

Influence of the human umbilical cord blood mononuclear cells transplantation on regeneration of the rat kidney after unilateral ureteral obstruction

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Abstract

Stem cell therapy may provide effective and pathogenetically proved treatment of chronic kidney disease caused by interstitial fibrosis after tubule damage. It was reported that transplanted bone marrow stem cells participate in tubule regeneration [1]. At the same time the potential of hematopoietic stem cells in tubule regeneration is not well investigated. The purpose of the study was to evaluate the participation of human cord blood stem cells in rat kidney tubule regeneration after unilateral ureteral obstruction. 18 laboratory rats were subjected to left unilateral ureteral obstruction (UUO). 3×10^6 of human cord blood mononuclears ($n = 9$) or equivalent volume of saline ($n = 9$) were injected into rat's tail vein. Kidney tissue was collected at the end of the 3, 6 or 14 day after operation. Paraffin-embedded slices were stained with mononuclear antibodies against c-kit (stem and progenitor cell marker), proliferating cell nuclear antigen for the cells proliferative capacity evaluation (PCNA) and α -smooth muscle actin (α -SMA) for myofibroblasts detection. Number of proliferating cells in tubuli and interstitium was considerably larger in the obstructed kidney of the transplantation group, as well as the number of proliferating cells in the glomeruli at 14 day after operation. At the same time number of α -SMA-positive cells in the transplanted group was significantly lower compared with sham-transplanted group. There were no differences in expression of these markers in the contralateral kidneys. UUO had no impact on c-kit expression in kidney tissue. Thus, transplantation of human cord blood mononuclear cells in UUO stimulates proliferative activity of tubular cells and interstitium, reduces myofibroblast activation and risk of kidney fibrosis. © Human stem cells institute, 2013.

Keywords

Cord blood mononuclear cells, Interstitial fibrosis, Kidney, Regeneration, Transplantation, Unilateral ureteral obstruction