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Boron-doped bone scaffolds

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Although boron (B) is increasingly identified as an element that has many benefits especially on bone health, limited number of studies that are investigating the effects of B in osteoblasts in cellular/molecular level are available. Therefore, the exact mechanism of B on bone health is still unknown. However, it is known that B has an important role on the metabolism of calcium, magnesium, vitamin D and steroid hormones which have many indirect effects on bone. The aim of this study was to develop boron-containing polymeric scaffolds to promote regeneration of bone tissue. The scaffolds were prepared by using two different approaches: Embedding of boric acid encapsulated nanoparticles into the scaffolds to achieve sustained B release; combining of polymeric scaffolds with B containing hydroxyapatite (HAp) that is produced by microwave-induced biomimetic method. The scaffolds were produced and characterized in terms of structural properties and *in vitro* B-release patterns. The effect of released B on the osteogenic activities of MC3T3-E1 preosteoblasts and mesenchymal stem cells derived from bone marrow and adipose tissue, seeded into the scaffolds was investigated *in vitro*. The results were evaluated with respect to cell viability, bone related ECM gene expressions, and cellular morphology. In conclusion, the cell culture studies proved that the encapsulated boron within the scaffolds can be used as an osteoinductive agent by showing its positive effects on the proliferation and differentiation of MC3T3-E1 cells and MSCs.

Biography

Menemse Gumudderelioglu is a Professor at Hacettepe University, Chemical Engineering Department since 1998. She has completed her BSc, MSc and Doctorate degrees from the same department. Her main research subjects are biomaterials, controlled release technology, animal cell biotechnology and tissue engineering. She has completed her research studies at London University, Birkbeck College, Harvard University, Medical School, Tufts University and Strathclyde University. She has more than 100 papers in international peer reviewed journals.

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