

Introduction to Pathophysiology xix

UNIT 1 Cell and Tissue Function 1

Chapter 1 Cell Structure and Function 1

Edward W. Carroll

Functional Components of the Cell 1

Cell Metabolism and Energy Storage 9

Integration of Cell Function 12

Body Tissues 20

Chapter 2 Cellular Responses to Stress, Injury, and Aging 33

Carrie J. Merkle

Cellular Responses to Persistent Stress 33

Cell Injury, Death, and Senescence 38

Chapter 3 Inflammation, the Inflammatory Response, and Fever 51

General Features of Inflammation 51

Acute Inflammation 55

Chronic Inflammation 63

Systemic Manifestations of Inflammation 64

Chapter 4 Cell Proliferation and Tissue Regeneration and Repair 73

Carrie J. Merkle

Cell Proliferation and Tissue Regeneration 73

Healing by Connective Tissue Repair 80

Chapter 5 Genetic Control of Cell Function and Inheritance 89

Edward W. Carroll

Genetic Control of Cell Function 89

Chromosomes 97

Patterns of Inheritance 100

Gene Technology 103

Chapter 6 Genetic and Congenital Disorders 109

Genetic and Congenital Disorders

Genetic and Chromosomal Disorders 109

Disorders Due to Environmental Influences 123

Prenatal Screening and Diagnosis 126

Chapter 7 Neoplasia 131

Carrie J. Merkle

Characteristics of Benign and Malignant

Neoplasms 131

Etiology of Cancer 139

Clinical Manifestations 146

Screening, Diagnosis, and Treatment 148

Childhood Cancers 154

UNIT 2 Integrative Body Functions 159

Chapter 8 Disorders of Fluid, Electrolyte, and Acid-Base Balance 159

Carol M. Porth and Kim A. Noble

Composition and Compartmental Distribution
of Body Fluids 159

Sodium and Water Balance 167

Potassium Balance 178

Calcium and Magnesium Balance 183

Acid-Base Balance 192

Chapter 9 Stress and Adaptation 209

Mary Pat Kunert

Stress and Adaptation 209

Disorders of the Stress Response 218

Chapter 10 Disorders of Nutritional Status 224

Joan Pleuss and Glenn Matfin

Energy Metabolism and Nutritional Status 224

Overweight and Obesity 231

Undernutrition and Eating Disorders 235

UNIT 3 Hematopoietic Function 243

Chapter 11 Disorders of White Blood Cells and Lymphoid Tissues 243

Hematopoietic and Lymphoid Tissues 243

Nonneoplastic Disorders of White Blood Cells 248

Neoplastic Disorders of Hematopoietic and
Lymphoid Origin 251

Chapter 12 Disorders of Hemostasis 263

Kathryn J. Gaspard

Hemostasis and Blood Coagulation 263

Hypercoagulability States 269

Bleeding Disorders 271

Chapter 13 Disorders of Red Blood Cells 279

Kathryn J. Gaspard

The Red Blood Cell 279

Anemia 284

Polycythemia 293

Age-Related Changes in Red Blood Cells 293

UNIT 4 Infection and Immunity 299

Chapter 14 Mechanisms of Infectious Disease 299

W. Michael Dunne Jr. and

Nathan A. Ledeboer

Infectious Diseases 299

Epidemiology of Infectious Diseases 307

Diagnosis and Treatment 312

New and Emerging Infectious Diseases 316

Chapter 15 Innate and Adaptive Immunity 319

Cynthia Sommer

- Introduction to the Immune System 319
- Innate Immunity 326
- Adaptive Immunity 332
- Developmental Aspects of the Immune System 342

Chapter 16 Disorders of the Immune Response 345

Judith A. Aberg and Jason Faulhaber

- Hypersensitivity Disorders 345
- Transplantation Immunopathology 353
- Autoimmune Disease 355
- Immunodeficiency Disorders 359

UNIT 5 Circulatory Function 377

Chapter 17 Control of Cardiovascular Function 377

- Organization of the Circulatory System 377
- Principles of Blood Flow 380
- The Heart as a Pump 384
- The Systemic Circulation and Control of Blood Flow 396
- Neural Control of Circulatory Function 402

Chapter 18 Disorders of Blood Flow and Blood Pressure 405

Glenn Matfin and Carol M. Porth

- Blood Vessel Structure and Function 405
- Disorders of the Arterial Circulation 407
- Disorders of Arterial Blood Pressure 422
- Disorders of the Venous Circulation 439

Chapter 19 Disorders of Cardiac Function 447

Toni Balistrieri and Kathleen Mussatto

- Disorders of the Pericardium 447
- Coronary Artery Disease 450
- Cardiomyopathies 461
- Endocardial and Valvular Disorders 466
- Heart Disease in Infants and Children 474

Chapter 20 Heart Failure and Circulatory Shock 486

Anna Barkman and Charlotte Pooler

- Heart Failure 486
- Circulatory Failure (Shock) 499
- Heart Failure in Children and the Elderly 508

UNIT 6 Respiratory Function 513

Chapter 21 Control of Respiratory Function 513

- Structural Organization of the Respiratory System 513
- Exchange of Gases Between the Atmosphere and the Lungs 520
- Exchange and Transport of Gases 528
- Control of Breathing 536

Chapter 22 Respiratory Tract Infections, Neoplasms, and Childhood Disorders 540

- Respiratory Tract Infections 540
- Cancer of the Lung 554
- Respiratory Disorders in Children 557

Chapter 23 Disorders of Ventilation and Gas Exchange 566

Charlotte Pooler

- Physiologic Effects of Ventilation and Diffusion Disorders 566
- Disorders of Lung Inflation 569
- Obstructive Airway Disorders 573
- Interstitial Lung Diseases 586
- Disorders of the Pulmonary Circulation 589
- Acute Respiratory Disorders 593

UNIT 7 Kidney and Urinary Tract Function 601

Chapter 24 Structure and Function of the Kidney 601

- Kidney Structure and Function 601
- Tests of Renal Function 616

Chapter 25 Disorders of Renal Function 620

- Disorders of Glomerular Function 620
- Tubulointerstitial Disorders 627
- Cystic Diseases of the Kidney 630
- Obstructive Disorders 633
- Malignant Tumors of the Kidney 637

Chapter 26 Acute Renal Failure and Chronic Kidney Disease 641

- Acute Renal Failure 641
- Chronic Kidney Disease 645
- Chronic Kidney Disease in Children and Elderly Persons 655

Chapter 27 Disorders of the Bladder and Lower Urinary Tract 659

- Control of Urine Elimination 659
- Disorders of Bladder Structure and Function 663
- Urinary Tract Infections 671
- Cancer of the Bladder 675

UNIT 8 Gastrointestinal and Hepatobiliary Function 679

Chapter 28 Structure and Function of the Gastrointestinal System 679

- Structure and Organization of the Gastrointestinal Tract 679
- Motility 684
- Hormonal, Secretory, and Microflora Functions 690
- Digestion and Absorption 694
- Anorexia, Nausea, and Vomiting 697

Chapter 29 Disorders of Gastrointestinal Function 700

- Disorders of the Esophagus 700
- Disorders of the Stomach 705
- Disorders of the Small and Large Intestines 710

Chapter 30 Disorders of Hepatobiliary and Exocrine Pancreas Function 729

- The Liver and Hepatobiliary System 729
- Disorders of Hepatic and Biliary Function 737
- Disorders of the Gallbladder and Exocrine Pancreas 752

UNIT 9 Endocrine System 761

Chapter 31 Mechanisms of Endocrine Control 761

Glenn Matfin

- The Endocrine System 761

Chapter 32 Disorders of Endocrine Control of Growth and Metabolism 774

Glenn Matfin

- General Aspects of Altered Endocrine Function 774
- Pituitary and Growth Disorders 775
- Thyroid Disorders 782
- Disorders of Adrenal Cortical Function 790

Chapter 33 Diabetes Mellitus and the Metabolic Syndrome 799

Safak Guven, Glenn Matfin, and Julie A. Kuenzi

- Hormonal Control of Nutrient Metabolism and Storage 799
- Diabetes Mellitus 805

UNIT 10 Nervous System 829

Chapter 34 Organization and Control of Neural Function 829

Edward W. Carroll and Robin Curtis

- Nervous Tissue Cells 829
- Nerve Cell Communication 833
- Developmental Organization of the Nervous System 837
- Spinal Cord and Brain 845
- The Autonomic Nervous System 855

Chapter 35 Somatosensory Function, Pain, and Headache 863

Kim A. Noble and Kim Litwack

- Organization and Control of Somatosensory Function 863
- Pain Sensation 870
- Alterations in Pain Sensitivity and Special Types of Pain 880
- Headache and Associated Pain 883
- Pain in Children and Older Adults 886

Chapter 36 Disorders of Neuromuscular Function 891

Serena W. Hung

- Organization and Control of Motor Function 891
- Disorders of the Motor Unit 899
- Disorders of the Cerebellum and Basal Ganglia 908
- Upper Motor Neuron Disorders 913

Chapter 37 Disorders of Brain Function 927

Diane S. Book

- Mechanisms and Manifestations of Brain Injury 927
- Cerebrovascular Disease 941
- Infections and Brain Tumors 951
- Seizure Disorders 955
- Disorders of Memory and Cognition 959

Chapter 38 Disorders of Special Sensory Function: Vision, Hearing, and Vestibular Function 966

Edward W. Carroll and Scott A. Jens, Disorders of Vision; Susan A. Fontana, Disorders of Hearing and Vestibular Function

- The Eye and Disorders of Vision 966
- The Ear and Disorders of Auditory Function 988
- The Vestibular System and Disorders of Equilibrium 1000

UNIT 11 Genitourinary and Reproductive Function 1009

Chapter 39 Disorders of the Male Genitourinary System 1009

Glenn Matfin

- Physiologic Basis of Male Reproductive Function 1009
- Disorders of the Penis, the Scrotum and Testes, and the Prostate 1016
- Disorders in Childhood and Aging Changes 1028

Chapter 40 Disorders of the Female Genitourinary System 1033

Patricia McCowen Mehring

- Structure and Function of the Female Reproductive System 1033
- Disorders of the Female Reproductive Organs 1041
- Menstrual Disorders 1055
- Disorders of the Breast 1059

Chapter 41 Sexually Transmitted Infections 1067

Patricia McCowen Mehring

- Infections of the External Genitalia 1068
- Vaginal Infections 1072
- Vaginal-Urogenital-Systemic Infections 1074

UNIT 12 Musculoskeletal Function 1081

Chapter 42 Structure and Function of the Skeletal System 1081

- Structures of the Skeletal System 1081
- Joints 1092

Chapter 43 Disorders of the Skeletal System: Trauma, Infections, Neoplasms, and Childhood Disorders 1096

Kathleen E. Gunta

- Injury and Trauma of Musculoskeletal Structures 1096
- Bone Infections and Osteonecrosis 1109
- Neoplasms 1113
- Skeletal Disorders in Children 1116

Chapter 44 Disorders of the Skeletal System: Metabolic and Rheumatic Disorders 1130

*Kathleen E. Gunta, Metabolic Disorders;
Debra Bancroft Rizzo, Rheumatic Disorders*

- Metabolic Bone Disease 1130
- Rheumatic Disorders 1138
- Rheumatic Diseases in Children and the Elderly 1153

UNIT 13 Integumentary Function 1159

Chapter 45 Structure and Function of the Skin 1159

Gladys Simandl

- Structure and Function of the Skin 1159
- Manifestations of Skin Disorders 1166

Chapter 46 Disorders of Skin Integrity and Function 1172

Gladys Simandl

- Primary Disorders of the Skin 1172
- Ultraviolet Radiation, Thermal, and Pressure Injury 1188
- Nevi and Skin Cancers 1194
- Age-Related Skin Manifestations 1198

Glossary 1207

Appendix A: Laboratory Values 1217

Index 1219