

Decellularized Brain-Chitosan Scaffold for Neural Tissue Engineering

Authors : Yun-An Chen, Hung-Jun Lin, Tai-Horng Young, Der-Zen Liu

Abstract : Decellularized brain extracellular matrix had been shown that it has the ability to influence on cell proliferation, differentiation and associated cell phenotype. However, this scaffold is thought to have poor mechanical properties and rapid degradation, it is hard for cell recellularization. In this study, we used decellularized brain extracellular matrix combined with chitosan, which is naturally occurring polysaccharide and non-cytotoxic polymer, forming a 3-D scaffold for neural stem/precursor cells (NSPCs) regeneration. HE staining and DAPI fluorescence staining confirmed decellularized process could effectively vanish the cellular components from the brain. GAGs and collagen I, collagen IV were be showed a great preservation by Alcain staining and immunofluorescence staining respectively. Decellularized brain extracellular matrix was well mixed in chitosan to form a 3-D scaffold (DB-C scaffold). The pore size was approximately $50\pm 10\ \mu\text{m}$ examined by SEM images. Alamar blue results demonstrated NSPCs had great proliferation ability in DB-C scaffold. NSPCs that were cultured in this complex scaffold differentiated into neurons and astrocytes, as reveled by NSPCs expression of microtubule-associated protein 2 (MAP2) and glial fibrillary acidic protein (GFAP). In conclusion, DB-C scaffold may provide bioinformatics cues for NSPCs generation and aid for CNS injury functional recovery applications.

Keywords : brain, decellularization, chitosan, scaffold, neural stem/precursor cells

Conference Title : ICMBE 2016 : International Conference on Medical and Biomedical Engineering

Conference Location : Paris, France

Conference Dates : April 25-26, 2016