

Contents

SECTION I

Fuel Metabolism I

- 1 Metabolic Fuels and Dietary Components 3
- 2 The Fed or Absorptive State 24
- 3 Fasting 34

SECTION II

Chemical and Biologic Foundations of Biochemistry 45

- 4 Water, Acids, Bases, and Buffers 47
- 5 Structures of the Major Compounds of the Body 62
- 6 Amino Acids in Proteins 80
- 7 Structure-Function Relationships in Proteins 100
- 8 Enzymes as Catalysts 128
- 9 Regulation of Enzymes 150
- 10 Relationship between Cell Biology and Biochemistry 169
- 11 Cell Signaling by Chemical Messengers 190

SECTION III

Gene Expression and the Synthesis of Proteins 211

- 12 Structure of the Nucleic Acids 213
- 13 Synthesis of DNA 230
- 14 Transcription: Synthesis of RNA 251
- 15 Translation: Synthesis of Proteins 274
- 16 Regulation of Gene Expression 294
- 17 Use of Recombinant DNA Techniques in Medicine 319
- 18 The Molecular Biology of Cancer 344

SECTION IV

Carbohydrate Metabolism, Fuel Oxidation, and the Generation of Adenosine Triphosphate 369

- 19 Basic Concepts in the Regulation of Fuel Metabolism by Insulin, Glucagon, and Other Hormones 376
- 20 Cellular Bioenergetics: Adenosine Triphosphate and O_2 394
- 21 Digestion, Absorption, and Transport of Carbohydrates 415

- 22 Generation of Adenosine Triphosphate from Glucose, Fructose, and Galactose: Glycolysis 434
- 23 Tricarboxylic Acid Cycle 457
- 24 Oxidative Phosphorylation and Mitochondrial Function 480
- 25 Oxygen Toxicity and Free-Radical Injury 504
- 26 Formation and Degradation of Glycogen 525
- 27 Pentose Phosphate Pathway and the Synthesis of Glycosides, Lactose, Glycoproteins, and Glycolipids 543
- 28 Gluconeogenesis and Maintenance of Blood Glucose Levels 566

SECTION V

Lipid Metabolism 591

- 29 Digestion and Transport of Dietary Lipids 594
- 30 Oxidation of Fatty Acids and Ketone Bodies 607
- 31 Synthesis of Fatty Acids, Triacylglycerols, and the Major Membrane Lipids 631
- 32 Cholesterol Absorption, Synthesis, Metabolism, and Fate 666
- 33 Metabolism of Ethanol 702
- 34 Integration of Carbohydrate and Lipid Metabolism 719

SECTION VI

Nitrogen Metabolism 735

- 35 Protein Digestion and Amino Acid Absorption 738
- 36 Fate of Amino Acid Nitrogen: Urea Cycle 751
- 37 Synthesis and Degradation of Amino Acids 769
- 38 Tetrahydrofolate, Vitamin B₁₂, and S-Adenosylmethionine 790
- 39 Purine and Pyrimidine Metabolism 806
- 40 Intertissue Relationships in the Metabolism of Amino Acids 823

SECTION VII

Tissue Metabolism 843

- 41 Actions of Hormones that Regulate Fuel Metabolism 845
- 42 The Biochemistry of Erythrocytes and Other Blood Cells 869
- 43 Blood Plasma Proteins, Coagulation, and Fibrinolysis 893
- 44 Liver Metabolism 910
- 45 Metabolism of Muscle at Rest and during Exercise 932
- 46 Metabolism of the Nervous System 953
- 47 The Extracellular Matrix and Connective Tissue 978

Patient Index 997

Subject Index 1000