

Osteogenesis in Thermo-Sensitive Hydrogel Using Mesenchymal Stem Cell Derived from Human Turbinate

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Abstract : These days, stem cell therapy is focused on for promising source of treatment in clinical human disease. As a supporter of stem cells, in situ-forming hydrogels with growth factors and cells appear to be a promising approach in tissue engineering. To examine osteogenic differentiation of hTMSCs which is one of mesenchymal stem cells in vivo in an injectable hydrogel, we use a methoxy polyethylene glycol-polycaprolactone blockcopolymer (MPEG-PCL) solution with osteogenic factors. We synthesized MPEG-PCL hydrogel and measured viscosity to check sol-gel transition. In order to demonstrate osteogenic ability of hTMSCs, we conducted in vitro osteogenesis experiment. Then, to confirm the cell cytotoxicity, we performed WST-1 with hTMSCs and MPEG-PCL. As the result of in vitro experiment, we implanted cell and hydrogel mixture into animal model and checked degree of osteogenesis with histological analysis and amount of expression genes. Through these experimental data, MPEG-PCL hydrogel has sol-gel transition in temperature change and is biocompatible with stem cells. In histological analysis and gene expression, hTMSCs are very good source of osteogenesis with hydrogel and will use it to tissue engineering as important treatment method. hTMSCs could be a good adult stem cell source for usability of isolation and high proliferation. When hTMSCs are used as cell therapy method with in situ-formed hydrogel, they may provide various benefits like a noninvasive alternative for bone tissue engineering applications.

Keywords : injectable hydrogel, stem cell, osteogenic differentiation, tissue engineering

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