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The Effect of Variable Energy Input from a Novel Light Source on the Photoactivated Bactericidal Action of Toluidine Blue O on *Streptococcus mutans*

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Abstract

Although the combination of toluidine blue O (TBO) dye and laser light at a wavelength of 633 nm has a bactericidal effect, light from laboratory lasers can only be directed externally at a bacterial colony or suspension. In this study a novel delivery system guided the laser light to an 800-μm diameter spherical tip (an isotropic tip) from which light radiated producing a uniform sphere of light within the colony or suspension. The system was highly effective in killing TBO-treated *Streptococcus mutans* NCTC 10449 in stirred planktonic suspension, killing at least 10^9 cfu/ml. Antibacterial action increased as the delivered energy dose increased. Energy doses of 1.8 J or more produced 100% kills and log reductions of 8–10 cfu/ml. Neither TBO dye nor light alone had a significant antibacterial effect under the experimental conditions used. The existence of a threshold energy, i.e. a minimum energy required before bactericidal action occurred, could not be demonstrated.