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Development of alendronat sodium nanoparticles in pluronic F127 based in situ gel for guided bone regeneration

Berrin Kucukturkmen[1], Umut Can Oz[1], Ongun M. Saka[1], Burcu Devrim[1], Mete Toptas[2], Ozge Ozdemir[3], Hasan Bilgili[4], M. Salih Deveci[5], Elif Unsal[6] and **Asuman Bozkir[1]**

[1]Ankara University, Turkey
[2]Bezmialem University, Turkey
[3]Cumhuriyet University Turkey
[4]Ankara University, Turkey
[5]Health Sciences University, Turkey
[6]Ankara University, Turkey

New biomaterials applied in guided bone regeneration (GBR) are expected to be biocompatible and are needed to prevent leakage caused by the invasion of peripheral epithelium and connective tissue at the onset of bone formation. In this report, a thermosensitive *in situ* gelling system was preferred to prevent soft tissue migration to the defect site during bone formation and prolong the residence time of the nanoparticles in this region. It is aimed to promote osteoblast cell activity with minimized dose by providing controlled release of alendronate sodium (AS) loaded in the PLGA nanoparticles. AS-loaded PLGA nanoparticles having a particle size of about 100 nm were prepared by nanoprecipitation method. AS was effectively encapsulated in PLGA nanoparticles and TEM images revealed the spherical shape of nanoparticles. Optimized AS nanoparticles were then dispersed in a thermosensitive Pluronic F127 gelling system. Thermosensitive hydrogel formulation containing nanoparticles significantly prolonged the release of AS over 24 hours. Efficacy of *in-situ* gel system in combination with PLGA nanoparticles for enhanced bone regeneration was investigated by implanting in 0.5x0.5 cm critical size defect in tibia and femur of New Zealand female rabbits. According to the histopathological results, fibroblast formations were found at defect area after 2 and 8 weeks of post implantation and any healing was observed in the untreated control defect. In contrast, treatment with the in-situ gelling formulation including AS loaded PLGA nanoparticles provided woven-bone formation was observed after 4 weeks of post implantation and mature-bone structures were found after 8 weeks of post implantation.

Biography

Berrin Kucukturkmen has graduated from Ankara University, Faculty of Pharmacy. She received her MSc on the subject of ocular in situ gelling systems in 2008, followed by a PhD about polymeric/solid lipid nanoparticles and their interaction with glioblastoma cells in 2014 from Ankara University, under Professor Asuman Bozkır. She is currently working as a postdoctoral research assistant at the same university.

berrinkucukturkmen@gmail.com

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