

Antimicrobial Effects of Micro Repair and Robotics over Oral Microorganisms: An *In Vitro* Study

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ABSTRACT

The micro-Repair consists of laboratory-created carbonate-hydroxyapatite-zinc crystals; thanks to their biomimetic capacity, such crystals are able to interact with tooth's hydroxyapatite exerting reconstructive effects as well as antibacterial activity. In the last decade, the use of probiotics to improve oral health has been increased considerably. The aim of this *in vitro* study was to evaluate the effects of micro-Repair combined with selected probiotics on the behavior of oral microorganisms. Six healthy volunteers were selected and asked to collect two sets of their saliva after chewing (for 20 min/each) a traditional gum A and a probiotic-containing gum P. The donors repeated their saliva donation in 3 successive sessions every 2 weeks. In this way, we obtained two pools of saliva, named Saliva A and Saliva P, that were subsequently used for the *in vitro* microbiological studies on orthodontic elastics (OE). Briefly, the OE were contaminated with Saliva A or Saliva P by 1h incubation at 37°C, washed and further incubated for 23h at 37°C; then, each OE set was divided into two subgroups, one exposed to treatment with a medium conditioned by micro-Repair toothpaste (Tp-SUP) and the other with saline solution. Furthermore, the OE, contaminated and treated or not with the Tp-SUP, were incubated for up to 48h. At time 0, 24 and 48h, the following parameters were tested: microbial load, adhesion to the OE, formation and persistence of biofilm. Our data show that the microbial load was qualitatively and quantitatively similar in both saliva pools. The biofilm was produced to a lower extent on the OE exposed to Saliva P compared to Saliva A. The Tp-SUP treatment drastically reduced the biofilm persistence, regardless of the saliva used for OE contamination. Notably, *Streptococcus mitis/oralis* predominated before treatment with Tp-SUP, while *Lactobacillus spp* overgrew after treatment in both Saliva A and Saliva P-contaminated OE. These findings open to *in vivo* studies on the clinical performance of such novel oral health-care products.

Keywords: Antimicrobial effects, Micro repair, Probiotics, Saliva, Oral pathogens, *In vitro*

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