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Histomorphometrical evaluation of cells and tissues in contact with a new anti-wear dental implant surface: Bioloy® coating

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Dental implants rehabilitation of edentulous patients is the current accepted treatment to increase prosthetic stabilization. Various implant surface modifications have been tried to enhance osseointegration and to reduce the spread of detrimental metallic ions toward host tissues [1].

The aim of this preliminary study was to investigate in vitro the viability, proliferation and adhesion of a Bioloy® (B®) coating compared to machined and sandblasted surfaces and to assess histologically in vivo the bone response to customized mini-implants coated with B® () placed in the mandible of patients. B® is a titanium niobium nitride coating applied on surface by physical vapor deposition (Permedica Spa). It is a thin ceramic monolayer, extremely hard and with high resistance against wear, scratches and corrosion [2]

Viability and adhesion was tested at 24, 48 and 72 hours after seeding of SAOS-2 on customised scaffold. Cell viability (2x104 cells) was evaluated by AlamarBlue® assay [3] and it resulted statistically higher on B® than in the other 2 groups (48 and 72 hours, p-value<0.05). No toxic response was observed. Adhesion (104 cells) was analysed by scanning electron microscope [3]. Cell morphology confirmed the healthy status. Cells adhered to the surface and proliferated, covering completely the surfaces of machined and B® at 72 hours.

Osseointegration was evaluated in 2 patients. After tooth extraction, 3 MIB® were placed. Three months later, during drilling process, the biopsies with MIB® were harvested for histological processing (Donath' protocol) [3]. In all sections MIB® resulted well osseointegrated and newly formed bone was highly mineralized and organized in lamellae (bone to implant contact 46.8%±9.15). The implant coils were filled with new bone for the 59.8% ± 4.23. Medullary spaces were rich in blood vessels without inflammatory infiltrate.

In conclusion, B® is a promising coating able to enhance the viability in vitro and to favor the osseointegration in vivo.

References

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Keywords
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