STUDY OF THE BIOMIMETIC COATING OF TI C.P. WITH CHITOSAN AND POLYCAPROLACTONE FOR APPLICATION IN IMPLANTS

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The application of titanium (Ti) in medical implants has been increasing due to its properties, such as excellent biocompatibility and high mechanical resistance. However, for orthopedic or orthodontic implants, biomaterials with porous structure demonstrated greater effectiveness, providing faster osteointegration. Hydroxyapatite (HA) is a porous ceramic, widely used for recovering titanium surface due to its high similarity to bone composition. Moreover, HA gives greater surface roughness to the metal and forms a bioactive layer, which induces the direct union between the implant and bone tissue, favoring short-term recovery. In addition to ceramic coating, polymeric coatings have been successfully used to recovery metal surfaces for medical applications due to the interesting properties of the polymers. Polycaprolactone (PCL) is a synthetic biocompatible polymer approved by the Food and Drug Administration (FDA/USA) for medical applications. It is hydrophobic and can be degraded by the body. Chitosan (CH) is a natural polymer widely used for biomedical applications because of its biocompatibility, biodegradability and antimicrobial activity. This present work proposes the biomimetic incorporation of HA in the Ti substrate and posterior coating with a polymeric layer in order to develop osteinductive, biocompatible and biodegradable structures for potential application as bone substitutes. For this, Ti discs were pre-prepared by alkaline and thermal treatments and the HA was incorporated by biomimetic method. Subsequently, polymeric coating was performed by immersing the Ti-HA discs in a 1% PCL or 1% CH solutions and drying in an oven at 37°C for 24 hours. Morphological and chemical characterization of the coatings was performed by Scanning Electron Microscopy, X-ray diffraction and Infrared spectroscopy. Moreover, samples were characterized by Bioactivity and Electrochemical tests. The efficiency and bioactivity of PCL and CH coatings was demonstrated, as well as the improvement on corrosion resistance, suggesting the potential use of these samples as bone implants. The authors thank FAPEMIG, CNPq, CAPES and FAPESP for the support they have received in their research.