INFLUENCE OF DIFFERENT GAMMA RADIATION DOSES ON PVA/GELATIN BASED SCAFFOLDS

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ABSTRACT

The present work aimed to study the influence of different radiation doses on a polymer blend at cryogenic and room temperature by means of crosslinking formation, pore size, morphology, topography and mechanical properties. The scaffold was prepared based on two formulations, one composed by gelatin (7%, w/w) and PVA (5%, w/w), and the second by gelatin (10%, w/w) and PVA (5%, w/w). The formulations were separately solubilized in distilled water and heated up to 80 ºC under constant stirring for 1 hour. Posteriorly, both blends were disposed in circular glass moulds. Half of samples was frozen for at least 24 h and then irradiated at 15, 25 and 50 kGy. The other half was cooled at 4 ºC for at least 24 h and then irradiated using the same doses. After irradiation both sample groups were frozen and freeze dried. The scaffold was characterized in terms of structure and morphology by mechanical assays, differential scanning calorimetry, scanning electron microscopy, optical coherence tomography and infrared spectroscopy. In addition, platelet adhesion and release, and cytotoxic assays were also performed. Samples irradiated at 15 kGy presented pore size diameter of around 1.4 µm and porosity of 54%, while samples irradiated at 25 kGy, presented pore size diameter of around 1.1 µm and porosity of 49%. Optical coherence tomography showed that gelatin control samples presented more superficial degradation as irradiation dose increased, while PVA control sample presented higher integrity, indicating that this polymer is less sensitive to gamma radiation. The system presented suitable mechanical properties and the platelet adhesion and release assays showed that the scaffold presented adequate pore size range to host and release the platelets, and non-cytotoxic to platelets, featuring adequate properties to be applied as dressing for wound treatments.

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