Contents

SECTION I

21

Fuel Metabolism I		Metabolism I
		Metabolic Fuels and Dietary Components 3
	2	The Fed or Absorptive State 24
		Fasting 34
	SECT	ION II
	Chem	ical 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
	SECT	ION III
	Gene	Expression and the Synthesis of Proteins 2 I I
	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
	SECT	ION IV
		hydrate Metabolism, Fuel Oxidation, and the Generation
		nosine Triphosphate 369
	19	Basic Concepts in the Regulation of Fuel Metabolism by Insulin, Glucagon, and Other Hormones 376
	20	Cellular Bioenergetics: Adenosine Triphosphate and 0 ₂ 394

Digestion, Absorption, and Transport of Carbohydrates 415

- 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
- 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