Titanium (Ti) and titanium-based alloys (such as Ti6Al4V) are among the most used clinical metallic materials for dental and orthopedic appliances due to their mechanical properties, corrosion resistance and more importantly to their biocompatibility. The beneficial properties of those materials are widely regulated by the formation of a protective TiO$_2$ layer. However, when this important layer fails or is destroyed by the surrounding environment, the materials properties are negatively compromised, such as biocompatibility. As a strategy to improve the biocompatibility of these materials, TiO$_2$ nanotubes (describes here as NTs) of 80-100 nm have been utilized. In the present work, amorphous NTs were fabricated by anodization, sterilized by UV and cleaned using an oxidized solution. In order to characterize the effect of the cleaning process, we evaluate the surface properties of NTs by scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDX) and atomic force microscopy (AFM). Moreover, in order to assess the biological activity of our surfaces, we seed pig periosteal osteoblasts and Staphylococcus aureus (S. aureus). The results showed that after cleaning the NTs, the S. aureus viability was significantly decreased; meanwhile the osteoblasts properties such as adhesion and morphology were not altered by the cleaning process. Our results suggest that UV and the use of oxidized water could be a recommendable method for implant sterilization and disinfection without altering osteoblast behavior.

Keywords: Disinfection, Nanotubes, Titanium

References:


Presenting author’s email: beltrane@uabc.edu.mx