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Role of stem-cell-derived microvesicles in the paracrine action of stem cells

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The paracrine theory has recently changed the view of the biological action of stem cells and of the subsequent potential application of stem cells in regenerative medicine. Indeed, most of the beneficial effects of stem-cell-based therapy have been attributed to soluble factors released from stem cells. In this context, MVs (microvesicles) released as exosomes from the endosomal compartment, or as shedding vesicles from the cell surface, may play a relevant role in the intercellular communication between stem and injured cells. By transferring proteins, bioactive lipids, mRNA and microRNA, MVs act as vehicles of information that may lead to alteration of the phenotype of recipient cells. The exchange of information between stem cells and tissue-injured cells is reciprocal. The MV-mediated transfer of tissue-specific information from the injured cells to stem cells may reprogramme the latter to gain phenotypic and functional characteristics of the cell of origin. On the other hand, MVs released from stem cells may confer a stem-cell-like phenotype to injured cells, with the consequent activation of self-regenerative programmes. In fact, MVs released from stem cells retain several biological activities that are able to reproduce the beneficial effects of stem cells in a variety of experimental models.

Keywords: exosome, microvesicle, stem cell, tissue repair