P715 Cellular studies of electrospun PCL/biocomponent nanofibers from alternative and traditional solvents

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Bicomponent polycaprolactone/gelatin and polycaprolactone/collagen nanofibers formed by electrospinning process using alternative solvent mixture as well as perfluorinated alcohol were subjected to in-vitro cellular studies and compared. The alternative solvent system consisted of the mixture of acetic acid (AA) and formic acid (FA), while hexafluoroisopropanol (HFIP) was used as a reference, an example of traditional solvent.

The alternative solvent mixture as well as the conditions for electrospinning process were optimized as previously described [1] and let us to obtain a similar fiber morphology as those electrospun from HFIP.

The set of six types of materials consisting of PCL/coll, PCL/gelatin, both in 9:1 w/w ratio, as well as pure PCL mats as reference materials, electrospun from two types of solvents underwent cellular in-vitro studies and wettability measurement.

Tests were performed using L929 mouse fibroblast cells and human primary fibroblasts. MTT cytotoxicity test was carried out on extracts and showed that all type of materials are not cytotoxic.

In order to assess cellular response in direct contact, the cells were cultured for 3, 5 and 7 days on all types of materials and afterwards SEM images were taken as well as fluorescent dying of nuclei and cytoskeleton were performed. DNA proliferation test, XTT and resazurin based tests were carried out up to three days.

Obtained results of cellular studies proved that the biopolymer addition facilitates cell adhesion and spreading on the surface of nonwovens in comparison to pure PCL materials. Similarly, wettability measurements showed a lower water contact angle for samples containing collagen/gelatin, with a small but noticeable difference in regard of solvent used in electrospinning.

Bicomponent electrospun nonwoven materials from AA/FA mixture solvent can be an attractive alternative for using expensive and toxic perfluorinated alcohols. Exhibiting good cellular response they show potential to be used in tissue engineering as a scaffold material.

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