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IMPLANT THERAPY OUTCOMES, PERI-IMPLANT BIOLOGY ASPECTS

BioHPP and soft tissue: confocal laser scanning evaluation of junctional connective tissue

Lo Giudice Roberto *[1], Puleio Francesco [2], Matarese Marco [2], Nicita Fabiana [2], Pantè Grazia Giulia [2], Previti Claudia [2], Rizzo Giuseppina [2]

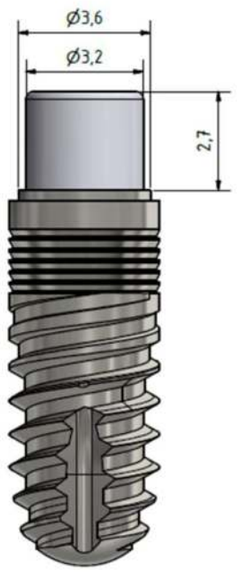
[1] *Department of Clinical and Experimental Medicine, Messina University, Messina, Italy*
[2] *Department of Biomedical and Dental Sciences and Morphofunctional Imaging, Messina University, Italy*

Abstract

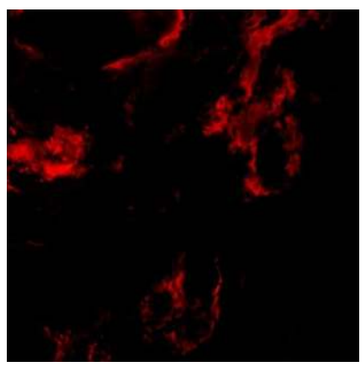
An experimental study in humans was conducted to histologically evaluate and compare the soft tissue interface formed at contact with experimental BioHPP and titanium healing abutments. After 4 weeks of soft tissue maturation, the experimental healing abutments were removed along with a 1 mm of periabutment soft tissue. The biopsy was processed and treated with antibodies for the observation with Zeiss LSM 510 confocal microscope to evaluate the fluorescence pattern of fibronectine, VEGF Type IV, collagen and elastine. Display profile analysis showed a more uniform and intense fluorescent signal in BioHPP group when compared to the titanium group. This could be related to a better proliferation and attachment behavior of fibroblasts, increased neoangiogenesis and extracellular matrix and so an increased quantity and quality of soft tissue adhesion at the transmucosal side.

Results

Five random sections of each group were selected and analyzed
In both groups were considered positive per the presence of fluorescence pattern for all of the selected antibodies.
The display profile analysis of the criosection of test group shows a fluorescence pattern for fibronectine, VEGF, Type IV collagen and elastine that appears to be more uniform and intense when compared to the control group.

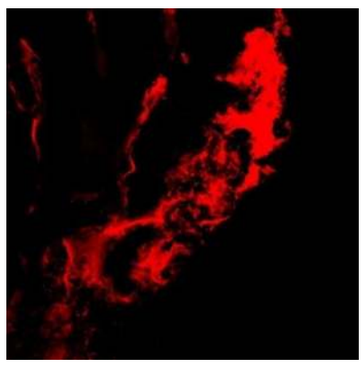


Axial and coronal view of experimental abutments

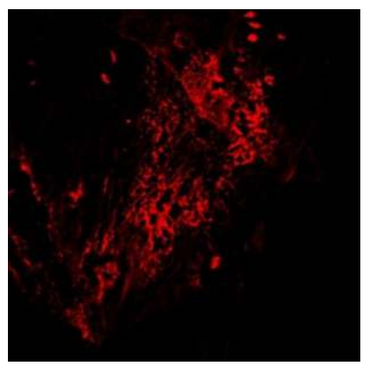


Titanium

Fibronectine

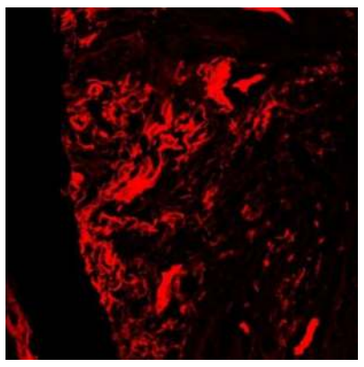


BioHPP

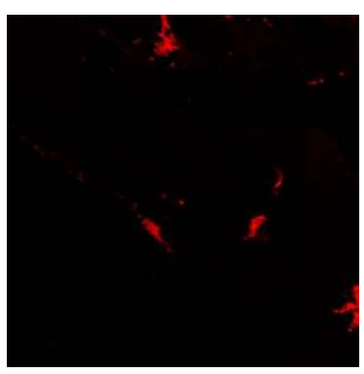


Titanium

Type IV collagen

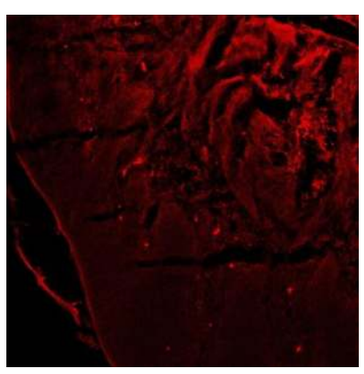


BioHPP

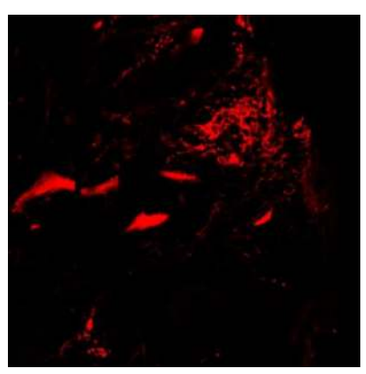


Titanium

VEGF

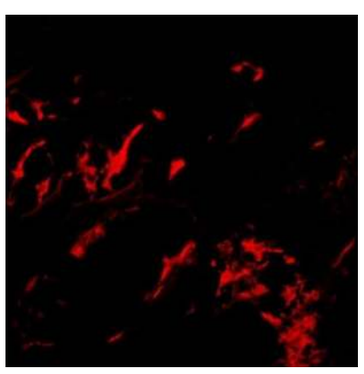


BioHPP



Titanium

Elastine



BioHPP

Background and Aim

The prosthetic abutments are a critical part of the implant-based rehabilitation due to importance of the mucosa that surround it that act as a protective seal between the oral environment and the underlying peri-implant bone.
Many materials are used for fabrication of prosthetic abutments, such as metals, ceramics, and composites.
BioHPP, is a PEEK synthetic polymeric material that contains XnM ceramic filler, represent a reliable alternative to titanium, thanks to an adequate biocompatibility, an elastic moduli close to human bone and a lower plaque accumulation
The aim of our research was to evaluate the biological behavior of the junctional connective tissue next to the surface of dental implant abutment made of BioHPP comparing it to titanium alloy substrates.

Conclusion

The confocal microscope immunofluorescence analysis shows how the test group fluorescent signal appears to be more uniform and intense when compared to the control groups for the observed structures. The clinical implication related to a better proliferation and attachment behavior of fibroblasts, increased neoangiogenesis and extracellular matrix apposition on BioHPP, is directly linked to an increased in quantity and quality of soft tissue adhesion at the transmucosal side of abutments providing a better protective seal between the oral environment and the implant neck.

Methods and Materials

An experimental study in humans was conducted using specially designed study abutments (Bredent) were provided in two different surfaces BioHPP (test) and Titanium (control) (2,7mm height, 3,2 mm diameter).
After 3 months of healing, the study abutments were randomly connected to the fixtures in a paramucosal- or slight submucosal position. Post-operative care consisted of rinsing with a 0.2% chlorhexidine digluconate solution twice a day for 4 weeks.
After 4 weeks, healing abutment was removed along with 1mm. of surrounding soft tissue, using a biopsy punch set to allow a safe and standardized soft tissue removal. A standard healing abutment was positioned.
The biopsy was processed and treated with antibodies for confocal laser scanning evaluation (Zeiss LSM 510) to quantitatively and qualitatively evaluate the presence of fribronectine, VEGF, type IV Collagen and elastine. The ‘display profile’ function of the laser-scanning microscope was used to show the intensity profile across an image along a freely selectable line

References

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