

Table of Contents

Section One: Introduction to Medical Biochemistry and an Overview of Fuel Metabolism

- 1 An Overview of Fuel Metabolism / 3

Section Two: Chemical and Biological Foundations of Biochemistry

- 2 Water, Acids, Bases, and Buffers / 25
- 3 Structures of the Major Compounds of the Body / 35
- 4 Amino Acids and Proteins / 49
- 5 Structure—Function Relationships in Proteins / 62
- 6 Enzymes as Catalysts / 79
- 7 Regulation of Enzymes / 97
- 8 Cell Structure and Signaling by Chemical Messengers / 111

Section Three: Gene Expression and Protein Synthesis

- 9 Structure of the Nucleic Acids / 131
- 10 Synthesis of DNA / 143
- 11 Transcription: Synthesis of RNA / 155
- 12 Translation: Synthesis of Proteins / 171
- 13 Regulation of Gene Expression / 182
- 14 Use of Recombinant DNA Techniques in Medicine / 199

Section Four: Fuel Oxidation and the Generation of ATP

- 15 Cellular Bioenergetics: ATP and O_2 / 217
- 16 Tricarboxylic Acid Cycle / 231
- 17 Oxidative Phosphorylation, Mitochondrial Function, and Oxygen Radicals / 248
- 18 Generation of ATP from Glucose: Glycolysis / 265
- 19 Oxidation of Fatty Acids and Ketone Bodies / 279

Section Five: Carbohydrate Metabolism

- 20 Basic Concepts in the Regulation of Fuel Metabolism by Insulin, Glucagon, and Other Hormones / 299
- 21 Digestion, Absorption, and Transport of Carbohydrates / 312
- 22 Formation and Degradation of Glycogen / 327
- 23 Pathways of Sugar and Alcohol Metabolism: Fructose, Galactose, Pentose Phosphate Pathway, and Ethanol Metabolism / 341
- 24 Synthesis of Glycosides, Lactose, Glycoproteins, Glycolipids and Proteoglycans / 360
- 25 Gluconeogenesis and Maintenance of Blood Glucose Levels / 373

Section Six: Lipid Metabolism

- 26** Digestion and Transport of Dietary Lipids / 393
- 27** Synthesis of Fatty Acids, Triacylglycerols, Eicosanoids, and the Major Membrane Lipids / 403
- 28** Cholesterol Absorption, Synthesis, Metabolism, and Fate / 424
- 29** Integration of Carbohydrate and Lipid Metabolism / 449

Section Seven: Nitrogen Metabolism

- 30** Protein Digestion and Amino Acid Absorption / 463
- 31** Fate of Amino Acid Nitrogen: Urea Cycle / 471
- 32** Synthesis and Degradation of Amino Acids and Amino Acid Derived Products / 481
- 33** Tetrahydrofolate, Vitamin B₁₂, and S-Adenosylmethionine / 505
- 34** Purine and Pyrimidine Metabolism / 516
- 35** Intertissue Relationships in the Metabolism of Amino Acids / 527

Patient Index / 541

Index / 544