MODIFICATION OF THE SURFACE OF THE TI 7.5MO ALLOY WITH ALKALINE TREATMENT AND SILVER IMMOBILIZATION

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ABSTRACT

Titanium and its alloys stand out as biomaterials due to their mechanical strength, chemical stability, and integration with the surrounding bone. The nanostructured surfaces resemble the bone matrix structure, favoring cell adhesion. For a successful implant, tissue integration must occur before bacterial adhesion. The nanoporous surface of the substrate – obtained through an alkaline treatment – optimizes the bone-implant contact, and the incorporation of silver nanoparticles forms a nanostructured film capable of preventing bacterial colonization. Therefore, it is necessary to modify the surface of the Ti7.5Mo alloy using alkaline treatment and silver immobilization. For this, the alkaline treatment of the Ti7.5Mo alloy discs was carried out in a thermostated bath with a NaOH solution at a temperature of 80º C and a concentration of 5M, for 72 h, allowing the corrosion of the TiO_2 layer, resulting in the nanoporous surface of the substrate. Soon after, the samples were immersed in a 50mM $AgNO_3$ solution — for incorporation of silver nanoparticles on the nanoporous surface — and incubated at a temperature of 60º C, for an interval of 18 h. Afterwards, the samples were submitted to calcination in an EDG muffle furnace, with a heating rate of 5º C/min, maintained for 1 h at a temperature of 450º C, followed by slow cooling inside the oven. Surface analysis was performed using Optical Profilometry, Scanning Electron Microscopy (SEM), Energy Dispersive

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Spectroscopy (EDS), Contact Angle Measurement, Cell Viability Assay (MTT), Cell Adhesion Assay (Violet Crystal) and Evaluation of antimicrobial activity. The results obtained showed a nanostructured film - nanoporous surface of the Ti7.5Mo alloy substrate with silver nanoparticles (AgNPs) - which favors mechanical anchoring, cell adhesion, is not cytotoxic and has antimicrobial properties that reduce biofilm formation, proliferation of bacteria.

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