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***In vitro* study on the effect of various treatments on bacterial adhesion to implant surfaces**

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Background: Peri-implantitis can be caused by various risk factors, including surface treatment, which can affect the physical structure and micro- and nano-morphology of implant surfaces. Titanium dioxide (TiO₂) can exist in different forms, such as amorphous or crystalline, including anatase and brookite. This study aimed to assess the antibacterial properties of grade IV and grade V titanium implants treated with four different surface treatments.

Methods: Titanium disks of grade IV and V underwent the following surface treatments: machining (G1), machining and anodization (G2), sandblasting and etching (G3), and sandblasting, etching, and anodization (G4). The physical structure of the surfaces was evaluated using MicroRaman spectroscopy. An in vitro bacterial adherence test was conducted using a reference strain of *S. aureus* (ATCC BAA-1717), and the results were expressed as Colony Forming Units (CFU).

Results: The grade V titanium samples showed no crystalline structural organization regardless of surface treatment. Among the grade IV samples, only the G4 group showed a Raman signal indicating the presence of anatase. Anodizing increased the antibacterial activity only on the micro-rough surfaces of grade V samples. In grade IV samples, the anodization treatment reduced bacterial adhesion on both machined and micro-rough surfaces, thereby allowing a decrease in bacterial adhesion.

Conclusions: The surface treatment and bulk material can influence bacterial adhesion, which may lead to peri-implant pathologies. Surfaces that reduce bacterial adhesion could help reduce the incidence of such pathologies.

Recent Publications

1. Chen W, Oh S, Ong AP, Oh N, Liu Y, Courtney HS, Appleford M, Ong JL. Antibacterial and osteogenic properties of silver-containing hydroxyapatite coatings produced using a sol gel process. *J Biomed Mater Res A*. 2007 Sep 15;82(4):899-906. doi: 10.1002/jbm.a.31197. PMID: 17335020.
2. Chen W, Liu Y, Courtney HS, Bettenga M, Agrawal CM, Bumgardner JD, Ong JL. In vitro anti-bacterial and biological properties of magnetron co-sputtered silver-containing hydroxyapatite coating. *Biomaterials*. 2006 Nov;27(32):5512-7. doi: 10.1016/j.biomaterials.2006.07.003. Epub 2006 Jul 26. PMID: 16872671.
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Biography

Riccardo Beltrami is from University of Pavia, Italy. He is interested in Biomedical Statistics, oral surgeon with numerous publications in the field of oral health and biomaterials. Researcher and private practitioner in Pavia (Italy).

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