

The Most Promising Laser in Dentistry and Periodontics

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The apparatus for treatment of dental diseases has been advanced. However, unpleasant noise, vibration and air contamination of atmosphere are inevitable when we use the mechanical dental apparatus. Recently various lasers have been developed for dentistry. The application of Neodymium-doped Yttrium-Aluminum-Garnet (Nd:YAG) laser and CO₂ laser for dental treatments and oral prevention have been performed. However, those lasers were not always suitable for hard tissue ablation due to various reasons.

Erbium doped Yttrium-Aluminum-Garnet (Er:YAG) laser is solid-state laser operation in the infrared wave length (2940 nm). This laser has been known as the most effective on hard tissue ablation including dental tissues. The Er:YAG laser with contact fiberoptic delivery and water spray systems was employed to remove the dental calculus in addition to caries treatment *in vitro* as well as *in vivo*. In *in vitro* study, the effectiveness of this laser was compared with that of conventional method with hand scalar in the treatment of periodontal lesions. Scanning electron microscope (SEM) and histological examination revealed that the calculus were removed effectively by Er:YAG laser ablation and, furthermore, no carbonization and cracking were observed on the surface of the lased area. In addition, bacteriocidal activity and elimination of LPS were also observed after irradiation of Er:YAG laser. Furthermore, Er:YAG irradiation to bone surface occurred elimination of bone structure as bar drilling and subsequent rapid bone regeneration. In *in vivo* study, the Er:YAG laser treatments were performed on volunteers with soft tissue problems. Most subjects did not show any pain or uncomfortable feeling during laser irradiation without anesthetization in order to remove the soft tissue lesion. These results indicate that the Er:YAG laser possesses excellent characteristics for dental and periodontal treatments without unpleasant noise and vibration. The disadvantage of the laser apparatus is expensive. But in future, this matter will be dissolved by the price down due to mass production. Laser dentistry will provide steadily a new field as an alternative of conventional therapy.

EDUCATION:

- 1959-1965 Faculty of Dentistry, Tokyo Medical and Dental University. (D.D.S.)
- 1966-1971 Ph.D. course, Faculty of Dentistry. Received a Ph.D. in March, 1971.
- 2000- present Professor and Chair, Periodontology, Department of Hard Tissue Engineering,
Graduate School, Tokyo Medical and Dental University.
- International Society for Lasers in Dentistry (Treasurer, 1989-present)
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