S-B43

제대혈 유래 줄기 세포가 당뇨병성 신증에 미치는 효과

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Effect of Umbilical Cord Blood-derived Mesenchymal Stem Cells on Diabetic Renal Injury

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Objective : Mesenchymal stem cells (MSC) are a group of cells which have self-renewal ability, are able to culture-expanded for a prolonged period of time, and are able to differentiate into various linages of connective progenies originated from embryonic mesoderm. Human embryonic cord blood (UCB) cells have many advantages because of immaturity of newborn cells compared with adult cells. The isolation and characterization of UCB-derived MSC has been recently established (Kang KS et al. Cytotherapy 7:368-73, 2005). The present study examined the effect of UCB-derived MSC on renal injury in diabetes.

Methods : Experimental diabetes was induced by intravenous injection of streptozotocin (STZ) 50 mg/kg into male Sprague-Dawley rats. Two days after STZ, diabetic rats were assigned to either of 2 groups: untreated or treated with UCB-derived MSC. UCB-derived MSC were infused at a dose of 1x106 cells per rat by tail vein. Urinary protein excretion was measured as a marker of renal injury. Renal expressions of E-cadherin, a-smooth muscle actin (a-SMA), heat shock protein 47 (Hsp 47), and bone morphogenetic protein-7 (BMP-7) protein and mRNA were also measured.

Results : At 4 weeks after the injection of STZ, diabetic rats showed significantly increased urinary protein excretion, kidney weight, and renal expression of a-SMA and Hsp 47 but decreased expression of E-cadherin and BMP-7. Administration of UCB-derived MSC effectively prevented proteinuria, a-SMA and Hsp 47 upregulation, and E-cadherin and BMP-7 downregulation in diabetic rats without significant effect on blood glucose.

Conclusion : UCB-derived MSC effectively prevented renal injury in STZ-induced diabetic rats. Further investigations are required to delineate cell types involved in therapeutic effect of UCB-derived MSC on diabetic renal injury.