



MODIFICATION OF THE TITANIUM BACKPLATE OF THE BKPRO BY ELECTRODEPOSITION

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ABSTRACT

The Boston keratoprosthesis (BKPro) is the most widely used artificial cornea in the world for the treatment of corneal blindness in patients who are not candidates for conventional keratoplasty. Despite excellent retention rates and good vision restoration, implant viability is affected by two main complications: infection and visual loss due to retroprosthetic membrane (RPM) formation [1].

In previous work the electrodeposition technique has been shown to be efficient to functionalize titanium with silver [2]. In this work the electrodeposition technique was used to modify the BKPro titanium backplate. The aim was to confer antibacterial properties to decrease the infection rates. For this, the experimental conditions have been optimized to adjust the number of cycles, voltage, and type of applied pulse. The obtained surfaces have been characterized physiochemically by means of X-ray photoelectron spectroscopy (XPS), contact angle measurements, profilometer, and scanning electron microscopy (SEM). Adhesion and cytotoxicity were studied in human fibroblasts using the MTT assay. The effect on bacterial strains that cause ocular infections (*Pseudomonas aeruginosa* and *Staphylococcus epidermidis*) was measured by a 2-hour adhesion test. The results of SEM and XPS corroborate the presence of silver particles in the titanium samples. Cytotoxicity has not been observed. The studied treatments decrease adhesion of *epidermidis* and *aeruginosa* by 78% and almost 63%, respectively.

[1] J. Park, P. Phrueksaodomchai, M.S. Cortina. *Ocular Surface*. 18 (2020) 893–900.

[2] M. Godoy-Gallardo, A.G. Rodríguez-Hernández, L.M. Delgado, J.M. Manero, F. Javier Gil, D. Rodríguez. *Clinical Oral Implants Research*. 26 (2015) 1170–1179.