TIO₂ NANOTUBES FABRICATED USING AN OXIDIZED SOLUTION DECREASE STAPHYLOCOCCUS AUREUS ADHESION AND VIABILITY

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Infections associated to implant materials are an important medical concern, due to the difficulties present when bacterial adhesion and the subsequent biofilm formation has been arisen after an implantation procedure. As an endeavor to prevent these bacterial contaminations, surface modification techniques have been emerged. As an example of surface modification, it has been performed the use of anodization in order to fabricate TiO₂ nanotubes (NTs). However, when NTs are present on the surface of Ti6Al4V, there is still the risk of bacterial adhesion on the NTs surface. In the present work, we fabricated 80 nm NTs on Ti6Al4V using an oxidized solution enriched with fluoride, with the aim of reduce the anodization time required to obtain NTs and also to generate an antibacterial surface able to decrease the bacterial adhesion and viability. In order to characterize the material surface, we performed scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDX) and atomic force microscopy (AFM). For the study of bacterial behavior, Staphylococcus aureus (S. aureus) was cultured for 1, 3 and 5 days, and was compared to a nonanodized Ti6Al4V alloy disk. By SEM analysis, the results showed decreased bacterial adhesion and biofilm formation for the NTs surface in each culture time. Moreover, no differences in bacterial morphology and topography were detected on both surfaces, as analyzed by SEM and AFM. In conclusion, this surface modification technique illustrated a possible strategy in order to reduce the adhesion of bacteria associated to implant infections.

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References:


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