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ePoster Viewing

Other foreign-body and implant infections

Photocatalytic enhancement of antibacterial effects of TiO₂ and silver modified TiO₂ nanoparticles studied by in vitro *Streptococcus salivarius* model

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Background: Bacterial colonization and biofilm formation on implanted devices is the reason of the infections of bone around the implant. The aim of this study was to develop a silver-copolymer nanocomposite surface treatment of titanium implants to restrict bacterial adhesion and to investigate these surfaces illuminated with distinct periods.

Material/methods: This study used commercially pure (CP4) sand blasted, acid etched (A, control surface) titanium sample discs (Denti® System Ltd., Hungary) 1.5 mm thick and 9 mm in diameter and two different surface modifications. Two copolymer based nanohybrid layers were developed: B) 60 % TiO₂/ 40 % copolymer and C) 60% AgTiO₂/ 40 % copolymer ([Ag] = 0,001 m/m%). These disks were incubated for 4 hours with a culture of *Streptococcus salivarius*, which is a first colonizer in titanium dental implant associated infections. The discs were then exposed to UV-visible light source-up to different time periods. The antibacterial effect of the photocatalysts in each group was represented by the bacterial survival ratio after 5, 10, 15 minutes illumination, determined by MTT assay and protein assay.

Results: The number of the attached bacteria on all titanium surfaces was reduced depending of time. We observed the least amount of living bacteria on the surface with silver (C) and both the MTT assay and protein assay confirmed these results. MTT results demonstrated that 15 minutes illumination on the titanium discs with 0,001% AgTiO₂ surface killed more with 25 % of attached bacteria compared to 5 minutes illumination.

Conclusions: According to our results the silver nanoparticle-modified titanium surface shows more intense antibacterial effect than the common TiO₂. This effect is intensified, if we apply 15 minutes UV-visible light illumination. The silver nanocomposite-coated titanium can prevent the infection affecting dental implants.

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