

Co-Culture Systems of Stem Cells using Various Scaffolds with Nano/Micro Pores

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Due to ease of isolation and expansion without losing the capacity to differentiate into various mesenchymal lineages, adult stem cells such as adipose stromal stem cells and bone marrow derived stem cells have received attention as excellent candidates for tissue engineering applications. Accordingly, there have been increasing demands for effective strategy of differentiation and delivery of adult stem cells. Among various differentiation methods, we have focused on co-culture systems using various scaffolds with nano/micro-pores since two different types of cells can maintain their direct cell contact through pores and can be easily separated, thus enabling the safe and effective co-culture condition. In a study using membranes with micro-pores, we have investigated the effect of the phenotype of co-cultured nucleus pulposus cells (NPCs) and the type of co-culture systems (direct and indirect, 2D and 3D) on differentiation of ASCs into NPCs. Additionally, various hydrogels including peptide based PEG hydrogels and protein based hydrogel were also developed to utilize them for 3D co-culture systems. We believe that this finding would elucidate how the appropriate and effective conditions could be set up for orthopedic tissue engineering applications.