

# CELL & STEM CELL RESEARCH

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## Cell therapy strategy for enhancing bone repair

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Cell therapy has been investigated as a promising treatment for bone defects in situations where the trauma extension surpasses the bone regenerative capacity. In this scenario, the aim of our study was to evaluate the effect of mesenchymal stem cells (MSCs) and osteoblasts (OBs) on bone repair. Bone marrow MSCs were harvested from rat femurs, selected by adherence to polystyrene and characterized by the expression of a panel of surface markers. OBs were differentiated from these MSCs by culturing them in osteogenic medium and characterized by the gene expression of bone markers. Defects with 5-mm diameter were created in rat calvarias and after 2 weeks they received a direct injection of: (1) MSCs, (2) OBs ( $5 \times 10^6$  cells in 50  $\mu$ L of PBS for each cell type) or (3) PBS without cells (control). Bone formation was evaluated 4 weeks post-injection by microtomographic and morphometric analyses. The data were compared by ANOVA ( $n=12$ ,  $p \leq 0.05$ ). MSCs presented a high percentage of cells expressing CD29 and CD90 and a low percentage expressing CD31, CD34, CD44 and CD45. OBs displayed higher gene expression of ALP, OC and OPN. Luciferase-expressing MSCs and OBs were detected within the defects till 12 days post-injections. The 3-D microtomography reconstructions as well as morphometric parameters showed more bone formation in defects injected with cells compared with control. Bone volume ( $p=0.03$ ), % bone volume ( $p=0.03$ ) and trabecular number ( $p=0.05$ ) were higher in cell-injected defects, trabecular separation ( $p=0.002$ ) was lower while bone surface ( $p=0.07$ ) and trabecular thickness ( $p=0.4$ ) were not affected by treatments. There was no difference between MSCs and OBs-injected defects in any of the evaluated parameters. The results show that the treatment of calvarial defects with cells irrespective of the differentiation stage increased bone repair suggesting that cell therapy is a potential strategy to induce bone regeneration in challenging clinical conditions.

## Biography

Adalberto L Rosa, DDS, MSc, PhD, is working as a full Professor of Oral and Maxillofacial Surgery in the University of São Paulo, Brazil. He has been developing research projects focused on Tissue Engineering and Cell Therapy aiming at bone repair using either *in vitro* or *in vivo* models.

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