CRYOGELS CONTAINING POLYELECTROLYTE COMPLEX FOR TISSUE ENGINEERING

Berillo D. and Zheng Y.

Department of Pharmaceutical and Toxicological chemistry, Pharmacognosy and botany School of Pharmacy at Asfendiyarov Kazakh National Medical University

berillo.d@kaznmu.kz

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The design of scaffolds for tissue engineering is an important task. The focus of our research is the design of various biocompatible scaffolds based on natural polymers such as gelatin, chitosan and casein using cryogelation technique.1-4 Cryogelation involves a process of the formation of macroporous polymer systems, so called cryogels, with well-developed 3D structure of interconnected pores. Typically, cryogels have porosity of 90% and macrochannels of 30-200 μm in size, depending on the preparation conditions. Cryogels has ability of unrestricted penetration of solutes as well as high surface area for attachment and proliferation of mammalian cells.2,3 Previously, the preparation of gelatin based cryogel was performed in environmentally friendly way using enzymatic reaction under cryoconditions.3 We used dextran dialdehyde as a mild nontoxic cross-linker and additional physical cross-linking via formation of polyelectrolyte complex(PEC) between oppositely charged groups of polymers. The advantage of PEC based scaffold preparation is the simultaneous existence of positive and negative charges on the surface at physiological pH, facilitating attachment of tissue components via electrostatic interactions, that is favourable for a tissue engineering2. Human hepatic epithelial cell line and fibroblasts were used for evaluation of biocompatibility. It is important to mention that the gelatin type A and B significantly different and therefore affecting the migration, proliferation of cells and also microscopic morphology of the material. This phenomenon may be related to different chemical composition effecting isoelectric point of gelatin. In the present study gelatin was utilised from cold skin fish and bovine type A were used. The PEC scaffold containing gelatin from fish exhibited better fibroblast growth compare to cryogels based on only gelatin and aldehyde dextran. The same composition cryogels based on gelatin(bovine A) and dextran dialdehyde revealed proliferation of hepatocytes inside of the material, whereas hepatocytes formed clusters on the surface of the PEC cryogel.

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