

## Photodynamic Treatment of Endodontic Polymicrobial Infection *In Vitro*

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### Abstract

We investigated the photodynamic effects of methylene blue on multispecies root canal biofilms comprising *Actinomyces israelii*, *Fusobacterium nucleatum* subspecies *nucleatum*, *Porphyromonas gingivalis*, and *Prevotella intermedia* in experimentally infected root canals of extracted human teeth *in vitro*. The 4 test microorganisms were detected in root canals by using DNA probes. Scanning electron microscopy showed the presence of biofilms in root canals before therapy. Root canal systems were incubated with methylene blue (25  $\mu\text{g}/\text{mL}$ ) for 10 minutes followed by exposure to red light at 665 nm with an energy fluence of 30  $\text{J}/\text{cm}^2$ . Light was delivered from a diode laser via a 250- $\mu\text{m}$  diameter polymethyl methacrylate optical fiber that uniformly distributed light over 360 degrees. Photodynamic therapy (PDT) achieved up to 80% reduction of colony-forming unit counts. We concluded that PDT can be an effective adjunct to standard endodontic antimicrobial treatment when the PDT parameters are optimized. (*J Endod* 2008;34:728–734)

### Key Words

Biofilms, endodontic polymicrobial infection, methylene blue, photodynamic therapy, root canals