

Two-body wear of artificial acrylic and composite resin teeth in relation to antagonist material.

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STATEMENT OF PROBLEM: Wear resistance is one of the most important physical properties of artificial resin teeth, and its dependence on the antagonist material has not been clearly established. **PURPOSE:** The purpose of this in vitro study was to investigate the wear resistance of representative artificial resin teeth in relation to antagonist material. **MATERIAL AND METHODS:** Twenty-four standardized specimens were prepared for each of 8 tooth types representative of anterior and posterior artificial acrylic and composite resin teeth (Gnathostar, SR Orthosit PE, Condyloform II NFC, SR Postaris DCL, SR Vivodent PE, VITA Physiodens, SR Antaris DCL, Bioplus), for a total of 192 specimens. Each specimen was prepared to a diameter of 5 mm and a thickness of 2 mm on the buccal/facial tooth surfaces. The specimens were then polished and subjected to simulated mastication (50 N, 1.2×10^5 cycles, 1.2 Hz) using a pin-on-block design and additional thermocycling (600 cycles, 5/55 degrees C, 2 min/cycle). Three antagonists (artificial resin teeth, steel, steatite) were prepared, and 8 specimens per tooth type were tested for each antagonist. Vertical substance and volume loss were analyzed using cast replicas and an optical 3-dimensional (3-D) surface profilometer, as well as scanning electron microscopy. Data were analyzed using 2- and 1-way ANOVA and the Games-Howell test ($\alpha=.05$). **RESULTS:** For both vertical substance and volume loss, significant differences were found for the various antagonists. Lowest overall mean values (SD) for vertical substance and volume loss were measured for artificial tooth antagonists (26 (10) microm to 95 (46) microm, 1.5 (1.5) microm³ to 10.5 (9) microm³), and the highest values were measured for steatite antagonists (95 (23) microm to 723 (168) microm, 8 (4) microm³ to 245 (109) microm³). Intermediate mean values (SD) for vertical substance and volume loss were measured for steel antagonists (118 (88) microm to 205 (120) microm, 9 (7) microm³ to 28 (24) microm³). Using artificial teeth and steel antagonists, few significant differences in wear resistance were found between the various resin teeth. In contrast, significant differences were observed with steatite antagonists. **CONCLUSIONS:** The use of steatite antagonists allowed for significantly better differentiation of wear behavior between various artificial teeth than the use of artificial resin teeth or steel antagonists.