

## PREVENTION OF BACTERIAL LEAKAGE AT IMPLANT-ABUTMENT CONNECTION LEVEL: AN *IN VITRO* STUDY OF THE EFFICACY OF THREE DIFFERENT IMPLANT SYSTEMS

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Peri-implantitis is the main cause of implant failures. Peri-implantitis is provoked by the presence of bacterial infiltration around Implant-Abutment Connection (IAC). Reduction of bacterial leakage may be achieved by improving the accuracy and precision of the two pieces of IAC. The aim of the present *in vitro* study was to evaluate bacterial microleakage from the inside to the outside of the IAC, testing the efficacy of three new designs of internal conical connection (FN - nano-fix -, NQ - uNiQo - and Elisir implant systems by FMD, Rome, Italy). To identify the efficacy of three new IAC, the passage of genetically modified *Escherichia coli* across IAC was evaluated. A total of 17 implants were used (5 FN, 6 NQ and 6 Elisir). All implants were immersed in a bacterial culture for 48 h and bacteria amount was then measured inside and outside IAC with Real-time PCR. Bacterial quantification was performed by Real-Time Polymerase Chain Reaction using the absolute quantification with the standard curve method. In all the tested implants, bacteria were found in the inner side, with a median percentage of 1.9% FN, 1.4% NQ and 2.6% Elisir. The analysis revealed that in both cases (internally and externally), bacteria grew in the first 48 hours but subsequently started to die, probably due to nutrient consumption. Of the three, the most efficacious connection was NQ. Within the limitations of this study, it was concluded that the best implant connection reducing bacterial leakage at IAC level was NQ (NQ implant system by FMD, Rome, Italy).

Success in implant dentistry requires an equilibrium between the host biology and mechanical factors (1). Failures are related to development of peri-implantitis associated with bone loss around the implant-abutment connection (IAC). Bone resorption around the implant is considered to be normal at approximately 1.0 mm for the first year of function and 0.2 mm thereafter (2). Peri-implantitis is caused by the presence of bacterial infiltration and inflammatory cells that can lead to bone loss around implant (3).

The amount of bacterial leakage at IAC level depends on different factors: the accuracy between implant connection and abutment, the tightening of the two components and micro-movements in dynamic conditions (4, 5). Bacterial leakage control at the IAC level is the aim of all new connection designs developed in all two-phase implant systems. The goal of an IAC design is to prevent bacterial leakage, minimizing the inflammation of soft and hard tissues and avoiding bone loss around the

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