B-P66 RADIOLOGICAL EXPERIMENTAL RESPONSE AND COMPUTATIONAL DOSIMETRIC EVALUATION OF HYDROXYAPATITE MACROAGGREGATES IMPLANTS

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Hydroxyapatite macroaggregates with incorporated radionuclides, namely M-HAP, present a great potential for brachytherapy implants. HAP is biocompatible, presenting neither local nor systemic toxicity and can have incorporated radionuclides. At the present work, experimental models were setup to study the spatial distribution, radiological and ultrasound response of M-HAP ("M"= metallic radionuclides such as: 89Sr, 90Y, 165Dy, 166Ho or 188Re) macroaggregates introduced by high viscosity CMC gel through interstitial implants into kidney, lung, liver, brain and muscle samples. A Monte Carlo computational dosimetric evaluation of M-HAPs interstitial implants was also performed taken conventional 125I seeds as comparison. The radiological images demonstrated high ecogenicity and easy ultrasound identification in all evaluated tissues experimental models. The incorporation of high atomic number (Z) radionuclides to the hydroxyapatite structure may improve the composition x-ray contrast. The M-HAP macroaggregates presented dose distribution adequated for tumor control. 188Re-HAP implants present radiodosimetric advantages when compared with 125I seeds.

B-P67 EFFECT OF ALKALI-TREATED TITANIUM INDUCED ON PRECIPITATION OF THE HIDROXIAPATITE

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The purpose of this study was to evaluate the growth ability of apatites after alkali treated titanium. Simple NaOH provided a cp-Ti with a bioactive graded surface struture of an amorphous sodium titanate, where the sodium titanate on the top surface gradually changed into the cp-Ti substrate trought titanium oxide spontaneously formed (TiO2). The sodium titanate transformed into a hydrated titania via Na+ ion release to induce a bonelike apatite formation on the cp-Ti substrate in a simulated body fluid (SBF) with ion concentrations nearly equal to those of human blood plasma or 1,5 SBF led to the formation of a dense and uniform bonelike apatite layer on the surface. The surfaces of chemical treatment with different NaOH concentrations (5.0, 0.5 and 0.05 M) and apatite growth were characterized by scanning electron microscopy (SEM) with coupled EDS and X ray diffraction. Sodium-implanted titanium surface shown to incorporate sodium-titanate on cp-Ti substrate and produced a rough surface. The titania hidrogel acquired the capability of inducing a apatites coatings from SBF.

B-P68 CYTOTOXIC EVALUATION OF SILICON NITRIDE BASED CERAMICS

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Silicon nitride based ceramic is a good candidate for orthopedic implants due to its chemical stability associated to suitable fracture toughness and propitious tribologic characteristics. Therefore, in this work, dense silicon nitride components obtained by normal sintering are investigated as biomaterial. Initially, two different compositions of silicon nitride were considered, using ytterbium, yttrium and aluminum oxides as sintering aids. The materials were sintered in a carbon resistance furnace under normal nitrogen atmosphere and were analyzed by means of X-ray diffraction and scanning electronic microscopy in order to characterize the microstructure. Indentation method was applied in order to obtain hardness and fracture toughness measurements, and in vitro cytotoxicity test was performed for a preliminary biological evaluation. The results have shown a microstructure composed by grains of beta-silicon nitride distributed in a secondary phase and fracture toughness values higher than 4 MPa.m1/2. Since a nontoxic behavior has been observed during the cytotoxicity tests with the samples, this finding suggests that silicon nitride based ceramic can be used as a material for clinical applications.