

# Editorial

Endodontics is one of the specialties that has achieved the greatest advances over the last 20 years. A considerable part of this development is the result of the development of nickel titanium alloy (NiTi) and its application to the manufacturer of rotary instruments, in response to the concerns of a profession that was well aware of the need to enlarge root canals in terms of both area and volume further in order to achieve better clinical results. Rotary NiTi instruments quickly changed the paradigms governing root canal preparation methods and finally made it possible to conduct preparations of larger dimensions. They also made it easier to respect the original anatomy of the canal, enabling faster, safer and more effective endodontic treatment. It was now possible to prepare teeth that it had previously been inconceivable to treat using stainless steel files.

At the same time, there was just one question being asked in the research laboratories: “What are the impacts of NiTi instruments on root canal preparation and their efficacy? Notwithstanding, there was also a need for evolution of the way that the efficacy of endodontic instruments for enlarging root canals was studied. If, on one hand, it is clinical need that directs research agendas, on the other, it is only by conducting well-designed and well-executed research that what is being done in clinical settings can be validated. New equipment and new study methodologies emerged and, little by little, the modus operandi of endodontics was changed. Micro-tomography ( $\mu$ CT) is one item of equipment that along with its respective study methodologies has had a great impact. It is now unthinkable to attempt to conduct a top-quality study without using this methodology. Endodontic research conducted using this equipment is capable of performing detailed anatomic analysis of teeth as well as studying preparation, obturation and retreatment of root canals. Samples that previously had to be destroyed for studies can now be preserved. The high resolution of the images obtained using  $\mu$ CT enables exact measurement of how much of the root canal has been instrumented in terms of volume, and provides exact visualization of where the instruments touch the root canal walls during preparation.

As a result, recent studies using  $\mu$ CT have been able to show that there is not always a direct correlation between enlargement of the root canal and the instruments entering into contact with the entirety of the canal walls. In other words, wider does not necessarily mean cleaner. As a result, endodontics is becoming more conservative. Preparations that had become larger at the start of the NiTi instrument revolution are now giving way to less aggressive preparations. The manufacturers of endodontic instruments have already understood the message coming from research. In addition to improved NiTi alloys, new generations of rotary instruments are being made available with tapers that are more compatible with more conservative preparation techniques, and their cross-sections, cutting angles and kinematics have also changed accordingly.

The current challenge is to develop an ideal instrument that allow a larger active area while providing adequate widening of the root canals in different groups of teeth.

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