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Surface characterization of dental ceramics and initial streptococcal adhesion in vitro.

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OBJECTIVES: The aim of this in vitro study was to investigate the surface properties of dental ceramic materials belonging to different ceramic classes, and to correlate the findings to the initial adherence of three oral streptococcal strains. METHODS: Rectangular specimens were prepared from different ceramic materials (glass/lithium disilicate glass/glass-infiltrated zirconia/partially sintered zirconia/hipped zirconia ceramic) and polished; surface roughness (Ra) was determined. Glass plates were used as a control. Specimens were incubated with phosphate-buffered saline or an artificial saliva (protein mixture; 2h, 37 degrees C). Surface free energy (gamma(t)) and its polar (gamma(p)) and disperse (gamma(d)) contribution were determined prior to and after artificial saliva exposure. Uncoated and protein-coated specimens were incubated with Streptococcus gordonii DSMZ 6777, Streptococcus oralis DSMZ 20068 or Streptococcus sanguinis DSMZ 20068 suspension for 2.5h at 37 degrees C (n=15 for each treatment and strain). Adherent streptococci were quantified fluorometrically. RESULTS: The lithium disilicate glass ceramic showed the highest values for Ra; the lowest values were found for the glass ceramic, the partially sintered zirconia and the hipped zirconia ceramic. Protein coating caused a significant increase in gamma(t) and gamma(p), but not in the control material. The control material showed higher values for streptococcal adhesion than all ceramic materials. After protein coating, only slight and random differences in streptococcal adhesion were found between the various ceramic materials. SIGNIFICANCE: Dental ceramic materials show differences in terms of Ra, gamma(t) and initial streptococcal adhesion; however, correlations between surface properties and streptococcal adhesion were poor.

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