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Phototherapy applied to cellulose and chitosan hydrogels in tissue engineering

We are developing a low-cost scaffold of cellulose and chitosan for cell growth, which has antibacterial properties and do not use growth factors.(1) The quaternized chitosan with different linear density of positive charge and molecular weight is being searched and synthetized to help the interaction with cells, where similar results were acquired using chitosan.(2) Additionally, the opportunity to integrate the fields of Tissue Engineering and Phototherapy to promote synergistically the cell adhesion are been evaluated for using different wavelengths and fluences. This research is being carried out through national and international collaboration with researchers of University of Bath and São Carlos Institute of Chemistry. The first part of the project was to develop and characterize the material. The first stage of the project was developed at the University of Bath and the analyses and techniques to hydrogel development were made through FT-IR, Confocal Microcopy, Fluorescence Microscopy and RMN. The synthetized chitosan presented 40% and 8% degree of quaternization and a molecular weight around 400 and 900 kg/mol. Also, the hydrogel presented higher cell's attachment (near to 60%), low cytotoxicity and high cell spreading (median circularity of 0.2). This results was observed for human osteosarcoma cells (lineage MG-63) and hydrogel casted with 40% quaternized chitosan, which was similar to tissue culture plate. The gram-negative bacteria (E. coli) had the more damage at higher DQ material casted, however the same material presented the higher number of E. coli attach to it. Lines are being drawn above hydrogel using a microdrop InkJet printer loaded with chitosan solution to evaluate possible patterns creation and measuring size and penetration inside the hydrogel.(3) Also, the interaction with a non-cancerous cells of fibroblast are being tested with hydrogel too. The results so far have a high potential at the development of Tissue Engineering using natural sources of low cost and high technological impact.

Área

Física Aplicada a Biomolecular

Subárea

Biotecnologia Molecular

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Apresentação do trabalho acadêmico para o público geral

Não

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