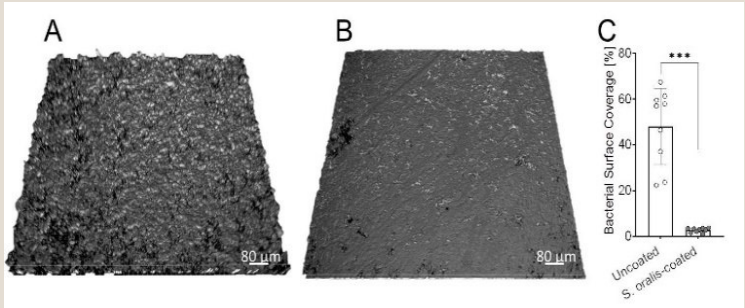
Effective prevention of biofilm-associated infections on dental implants

Reference Number TO 15-00577

Challenge

Dental implants are widely used as safe and long-lasting dental prostheses for the replacements of missing teeth. In contrast to removable dentures or bridges between adjacent teeth, dental implants harbour the advantage of preserving surrounding gingival and bone structures. However, post-implantation inflammatory processes remain a major obstacle to prevent successful osseointegration and therefore greatly limit targeted implant survival. These inflammatory reactions are predominately associated with the invasion of recalcitrant infectious biofilms, consisting of pathogenic bacteria that can form on the implants surface after implantation.



Medical implants with Streptococcal coating resist the adhesion of multispecies biofilm (B) compared to uncoated control (A); Quantification of bacterial adhesion (C)

Technology

The novel technology rests on applying composite multilayered coating on implants with heat-inactivated *S. oralis*, a non-pathogenic bacterium. Several species of bacteria such as those belonging to streptococci peacefully reside in the oral cavity as commensals to modulate the immune system and protect tissue from diseases. The present study describes a novel approach of applying oral commensal *S. oralis* as multilayered coating on implants to resist the adhesion of infectious biofilms. S. oralis were chosen more relevant since they secrete hydrogen peroxide and lactate reported to be effective against infectious bacteria. In vitro studies show that this approach prevents biofilm formation by a variety of harmful bacteria, such as *P. gingivalis* and *T. denticola*, strongly associated with periodontal diseases. The coating generated anti-adhesiveness against complex bacterial adhesion mechanisms. At the same time the novel coating proofed biocompatible with gingival fibroblasts, indicating a beneficial feature of the coating material for gingival attachment. In summary, this new technique has the potential to reduce post-implantation inflammation and thereby significantly improve the survival of dental implants.

Commercial Opportunity

In-licensing or collaboration for further development is possible.

Developmental Status

In vitro studies concerning the stability of coatings, prevention of infectious biofilm formation by diverse periodontal pathogens, anti-adhesive properties of coatings and biocompatibility with gingival fibroblasts have been performed.

Patent Situation

European patent application and US patent application based on international PCT application WO 2020/234332 A1 are pending.

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