Prof. Franck Diemer

Prof.Diemer received his dental surgery's doctorate in1995at the University of Toulouse, France. He also holds a Master in Science and Medical Biology(1998),a postgraduate diploma in pedagogy (2001),and a PhD from the Paul Sabatier University, Toulouse, France (2006). He is associate professor in the Toulouse Dental Surgery's University, at the head of Endodontics department.

Dr Diemer is a member of the French National College of Teachers in Dentistry (CNEOC), of the French Society of Endodontics (SFE) and of the scientific committee of Toulouse Dental Surgery'sUniversity.

Dr.Diemer has full hospital practice and is attached to the Clement Ader Institute, Toulouse, France (Surface, Machining, Materials and Tools team - EA 814).He has presented numerous lectures and continuing education, and published many national and international articles

Title: Effect of Design on the Behavior of Rotary Root Canal Instruments

Current concepts in root canal system preparation still largely rely on mechanical instrumentation. Two major factors affect the choice of instruments for root canal preparation: its ability to achieve the root canal shaping and its safety.

The file accuracy is linked to its resistance to fracture, its lack of threading in dentinal walls when used in continuous rotary motion and its ability to respect the initial canal path in curved canals. The original canal anatomy must be maintained. Most of these factors depend on the profile of the instrument and so, on the design of its active part.

When used in a continuous rotating motion, even at low speed, Ni-Ti instruments may be found threading into the root canal. Using instruments with flat radial land areas enabled to reduce this tendency. However, radial-landed instruments generate very high stresses even if they are able to safely prepare up to ten canals without separation due to cyclic fatigue. Stresses may be localized in the cutting edges but also at the core of the instrument. And they are more evenly distributed on no radial land instrument than with radial land.

Recent numerical study shows the bending and torsional mechanical behavior of endodontic rotary Ni–Ti instruments with similar size and various designs for tapers, pitch, and cutting blades do not have the same bending and torsional mechanical behavior.

The geometry of the instruments since ten years evolved a lot. In 2008, the emergence of asymmetrical cross section with the Revo-S® has reduced the constraints and improve the cleaning ability of endodontic instruments. The important mastery of Micro-Mega NiTi machining, new cross section developments and surface treatment (electro-polishing and heat treatment) authorized it to carry out a new sequence. This short sequence aloud to shape the canals with only two asymmetric files.

Each clinician must be aware of these behavior differences to use the adequate file according to the clinical situation and to the manufacturer’s recommendations.