

Stromal Stem Cells and Platelet-Rich Plasma Improve Bone Allograft Integration

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Early vascular invasion is a key factor in bone allograft incorporation. It may reduce the complications related to slow and incomplete bone integration. Bone-marrow-derived stromal stem cells associated with platelet-rich plasma are potent angiogenic inducers proven to release vascular endothelial growth factor. Our goal was to test whether the combination of stromal stem cells and platelet-rich plasma is able to increase massive allograft integration in a large animal model with sacrifice at 4 months. A critical defect was made in the mid-diaphysis of the metatarsal bone of 10 sheep; the study group received an allograft plus stromal stem cells, platelet-rich plasma, and collagen (six animals) and the control group received only the allograft (four animals). Investigation was done with radiographs, mechanical tests and histomorphometric analysis, including new vascularization. Results showed substantial new bone formation in the allograft of the study group. Bone formation is correlated with better vascular invasion and remodeling of the graft in the study group. These results confirm the key role played by stromal stem cells and platelet-rich plasma in bone repair.

Further studies are needed to better define the role stromal stem cells play when implanted alone.
