Hydroxyapatite pellets as versatile model surfaces for systematic adhesion studies on enamel

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Research into materials for medical application draws inspiration from naturally occurring or synthesized surfaces. Particular attention must be paid to biocompatibility, osseointegration and bacterial adhesion behavior. To understand their properties and behavior, experimental studies with natural materials such as teeth are strongly required. The results, however, may be highly case-dependent because natural surfaces have the disadvantage of being subject to wide variations, for instance in their chemical composition, structure, morphology, roughness, and porosity. Synthetic surfaces which mimic enamel in its performance with respect to bacterial adhesion and biocompatibility, therefore, facilitate systematic studies. We performed single-cell force spectroscopy with single *Staphylococcus aureus* cells to measure adhesion-related parameters such as adhesion force and rupture length of cell wall proteins binding to enamel and synthetic hydroxyapatite (HAp) pellets. We examine the influence of blood plasma and saliva on the adhesion properties of *S. aureus* and match these results to water wettability, elemental composition of the samples and the change in the macromolecules adsorbed over time on the surface. We found that the adhesion properties of *S. aureus* were similar on HAp and enamel samples under all conditions and we therefore conclude that HAp pellets are a good alternative for natural dental material [1].

[1] Mischo, J.; Faidt, T.; McMillan, R.B.; et. al. Hydroxyapatite pellets as versatile model surfaces for systematic studies on enamel. *bioRxiv* **2021**, DOI: 10.1101/2021.01.05. 426207