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## Adhesion: On Its Way to the Apex!

Dear Reader,

If there is one area in dentistry which shows an elevated rate of failures in daily practice, it is certainly endodontics. In the long term, approximately 50% of the endodontically treated teeth show signs of periapical periodontitis. This is true despite the fact that during the last 10 years a revolution has taken place in terms of negotiating the root canal: with the introduction of power-driven nickel-titanium instruments, a root canal can be prepared with a distinctly lower risk of failure. We all know that good mechanical negotiation of the root canal combined with antiseptic rinsing is a prerequisite for endodontic success. However, we also know that this alone is not sufficient. In the ideal case, the root canal filling does not show any leakage, thus preventing migration of microorganisms towards the apex. Therefore, the sealing quality of a dental biomaterial is considered an essential factor for clinical success. This is seen today in the influence of the quality of a coronal restoration on the success of the root canal treatment.

Gutta-percha is still the material of choice for the obturation of root canals. Usually, gutta-percha is used in conjunction with a root canal sealer. However, of the numerous sealers available, none are able to bond strongly enough to gutta-percha and thus reduce to a minimum the microleakage of root canal fillings. Nevertheless, gutta-percha is still the material most favored by endodontists, due to its thermoplastic behavior and its biocompatibility. This material shares the record with amalgam for length of use in dentistry: it was introduced as a material to fill cavities in 1848. Its endodontic use was first recommended in 1883!

Improving the quality of root canal obturations should logically be accomplished by an alternative to gutta-percha. This has finally been achieved by the research group of Dr. Martin Trope at the University of North Carolina. They have formulated a gutta-percha substitute based on a thermoplastic synthetic material which is filled with a bioactive glass and some radiopaque components

(Resilon™). This new biomaterial shows the potential of all favorable properties of gutta-percha (plasticity and ability to flow at elevated temperatures, solubility in certain organic solvents, etc). Furthermore, it is able to bond to resin-based systems, such as dentin bonding agents and resin-based luting cements. Adhesive techniques are already implemented in the coronal part of the root canal, eg, cementation of glass fiber posts with composite resins. Now adhesion is ready to move to the apical zone.

The data presented in two recent articles about in vitro and in vivo experiments with this new adhesive system seem very encouraging. They seem to confirm the potential of this system to completely seal the root canal.<sup>1,2</sup> Therefore, one may hope that this type of root canal filling may improve the biomechanical properties of pulpless teeth.<sup>3</sup>

This puts us on the threshold of another revolution, and opens a new domain for adhesive dentistry. When adhesion meets apex, the possibilities will be exciting!

### REFERENCES

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Michel Degrange