# Efficacy of color-change adhesive in orthodontic debonding:

## An in-vitro 3D analysis

Author

1 Prajak Jariyapongpaiboon, Dental Section, Rajavithi Hospital, Department of Medical services, Ministry of Public Health, Bangkok, Thailand.

2 Kriskrai Sittheseripratip, Principal Researcher, National Metal and Materials Technology Center, Pathumthani, Thailand.

3 Jaturong Jitsaard, Engineer, National Metal and Materials Technology Center, Pathumthani, Thailand.

4 Pongnarin Jiamwatthanachai, PhD Student, Institute of Biomedical Engineering, Faculty of Medicine, Prince of Songkla University, Songkhla, Thailand.

ABSTRACT

**Objective:** To assess and compare the efficacy of removing color-change adhesive with that of conventional light-cured adhesive for different orthodontic debonding protocols.

**Materials and Methods:** Sixty extracted upper premolar were scanned with a 3D optical scanner (initial scan). Out of 60 teeth, 40 were bracket-bonded with color-change adhesive while 20 with conventional light-cured adhesive. One day later, brackets were debonded. All teeth were scanned (after-debonding scan) and divided into 3 groups: 2 groups consisted of 21 and 19 samples having color-change adhesive remnants grinded by carbide burs with low-speed friction-grip handpiece (Group CM), and by carbide burs with airotor (Group CA). 20 samples having conventional light-cured adhesive residues cleaned by carbide burs with airotor (Group LA) made up the remaining group. Grinding time of each teeth was recorded and all teeth were finally scanned (after-cleanup scan). After-debonding and after-cleanup scans were superimposed on the initial scan to quantify surface changes. The results were statistically analyzed with Kruskal-Wallis test ($\alpha$ =0.05).

**Results:** The area and volume of after-debonding adhesive remnants were significantly lesser for the color-change adhesive groups (Group CM and CA) compared with those of Group LA. Group CM clearly preserved enamel with significant difference in the depth of enamel loss but insignificant difference in the volume of enamel loss compared with those of Group CA and LA. After cleanup, the color-change adhesive groups (Group CM and CA) were less likely to leave adhesive remnants regarding both volume and thickness, even though the differences were insignificant. Debonding procedure for Group CA was least time consuming followed by those for Group LA and CM with significant differences.

**Conclusion:** The color-change adhesive was found to reduce enamel damage, decrease adhesive remnants and less time consuming. Yet, further studies are necessary to draw more definite conclusions concerning the advantage of using this type of adhesive.

KEY WORDS: Enamel loss; Debonding; Color-change adhesive; 3D scan