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Induction of chondrogenesis in adult human mesenchymal stem cell monolayer culture system by using chitosan based injectable hydrogel accompanied with GDF-5

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Cartilage tissue engineering has focused on damaged cartilage regeneration due to traumatic injury and disease. Among various growth factors, transforming growth factor beta-3 (TGFβ-3) and growth differentiation factor-5 (GDF-5) have been reported that they play critical roles in mesenchymal cell condensation and chondrogenesis. *In vitro* chondrogenic differentiation of human mesenchymal stem cell (hMSC) is regularly accomplished by widely used pellet culture system which could mimic molecular, cellular and spatial organization of cartilage extracellular matrix (ECM). In this study, thermo-sensitive carboxylic anhydride conjugated glycol chitosan hydrogel was synthesized and employed as an injectable delivery carrier for GDF-5. First, neutral red (NR) loaded in hydrogel showed its kinetic behaviors, in that NR was released according to designated time point, following its degradation rate. It implied that load and release of bioactive substance within hydrogel was able to be controlled. Monolayer culture system with hMSC instead of typical 3D culture was introduced for assessing the value of glycosaminoglycan by using Alcian blue staining. GDF-5 released from hydrogel induced chondrogenic differentiation of hMSC better than the control. We are currently evaluating the chondrogenic effects in hMSC monolayer culture system with released GDF-5 by RT-PCR for gene expression related to chondrogenesis: Type II collagen, type X collagen, aggrecan and sox9.

Biography

Bosun Kwon has completed his MS and PhD from University of Southern California, USA. He was the Research Advisor and Consultant of Wooridul Spine Hospital, Seoul, Korea. He is the Research Director of Wooridul Huebrain Research Institute and Winnova Integrative Bioresearch Institute, Seoul, Korea. He has various patents and publication related to studies for tissue engineering and has been serving as an Editorial Board Member of The Korea Society of Industrial and Engineering Chemistry.

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