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Effect of Dentine and Collagen on the Lethal Photosensitization of *Streptococcus mutans*

Key Words

Collagen

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Abstract

Suspensions of the cariogenic bacterium, *Streptococcus mutans* were treated with either toluidine blue O or aluminium disulphonated phthalocyanine and then exposed to light from a helium-neon or gallium-aluminium-arsenide laser, respectively, after passing through demineralized dentine slices. Bacteria were also embedded in a collagen matrix prior to sensitization and exposure to the laser light. When dentine slices were interposed between the laser light and the bacterial suspension, substantial kills (10^7 CFU) were achieved at energy doses of 876, 1,752, and 3,504 mJ with the helium-neon laser and of 1,188, 2,376, and 4,752 mJ with the gallium-aluminium-arsenide laser. There was no apparent relationship between the extent of killing and the degree of demineralization of the dentine. Prolonging the exposure of the sensitized bacteria to the laser light increased the kill achieved. Substantial numbers (10^8 to 10^{10} CFU) of *S. mutans* were also killed when embedded in a collagen matrix and exposed to 438 and 1,314 mJ of helium-neon laser light and 594 and 1,782 mJ of light from the gallium-aluminium-arsenide laser. These results imply that lethal photosensitization may be effective at killing *S. mutans* in a carious lesion, even when the organism is embedded in demineralized dentine.