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Suitability Verification of Cellulose Nanowhisker as a Scaffold for Bone Tissue Engineering

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Abstract : Scaffolds are an important part to support growth and differentiation of osteoblast for regeneration of injured bone in bone tissue engineering. We utilized tunicate cellulose nanowhisker (CNW) as scaffold and developed complex system that can enhance differentiation of osteoblast by applying mechanical stimulation. CNW, a crystal form of cellulose, has high stiffness with a large surface area and is useful as a biomedical material due to its biodegradability and biocompatibility. In this study, CNW was obtained from tunicate extraction and was confirmed for its adhesion, differentiation, growth of osteoblast without cytotoxicity. In addition, osteoblast was successfully differentiated under mechanical stimulation, followed by calcium dependent signaling. In conclusion, we verified suitability of CNW as scaffold and possibility of bone substitutes.

Keywords : osteoblast, cellulose nanowhisker, CNW, mechanical stimulation, bone tissue engineering, bone substitute
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