

Contents

Preface.....	xi
How to Use <i>Fundamentals of Medical Physiology</i>	xii
Section I Foundations of Physiology	1
Overview.....	2
Chapter 1 The Cell.....	3
Chapter 2 The Cell Membrane	9
Chapter 3 Genes and Proteins.....	17
Chapter 4 Control Systems and Homeostasis	21
Section II Physiology of Nerves and the Autonomic Nervous System	25
Overview.....	26
Case Presentation.....	27
Chapter 5 Functional Anatomy of the Nervous System	29
Chapter 6 Resting Membrane Potential.....	33
Chapter 7 Membrane Excitation and Action Potential	39
Chapter 8 Electrophysiology of Ion Channels	43
Chapter 9 Conduction of the Action Potential.....	47
Chapter 10 Sensory Mechanisms	54
Chapter 11 Transmission at Neuromuscular Junctions and Synapses	57
Chapter 12 The Autonomic Nervous System.....	63
Answers to Applying What You Know.....	68
Case Analysis	70
Section III Physiology of Muscle	73
Overview.....	74
Case Presentation.....	75
Chapter 13 Functional Anatomy of Muscle	76
Chapter 14 Mechanism of Muscle Contraction.....	81
Chapter 15 Characteristics of Muscle Contraction.....	85
Chapter 16 Muscle Elasticity.....	91
Chapter 17 Muscle Mechanics.....	94
Chapter 18 Smooth Muscle.....	98

Chapter 19 Cardiac Muscle	102
Answers to Applying What You Know.....	106
Case Analysis	108
Section IV Blood and Immune System	111
Overview.....	112
Case Presentation.....	113
Chapter 20 Body Fluids and Blood	114
Chapter 21 Red Blood Cells	118
Chapter 22 Hemoglobin.....	123
Chapter 23 Hemopoiesis	130
Chapter 24 Hematinic Factors	134
Chapter 25 Blood Grouping and Transfusion.....	141
Chapter 26 Blood Platelets and Hemostasis	145
Chapter 27 Hemostatic Balance	151
Chapter 28 Granulocytes.....	157
Chapter 29 Agranulocytes and Lymphoid Organs.....	162
Chapter 30 Immunity, Tolerance, and Hypersensitivity.....	166
Chapter 31 Immune Mechanisms	171
Answers to Applying What You Know.....	177
Case Analysis	179
Section V Cardiovascular System.....	181
Overview.....	182
Case Presentation.....	183
Chapter 32 Cardiac Excitation and the Electrocardiogram	185
Chapter 33 Cardiac Cycle.....	196
Chapter 34 Cardiac Output	202
Chapter 35 Circulatory Pathway and Hemodynamics	212
Chapter 36 Capillary Exchange and Lymphatic Circulation	225
Chapter 37 Chemical and Neural Control of the Cardiovascular System	230
Chapter 38 Blood Pressure Regulation.....	237
Chapter 39 Coronary Circulation.....	251
Chapter 40 Cerebral Circulation.....	255
Chapter 41 Pulmonary and Pleural Circulation.....	261
Chapter 42 Cutaneous, Muscle, and Splanchnic Circulation.....	265
Chapter 43 Regulation of Body Temperature	271
Answers to Applying What You Know.....	277
Case Analysis	282

Section VI Respiratory System.....	285
Overview.....	286
Case Presentation.....	287
Chapter 44 Functional Anatomy of the Respiratory System.....	289
Chapter 45 Mechanics of Pulmonary Ventilation.....	294
Chapter 46 Measurements of Pulmonary Ventilation	307
Chapter 47 Alveolar Ventilation, Perfusion, and Gas Exchange	315
Chapter 48 Transport of Gases.....	321
Chapter 49 Neural Control of Respiratory Rhythm.....	325
Chapter 50 Chemical Control of Pulmonary Ventilation.....	329
Chapter 51 Respiration in Unusual Environments.....	336
Chapter 52 Pulmonary Function Tests and Respiratory Disorders	339
Answers to Applying What You Know.....	347
Case Analysis	350
Section VII Renal System	353
Overview.....	354
Case Presentation.....	355
Chapter 53 Functional Anatomy of the Kidney	357
Chapter 54 Glomerular Filtration and Tubular Reabsorption.....	363
Chapter 55 Renal Handling of Sodium	367
Chapter 56 Renal Mechanisms Determining Urine Osmolarity.....	372
Chapter 57 Body Fluid and Electrolyte Balance	375
Chapter 58 Renal Contribution to Acid-Base Balance	380
Chapter 59 Renal Regulation of Potassium Balance.....	382
Chapter 60 Renal Handling of Miscellaneous Substances.....	386
Chapter 61 Hormones Acting on the Kidney	389
Chapter 62 Quantification of Renal Functions.....	392
Chapter 63 Whole Body Acid-Base Balance.....	399
Chapter 64 Renal Syndromes	403
Chapter 65 Urinary Bladder and Micturition	406
Answers to Applying What You Know.....	410
Case Analysis	413
Section VIII Gastrointestinal System and Nutrition	415
Overview.....	416
Case Presentation.....	417
Chapter 66 Nutritional Needs of the Body.....	419
Chapter 67 Functions of the Mouth and Esophagus.....	425

Chapter 68 Functions of the Stomach	429
Chapter 69 Functions of the Duodenum	435
Chapter 70 Functions of the Small Intestine	442
Chapter 71 Functions of the Colon	446
Chapter 72 Gastrointestinal Hormones	449
Chapter 73 Gastrointestinal Disorders	453
Answers to Applying What You Know	458
Case Analysis	460
Section IX Endocrine System	463
Overview	464
Case Presentation	465
Chapter 74 Metabolic Pathways	467
Chapter 75 Mechanism of Hormonal Action	475
Chapter 76 Hypothalamic and Pituitary Hormones	481
Chapter 77 Thyroid Hormones	487
Chapter 78 Hormones Regulating Calcium Balance	494
Chapter 79 Hormones of the Adrenal Cortex	501
Chapter 80 Hormones of the Adrenal Medulla	510
Chapter 81 Pancreatic Hormones and the Regulation of Blood Glucose	513
Answers to Applying What You Know	524
Case Analysis	527
Section X Reproductive System	529
Overview	530
Case Presentation	531
Chapter 82 Testicular and Ovarian Hormones	532
Chapter 83 Puberty and Gametogenesis	537
Chapter 84 Menstrual Cycle	543
Chapter 85 Sperm Transport and Fertilization	547
Chapter 86 Sexual Differentiation of the Fetus	555
Chapter 87 Pregnancy	559
Chapter 88 Parturition and Lactation	564
Answers to Applying What You Know	568
Case Analysis	570
Appendix A: Principles of Physics in Physiology	572
Appendix B: Principles of Chemistry in Physiology	579
Appendix C: Abbreviations Used in Text	587
Inside Front Cover: General Models	
Inside Back Cover: Tables of Normal Values	
Index	589