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2.2 Oxidative Phosphorylation and the Chemiosmotic Theory2.3 The Various Mechanisms of Energy Waste; 2.3.1 Passive Leak; 2.3.2 Leak Catalyzed by Uncoupling Proteins; 2.3.3 The Active Leak; 2.3.4 The Slipping Mechanism; 2.4 Mechanisms of Coupling in Proton Pumps; 2.5 Oxidative Phosphorylation Control and Regulation; 2.5.1 Metabolic Control Analysis; 2.5.2 Regulations; 2.5.2.1 Kinetic Regulation of Mitochondrial Oxidative Phosphorylation: Complex I Covalent cAMP-dependent Phosphorylation; 2.5.2.2 Cytochrome Oxidase: An Example of Coordinate Regulation
2.6 Supramolecular Organization of the Respiratory Chain2.6.1 Structural Data; 2.6.1.1 ATP Synthase Organization; 2.6.1.2 Respiratory Chain Supramolecular Organization; 2.6.2 Functional Data; 2.7 Conclusions; References; 3 Integrated and Organized Cellular Energetic Systems: Theories of Cell Energetics, Compartmentation, and Metabolic Channeling; Abstract; 3.1 Introduction; 3.2 Theoretical Basis of Cellular Metabolism and Bioenergetics; 3.2.1 Thermodynamic Laws, Energy Metabolism, and Cellular Organization
3.2.2 Chemical and Electrochemical Potentials: Energy of Transmembrane Transport and Metabolic Reactions3.2.3 Non-equilibrium, Steady-state Conditions; 3.2.4 Free Energy Changes and the Problem of Intracellular Organization of Metabolism; 3.2.5 Macromolecular Crowding, Heterogeneity of Diffusion, Compartmentation, and Vectorial Metabolism; 3.2.5.1 Heterogeneity of Intracellular Diffusion and Metabolic Channeling; 3.2.5.2 Compartmentation Phenomenon and Vectorial Metabolism; 3.3 Compartmentalized Energy Transfer and Metabolic Sensing
3.3.1 Compartmentation of Adenine Nucleotides in Cardiac Cells

Sommario/riassunto

In this first integrated view, practically each of the world's leading experts has contributed to this one and only authoritative resource on the topic. Bringing systems biology to cellular energetics, they address in detail such novel concepts as metabolite channeling and medical aspects of metabolic syndrome and cancer.