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Original Articles

## Surface Characteristics of Orthodontic Materials and Their Effects on Adhesion of Mutans streptococci

Seung-Pyo Lee<sup>a</sup>, Shin-Jae Lee<sup>b</sup>, Bum-Soon Lim<sup>c</sup>, and Sug-Joon Ahn<sup>d</sup>

### Abstract

**Objective:** To test the hypothesis that there are no significant differences in the adhesion of mutans streptococci (MS) to various orthodontic materials based on their surface characteristics.

**Materials and Methods:** Surface roughness (SR) and surface free energy (SFE) characteristics were investigated for nine different orthodontic materials (four orthodontic adhesives, three bracket raw materials, hydroxyapatite blocks, and bovine incisors) using confocal laser scanning microscopy and sessile drop method. Each material, except the bovine incisors, was incubated with whole saliva or phosphate-buffered saline for 2 hours. Adhesion assays were performed by incubating tritium-labeled MS with each material for 3 or 6 hours.

**Results:** Orthodontic adhesives had higher SFE characteristics and lower SR than bracket materials. Orthodontic adhesives showed a higher MS retaining capacity than bracket materials, and MS adhesion to resin-modified glass ionomer and hydroxyapatite was highest. Extended incubation time increased MS adhesion, while saliva coating did not significantly influence MS adhesion. SFE, specifically its dispersive and polar components, was positively correlated with MS adhesion, irrespective of saliva coating.

**Conclusions:** The hypothesis is rejected. This study suggests that SFE characteristics play an important role in the initial MS adhesion to orthodontic materials.

**Keywords:** [Surface characteristics](#), [Orthodontic materials](#), [Mutans streptococci](#), [Adhesion](#)

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<sup>a</sup> Associate Professor, Dental Research Institute and Department of Oral Anatomy, Seoul National University, Seoul, Korea<sup>b</sup> Associate Professor, Department of Orthodontics, School of Dentistry and Dental Research Institute, Seoul National University, Seoul, Korea<sup>c</sup> Professor, Dental Biomaterials Science and Dental Research Institute, Seoul National University, Seoul, Korea<sup>d</sup> Assistant Professor, Dental Research Institute and Department of Orthodontics, College of Dentistry, Seoul National University, Seoul, KoreaCorresponding author: Dr Sug-Joon Ahn, Dental Research Institute and Department of Orthodontics, College of Dentistry, Seoul National University, 28-22 Yeunkun-dong, Chongro-ku, Seoul, Korea 110-768, South Korea ([titoo@snu.ac.kr](mailto:titoo@snu.ac.kr))


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