

IAOMT Commentary on Endodontics

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“In the middle of every difficulty lies opportunity.” – Albert Einstein

The root canal debate has reached a critical juncture, as it has recently hit the main stream media, causing concern amongst patients, providers and dental schools and organizations. With more than [15 million root canal procedures performed each year](#),¹ we have a responsibility to ourselves, our colleagues, and our patients to search for the truth, and not be afraid of what we may discover.

We must take an unbiased look at ALL the scientific evidence available to us when forming and sharing opinions on such an important issue. There is a large body of evidence growing that supports the oral-systemic connection and shines light on the need for an integrated medical-dental health care system.

Before diving into the science, it is important to understand some definitions. The word “root canal” itself is an anatomical term, every tooth has at least one root canal in it. This canal is a channel that houses the vasculature and nerves that innervate the tooth. A “root canal treated tooth” is a tooth that has had endodontic therapy, usually due to pain and/or infection of the root canal vasculature and nerves within a tooth. A “root canal infection” refers to an an inflamed or necrotic root canal space that may also include an infection in the surrounding ligament and bone, called apical periodontitis. A previously treated root canal that is failing can also have related apical periodontitis.

Although several research studies report associations between [oral infections and cardiovascular diseases](#),^{2 3 4} controversy still lingers. However, [a study published in the February 2019 edition of the Journal of Endodontics](#) showed when lesions of endodontic origin are present, there is “an elevated systemic inflammatory burden, providing a clear mechanistic link with moderate to high cardiovascular risk.”⁵ This conclusion does not apply to all root canal treated teeth, it is

¹ American Association of Endodontists (AAE). Quick Endodontic Facts [Internet]. Chicago: American Association of Endodontists; 2019 [cited 8 Feb. 2019]. Available from:

<https://www.aae.org/specialty/about-aae/news-room/endodontic-facts/>

² Garg P, Chaman C. Apical periodontitis-Is it accountable for cardiovascular diseases?. *Journal of Clinical and Diagnostic Research: JCDR*. 2016 Aug;10(8):ZE08. Available from:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5028556/>

³ Messing M, de Souza LC, Cavalla F, Kookal KK, Rizzo G, Walji M, Silva R, Letra A. Investigating potential correlations between endodontic pathology and cardiovascular diseases using epidemiological and genetic approaches. *Journal of Endodontics*. 2019 Jan 17.

⁴ Janket SJ, Javaheri H, Ackerson LK, Ayilavarapu S, Meurman JH. Oral infections, metabolic inflammation, genetics, and cardiometabolic diseases. *Journal of Dental Research*. 2015 Sep;94(9_suppl):119S-27S.

⁵ Garrido M, Cárdenas AM, Astorga J, Quinlan F, Valdés M, Chaparro A, Carvajal P, Pussinen P, Huamán-Chipana P, Jalil JE, Hernández M. Elevated systemic inflammatory burden and cardiovascular risk in young adults with endodontic apical lesions. *Journal of Endodontics*. 2019 Feb 1;45(2):111-5.

specifically looking at teeth with root canal infections and apical periodontitis (lesions of endodontic origin).

It is essential to recognize the critical [role of immune response](#),⁶ as well as the confounding relationship among [oral infections, metainflammation \(low-grade systemic inflammation\), and genetics](#).⁷ In particular, specific genetic polymorphisms can influence host response and enhance inflammatory reactions, increasing the [susceptibility to persistent apical periodontitis](#),⁸ which has also been associated with systemic diseases.

For root canal therapy to be considered effective, microorganisms must be eliminated from the root canal systems and recontamination after treatment must be prevented. An infected root canal presents health risks to the patient. Many factors have been associated with the effectiveness of endodontic therapy, such as the use of dental dams, surgical operating microscopes, periodontal condition, activation of irrigants and the quality of the final restoration.

In 2011 the American Association of Endodontists (AAE) Colleagues for Excellence featured [a review on root canal irrigants and disinfectants](#). The review states that “current solutions and techniques cannot completely remove all irritants, dissolve all organic tissue or remove the smear layer from the root canal system.”⁹ This is the most challenging and detrimental part of root canals.

More recently there has been a surge in the development of new technology in 3D imaging, 3D disinfection, and biomaterials which has elevated the standard of care in the field of endodontics. Endodontics is the branch of dentistry that focuses on the morphology, physiology and pathology of the human dental pulp and periradicular tissues. The goal of endodontic therapy is to prevent and/or treat infections of these structures.

The American Association of Endodontists (AAE) published a [Treatment Standards report in 2018](#). Below are a few very important highlights to consider:

1. Despite similar predoctoral educational curricula, disparities exist in the levels of knowledge, competency and skill, and clinical experiences of general dentists.
2. Over the past two decades there have been significant advances in technology, materials and endodontic treatment procedures.

⁶ Lechner J, Von Baehr V. Impact of endodontically treated teeth on systemic diseases. *Dentistry*. 2018;8(476):2161-1122.

⁷ Janket SJ, Javaheri H, Ackerson LK, Ayilavarapu S, Meurman JH. Oral infections, metabolic inflammation, genetics, and cardiometabolic diseases. *Journal of Dental Research*. 2015 Sep;94(9_suppl):119S-27S.

⁸ Morsani JM, Aminoshariae A, Han YW, Montagnese TA, Mickel A. Genetic predisposition to persistent apical periodontitis. *Journal of Endodontics*. 2011 Apr 1;37(4):455-9.

⁹ American Association of Endodontics (AAE). *Root Canal Irrigants and Disinfectants*. Chicago: American Association of Endodontists. Winter 2011. Available from: <https://www.aae.org/specialty/wp-content/uploads/sites/2/2017/07/rootcanalirrigantsdisinfectants.pdf>

3. Treatment by the general dentist is expected to meet minimum standards as set out in guidelines the American Association of Endodontists has developed and published as “Standards of Practice.”
4. Currently, general dentists perform approximately 75% of all nonsurgical endodontic procedures. While endodontists perform only 25% of the total root canal procedures...¹⁰

The report also notes that it is the responsibility of all practitioners performing endodontics to understand and meet these contemporary standards, discern which cases are truly successful, and properly manage any failed cases.

The literature reports many factors to be responsible for endodontic treatment failure, and some are preventable iatrogenic errors resulting from poor case selection by practitioners. Other reasons for failure include residual necrotic pulp tissue, presence of peri-radicular infection, periodontal disease, root fractures, broken instruments, mechanical perforations, root canal overfillings, root canal underfillings, missed canals or unfilled canals. These cases often result in pain and/or periapical pathology.

Fortunately, there is technology on the rise that may eliminate these shortcomings in traditional endodontic diagnosis and treatment protocols. The [use of cone beam computed tomography \(CBCT\) machines in diagnosing endodontic pathology](#)¹¹ will soon be the standard of care. The development of technology that enhances 3D-disinfection through [laser activated irrigation](#)¹² [Er:YAG] and [multisonic irrigation](#)¹³ has also gained momentum. The use of medical grade [ozone as a complimentary therapy](#)¹⁴ shows great promise. Research is underway at UCLA investigating the combination therapy of laser activated irrigation and root canal insufflation with high concentration ozone gas.

¹⁰ American Association of Endodontics (AAE). *Treatment Standards*. Chicago: American Association of Endodontists. 2018. Available

from: https://www.aae.org/specialty/wp-content/uploads/sites/2/2018/04/TreatmentStandards_Whitepaper.pdf

¹¹ Fayad MI, Nair M, Levin MD, Benavides E, Rubinstein RA, Barghan S, Hirschberg CS, Ruprecht A. AAE and AAOMR joint position statement: use of cone beam computed tomography in endodontics 2015 update. *Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology*. 2015 Oct 1;120(4):508-12. Available from: <https://www.aae.org/specialty/wp-content/uploads/sites/2/2017/06/conebeamstatement.pdf>

¹² American Association of Endodontics (AAE). Use of Lasers in Dentistry: AAE Position Statement. Chicago: American Association of Endodontists. 2013. Available from: <https://www.aae.org/specialty/wp-content/uploads/sites/2/2017/06/lasersnew.pdf>

¹³ Sigurdsson A, Garland RW, Le KT, Rassoulian SA. Healing of Periapical Lesions after Endodontic Treatment with the GentleWave Procedure: A Prospective Multicenter Clinical Study. *Journal of Endodontics*. 2018 Mar 1;44(3):510-7.

¹⁴ Huth KC, Quirling M, Maier S, Kamereck K, Alkhayer M, Paschos E, Welsch U, Miethke T, Brand K, Hickel R. Effectiveness of ozone against endodontopathogenic microorganisms in a root canal biofilm model. *International Endodontic Journal*. 2009 Jan;42(1):3-13.

Advanced irrigant activation techniques improve intracanal cleanliness across a substantial portion of the canal and deep into the dentinal tubules. However, current data is too heterogeneous to compare and identify superiority of an individual technique, highlighting the need to standardize experimental protocols and develop a more representative research model to investigate the in vivo impact of irrigant activation techniques on clinical outcomes and periapical healing following root canal treatment.

We need large prospective studies that would more clearly delineate which root canals are a systemic burden and which are coexisting without clear negative clinical impact (incidence of heart attack, cancer, all-cause mortality, etc.). Lack of pain and an unchanged radiological picture are simply *not* adequate ways to know what root canals are doing to the body. The public must understand the importance of seeking an endodontic specialist for all root canal therapy.

As a holistic-minded, board-certified endodontist, I am compelled to share my understanding of how valuable it is to save our natural teeth. It is paramount for

- 1) optimal esthetics;
- 2) nourishment and immunity through the vasculature supplied by the periodontal ligament surrounding the root structure
- 3) proper masticatory function through a complex sensory feedback mechanism.

An example of this was presented in a [study published in 2017](#), which found that the collective proprioceptive input from mastication provides brain stimulation that prevents a decline in memory and learning function, with decreased neurogenesis, neuronal activity, and synapse formation.

A new paradigm in endodontics is overdue. The use of a microscope, CBCT, advanced irrigation and disinfection techniques and pre-op and post-op biological monitoring (hs-CRP, various cytokines, fibrinogen, etc.) should be the new standard of care in my opinion. Patients should seek care from qualified specialists that use advanced 3D debridement and disinfection protocols. Meanwhile, the following statement written in a status report by IAOMT in 2001 still rings true:

The IAOMT cannot take the position that all non-vital teeth must be extracted. On the other hand, it is clear that non-vital teeth -- with or without endodontic therapy -- can present a systemic health risk to some patients. Each patient must be evaluated on an individual basis, considering the medical status and other factors. The IAOMT encourages the dental, medical, and scientific communities to address this area with vigor. Efforts must be made to provide valid methods of determining the systemic health risk from non-vital teeth and provide techniques of endodontic therapy that eliminate, or at least reduce, the risk.

About the Author



Dr. Valerie Kanter is a third-generation dentist, Board Certified Endodontist and Naturopath, practicing Integrative and Regenerative Endodontics in Los Angeles, CA. She graduated from the University of Florida College of Dentistry with her D.M.D. and M.S. degree with a specialty in endodontics, and later became a Naturopath through the American College of Integrative Medicine and Dentistry.

In addition to her continued studies in nutrition and integrative health care, she has gained many mentors from the highest echelons of dentistry. Dr. Kanter lectures internationally on the subject of laser endodontics and teaches post-graduate residents, pre-doctoral D.D.S. and foreign dental students in advanced clinical endodontics at the University of California, Los Angeles. She enjoys the opportunity to help students acquire real-life clinical skills beyond those that can be taught in a classroom.

In 2018 Dr. Kanter founded the ComprEndo Academy, an educational platform for patients and practitioners to explore a functional and integrative approach to dentistry and whole-body health. She currently serves as the IAOMT Endodontic Committee Chair and advocates a patient-centered, biological approach to endodontics.

As an oral health care professional, she strives to go above and beyond the so-called traditional standard level of care. She is a trailblazer in the adaptation of stem cell and laser technologies, as a more natural and chemical-free approach to the treatment of root canals. The process of becoming a Board Certified Naturopath has broadened her view of the human mind, body and spirit. She has a great respect and understanding of the connection between teeth and systemic health and wellness.