STEM CELLS

Boosted bone healing in the MSC matrix

Human mesenchymal stem cells (hMSCs) have osteogenic capacity, but harnessing this potential has been challenging. New data published in *Science Translational Medicine* show that the opportunity for hMSC-derived healing is limited to the first stages of bone repair, but that this window can be extended by administering the cells in a scaffold of hMSC-derived extracellular matrix (ECM). “MSCs co-administered with the matrix adhered and remained at the lesion after the repair phase would have normally ended, resulting in 100% healing the majority of times tested,” notes author Carl Gregory from the Texas A&M Health Science Center, USA.

Bone repair is complex and split into three stages: inflammation, regeneration and remodelling. In a mouse model of calvarial bone healing, Gregory and co-workers found that hMSC-mediated bone repair occurred in the rapid osteogenic regeneration phase, but upon entering the remodelling phase (after ~3 weeks), hMSCs left the lesion site.

Human mesenchymal stem cells in an extracellular matrix. Courtesy of C. A. Gregory.

To aid retention and enhance bone repair, the team prepared a scaffold containing hMSCs treated with GW9662 (a small molecule that improves bone healing) and hMSC-derived ECM. The cell–matrix mix enhanced bone healing to 80–100%, compared with only 60% after application of GW9662-treated hMSCs, and improved cell engraftment.

The researchers are now planning further experiments in larger animal

models to reproduce their findings. In the future, they hope that such ‘bioconditioned’ cell scaffolds will increase the clinical potential of hMSCs in bone repair.

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Original article Zeitouni, S. *et al.* Human mesenchymal stem cell-derived matrices for enhanced osteoregeneration. *Sci. Trans. Med.* 4, 132ra55