

Differentiation effects of MNP-incorporated MSCs by mechanical stimulation

조현진, 박정극*

동국대학교

(jpark@dongguk.edu*)

Mesenchymal stem cells (MSCs) have multipotency for differentiation into other cell types, which makes them applicable to medical therapies. The first adult stem cells isolated were hematopoietic stem cells from bone marrow. These cells are known to be a reservoir for bone, fat, and cartilage tissues. Magnetite (Fe₃O₄) nanoparticles are emerging as ideal candidates for drug delivery and biomedical applications due to their ultra-fine sizes, biocompatibility and superparamagnetic properties. We used polyethyleneglycol (PEG) derivatived phospholipid ligands to improve their intracellular uptake. Mechanical signals are cues that cells can sense as a result of applied force. Stimulation begins with a mechanical response such as stress or intracellular force, after which cells transduce the mechanical stimuli into a biochemical output, which is known as mechanochemical signaling. In this study, to investigate mechanical forces like vibration or sound effects, we tested the neural differentiation of hBM-MSCs under mechanical stimulation conditions. So these results suggest that mechanical forces enhance differentiation on hBM-MSCs incorporated with MNPs and it would be effective method to differentiate cells.