Novel chemically modified bacterial cellulose nanocomposite as potential biomaterial for stem cell therapy applications.

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Introduction

Bacterial cellulose (BC) has become established as a remarkably versatile biomaterial and can be used in a wide variety of applied scientific applications, especially for medical devices.

Materials and Methods

In this work, the bacterial cellulose fermentation process is modified by the addition of hyaluronic acid and gelatin (1% w/w) to the culture medium before the bacteria are inoculated. Hyaluronic acid and gelatin influence in bacterial cellulose was analyzed using transmission infrared spectroscopy (FTIR) and Scanning Electron Microscopy (SEM). In order to verify the interaction among the biomaterial and cells, adhesion and viability assays were performed using a line of stem cells from deciduous teeth.

Results

Adhesion and viability studies with human dental pulp stem cells using natural bacterial cellulose/hyaluronic acid scaffolds for regenerative medicine are presented for the first time in this work. MTT assays show higher cell viability in bacterial cellulose/gelatin and bacterial cellulose/hyaluronic acid scaffolds over time with differences due to fiber agglomeration in bacterial cellulose/gelatin (Fig. 1). Confocal microscopy images showed that the cell were adhered and well distributed in the fibers in both types of scaffolds (Fig. 2).

Discussion and Conclusions

Bacterial cellulose was successfully modified by changing the fermentation medium, as shown with SEM and FTIR, which produced scaffolds with different surface morphology but similar cell adhesion and attachment. Natural scaffolds with bacterial cellulose and bacterial cellulose nanocomposites had good cell adhesion over time between the tested samples, therefore being a potentially effective material for tissue regeneration.

References List


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Disclosures

The authors declare there are no potential conflicts of interest with respect to the authorship and/or publication of this abstract.