

# Thermal Effects of Diode Laser During Endodontic Treatments

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The thermal effects of laser irradiation during endodontic treatments should always be considered, as the temperature could rise to critical levels and damage the tissues surrounding the tooth. **Purpose:** The purpose of this study was to investigate the thermal effects of a diode laser (808 nm) at the external root surface during laser irradiation. **Material and Methods:** A total of 20 inferior incisors were used and randomly assigned between two groups: Group I – 2.5 W (CW);  $\varnothing = 400 \mu\text{m}$ ;  $1989 \text{ KW/cm}^2$  and Group II – 2.5 W; 10 Hz;  $\varnothing = 400 \mu\text{m}$ ;  $994.5 \text{ KW/cm}^2$ . Laser irradiation was performed along the work length by the optical fiber, which was pulled from apical to coronal in helicoidal movements (2 mm/s). Samples were irradiated five times with breaks of 20 seconds in between. **Results:** The temperature rise was evaluated by an infrared thermographic camera, with sensitivity of  $0.03^\circ\text{C}$ . The resulting confidence intervals of the medians, for significance of 95% (Wilcoxon), were from  $1.6^\circ\text{C}$  to  $8.6^\circ\text{C}$  for group I and from  $1.2^\circ\text{C}$  to  $3.3^\circ\text{C}$  for group II. Thus the obtained maximum temperature variations during root canal irradiation is below the safety limit (considered to be  $10^\circ\text{C}$ ) for both diode laser operating conditions: continuous emission and with a duty cycle of 50 %. Electron microscopic analysis revealed closed dentinal tubules, especially at the apical regions. **Conclusion:** The results suggest that diode laser can be used in vivo for endodontics purpose at the investigated parameters been safe for the periodontal tissues.