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# The 8th International Congress on Lasers in Dentistry



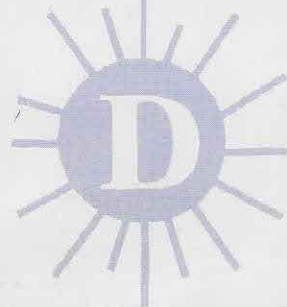
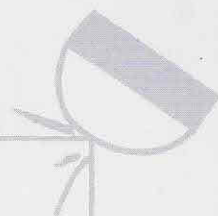
in conjunction with



The 14th  
Annual Meeting  
of the Japanese Society  
for Laser Dentistry

July 31-August 2, 2002  
YOKOHAMA, JAPAN

**Program and Abstract**



# **The 8th International Congress on Lasers in Dentistry**

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**Laser Dentistry  
– Revolution of Dental Treatment in New Millenium –**

新世紀における歯科治療の革新 “レーザー歯学”

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## 29 Er:YAG Assisted Root Canal Fillings. Evaluation of the Microleakage

P. Cremona, M.F. Bertrand, J.P. Rocca

Lab. Biomaterials, UFRO, UNSA, Nice, France.

Warm gutta-percha to be vertically condensed is recognized as a secure and reproducible technique. The aim of this study was to compare the microleakage values in an Er:YAG assisted warm vertically condensed gutta-percha vs conventional method as described previously by Schilder.

Twenty four freshly extracted single rooted teeth, with straight canals were prepared with rotary instruments in such a way that the apex was reached with a # 25 file. Two groups of 12 root canals each were randomly filled in the following way:

- a non-normalised gutta-percha cone was adjusted to the diameter of the master file to obtain a "tug back" and apically cemented with a modified ZOE cement (Gp1, Gp2);
- Gp1: vertical condensation was performed with an Er:YAG laser (Kavo Key III, diameter of the fibre 300  $\mu\text{m}$ , output parameters 400 mJ, 4Hz, power= 1.6 W, loss of energy due to the fibre: 60%, power at the tip end: 0.640 W, Power density= 905 W / $\text{cm}^2$ , fluence = 226 J/ $\text{cm}^2$ )
- Gp2: vertical condensation ( manual Schilder Technique).

The roots were coated with varnish (V33<sup>®</sup>) in exception of the last 2-3 apical millimeters, immersed in a solution of methylene blue for 48 hrs. The varnish was mechanically removed and the samples embedded (epoxide resin, Buehler), sliced each 3mm (Isomet Buehler). The dye penetration was evaluated under a light microscope (x 1 to x 5). A Mann-Whitney U test served for statistical interpretation.

Results showed: a lower level of leakage was observed in Gp2 (mean range = 2.01 mm, SD  $\pm$  0.66) than in the Gp1 (mean range = 2.72 mm, SD  $\pm$  1.13). The differences were not statistically significant ( $p < 0.002$ ).

The ability of an Er:YAG laser to fill root canal in three dimensions is demonstrated and microleakage values are comparable to the conventional methods.

## 30 Comparative Study of Dentine Permeability after Apicectomy and Surface Treatment with 9.6 $\mu\text{m}$ CO<sub>2</sub> and Er:YAG Laser Irradiation.

S. Gouw-Soares<sup>\*1</sup>, A. Stabholz<sup>2</sup>, J.L. Lage-Marques<sup>\*3</sup>, D.M. Zezell<sup>\*4</sup>, C.P. Eduardo<sup>\*1</sup>.

<sup>\*</sup>Mestrado Profissionalizante "Lasers em Odontologia" IPEN/FOUSP

<sup>1</sup>Departamento de Dentística Restauradora – Faculdade de Odontologia da Universidade de São Paulo (FOUSP), S. Paulo, Brasil.

<sup>2</sup>Department of Endodontics – School of Dentistry – Hadassah University, Jerusalem, Israel.

<sup>3</sup>Departamento de Endodontia – Faculdade de Odontologia da Universidade de São Paulo (FOUSP), S. Paulo, Brasil.

<sup>4</sup>Centro de Laser e Aplicações do Instituto de Pesquisas Energéticas e Nucleares (CLA), S. Paulo, Brasil.

Failure of the apicectomies is generally attributed to dentine surface permeability and to the lack of an adequate marginal sealing of the retrofilling material which allow the percolation of microorganisms and their products from the root canal system to the periodontal region compromising the periapical healing. The purpose of this study was to evaluate the dentine and the marginal permeability after apicectomy and surface treatment with 9.6 $\mu\text{m}$  CO<sub>2</sub> laser and 2.94 $\mu\text{m}$  Er:YAG laser irradiation. Sixty-five single rooted human endodontically treated teeth were divided in five experimental groups: group I (control), the apicectomy performed with high speed bur; group II, similar procedure to the group I followed by dentinal surface treatment with the 9.6 $\mu\text{m}$  CO<sub>2</sub> laser; group III, similar procedure to group I followed by dentinal surface treatment with the Er:YAG laser; group IV, apicectomy and surface treatment with 9.6 $\mu\text{m}$  CO<sub>2</sub> laser, and the group V, apicectomy and surface treatment with the Er:YAG laser. The analysis of methylene blue dye infiltration through the dentinal surface and the retrofilling material demonstrated that the samples from the groups which were irradiated with the lasers showed significantly less infiltration indexes than the ones from the control group. These results were compatible to the structural morphological changes evidenced through the SEM analysis. The samples from the groups II and IV (9.6 $\mu\text{m}$  CO<sub>2</sub> laser) showed clean smooth surfaces, fusion and recrystallized dentine distributed homogeneously throughout the irradiated area sealing the dentinal tubules. The samples from the groups III and V (Er:YAG laser 2.94 $\mu\text{m}$ ) also presented clean surfaces, without smear layer but slightly rough compatible to the ablated dentine and without evidence of dentinal tubules. Through the conditions of this study, the Er:YAG 2.94 $\mu\text{m}$  and the 9.6 $\mu\text{m}$  CO<sub>2</sub> laser used for root canal resection and dentine surface treatment showed a reduction of permeability to methylene blue dye.