

Current Stem Cell Research & Therapy

Title: Contribution of Stem Cells to Kidney Repair

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Abstract: A current explanation for development of chronic renal injury is the imbalance between injurious mechanism and regenerative repair. The possibility that stem cells contribute to the repair of glomerular and tubular damage is of great interest for basic and translational research. Endogenous bone marrow-derived stem cells have been implicated in the repair of renal tissue, although the lineage of stem cells recruited has not been determined. If endogenous bone marrow-derived stem cells repopulate injured nephrons directly or act indirectly over a paracrine/endocrine mechanism remains also controversial. Therapeutic administration of exogenous bone marrow derived stem cells in animal models of acute renal injury suggests that a stem cell-based therapy may improve the recovery of both glomerular and tubular compartments. Whereas the therapeutic benefit of sorted hematopoietic stem cells remains uncertain, several studies showed a beneficial effect of mesenchymal stem cell administration in models of acute tubular injury and of endothelial progenitors in acute glomerular injury. Recent studies demonstrate the presence of resident stem cells within the adult kidney. These cells are capable, when injected in animals with acute tubular injury, to localize to renal compartments and contribute to regeneration. This review summarizes the current literature on the physiological role of endogenous stem cells in renal regeneration and on the therapeutic potential of exogenous stem cell administration. Moreover, critical points that still need clarification, such as the homing mechanisms of stem cells to injured tissue, the secreted factors underlying the paracrine/endocrine mechanisms and the long-term behaviour of in vivo administered stem cells, are discussed.

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