In vivo evaluation of mesenchymal stem cells and tricalcium phosphate construct. Early results on effect and security.

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Bone regeneration techniques constitute a valid surgical procedure to increase the quality and quantity of bone in areas with inadequate volume [1]. The combination with cell therapy may result in a qualitative step forward in the treatment of pathologies involving bone destruction. The cultivation of mesenchymal cells in tricalcium phosphate together with demineralized bone matrix could be a benefit for the stimulation of bone regeneration [2,3].

The main objective of the study is check the security of the use of mesenchymal cells of human bone marrow (MSC) seeded and cultured on tricalcium phosphate porous matrix (FTC) associated with demineralized bone matrix (MOD) implanted in immunosuppressed mice NOD/SCID. In this analytical prospective study 30 immunosuppressed mice NOD/SCID were divided in Group 1 of 25 mice NOD/SCID. We perform a subcutaneous grafting with a construct of mesenchymal cells of autologous bone marrow, cultured on tricalcium phosphate porous matrix and combines with demineralized bone matrix (MSC+FTC+MOD). Group 2 (control) of 5 mice NOD/SCID; the subcutaneous grafting was a construct of saline solution 0.9% combined with tri-calcium phosphate porous matrix and demineralized bone matrix (SSF+FTC+MOD). Both grafting were performed in paravertebral area. Acute toxicity was evaluated by animal welfare clinical score describe by Walfenson Lloyd at 5, 30, 120 and 240 min after surgery. To evaluate chronic toxicity, histological hematoxylin eosin analyzes were performed on: heart, kidney, lung, liver, spleen, gonads, brain and bone. To evaluate the effectiveness, histological analysis of the construct and osteocalcin determination was performed. 100% of NOD/SCID mice presented an animal welfare clinical score 0 from the date of receipt until the end of the study, non-spontaneous deaths were recorded. Histological changes were detected in 5/25 NOD/SCID cases of group I (17.5%) and in 1/5 mice in group II (5%). NOD/SCID mice had a higher number of histological changes in function of the implanted construct (P > 0.05) regardless of sex. 100% of cases showed pulmonary condensation. In 7 NOD/SCID mice bone formation was observed at the end of the study.

References