

Two-body wear of dental porcelain and substructure oxide ceramics.

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Source

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Abstract

The aim of this in vitro study was to investigate the two-body wear of different ceramics. Two-body wear tests were performed in a chewing simulator with steatite and enamel antagonists, respectively. Specimens were loaded in a pin-on-block design with a vertical load of 50 N for 1.2×10^5 cycles; ($f = 1.6$ Hz; lateral movement, 1 mm; mouth opening: 2 mm). Human enamel was used as a reference. Three zirconia ceramics, three veneering porcelains, two glass-infiltrated and one lithium disilicate ceramic were investigated. Veneering and lithium disilicate ceramics were glazed before testing. Surface roughness Ra (SP6, Perthen-Feinprüf, G) and wear depth were determined using a 3D scanner (Laserscan 3D, Willytec, G). SEM (Quanta FEG 400, FEI, USA) pictures of the worn specimens and antagonists were made for evaluating wear performance. Veneering porcelain provided wear traces between 71.2 and 124.1 μm (enamel antagonist) and 117.4 and 274.1 μm (steatite). Wear of the steatite antagonists varied between 0.618 and 2.85 mm^2 . No wear was found for zirconia and glass-infiltrated substructure ceramics. Also, no wear was found for the corresponding antagonists. Wear of specimens and antagonists was strongly material dependent. No visible wear was found on zirconia and glass-infiltrated ceramics. Porcelain and lithium disilicate ceramic showed a comparable or lower wear than the enamel reference. Antagonist wear was found to be lower when specimens were made of substructure oxide ceramics instead of veneering porcelain. From the point of wear testing, zirconia may be used for the fabrication of fixed dental prosthesis without veneering.