Bacterial colonization of the dental implant fixture-abutment interface: an in vitro study.

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ABSTRACT.
Background. The geometry of the fixture-abutment interface (FAI) might influence the risk of bacterial invasion of the internal part of the implant. The aim of this study was to use an in vitro model to assess the potential risk for invasion of oral microorganisms into the FAI microgap of dental implants with different characteristics of the connection between the fixture and abutment.

Methods. Thirty implants were divided into three groups (n = 10 per group) based on their microgap dynamics. Groups 1 and 2 were comprised of fixtures with internal Morse-taper connections that connected to standard abutments and the same abutments with a 0.5-mm groove modification, respectively. Group 3 was comprised of implants with a tri-channel internal connection. Fixtures and abutments were assembled and allowed to incubate in a bacterial solution of Aggregatibacter actinomycetemcomitans (previously Actinobacillus actinomycetemcomitans) and Porphyromonas gingivalis. Two standard abutments were either exposed to bacterial culture or left sterile to serve as positive and negative controls. After disconnection of fixtures and abutments, microbial samples were taken from the threaded portion of the abutment, plated, and allowed to culture under appropriate conditions.

Results. Three of the 10 samples in group 1 developed one colony forming unit (CFU) for A. actinomycetemcomitans, whereas zero of 10 samples developed CFUs for P. gingivalis. Ten of 10 and nine of 10 samples from groups 2 and 3, respectively, developed multiple CFUs for A. actinomycetemcomitans and P. gingivalis.

Conclusion. This study indicated that differences in implant designs may affect the potential risk for invasion of oral microorganisms into the FAI microgap.