Le Couteur	
477 Caring for the Geriatric Patient.....	3739
Joseph G. Ouslander, Bernardo Reyes	

PART 19 Consultative Medicine

478 Approach to Medical Consultation.....	3761
Jeffrey Berns, Jack Ende	
479 Medical Disorders During Pregnancy.....	3762
Sarah Rae Easter, Robert L. Barbieri	
480 Medical Evaluation of the Surgical Patient	3769
Prashant Vaishnava, Kim A. Eagle	

PART 20 Frontiers

481 Behavioral Economics and Health.....	3775
Kevin G. Volpp, George Loewenstein, David A. Asch	
482 Complementary and Integrative Therapies and Practices	3784
Helene M. Langevin	
483 The Role of Epigenetics in Disease and Treatment.....	3790
Brian C. Capell, Shelley L. Berger	
484 Applications of Stem Cell Biology in Clinical Medicine	3796
John A. Kessler	
485 The Role of Circadian Biology in Health and Disease.....	3800
Jonathan Cedernaes, Kathryn Moynihan Ramsey, Joseph Bass	
486 Network Medicine: Systems Biology in Health and Disease	3812
Joseph Loscalzo	
487 Emerging Neurotherapeutic Technologies.....	3819
Jyoti Mishra, Karunesh Ganguly	
488 Machine Learning and Augmented Intelligence in Clinical Medicine.....	3826
Arjun K. Manrai, Isaac S. Kohane	
489 Metabolomics	3831
Jared R. Mayers, Mathew G. Vander Heiden	
490 Circulating Nucleic Acids as Liquid Biopsies and Noninvasive Disease Biomarkers.....	3836
Ash A. Alizadeh, Kiran K. Khush, Yair J. Blumenfeld	
491 Protein Folding Disorders	3846
Richard I. Morimoto, G. Scott Budinger	
492 Novel Approaches to Diseases of Unknown Etiology.....	3851
David Adams, Camilo Toro, Joseph Loscalzo	
Index	I-1