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### **Fatigue Resistance of Root Dentin After Laser Treatment**

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**Objectives** Laser technology has emerged as a potential method for root canal disinfection. However, its impact on mechanical properties of root dentin remains uncertain. This study aimed to assess effects of Erbium or Diode laser irradiation, delivered through modified glass-fiber tips, on root dentin fatigue strength.

**Methods** Single-rooted teeth were used to prepare dentin beams (0.9x0.9x12 mm), which were divided into four testing groups: (1) Er:YAG 2940nm (PIPS; Fotona), (2) Er,Cr:YSGG 2780nm (RFT2; Biolase), and (3) Diode 960nm (Endo, Biolase) with 4) non-irradiated beams as controls. Laser disinfection followed established protocols for endodontic treatments using a dedicated root canal set up for laser application on the inner surfaces of root dentin beams. Irradiated beams were tested under 4-point-flexure at quasi-static loads (n=12) and then under cyclic loads (n=25). The stress-life fatigue behavior was evaluated using the staircase method at 4Hz and apparent endurance limits were calculated at  $10^7$  cycles. Fractured surfaces were evaluated using SEM. Monotonic data were analyzed by one-way ANOVA, and cyclic-loaded data were analyzed by Kruskal-Wallis on Ranks ( $\alpha=0.05$ ).

**Results** Flexural strength results ranged between 151MPa to 121MPa for control and RFT2 respectively with no significant difference between the groups ( $p>0.05$ ). The control group had the lowest apparent endurance limit (32.65MPa), while PIPS disinfection showed the highest endurance limit (37.97 MPa). A comparison of fatigue life distributions did not show significant difference among the test groups ( $p>0.05$ ). Laser application induced surface alterations on dentin, as observed in SEM images.

**Conclusions** Laser application in root canals do not affect the fatigue strength of dentin, indicating its safety for root canal disinfection when applied with appropriate protocols.