EVENT ABSTRACT

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CRYOGELS BASED ON POLYELECTROLYTE COMPLEX BETWEEN CHITOSAN AND GELATIN FORMED UNDER CRYOCONDITIONS FOR TISSUE ENGINEERING

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Cryogelation technique is a versatile technique for design of various biocompatible scaffolds based on natural polymers as gelatin(Gel), chitosan and casein using cryogelation technique. [1-4] Cryogelation is the process of the formation of macroporous polymer systems, so called cryogels, with well-developed 3D structure of interconnected pores. Cryogels have porosity of 90-95% and macro-channels of 20-150 μm in size. Interconnected pores provide unrestricted penetration of nutrients and provides high surface area for attachment and proliferation of mammalian cells.[1,2] Previously, the preparation of Gel based cryogel was carried out in environmentally friendly way using enzymatic reaction under cryoconditions.[3] To prepare stable materials we developed a preparation method allowing avoid the use of toxic reducing agent borohydride for reduction of Schiff's base.[4] In this study we used dextran dialdehyde as a mild nontoxic cross-linker for preparation of cryogels based on different types of gelatin and chitosan. Additionally the cryogels were cross-linked via formation of polyelectrolyte complex(PEC) between oppositely charged groups of gelatine and chitosan. Physico-chemical properties, elastic modulus and degradation of the materials based on different ratios of dextran-gelatin and dextran-gelatin-chitosan at physiological conditions were inverstigated.

Human hepatic epithelial cell culture line and fibroblasts cells grow in the dextran-gelatin-chitosan cryogel scaffolds were studied. The type of gelatin significantly affected the migration, proliferation of cell and also microscopic morphology of the scaffold. The dextran-chitosan-gelatin (fish)(1:1:1wt %) based materials show better fibroblast growth compare to dextran-fish gelatin only. The cryogels containing dextran-chitosan-gelatin(bovine A)(1:1:1wt %) revealed good attachment and proliferation of hepatocytes inside of the material, whereas the cell line formed clusters on the surface of the PEC cryogel based on dextran-chitosan-gelatin(bovine A)(Fig. 1).

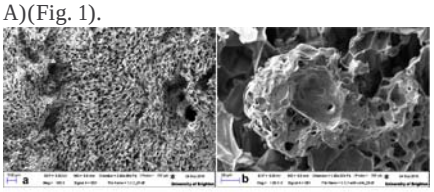

Figure 1. SEM images of gelatin-chitosan cryogel crosslinked by dextran dialdehyde: initial gel (b); with proliferated hepatocytes (b).

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