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Photofunctionalization: A new method to bio-activate the titanium implant surface

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Titanium implant surfaces inevitably undergo biological aging, associated with lower bone-implant-contact (BIC) values. Already 4 weeks from manufacturing the implant surfaces are contaminated with polycarbonyls and hydrocarbons that modify their physio-chemical state, leading to significant reductions of BIC values (45-75%) and, likely, low numbers of stem cells actually reaching the surface of the fixture. However, Photofunctionalization (UV light irradiation) of the surface can reverse the biological aging of titanium, recovering BIC values virtually to 100% and greatly enhancing the Osteointegration process. In our study we investigated how UV irradiation may affect osteogenic environment, increasing cell adhesion, migration, proliferation and differentiation. First, weevaluated how the changes in surface molecular composition affect hydrophilicity and electrostatic state of titanium and how it is correlate with UV intensity. Second we tested the hypothesis that the bio-activated titanium surface may attract more stem/progenitor cells and/or promote their osteogenic differentiation. To this aim, human osteogenic cells seeded onto bio-activated or untreated surfaces were compared at different time points for cellular and molecular properties. Particular attention was focused on the expression profiles of regulatory gene networks (HOX and TALE) known to reflect positional, embryological and hierarchical identity of human stromal cell populations, thus providing useful biological markers.

Biography

Marco Roy has completed his dental degree at the Poznan University at the age of 24 years. He is attending Postdoctoral studies at Poznan University of Medical Sciences in the field of Dental Implantology. He is an Assistant Professor in the Department of Implant Prosthodontics. He has published in reputed journals and has been actively participating in research groups.

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