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Molecular and Epigenetic Basis of Extracellular Vesicles Cell Repair Phenotypes in Targeted Organ-specific Regeneration

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Abstract

Extracellular vesicles (EVs), which are released by most of the cells, constitute a new system of cell-cell communication by transporting DNA, RNA, and proteins in various vesicles namely exosomes, apoptotic bodies, protein complexes, high-density lipid (HDL) microvesicles, among others. To ensure accurate regulation of somatic stem cell activity, EVs function as an independent metabolic unit mediating the metabolic homeostasis and pathophysiological of several diseases such as cardiovascular diseases, metabolic diseases, neurodegenerative diseases, immune diseases, and cancer. Whist examining the EV biomolecules cargos and their microenvironments that lead to epigenetic alteration of the cell in tissue regeneration, studies have gained further insights into the biogenesis of EVs and their potential roles in cell biology and pathogenicity. Due to their small size, non-virulence, flexibility, and ability to cross biological barriers, EVs have promising therapeutic potentials in various diseases. In this review, we describe EV's mechanism of action in intercellular communication and transfer of biological information as well as some details about EVinduced epigenetic changes in recipient cells that cause phenotypic alteration during tissue regeneration. We also highlight some of the therapeutic potentials of EVs in organ-specific regeneration.

Keywords: Cell communication; cell signalling; cellular therapy; epigenetics; exosomes; extracellular vesicles; microvesicles; regenerative medicine.