



The effect of GO-PEG-NH₂ on the mechanical resistance of bovine pericardium used in cardiovascular device

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Valvular heart disease (VHD) is a clinical condition where one of the four-heart valves is damaged or has a defect. It was estimated that approximately 300,000 to 400,000 heart valve replacement surgeries were performed in 2014. There are two types of prostheses, the bioprosthesis and the mechanical prosthesis. Even though the first one presents a smaller rejection, its durability is reduced due to calcification followed by deterioration. The objective of this work was to increase the durability of prostheses made from bovine pericardium (BP) by incorporating GO functionalized with amino-PEG (GO-PEG-NH₂). Briefly, GO functionalized was firstly sterilized with gamma radiation and then incorporated to BP in two different ways: chemical and physical. Mechanical characterization assays of BP treated with GO-PEG-NH₂ and untreated (control) were performed in an INSTRON model 3365 universal test equipment using the BioPlus accessory, which allows the assays to be carried out immersed in a physiological solution of 0,9% NaCl at 36 °C, simulating the environment of material's application. The static deformation in the uniaxial direction of the test specimens was verified using the ASTM D638-10 standard test method for tensile properties of plastics, 2010 from the American Society for Testing and Materials (ASTM Standards). The results indicated that GO-PEG-NH₂ improved the mechanical strength of the biomaterial, increasing the resistance to permanent plastic deformation, maximum supported load, flow limit, maximum traction tension, rupture tenacity and rupture traction tension no matter of GO-PEG-NH₂ incorporation methods and it is possible to improve the performance of bioprosthesis by coating them with GO-PEG-NH₂ and consequently increasing their durability.

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