

OSTEOSCOOP

News on current events in osteoporosis and rheumatology

Systemic injection of engineered stem cells restores bone mass

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Transplantation of gene-modified mesenchymal stem cells (MSCs) in animals for bone regeneration therapy has been evaluated extensively in recent years. However, increased endosteal bone formation by intravenous injection of MSCs ectopically expressing a foreign gene has not yet been shown. Aside from the clearance by lung and other tissues, the surface compositions of MSCs may not favor their bone marrow (BM) migration and engraftment.

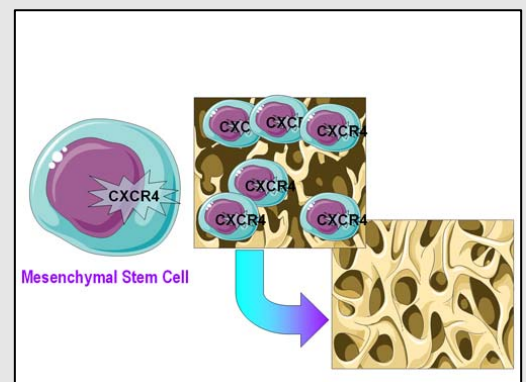
To overcome these hurdles, the authors of a recent study [1] transduced CXCR4, a gene encoding the chemokine receptor largely responsible for stromal-derived factor-1 (SDF-1)-mediated BM homing, into murine MSC by adenovirus infection. A dose-dependent increase of CXCR4 surface expression with a parallel enhanced chemotaxis toward SDF-1 in these cells after virus infection was observed. Higher BM retention and homing of CXCR4-expressing MSCs were also found after they were transplanted by intramedullary and tail vein injections, respectively, into immunocompetent mice. Interestingly, a full recovery of bone mass and a partial restoration of bone formation in glucocorticoid-induced osteoporotic mice were observed 4 wk after a single intravenous infusion of one million CXCR4-expressing MSC cells. In the meantime, complete recovery of bone stiffness and strength in these animals was consistently detected only after a systemic transplantation of CXCR4 and Cbfa-1 co-transduced MSCs.

This is the first report to show unequivocally the feasibility of ameliorating glucocorticoid-induced osteoporosis by systemic transplantation of genetically manipulated MSCs.

1. Lien CY et al. *J Bone Miner Res.* 2009;24:837-848.

Systemic injection of engineered stem cells restores bone mass

Transplantation of gene-modified mesenchymal stem cells in animals for bone regeneration therapy is a promising technique. In order to improve bone marrow homing, mesenchymal stem cells were transduced with the chemokine receptor CXCR4. Improved homing of engineered cells in bone marrow was observed after systemic or intramedullary injection of these cells. Successful homing improved greatly glucocorticoid-induced osteoporosis.



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