

Endodontic parousia— *Nullius in verba* redux

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The intent of this article is to see whether I can finally shake up those of you who read my blog (on www.oralhealthjournal.com), spend time on it and yet do not post. The point of this "mashup" is to engender "discovery" of information, trends, likes, dislikes etc. and to DIALOGUE in the truest manner and context of social networking within this profession. Read away McDentist and offer your commentary, good, bad or indifferent, but never overlook the opportunity to make your voice heard.

Every era lives with contradictions that it manages to ignore: the Greeks talked of justice and kept slaves, the Crusaders preached the gospel of the Prince of Peace and rode off to annihilate the infidels, and the 17th century believed in a universe that ran like clockwork, entirely in accord with natural law, and also in a God who reached down into the world to perform miracles and punish sinners.¹

Historically, the decision to perform endodontic therapy and restore a tooth or to extract and replace it in some manner was a relatively "straight-line" decision; however, in the implant-driven treatment planning era of the new millennium, dentists face a multitude of complicating factors, most notably the irrefutable success of dental implant therapy and the relative ease and facility of "nuts and bolts" restoration, provided the foundational aspects of surgical placement are met.²

As a discipline specifically and as a profession in general, we must ensure that our process does not engender "rearranging the deck chairs on the Titanic".³ The identification and quantification of specific factors that affect rehabilitative prognosis in individual patients are essential to formulating standardised treatment protocols and individual treatment plans. Such factors include bone quantity and quality, caries and periodontal disease risk, as well as the critically important factor of the amount of remaining tooth structure. Minor or even moderate differences in overall treatment outcomes or costs must not affect clinical decisions and must not sway critical thinking.⁴

Endodontics mandates, as does any discipline, the aggregation and verification of scientific knowledge and proof in order to create the proficiency inherent in the desired positive treatment outcomes; it does not manifest as a paint-by-numbers technical approach whereby the illusion of science is discernible only in the design and perceived innovation of the equipment or product brought to market without retrospective studies or meta-analyses of multivariate, multicentre treatment outcomes. In a Madoffian world, it is lunacy to be driven by guru-centric claims and pronouncements.

It would be disingenuous and gratuitous to suggest that condemnation of salvageable and healthy teeth has not reached epidemic proportions. Yet, the treatment outcomes studies on implant survival for the most part report survival as a binary outcome rather than using the Kaplan–Meier survival analysis, which is a far more accurate reflection of the percentage of success.⁵ It is because binary outcome has been the benchmark to justify removal of salvageable teeth that the pendulum swung too far too fast. Dentistry needs a "Sputnik" moment to reinvigorate our basic tenets and grounding fundamentals. Sadly, endodontists are infrequent visitors to the critical-thinking, treatment-planning loop, as the technological simplification of the discipline is negating its biological contribution to the interdisciplinary team approach.

This article serves to determine whether endodontics as a specialty has made a case for true partnership in the landscape of foundational, interdisciplinary dentistry. Its intent is to assess the innovations and iterations in the toolbox of the endodontic discipline and ensure that retention of natural teeth is keeping pace with biological reality and not marketing budget-driven science.

There are two historic milestones that bracket our understanding of the myriad complexities of the root-canal system; the first, the work of Hess, was woven into the fabric of the era of Focal Infection

Theory and stimulated the annihilation of millions of salvageable teeth and put dentistry firmly back in the Dark Ages of science (Fig. 1). The second, the use of micro-CT technology to map the inner space of teeth, replicated the Hess studies using digital tools (Fig. 2). Unfortunately, the outcome of this renewed awareness has not resulted in a more sophisticated approach to preservation of natural teeth using a century of evolutionary advances in material and technique, but has fostered a "simpler is better" mentality, which will inevitably be as devastating to retention of the natural dentition as Dr Hunter's egregious dental witch hunt of the early 1900s.⁶

plethora of product launches that has now reached its crescendo with the arrival of a "single file that does all".

From a metamorphosis of instruments borne of angioplasty materials to the enhanced elasticity of NiTi and its reformulation in newly ground shapes and its use in reciprocating rather than rotary feed rates, the market is once again driving science and our patients and ultimately our profession will pay the price for the oversimplification and obtuse denial of the reality we know for the expediency we are being trained to crave.

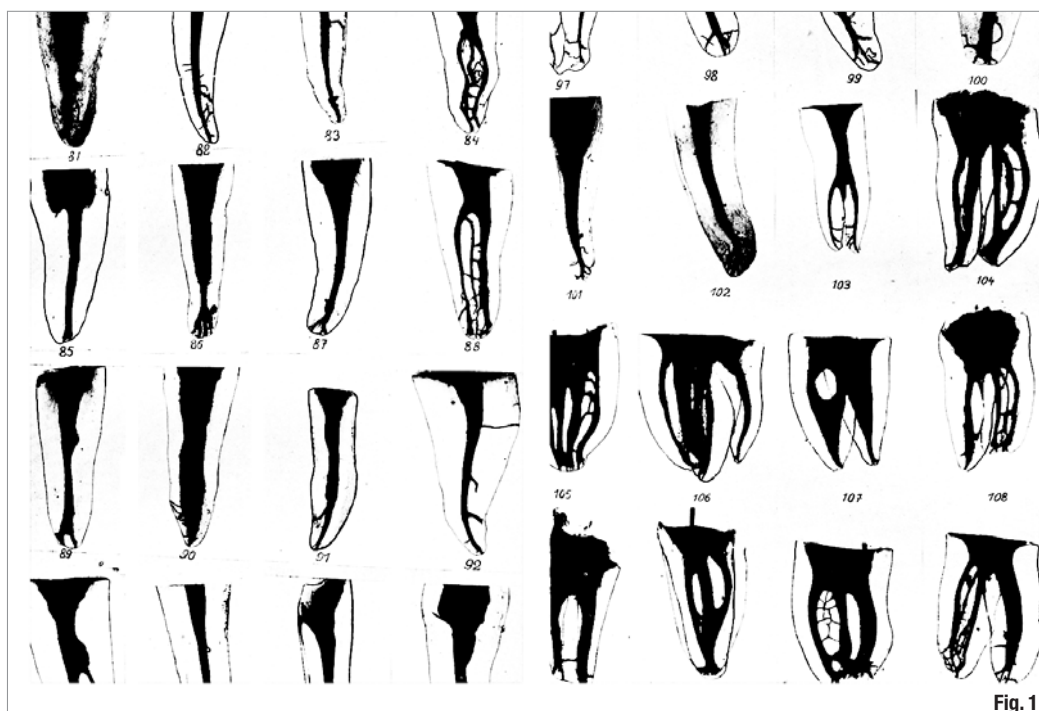


Fig. 1 Images of perfusion studies to illustrate the complexities of the root-canal system of all tooth types.¹⁰

The hard-tissue repository of the human dental pulp takes on numerous configurations and shapes. A thorough knowledge of tooth morphology, careful interpretation of angled radiographs, use of small FOV CBT, proper access preparation and detailed exploration of the interior of the tooth are essential prerequisites for a successful treatment outcome. A thorough understanding of the complexity of the root-canal system is essential for understanding the principles and problems of debridement, disinfection and root filling for determining the apical limits and dimensions of canal preparations, and for performing successful microsurgical procedures when necessary.

And yet, the past few decades have been entombed in the most egregious nihilistic "Mad Men" description of the technological wizardry and biological understanding necessary to ensure long-term predictable prognosis of the endodontically treated tooth: "clean, shape, pack". This has produced a

Sealers based on restorative fundamentals were to be the *sine qua non* of monobloc creation in the root-canal space. Unfortunately, one of the most exhaustive studies done to evaluate evidence-based support on the merits of their clinical use concluded that "on the basis of the *in vitro* and *in vivo* data available to date, there appears to be no clear benefit with the use of methacrylate resin-based sealers in conjunction with adhesive root filling materials at this point in their development".⁷

Science has shown that the direction for eradication of refractory and chronic disease related to biofilm elimination lies in photodynamic therapy, which has provided clear evidence of clinical efficacy and applicability continues to be demonstrated.⁸ And yet, an array of sonic and ultrasonic products have infused the market with specious claims to optimise microbial control through innovations in irrigation protocols designed to disinfect and remove the smear layer of the prepared root-canal space in spite of the



Fig. 2

Fig. 2 Micro-CT images of a molar tooth. (Images courtesy of the Root Canal Anatomy Project; <http://rootcanalanatomy.blogspot.com/>).

fact that their ability to remove mixed-species biofilm remains unproven.

The great virtue of mathematics is that its truths alone are certain and inevitable; in any universe, the shortest distance between two points is a straight line. And yet, the pundits of the new wave in endodontics would have us believe that single files regardless of their envelope of motion, be it reciprocating, rotary or piston-like, can effectively debride the negative space of the root-canal system in defiance of the morphometrics and myriad complexities of the inner world of teeth. Similarly, insubordinate to the science of rheology, carrier-based obturation is deemed

equivalent to the force generation and resultant gravitometrics of injection-moulded, warm thermo-labile techniques as described initially by Blaney and made mainstream by Schilder.

And yet, we have a new wave of carrier-based obturation devices that, in concert with simplified instrumentation protocols, are being marketed by their developers in the context that, "I have read this argument about making root-canal treatment simple. Many colleagues struggle with the complexities of root-canal treatments and I do not see why we can't make it simpler. Any competent dentist has good manual skills. If we can simplify the treatment procedure for the general dentists and thereby improve their skills in completing more root-canal treatments to a higher standard, our patients will surely benefit."⁹

For those who would suggest that this article is self-serving, I would suggest that you simply replace the discipline cited with any other. Perhaps we have reached the point that we no longer wish to advance and support the art and science of _____ (fill in the blanks) with definitive research that will refute the nattering nabobs of nihilism on the other side of that proverbial line in the sand. It is time for dentists to acknowledge the gravity of the problem where industry is the driver and the profession the passenger. We need leadership to regenerate the science of dentistry before the artistry truly becomes pre-planned and pre-programmed by those outside the profession whose vested interests lie in profit and loss statements, and not in the eradication of oral disease.

Editorial note: A complete list of references is available from the publisher. To comment on this article, please contact the Managing Editor at c.salwiczek@oemus-media.de

_about the author

roots



Dr Kenneth S. Serota graduated from the University of Toronto in 1973 and was awarded the George W. Switzer Memorial Key for Excellence in Prosthodontics. He received his Certificate in Endodontics and Master of Medical Sciences degree from the Harvard-Forsyth Dental Center in Boston.

A recipient of the American Association of Endodontics Memorial Research Award for his work in nuclear medicine screening procedures related to dental pathology, his passion is education, and most recently e-learning, and rich media. Dr Serota provided an interactive endodontic programme for the Ontario Dental Association from 1983 to 1997 and was awarded the ODA Award of Merit for his efforts in the provision of continuing education.

The author of more than 60 publications, Dr Serota is on the editorial board of *Endodontic Practice*, *Endo Tribune* and *Implant Tribune*. He founded ROOTS, an online educational forum for dentists from around the world who wish to learn cutting-edge endodontic therapy, and recently launched IMPLANTS (www.rximplants.com) and www.tdsonline.org in order to provide dentists with a clear understanding of the endodontic-implant algorithm in foundational dentistry.

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