

# roots

the international C.E. magazine of endodontics

1 2012

## **\_C.E. article**

The antibacterial effects  
of lasers in endodontics

## **\_technique**

Positive versus negative  
pressure irrigation

## **\_technique**

Negotiating and shaping  
around impediments



## Endodontic Instruments

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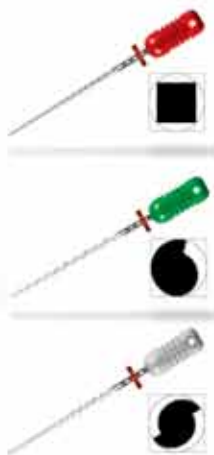
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# A new year brings new opportunities



Fred Weinstein, DMD, MRCD(C), FICD

**The amount of information available in the dental field about new products, techniques and research data is astounding.** Running a practice and seeing patients leaves little time for catching up on the latest clinical news and product information. Thus, I hope *roots* will not only be a welcome respite for those rare chunks of time you can devote to leisurely reading, but one that provides a practical return on your investment by giving you information that you can actually put to immediate use.

This issue of *roots* features a collection of articles from some of the most respected names in endodontics. These expert clinicians are sharing their knowledge and expertise with you.

Within this issue, Dr. Gregori M. Kurtzman describes positive versus negative pressure irrigation; Dr. L. Stephen Buchanan writes about negotiating and shaping around anatomic impediments; and Dr. Barry Lee Musikant shares his perspective on "the rules of engagement." In addition, Dr. Enrico DiVito, Prof. Rolando Crippa, Prof. Giuseppe Iaria, Prof. Vasilios Kaitsas, Prof. Stefano Benedicenti and Prof. Giovanni Olivi share the latest information on the use of lasers in endodontics.

But there's more.

Every issue of *roots* also contains a C.E. component. By reading the article on the antibacterial effects of lasers in endodontics by Dr. Selma Cristina Cury Camargo, then taking a short online quiz about this article at [www.DTStudyClub.com](http://www.DTStudyClub.com), you will gain one ADA CERP-certified C.E. credit. Keep in mind that since *roots* is a quarterly magazine, you can actually chisel four C.E. credits per year out of your already busy life without the lost revenue and time away from your practice.

To learn more about how you can take advantage of this C.E. opportunity, visit [www.DTStudyClub.com](http://www.DTStudyClub.com). Annual subscribers to the magazine (\$50) need only register at the Dental Tribune Study Club website to access these C.E. materials free of charge. Non-subscribers may take the C.E. quiz after registering on the DT Study Club website and paying a nominal fee.

I know that taking time away from your practice to pursue C.E. credits is costly in terms of lost revenue and time, and that is another reason *roots* is such a valuable publication.

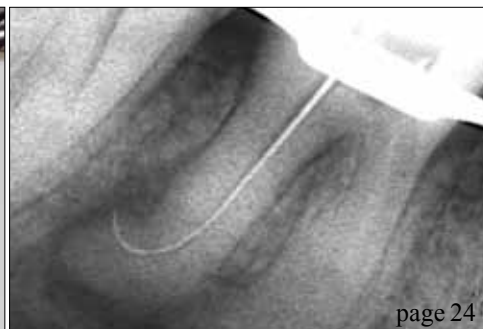
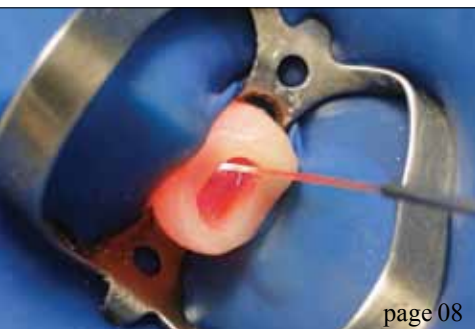
I hope you enjoy this issue and that you get the most out of it.

And, for those who will be attending the AAE Annual Session in Boston this spring, please say hello to me there.

Sincerely,

Fred Weinstein, DMD, MRCD(C), FICD  
Editor in Chief





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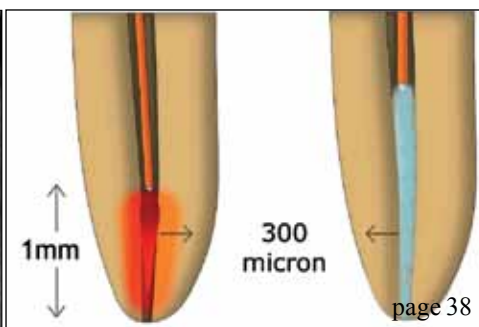
## about the publisher

- 49 \_submissions  
50 \_imprint



## on the cover

Image courtesy of Dr. Eric Hebranson,  
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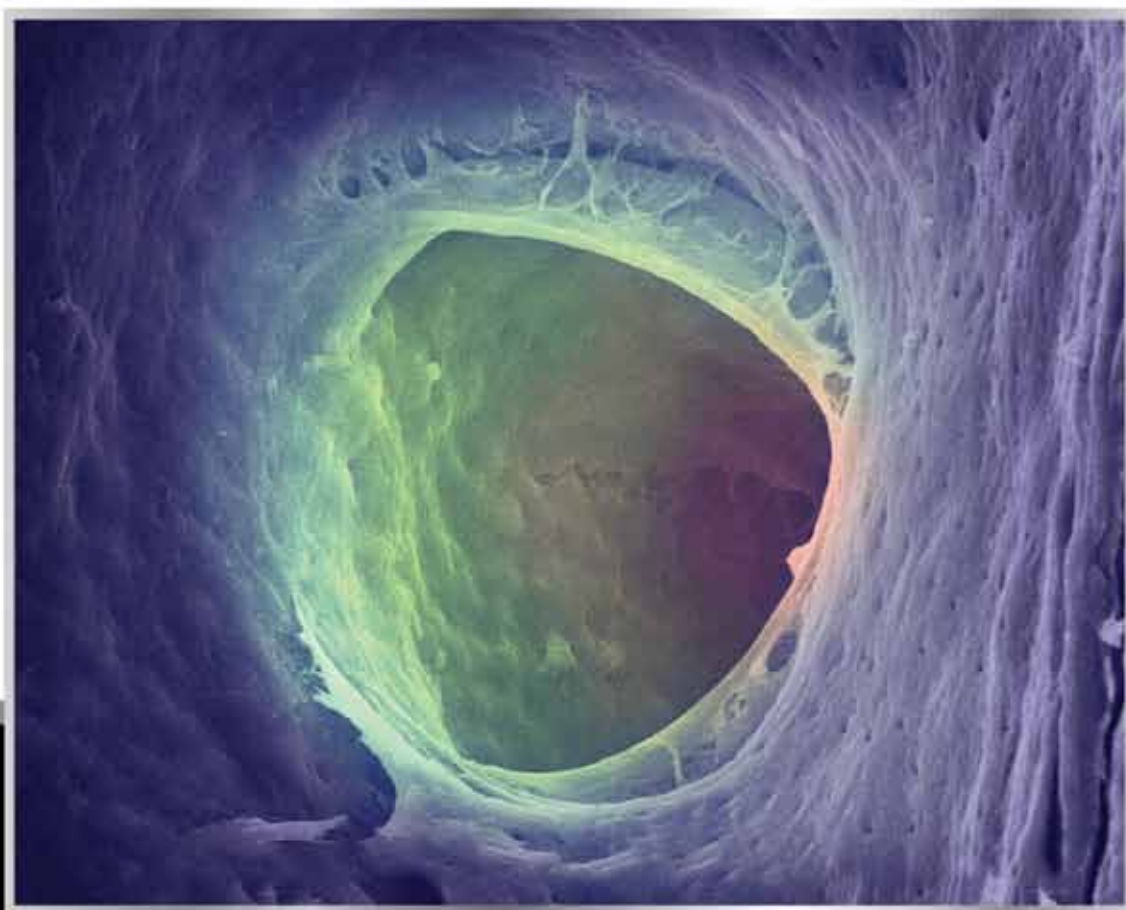


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Peters O, Bardsley S, Fong J, Pandher G, DiVito E. *Disinfection of Root Canals with Photon-initiated Photoacoustic Streaming*, JOE – Volume 37, Number 7, July 2011

DiVito E, Colonna M, Olivi G. *The Photoacoustic Efficacy of an Er:YAG Laser with Radial and Stripped Tips on Root Canal Dentin Walls: An SEM Evaluation*, J Laser Dent 2011;19(1):156-161

G. Olivi, R. Crippa, E. DiVito, G. Iaria, V. Kaitsas, *Laser in Endodontics: a review and outlook*, Endo Tribune, Italian Edition 2 – Novembre 2010

Olivi G, Crippa R, Iaria G, Kaitsas V, DiVito E, Benedicenti S. *Laser in endodontics (Part II), roots*, 2, 2011





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# The antibacterial effects of lasers in endodontics

Author\_Selma Cristina Cury Camargo, DDS, PhD

## \_c.e. credit

This article qualifies for C.E. credit. To take the C.E. quiz, log on to [www.dtstudyclub.com](http://www.dtstudyclub.com). The quiz will be available on April 6.

## \_Endodontic infection

The success of endodontic treatment reaches values between 85 to 97 percent.<sup>1</sup> Adequate treatment protocols, knowledge and infection control are the basic components to achieve such values<sup>2</sup> (Fig. 1). It is well known that apical periodontitis is caused by the communication of root-canal microorganisms and their byproducts with the surrounding periodontal structures. Exposure of dental pulp directly to the oral cavity, or via acces-

sory canals, open dentinal tubules or periodontal pockets, are the most probable routes of the endodontic infection.<sup>2,3</sup>

Clinically, apical periodontitis is not evident as long as the necrotic tissue is not infected with microorganisms.<sup>4-6</sup> There are up to 40 isolated species of bacteria present in the root canal. Cocci, rods, filaments, spirochetes, anaerobic and facultative anaerobic are frequently identified in primary infection, fungus can also be isolated.<sup>2,7</sup>



Fig. 1\_Success in endodontic treatment: apical radiolucency repair.



Endodontic microbiota can be found suspended in the main root canal, adhered to the canal walls and deep in the dentinal tubules at a depth of up to 300  $\mu\text{m}$  (Fig. 2). The absence of cementum dramatically increases bacteria penetration into dentinal tubules.<sup>8-11</sup>

It has been shown that bacteria can also be found outside the root-canal system, located at the apical cementum and as an external biofilm on the apex.<sup>12-15</sup> Following conventional endodontic treatment, 15 to 20 percent of non-vital teeth with apical periodontitis fail.<sup>16-18</sup>

The presence of bacteria after the decontamination phase or the inability to seal root canal after treatment are reasons for failure.<sup>2</sup> The remaining contamination in endodontically treated teeth is able to maintain the infectious disease process in the periapical tissue.

Retreatments are the first choice in failed root canals. The microbiota found in persistent infections differs from that in primary infection (Fig. 3). Facultative anaerobic gram positive (G+) and negative (G-) microorganisms and fungus are easily found.<sup>19-21</sup> Special attention is given to *Enterococcus faecalis*, a resistant facultative anaerobic G+ cocci, identified in a much higher incidence in failed root canals.<sup>22-25</sup>

The importance of bacterial control plays a significant role in endodontic success. Adequate and effective disinfection of the root-canal system is necessary. Based on that, all efforts must be done in order to achieve this result.

## Endodontic therapy

The bacterial flora of the root canal must be actively eliminated by a combination of debridement and antimicrobial chemical treatment. Mechanical instrumentation eliminates more than 90 percent of the microbial amount.<sup>26</sup>

An important point of note is the adequate shaping of the root canal. Evaluating the antibacterial efficacy of mechanical preparation itself, Dalton et al.<sup>27</sup> concluded that instrumentation to an apical size of #25 resulted in 20 percent of canals free of cultivable bacteria, when a #35 size was made, 60 percent showed negative results.

Irrigant solution has been associated with mechanical instrumentation to facilitate an instrument's cutting efficiency, remove debris and the smear layer, dissolve organic matter, clean inaccessible areas and act against microorganisms. Sodium hypochlorite is the most common irrigant used in endodontics.<sup>28</sup> It has an excellent cleansing ability, dissolves necrotic tissue, has a potential antibacterial effect and, depending on

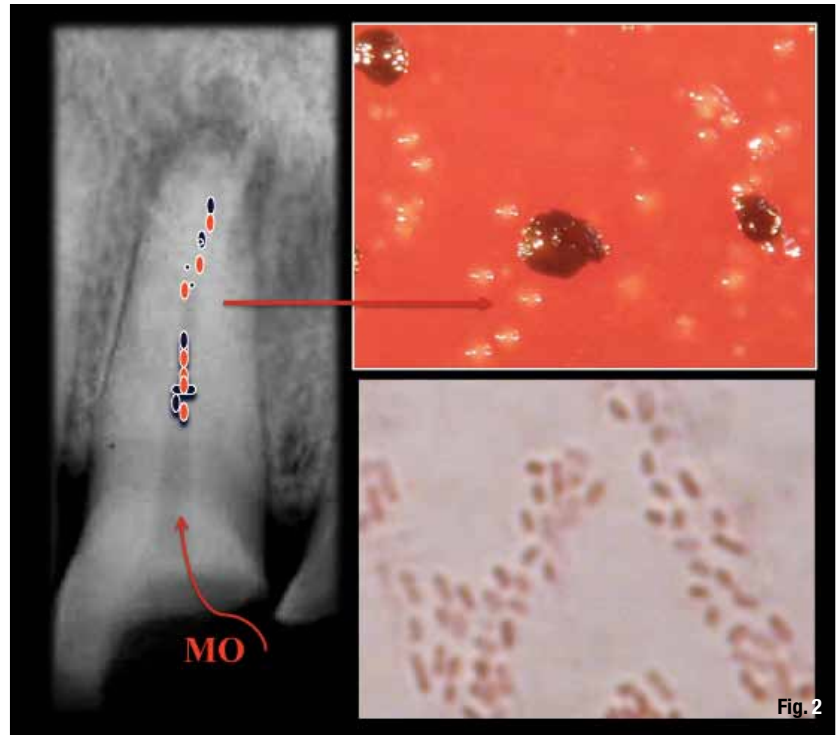


Fig. 2

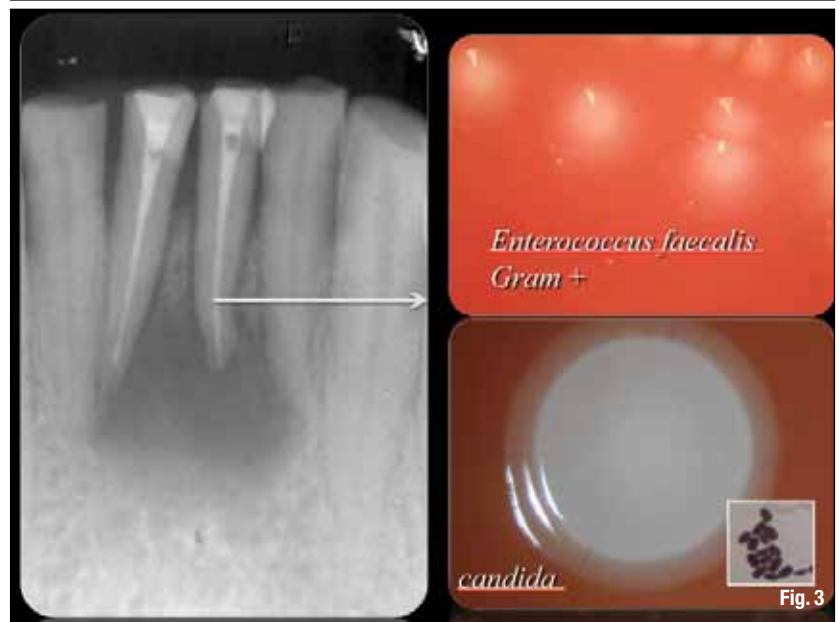


Fig. 3

the concentration, is well tolerated by biological tissues. When added to mechanical instrumentation, it reduces the number of infected canals by 40 to 50 percent.

Other irrigant solutions are also used during endodontic preparation. EDTA, a chelating agent used primarily to remove the smear layer and facilitate the removal of debris from the canal has no antibacterial effect.<sup>29</sup> Chlorhexidine gluconate has a strong antibacterial activity to an extensive number of bacteria species, even the resistant *Enterococcus faecalis*, but it does not break down proteins and necrotic tissue as sodium hypochlorite does.<sup>30</sup>

Fig. 2\_Primary infection of black pigmented strains and G-rods.

Fig. 3\_Persistent infection.