

PREFLARING & GLIDE PATH

How it's currently done

- ❑ **Preflaring** is the **preliminary root canal enlargement** needed to reduce the risk of taper lock of the tip of the first rotary instrument used to shape the canal.
- ❑ **Glide Path** is obtained during preflaring and corresponds to the **smooth canal preparation** that rotary instruments can follow without the risk of blockage or bending.
- ❑ Until now, this stage is conventionally performed with hand SST instruments, such as K-Files 008, 010 or 015.
 - ❑ Research shows that SS is less safe for canal fidelity!



MANUAL PREFLARING

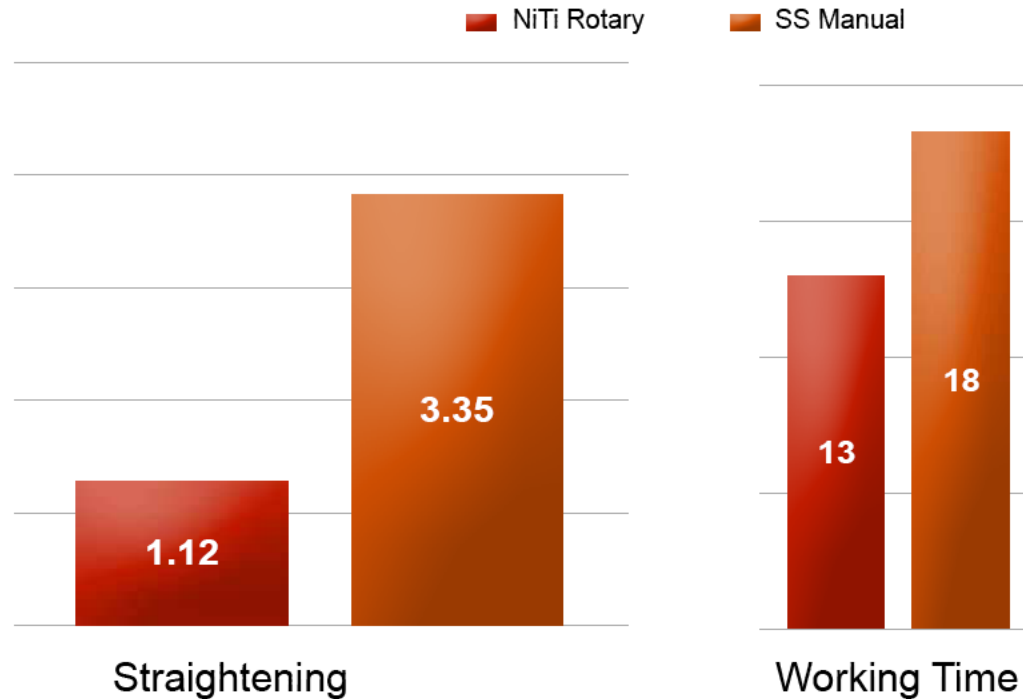
Potential issues

- ❑ The initial preflaring and glide path are normally carried out with **stainless steel hand files**.
- ❑ Because of the relative stiffness of these instruments, it can be difficult to avoid the risk of:
 - **canal transportation**
 - may lead, in severe cases, to root canal perforation
- ❑ Because of the relative stiffness of these instruments, it can be difficult to avoid the risk of:
 - **ledges**
 - the tip could block in the canal and, if not withdrawn but pushed apically, could eventually break
 - **apical zip**
 - may lead to obturation difficulties



Research – NiTi Vs Stainless Steel JOE 2004

- Preoperative and postoperative (after obturation) radiographs were taken of each tooth. Straightening of the canal curvatures was determined with a computer image analysis software



Schäfer E, Schulz-Bongert U, Tulus G. Comparison of Hand Stainless Steel and Nickel Titanium Rotary Instrumentation: A Clinical Study. J Endodon 2004;30 (6):432-435

Research

- Even in severely curved canals, the use of NiTi rotary instruments significantly lowers the risk of ledging and straightening in comparison with hand instrumentation

Investigations in Simulated Canal Blocks

3-Thompson SA, Dummer PMH. Shaping ability of ProFile .04 taper series 29 rotary nickel-titanium instruments in simulated canals: part 1. *Int Endod J* 1997;30:1-7.

4-Thompson SA, Dummer PMH. Shaping ability of Hero 642 rotary nickel- titanium instruments in simulated root canals: part 1. *Int Endod J* 2000;33: 248 -54.

5-Schäfer E. Shaping ability of Hero 642 rotary nickel-titanium instruments and stainless steel hand K-Flexofiles in simulated curved root canals. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2001;92:215-20.

6-Garip Y, Gunday M. The use of computed tomography when comparing nickel-titanium and stainless steel files during preparation of simulated curved canals. *Int Endod J* 2001; 34:452-457

7-Schäfer E, Lohmann D. Efficiency of rotary nickel-titanium FlexMaster instruments compared with stainless steel hand K-Flexofile: part 1. Shaping ability in simulated curved canals. *Int Endod J* 2002;35:505-13.

8-Hata G, Uemura M, Kato AS, Imura N, Novo NF, Toda T. A comparison of shaping ability using ProFile, GT file, and Flex-R endodontic instruments in simulated canals. *J Endodon* 2002;28:316 -21.

9-Schäfer E, Florek H. Efficiency of rotary nickel-titanium K3 instruments compared with stainless-steel hand K-Flexofile. Part 1. Shaping ability in simulated curved canals. *Int Endod J* 2003;36:199 -207.

Research

- ❑ **Even in severely curved canals, the use of NiTi rotary instruments significantly lowers the risk of ledging and straightening in comparison with hand instrumentation**

Research in Curved Canals of Extracted Teeth

3-Schäfer E, Lohmann D. Efficiency of rotary nickel-titanium FlexMaster instruments compared with stainless steel hand K-Flexofile, part 2: cleaning effectiveness and instrumentation results in severely curved root canals of extracted teeth. *Int Endod J* 2002;35:514–21.

4-Schäfer E, Schlingemann R. Efficiency of rotary nickel-titanium K3 instruments compared with stainless steel hand K-Flexofile, part 2: cleaning effectiveness and instrumentation results in severely curved root canals of extracted teeth. *Int Endod J* 2003;36:208–17.

5-Braun A, Schüttlöffel ME, Frentzen M. Straightening of root canals following preparation with rotary NiTi systems. *Dtsch Zahnarztl Z* 2003;58: 42–5.

6-Weiger R, Brückner M, ElAyouti A, Löst C. Preparation of curved canals with rotary FlexMaster instruments compared to Lightspeed instruments and hand files. *Int Endod J* 2003;36:483–90.

7-Davis RD, Marshall JG, Baumgartner JC. Effect of early coronal flaring on working length change in curved canals using rotary nickel-titanium versus stainless steel instruments. *J Endodon* 2003;28:438–42.

In-Vivo research in Curved Canals of Extracted Teeth

1-Pettiette MT, Metzger Z, Phillips C, Trope M. Endodontic complications of root canal therapy performed by dental students with stainless-steel K-files and nickel-titanium hand files. *J Endodon* 1999; 25: 230-234.

2-Pettiette MT, Delano EO, Trope M. Evaluation of success rate of endodontic treatment performed by students with stainless-steel K-files and nickel-titanium hand files. *J Endodon* 2001; 27:124-27

3-Schäfer E, Schulz-Bongert U, Tulus G. Comparison of Hand Stainless Steel and Nickel Titanium Rotary Instrumentation: A Clinical Study. *J Endodon* 2004;30 (6):432-435.

PREFLARING & GLIDE PATH

The future

- ❑ PathFile™, a new rotary Nickel-Titanium solution for Mechanical Glide Path and Preflaring



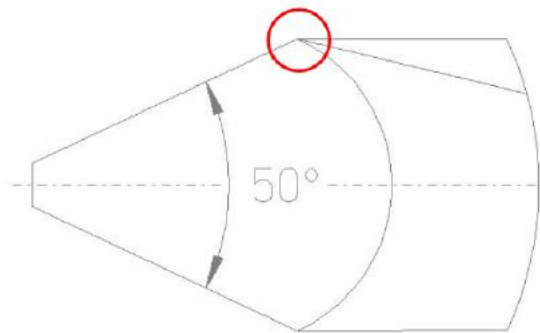
- ❑ Complete range available in 3 ISO sizes (013, 016 and 019) and 3 lengths (21, 25 and 31mm).
 - ❑ Flexible and resistant to cyclic fatigue, they offer many advantages compared to manual solutions.

PATHFILE™

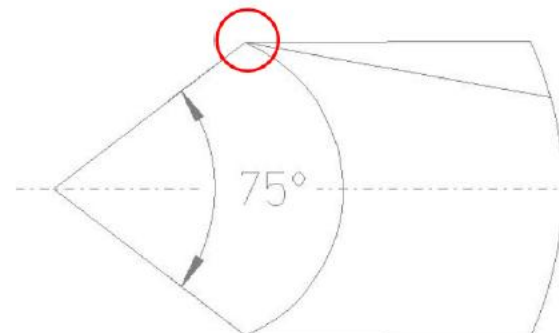
Product Details

Tip design (transition angle reduction)

- ❑ Reduced risk of ledges and canal transportation



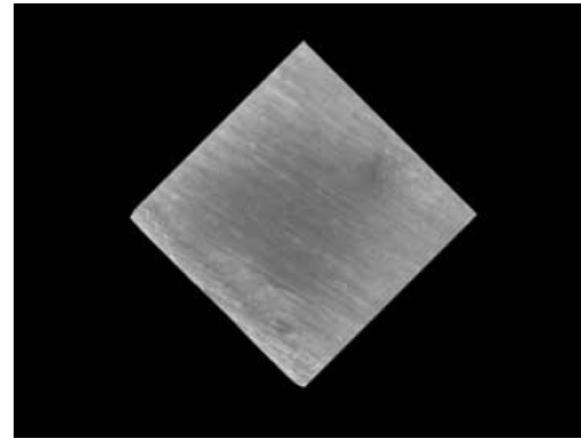
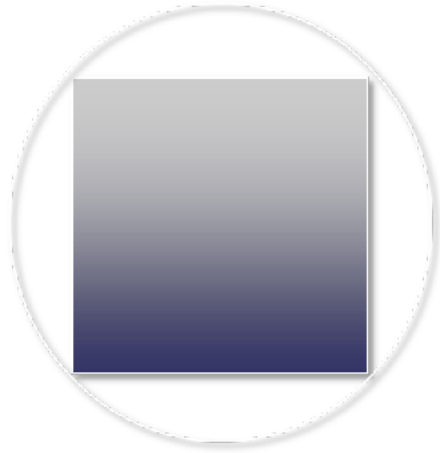
PathFile™



K-File



PATHFILE™ Product Details



- ❑ High torque strength using a square cross section
- ❑ .02 taper for high resistance to cyclic fatigue

PATHFILE™

Procedure

- ❑ Scout and negotiation with a standard K-File #010 until it can move smoothly along the canal
- ❑ With same file, working length determination in combination with an Apex locator
- ❑ PathFile™ #013 to working length
- ❑ PathFile™ #016 to working length
- ❑ PathFile™ #019 to working length
- ❑ Ready for canal shaping with any NiTi rotary system



PATHFILE™

Directions for Use

- ❑ Rotation speed ≈ 300 rpm
- ❑ Instruments should be used with a delicate in/out movement until they reach the full length. Strong axial forces should therefore be avoided.
- ❑ Time needed to reach working length normally does not exceed 3-5 seconds/file
- ❑ The rotating motion will carry debris in a coronal direction



Clinical Studies

**Development in collaboration with Prof Berutti,
Prof Cantatore and Dr Castellucci**

- ❑ support of 3 internationally renowned Opinion Leaders
- ❑ quality evidence thanks to their expertise





Use of Nickel-Titanium Rotary PathFile to Create the Glide Path: Comparison With Manual Preflaring in Simulated Root Canals

Elio Berutti, MD, DDS,* Giuseppe Cantatore, MD, DDS,† Arnaldo Castellucci, MD, DDS,‡ Giorgio Chiandussi, MSc, PhD,§ Francesco Pera, DDS,* Giuseppe Migliaretti, MD,¶ and Damiano Pasqualini, DDS*

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Study Objectives

- ❑ The study carried out by Prof Berutti, Prof Cantatore and Dr Castellucci (with the Universities of Turin and Verona) had the followings objectives:
 - compare differences between manual and rotary Glide Paths
 - analyze the influence of the practitioner's experience

- ❑ The 3 followings aspects were evaluated
 - canal anatomy maintenance
 - analysis of canal aberrations (apical zip and elbows)
 - working time



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Study Methodology

- ❑ A total of 200 preflared “S-shaped” plastic Endo training blocks across 4 groups

Group	Operator	Instrument
1	Expert clinician	PathFile™
2	Expert clinician	K-Files
3	Inexpert clinician	PathFile™
4	Inexpert clinician	K-Files

- ❑ Mechanical preflaring: PathFile™ 013, 016 and 019 at WL
- ❑ Manual preflaring: K-Files 008, 010, 015 and 020 at WL



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Study Results

□ Group 4: K-Files - **Inexpert**



=> **widened foramen and curvature straightening**

PATHFILE™

Study Results

□ Group 2: K-Files - **Expert**



=> **widened foramen and curvature straightening**

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Study Results

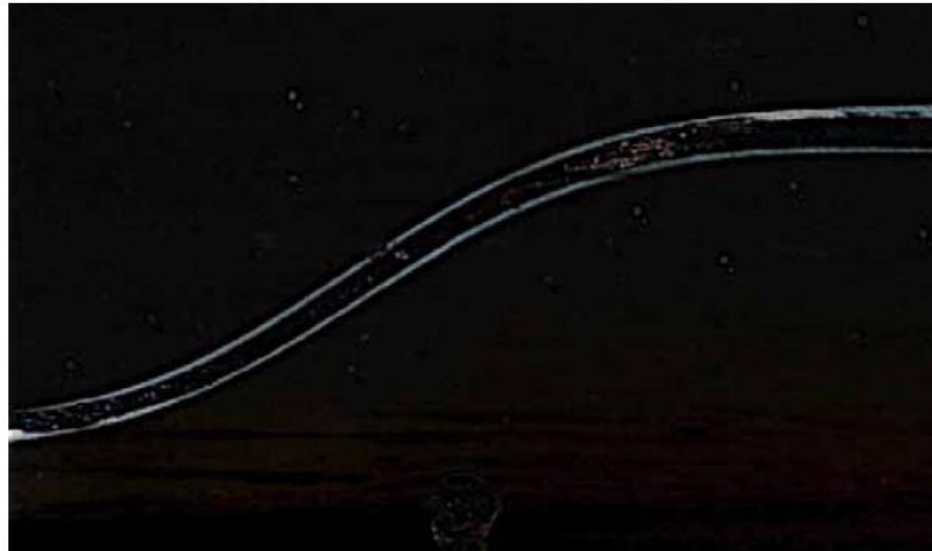
□ Group 3: PathFile™ - **Inexpert**



=> **virtually no transport**

Study Results PATHFILE™

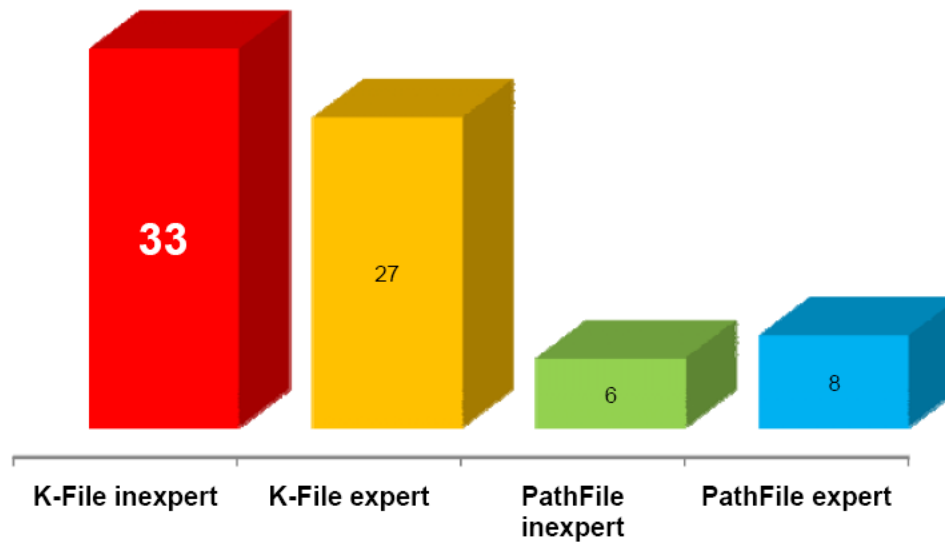
□ Group 1: PathFile™ - **Expert**



=> **virtually no transport**

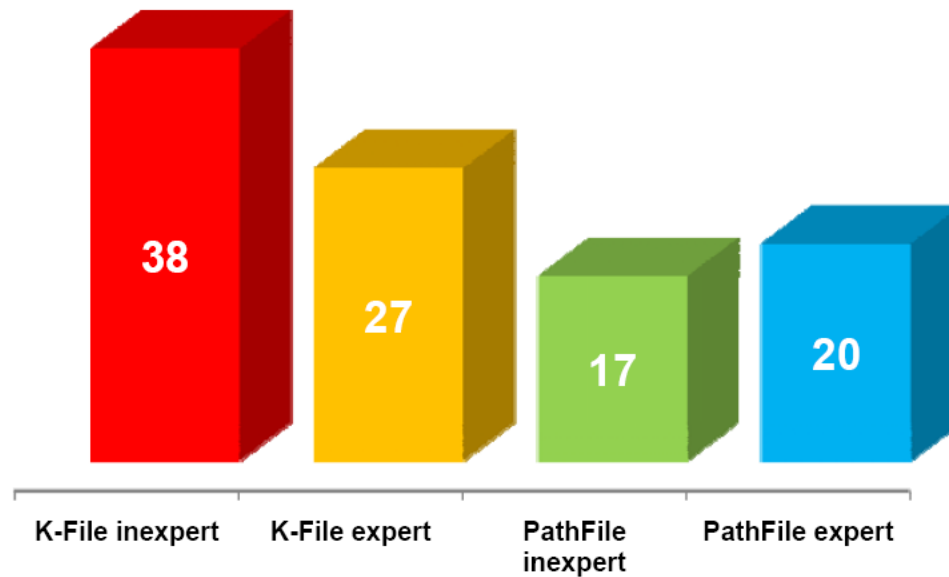
PATHFILE™ Study Results

□ % of transportation in the canal middle third



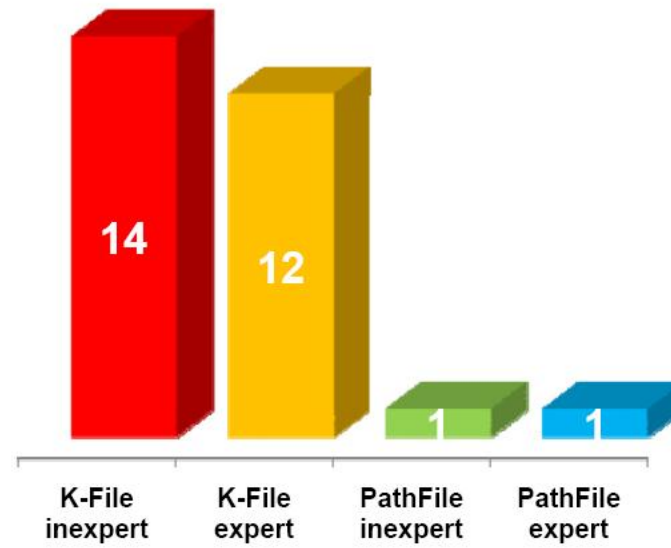
PATHFILE™ Study Results

□ % of transportation in the canal apical third



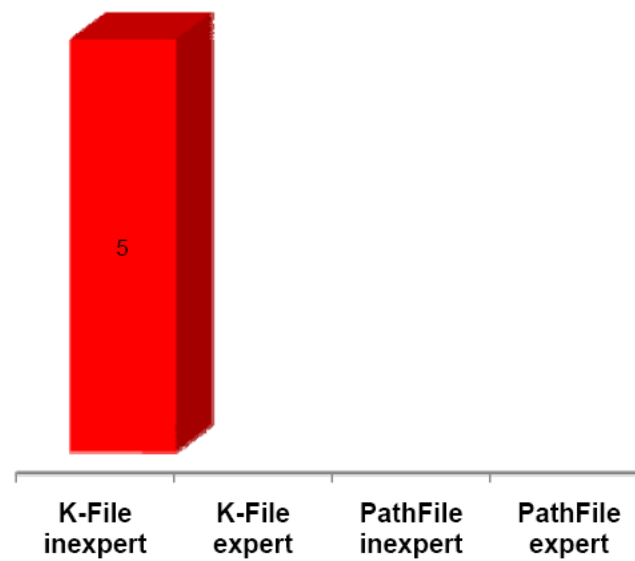
PATHFILE™ Study Results

□ Apical zip



PATHFILE™ Study Results

▣ Ledges



PATHFILE™ Study Results

□ Time spent by instruments in the canal

