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Osteogenic differentiation of adipose and bone marrow derived MSCs on boron-hydroxyapatite coated chitosan scaffolds

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Boron (B) is a notable trace element in humans which has stimulating potential on osteogenesis. The effect of B on the osteogenic differentiation of hBMSCs, hTGSCs and MC3T3-E1 cell line had been reported. The aim of this study was to evaluate the effects of B-doped hydroxyapatite (HAp) coated chitosan (B-HAp/Ch) scaffolds on osteogenic differentiation of rat mesenchymal stem cells (MSCs) derived from bone marrow (BMSCs) and adipose tissue (AdMSCs) comparatively. AdMSCs were isolated enzymatically from adipose tissue and BMSCs were harvested from the femurs and tibias of the male Sprague-Dawley rats. Freeze-drying method was used to fabricate porous chitosan scaffolds and the scaffolds were coated with HAp and B-HAp in the presence of microwaves. In addition, fibronectin (Fn) was immobilized to the scaffolds to enhance the cell attachment. Cell culture studies were conducted with Ch, HAp/Ch and B-HAp/Ch scaffolds. MSCs at a concentration of 2.5×10^5 cells were seeded into each scaffolds. The cells were cultured with osteogenic medium for 28 days under static conditions. The adhesion behaviour and morphology of cells on the scaffolds were observed by SEM analysis at desired culture periods. Proliferation behaviour of cells was determined using MTT assay. Real-time PCR was used to detect the expression of several osteogenic differentiation-related marker genes such as Coll1, β -actin, osteocalcin, osteonectin and RunX2. Our results showed that boron enhances proliferation and osteogenic differentiation of both of the AdMSCs and BMSCs. These findings suggest that B-HAp/Ch can be evaluated as a promising scaffold for bone tissue engineering.

Biography

Inji Shikhaliyeva has graduated from Baku State University, Department of Biology (BSc). She is MSc Student at Hacettepe University, Department of Bioengineering and a member of Hacettepe University Cell and Tissue Engineering Research Group headed by Prof Dr Menemse Gumusderelioglu.

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