

## Optimum Er: YAG Laser Parameters for Orthodontic Composite Debonding: An in vitro Study

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**Abstract :** Several studies have produced estimates of Er:YAG laser parameters and specifications but there is still insufficient data for reliable selection of laser parameters. As a consequence, there is a heightened need for ideal specifications of Er:YAG laser to reduce the amount of enamel ablation. The objective of this paper is to investigate the influence of Er:YAG laser parameters, energy level and pulse duration, on orthodontic composite removal after bracket debonding. The sample consisted of 45 cuboids of orthodontic composite made by plastic moulds. The samples were divided into three groups, each was irradiated with Er:YAG laser set at different energy levels and three values for pulse durations (50  $\mu$ s, 100  $\mu$ s, and 300  $\mu$ s). Geometrical parameters (depth and area) of cavities formed by laser irradiation were determined. ANCOVA test showed statistically significant difference ( $p < 0.0.5$ ) between the groups indicating a potential effect of laser pulse duration on the geometrical parameters after controlling laser energy level. A post-hoc Bonferroni test ranked the 50 $\mu$  Er:YAG laser pulse as the most influential factor for all geometrical parameters in removing remnant composite from enamel surface. Also, 300 mJ laser pulses caused the largest removal of the composite. The results of the present study demonstrated the efficacy of 50  $\mu$ s and 300 mJ Er:YAG laser pulse for removal of remnant orthodontic composite.

**Keywords :** enamel, Er:YAG, geometrical parameters, orthodontic composite, remnant composite

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