SYNTHESIS AND CHARACTERIZATION OF CHITOSAN-GELATIN FILMS AS POTENTIAL SCAFFOLDS FOR DERMAL SUBSTITUTES

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Burns can cause swelling, blistering, scarring and even disability and death. Large and deep wounds require specialized treatment. Autologous skin transplantation is the “gold standard” in these cases; however, for extensive burns there is little healthy tissue remaining for autologous skin grafts. One avenue to overcome this is the development of cultured scaffolds that can simultaneously work as protective covers and cells carriers; scaffolds must be biocompatible and capable to sustain skin cells culture. Chitosan (CTS) and Gelatin (GL) are two natural-derived polymers widely used in tissue engineering because of its biocompatibility, non-citotoxicity and biodegradability.

In the present work chitosan-gelatin films were synthesized and characterized to assess the feasibility of using them as scaffolds for dermal substitutes. Different amounts of CTS-GL were dissolved in 0.1 M acetic acid to obtain the different samples: CTS1-GL0.5, CTS1-GL1, CTS1.5-GL0.5 and CTS-GL1; numbers stand for CTS/GL weight percentages in the solutions. Solutions were kept under stirring for 24 h and films were obtained by solvent casting. Films were characterized by FT-IR spectroscopy, X-ray diffraction, contact angle measurements and swelling and degradation studies. To study the biological response, human fibroblasts were plated (79,000 cells/cm²) on the sterilized films and cultured for 7 days. The number of cells on the scaffolds and their viability were assessed at culture day 3 and 7 by toluidine blue staining and using the Calcein-AM/Ethidium homodimer fluorescent kit assay. Cells functionality and proliferation were assessed at day 7 by immunofluorescence analyses against type I procollagen, tropoelastin and Ki67. According to the present study, fibroblasts were able to adhere, proliferate and remain functional on the scaffolds. The addition of gelatin to the films increased the cell number and viability on the scaffolds; nevertheless, it decreased the films stability under cell culture conditions. The films synthesized with 1 % CTS and 0.5 % (wt %) showed the most favorable biological response.

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