Preparation and Characterization of A Crosslinked Chitosan–Polycaprolactone Gel and its Interaction with Cells

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Abstract

For applications in tissue engineering to prepare scaffolds containing functional groups have been widely studied over the past decade [1-3]. In addition, these materials have to be strong to provide physical support for growing cells on their surfaces [4,5]. In this study, a new biodegradable polymeric gel containing chitosan/polycaprolactone (PCI) in the various combinations was prepared to use as a scaffold for tissue engineering. The morphological characterization of the gels was studied. The gel preparation reactions were performed in suitable acetic acid solutions in order to obtain the products in high yields. The crosslinking agent was added to produce swellable gels. The swelling behavior of crosslinked chitosan/polycaprolactone gel in different percentage was studied and the results were discussed. These polymeric gels were used for preparation of a suitable surface for cell growth experiments.

In order to prepared chitosan/PCI gel, suspension of chitosan in water was heated and kept at high temperature in 20 mins [6]. Then acetic acid was added to the suspension equivalent to 0.5M. Polycaprolactone was dissolved in glacial acetic acid. These two solutions were mixed using the following proportions of chitosan/PCI (v/v) (25/75, 50/50, 75/25) by adding crosslinking (DCC) and catalyse (T-12). The solutions were poured into a glass Petry dishes and placed in a hood at room temperature for evaporation. These gels were lyophilized in a freeze drier to obtained porous scaffolds. The lyophilization process was followed by the cell growth experiments.

The results of the cell growth experiments suggested that the crosslinked chitosan/PCI gel can be successfully used as base materials for scaffold devices.

References