Assessment of the Effect of Bone Marrow and Adipose ï Derived Stem Cells on the Healing Of Induced Bone Defects on Irradiated Albino Rats

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Abstract

The aim of the present study was to compare osteogenic potential of bone marrow-derived mesenchymal stem cells (BMSCs) and adipose tissue ï derived mesenchymal stem cells (ASCs) on the healing process of induced bone defect in the tibia of irradiated albino rats. Forty five male albino rats were subjected to whole body 6 gray gamma radiation. One day post irradiation, a unicortical osseous wound was created. The rats were randomly equally divided into three groups. Group 1 (irradiated), group 2 and group 3 (BMSCs & ASCs were delivered into the holes respectively). Animals were sacrificed after 3.6 and 12 weeks postoperative. The healing process was assessed radiographically (measuring the bone density) and histopathologically. The bone density decreased in all groups after the third week and slightly increased after the sixth one. After the twelfth week, newly formed bone densities of BMSCs group followed by ASCs group exceeded the density of the bone at 0 week (density of the bone at the base of the defect) that represents lamellar bone filling the defect. Histopathologically, the newly formed bone trabeculae in group 2 appeared thick entrapping vascular bone narrow and were surrounded by regularly arranged deeply stained osteoblasts. BMSCs application showed better healing process than that of ASCs which showed thinner woven bone trabeculae. The bone marrow cavities slightly increased in size but still smaller than those were detected in irradiated group. In conclusion, topical engraftment of BMSCs accelerated the healing process of the induced bone defect more than in case of ASCs application.

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