



Antibacterial action of photoactivated disinfection {PAD} used on endodontic bacteria in planktonic suspension and in artificial and human root canals

Jill A. Williams^{a,*}, Gavin J. Pearson^a, Michael Wilson^b, M. John Colles^c

^aDepartment of Biomaterials in Relation to Dentistry, Medical Science Building, Queen Mary University of London, Mile End Road, London E1 4NS, UK

^bDepartment Microbiology, Eastman Dental Institute for Oral Health Care Sciences, University College, London, UK

^cDenfotex Light Systems Ltd., Inverkeithing, Fife, UK

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Summary Objectives: To measure antibacterial action of photoactivated disinfection (PAD) on endodontic bacteria in planktonic suspension and root canals. **Methods:** Four bacteria, *Fusobacterium nucleatum*, *Peptostreptococcus micros*, *Prevotella intermedia* and *Streptococcus intermedius*, were tested in suspension. After mixing equal volumes of Tolonium chloride and bacterial suspension for 60 s, each 200 μ L of concentration ($> 10^6$ cfu mL⁻¹) was irradiated with light at 633 ± 2 nm. Each energy dose/Tolonium chloride concentration combination was tested eight times, with controls. Prepared root canals in Training Blocs and extracted human teeth were inoculated with *S. intermedius* followed by 10 mg L⁻¹ Tolonium chloride or saline. Bacteria in canals were sampled before and after light irradiation. Student *t*-test assessed significance of changes in viable bacteria produced by treatment of either light or Tolonium chloride alone and light/Tolonium chloride combinations.

Results: In suspension, reductions in bacteria were highly significant ($P < 0.01$) for light/Tolonium chloride combinations compared to light or Tolonium chloride alone. Maximum mean log reductions of 1.14 (*P. intermedia*), 2.48 (*P. micros*), 2.81 (*F. nucleatum*) and 6.73 (*S. intermedius*) were at 4.8 J/20 mg L⁻¹. Antibacterial action was increased by energy dose increase (not always significantly), but not by Tolonium chloride concentration. In control canals mean log reductions of 0.42 (Bloc) and 0.38 (teeth) from initial levels were not significant. PAD mean log reductions of 2.40 (Bloc) and 2.01 (teeth) were highly significant. Changes for PAD/energy dose combinations were not significant.

Conclusion: PAD killed endodontic bacteria at statistically significant levels compared to controls. Kills varied with bacterial species.

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