

The antimicrobial efficacy of the erbium, chromium:yttrium-scandium-gallium-garnet laser with radial emitting tips on root canal dentin walls infected with *Enterococcus faecalis*

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ABSTRACT

Background. The authors used an in vitro model to investigate the ability of an erbium, chromium:yttrium-scandium-gallium-garnet (Er,Cr:YSGG) laser with radial emitting tips to disinfect *Enterococcus faecalis*-infected dentin.

Materials and Methods. The in vitro infected-dentin model system consisted of a dentin cylinder, prepared from a human anterior tooth root, cemented into a sealable two-chamber device fabricated from a syringe needle cap. The model's lower chamber contained a buffer solution, and the dentin cylinder was placed between the upper and lower chambers. After sterilization, the authors inoculated the root canal of each dentin cylinder with *E. faecalis*. They used an Er,Cr:YSGG laser with radial emitting tips to irradiate the root canal of each infected dentin cylinder (varying laser power and exposure time). After laser treatment, the authors machined the root canal dentin walls and collected the resulting dentin filings in the buffer-reservoir. They quantified the *E. faecalis* titer of each buffer-reservoir by using selective agar plates.

Results. The authors found that bacterial recovery decreased when laser irradiation duration or power increased. A greater degree of disinfection was achieved with a 120-second application of laser than with sodium hypochlorite treatment. Finally, they found that a 99.7 percent reduction in bacterial counts could be obtained using the laser.

Conclusion. The results of this study suggest that the Er,Cr:YSGG laser with a radial emitting tip has a significant antimicrobial effect on dentinal tubules infected with *E. faecalis*.

Clinical Implications. Er,Cr:YSGG laser treatment could be a valuable tool for root canal disinfection during endodontic treatment.

Keywords. Bacteria; disinfection; endodontic therapy; lasers; root canal. *JADA* 2007;138(7):992-1002.

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