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Paracrine/endocrine mechanism of stem cells on kidney repair: role of microvesicle-mediated transfer of genetic information

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Abstract

Purpose of review: The mechanism of stem cell-induced kidney repair remains controversial. Engraftment of bone marrow-derived stem cells is considered a rare event and several studies point to paracrine/endocrine processes. This review focuses on microvesicle-mediated transfer of genetic information between stem cells and injured tissue as a paracrine/endocrine mechanism.

Recent findings: The following findings support a bidirectional exchange of genetic information between stem and injured cells: microvesicles shuttle defined patterns of mRNA and microRNA, are actively released from embryonic and adult stem cells and are internalized by a receptor-mediated mechanism in target cells; transcripts delivered by microvesicles from injured cells may reprogram the phenotype of stem cells to acquire specific features of the tissue; transcripts delivered by microvesicles from stem cells may induce dedifferentiation of cells surviving injury with cell cycle reentry and tissue self-repair.

Summary: Transfer of genetic information from injured cells may explain stem cell functional and phenotypic changes without the need for transdifferentiation into tissue cells. On the contrary, transfer of genetic information from stem cells may redirect altered functions in target cells suggesting that stem cells may repair damaged tissues without directly replacing parenchymal cells.