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**Influence of Toothpastes on Probiotic Effectiveness in Enhancing Oral Health**

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**Objectives** Dental biofilms are associated with oral diseases such as periodontitis, peri-implantitis, halitosis, and tooth decay. These diseases are characterized by dysbiosis, an imbalance between the host and microbiome. Current treatments rely on the mechanical removal of the biofilm and killing the microbiome with antimicrobials. However, rising antimicrobial resistance necessitates alternatives. Pro-microbial strategies, notably probiotics, hold promise for rebalancing the oral microbiome towards a symbiotic state. However, uncertainties persist, particularly regarding the impact of toothpaste on probiotic efficacy.

**Methods** In the *in-vitro* part, we assessed the inhibition of selected toothpastes on probiotic viability, probiotic adhesion to toothpaste pre-treated hydroxyapatite discs, the effect of probiotic strains on *in-vitro* oral biofilms that were pre-treated with brushing with selected toothpastes, and the anti-inflammatory effects of probiotics. In the *ex-vivo* part, ten volunteers brushed with selected toothpastes, and saliva samples were collected at different intervals for probiotic survival evaluation.

**Results** The antimicrobial efficacy of the selected toothpastes varied with concentration and probiotic strain. The adhesion of probiotics to hydroxyapatite discs is influenced by both the toothpaste product and the probiotic strain. The survival, colonization, and effect of the probiotics on the biofilm model are antiseptic and species-dependent. The ecology and composition of the biofilms were influenced by the toothpastes as well as by the applied probiotics. The probiotics anti-inflammatory activity varies between different pro-inflammatory genes and different toothpastes. Brushing with selected toothpastes did not decrease probiotic survival across different toothpastes and timepoints.

**Conclusions** Depending on the probiotic strain, colonization and effect of the probiotics are at least *in-vitro* dependent on the toothpaste used. The survival of the probiotic in saliva is not affected by the toothpaste *ex-vivo*.