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عنوان مقاله:

Study of the Effect of Donepezil Hydrochloride Drug on Genes Expression During the Osteogenic Differentiation of Mesenchymal StemCells on PLLA Nanofibers

محل انتشار:

سومین جشنواره ملی و کنگره بین المللی علوم و فناوری های سلول های بنیادی و پزشکی بازساختی (سال: 1397)

تعداد صفحات اصل مقاله: 1

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خلاصه مقاله:

Background and Aim: Human mesenchymal stem cells (hMSCs) havepotential to self-renewal and differentiation to other subtype cells suchas osteoblast, adipose, and cartilage. PLLA (poly L-lactic acid) is abiodegradable and biocompatible nanofibrous scaffold that mimics thephysical and biological properties of the extracellular matrix. Donepezilhydrochloride is an acetylcholine esterase inhibitor that prescribesin patients who suffer from dementia. In this study, we examined the proliferation and osteogenic differentiation of hBMSCs on PLLAnanofibrous scaffold in the presence of donepezil. Methods: PLLA nanofibrous scaffold synthesized by an electrospinningtechnique, and then were exposed to oxygen plasma to inducehydrophilicity and better cell adherence. hMSCs were seeded in fourconditions to achieve the purpose of promoting cell proliferation andbone differentiation: 1-control group, 2-PLLA nanofiber, 3-donepezilhydrochloride and 4- PLLA- donepezil hydrochloride then, all of themwere treated with osteogenic induction media. The biocompatibility ofscaffolds and cytotoxicity of the drug were studied by MTT assay andAcridine orange staining. Bone-related markers were evaluated by calciumcontent, alkaline phosphatase (ALP) von Kossa, and Alizarin Redstaining. In addition, bone-related genes expression (ALP. activity. Osteonectin, Osteocalcin, and RUNX2) was evaluated by immunofluorescence staining and quantitative real-time PCR (qPCR) analysis.Results: MTT results showed that the fabricated PLLA scaffold didnot have any cytotoxicity as well as promote the cell attachment and proliferation of hBMSCs. Under a fluorescence microscope, viablecells appear green color with the recognizable plasma membrane. MTTassay showed that donepezil hydrochloride caused toxicity in morethan 50 µg/mL but in the range between 500 ng and 1 µg it acts as a co-stimulator. Our results showed higher ALP enzyme activity, biomineralization, von Kossa staining with more intensity in differentiatedcells on PLLA-donepezil hydrochloride. The expression level of 4 genesrelated to osteoblasts was evaluated on four conditions. A higher levelof alkaline phosphatase activity, as well as osteonectin, osteocalcin and RUNX2 genes expression on donepezil/PLLA, was detected. The level ofosteocalcin and osteonectin protein markers was increased in the periodof differentiation of hMSCs into osteogenic lineages.Conclusion: A higher level of osteogenic markers such as ALP activity, calcium content and bone-related gene expression was detected on the donepezil/ PLLA scaffolds. According ... to the results fabricated P

كلمات كليدى:

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