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Intercellular Mitochondrial Transfer: Molecular Mechanisms and Role in Maintaining the Energy Homeostasis in Tissues

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Mitochondria determine cell metabolism and cell survival and frequently undergo structural and positional changes when responding to various stresses and impaired energy homeostasis. In addition to intracellular movement, intercellular transfer of mitochondria is of great importance. Intercellular mitochondrial transfer occurs both under physiological conditions and in pathology being accompanied with restoration of stressed cells and structural and functional alterations caused by mitochondrial dysfunction. This review summarizes the latest data obtained in this field and provides an overview of the molecular mechanisms of mitochondrial intercellular transport and its potential role in maintaining energy homeostasis in tissues. In addition, future directions in the study of mitochondrial transfer for mitochondria-targeted therapy of several diseases are discussed.

Keywords: mitochondria, intercellular transfer, mitochondrial dysfunction, mitochondrial biogenesis, mitochondrial therapy, tissue homeostasis