Exosomes and Microvesicles: from Stem Cell Biology to Translation in Human Diseases

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Exosomes/microvesicles also known as extracellular vesicles emerged as a well evolutionary preserved cell-to-cell communication mechanism [1]. The first recognition that stem cells may communicate through vesicles [2] was followed by several studies showing the role of extracellular vesicles in stem cell biology [3, 4]. Moreover, it has been shown that stem cell-derived vesicles may mimic the biological activity of the stem cells of origin and that they represent a relevant element of the paracrine action of stem cells. These observations served as the rationale for several studies aimed to exploit the potential therapeutical activity of stem cell-derived vesicles in different pathological conditions. The biological active vesicles represent a heterogeneous population which differentially expresses the regenerative properties as seen by the analysis of sub-population fractions [5]. The mechanism of action of stem/progenitor cell-derived vesicles has been related to the transfer of transcripts that may modulate selected pathways in the recipient cells inducing epigenetic, functional, and phenotypic changes in the latter [2, 6].

The present special issue of Stem Cell Reviews and Reports is focused mainly on the cargo and on selected transcripts carried by vesicles released by mesenchymal stem cells of different origin. In particular, these transcripts appeared to be relevant for the immunomodulatory/anti-inflammatory and regenerative properties of stem cell-derived vesicles in a variety of pathological conditions including diabetes, kidney, liver, bone, and spinal cord injuries.

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