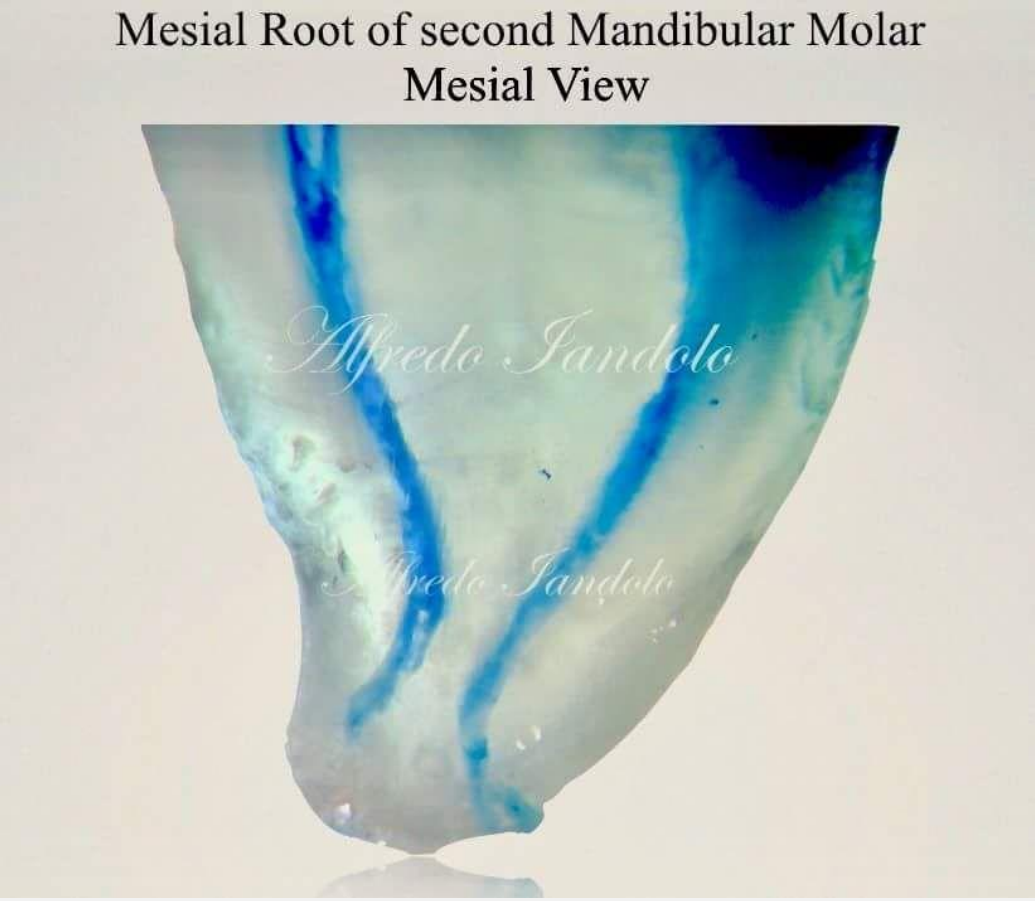
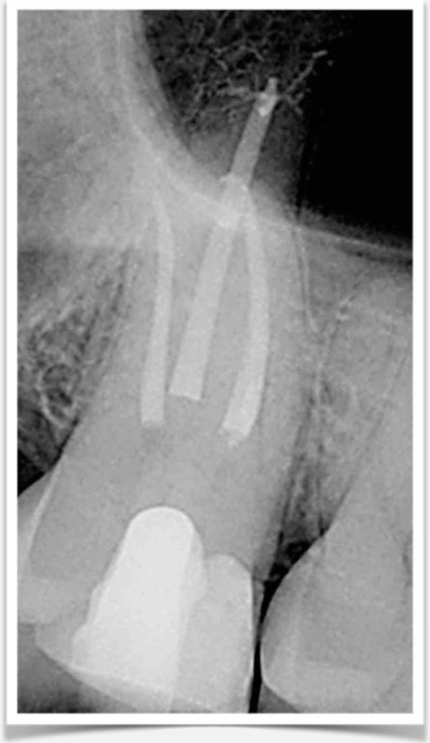
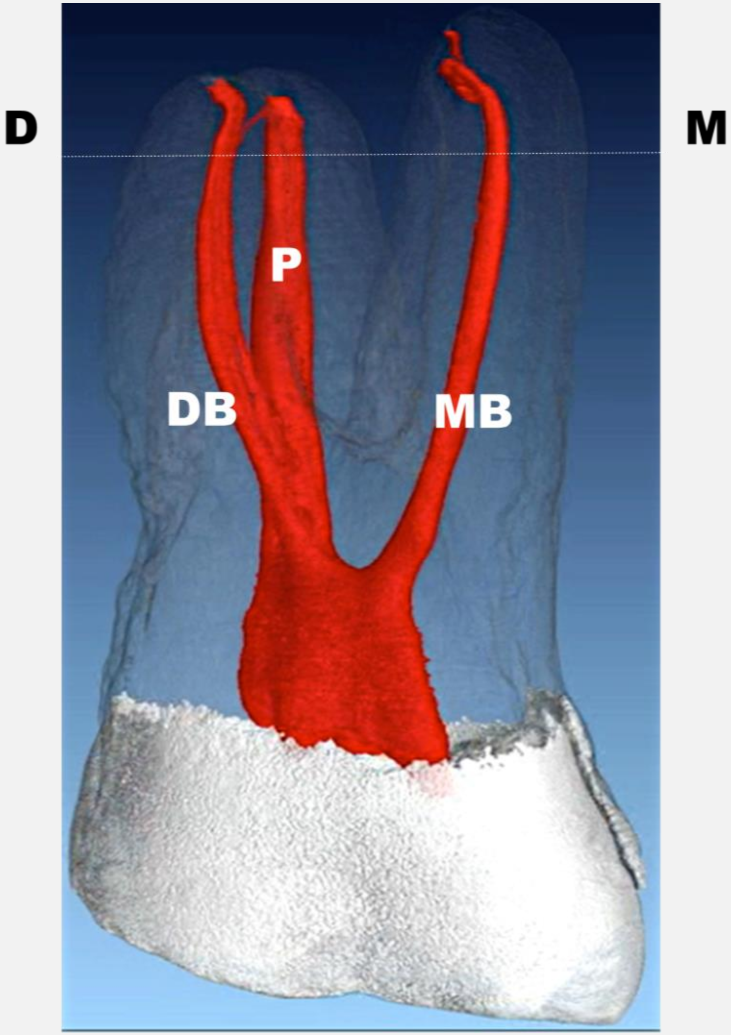
SOCIETY FOR DENTAL SCIENCE

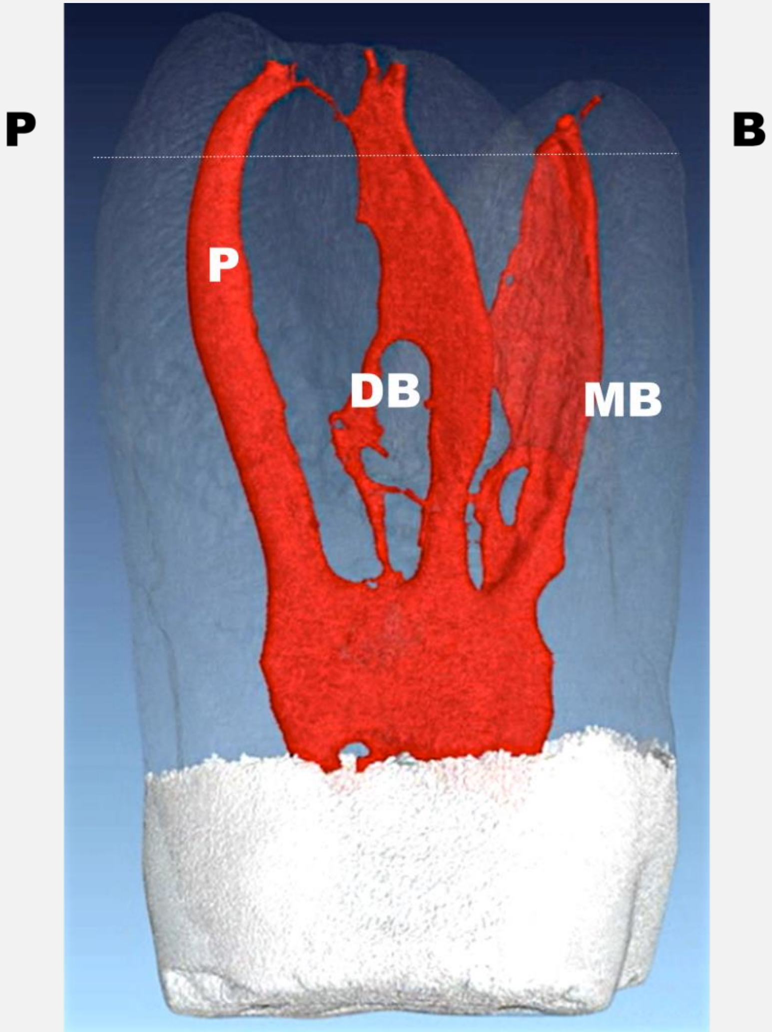
Nouveautés en odontologie : Instrumentation en 3D et biocéramique

Dr Isabelle Portenier, DDS, PhD
(Pratique privée, Nyon)









Courtesy of Dr. Frank Paqué, Switzerland

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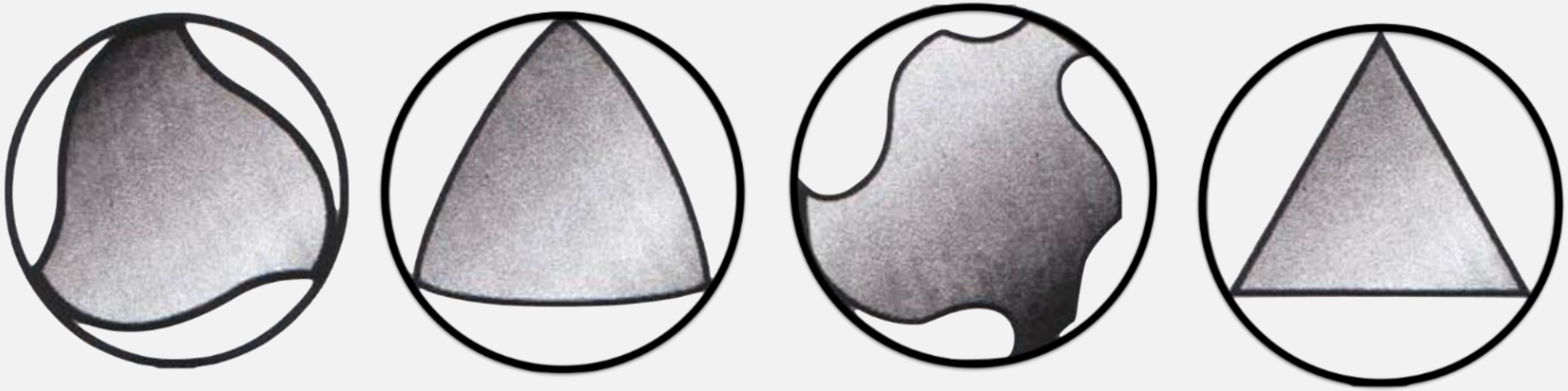
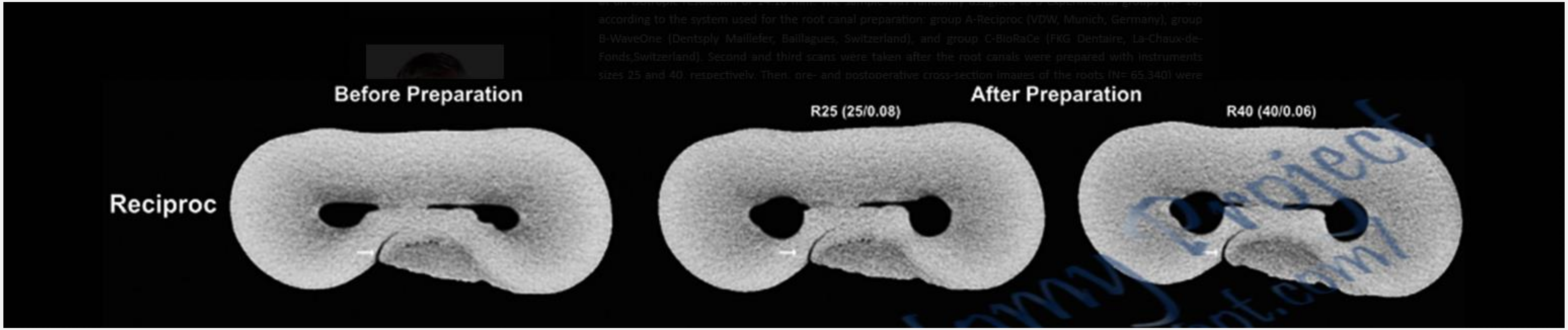


Hero Protaper K3 Race



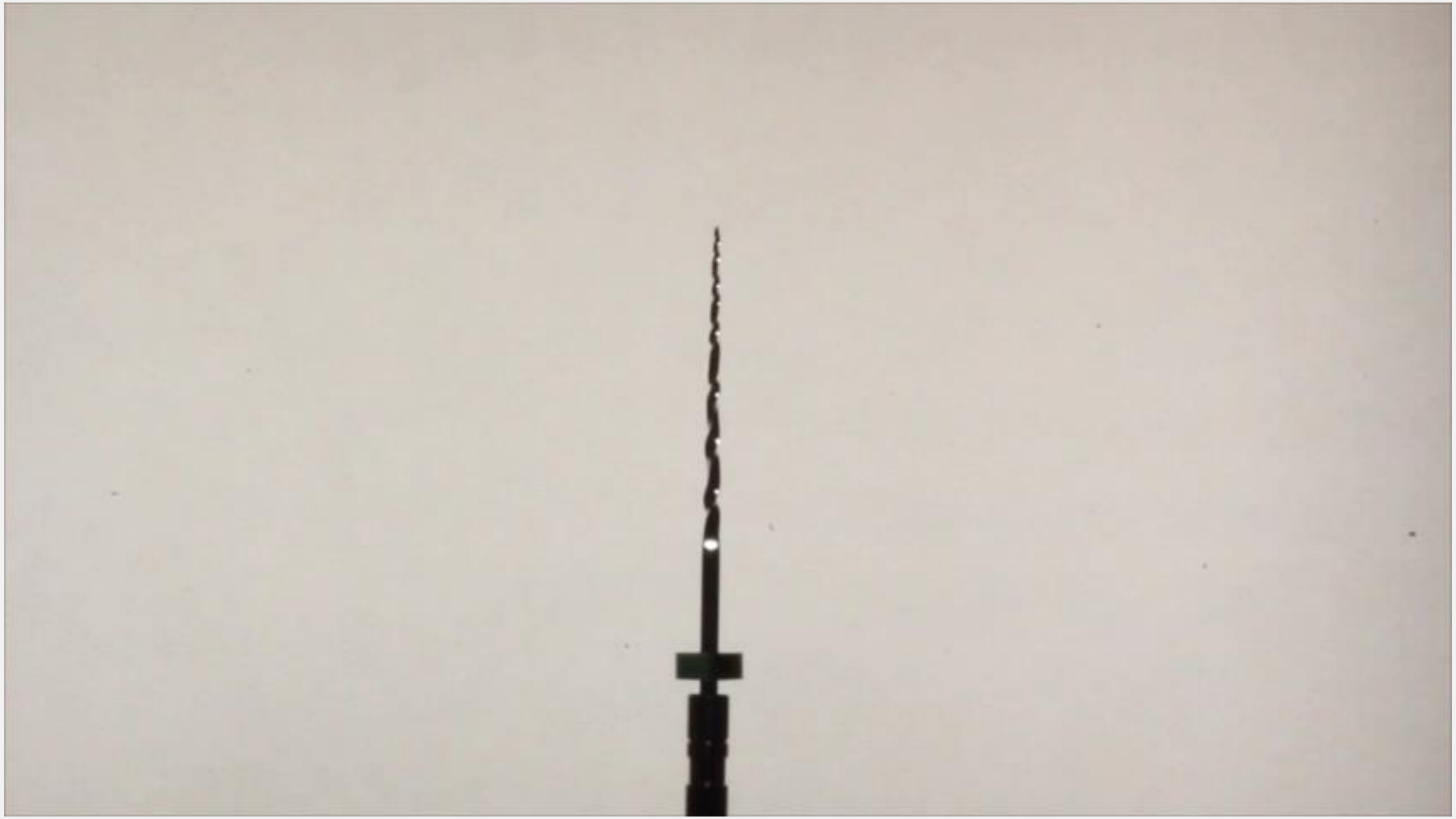
Erreurs:

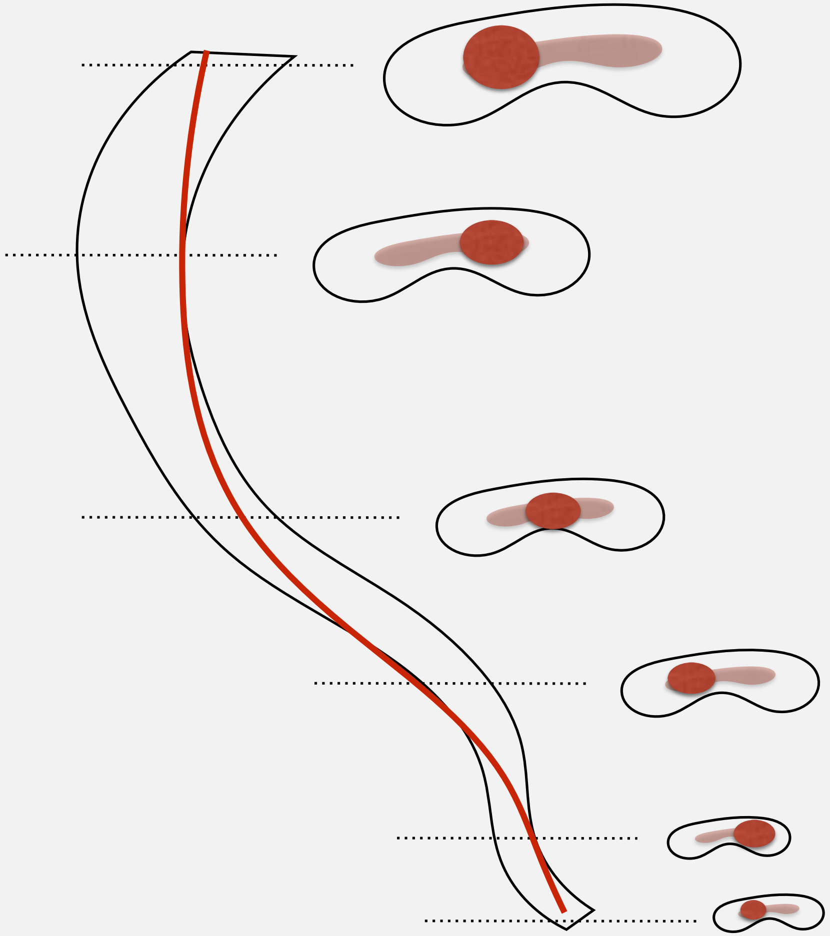
1 – enlevé de la dentine saine

2 – surface non-instrumentée

3 – formation de débris

Transformation du matériel – NiTi lime



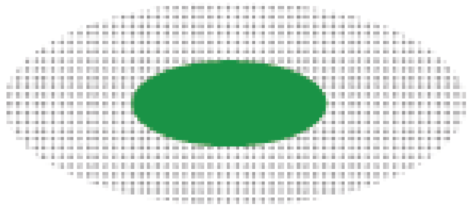


Anatomie originale du canal

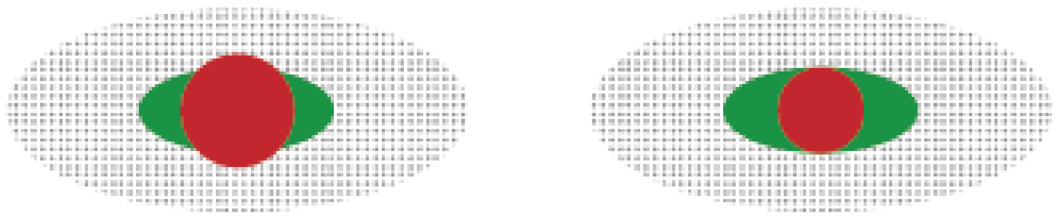
Dentine

Canal (zone à nettoyer)

Zone nettoyée



► Préparation canalaire avec limes NiTi standard



Preparation of Oval-shaped Root Canals in Mandibular Molars Using Nickel-Titanium Rotary Instruments: A Micro-computed Tomography Study

Frank Paqué, Prof. Dr. med dent, Marc Balmer, med dent,* Thomas Attin, Prof. Dr. med dent,* and Ove A. Peters, DMD, MS, PhD†*

Abstract

Introduction: This study evaluated the prepared surface areas of oval-shaped canals in distal roots of mandibular molars using four different instrumentation techniques. **Methods:** Teeth were prescanned and reconstructed using micro–computed tomography (MCT) scans at low resolution (68 μm). Forty-eight molars with ribbon-shaped/oval distal root canals were selected and randomly assigned to four groups. Distal canals ($n = 12$ each) were prepared by circumferential filing using Hedström files to apical size #40 (group H/CF); with ProTaper nickel-titanium rotaries to finishing file 4 (F4) considering the distal canal as 1 canal (group PT/1); ProTaper to F4 considering buccal and oral aspects of the distal canal as 2 individual canals (group PT/2); ProTaper to F4 in a circumferential filing motion (PT/CF). Before and after shaping, teeth were evaluated using MCT at 34-μm resolution. The percentage of prepared surface was assessed for the full canal length and the apical 4 mm. Statistical analysis was performed using analysis of variance and Bonferroni/Dunn multiple comparisons. **Results:** Preoperatively, canal anatomy was statistically similar among the groups ($p = 0.56$). Mean (± standard deviation) untreated areas ranged from 59.6% (±14.9, group PT/2) to 79.9% (±10.3, PT/1) for the total canal length and 65.2% to 74.7% for the apical canal portion, respectively. Canals in group PT/1 had greater untreated surface areas ($p < 0.01$) than groups PT/2 and PT/CF. Among all groups, amounts of treated surface areas were statistically similar in the apical 4 mm. **Conclusions:** Preparations of oval-shaped root canals in mandibular molars left a variable portion of surface area unprepared regardless of the instrumentation technique used. However, considering oval canals as two separate entities during preparation appeared to be beneficial in increasing overall prepared surface. *(J Endod 2010;36:703–707)*

Key Words

Micro–computed tomography scans, nickel-titanium instruments, oval root canals, root canal preparation

One of the major procedural steps in endodontic treatment is to thoroughly remove debris, pulp tissue, and microorganisms from the root canal system by means of chemomechanical preparation (1). To this end, it has been suggested to prepare canals to a homogenous tapered shape with the prepared canal including the preoperative outline (1, 2). However, the root canal system is anatomically complex, and mechanical instrumentation may result in preparation errors. Moreover, the use of both conventional hand files and current nickel-titanium (NiTi) rotary instruments does not result in a fully prepared root canal surface (3).

A funnel-shaped canal with a circular base is not the common configuration in root canal anatomy (2). Recently, cross-sectional root canal configurations have been classified as round, oval, long oval, flattened, or irregular (4). Metrically, Jou et al (4) defined "oval" as having a maximum diameter of up to 2 times greater than the minimum diameter and "long oval" as having a maximum diameter of 2 to 4 times greater than the minimum diameter.

A high prevalence of oval and long oval root canals even in the apical root canal portion has been reported (5–7). According to Wu et al (5), the prevalence of long-oval root canals in the apical third of human teeth is generally about 25%; in some groups of teeth such as lower incisors and upper second premolars, the prevalence is greater than 50%, and in distal roots of lower molars, the prevalence is 25% to 30%. This complex anatomy may be regarded as one of the major challenges in infection control through root canal preparation.

One aim in the preparation of infected root canals is to remove the inner layer of dentin (8). This aim is particularly hard to achieve when preparing long oval root canals. Furthermore, after preparation, uninstrumented recesses may be left in many oval canals, irrespective of the instrumentation technique, thus leaving debris and unprepared root canal surfaces behind (8–13).

Various instrumentation techniques have been recommended to facilitate the preparation of oval root canals (13). The most common technique using hand instruments is circumferential filing with K-type or Hedström files. After the introduction of rotary NiTi instruments, laboratory research on extracted teeth has also addressed their ability to shape oval root canals (12). However, in that study, rotary instruments, even if used in a circumferential filing motion, were not superior compared with hand instrumentation techniques. More recently, the use of rotary instruments with taper larger than 4% was shown to be more efficient than hand files in preparing oval root canals (14). However, the tapered NiTi instruments used in that study were unable to completely prepare oval root canal walls.

The previously mentioned studies were performed on roots of extracted teeth, which were sectioned before the preparation of the root canals. Then, root cross-sections were assessed before and after preparation, thus representing

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0099-2399/$0 - see front matter

doi:10.1016/j.joen.2009.12.020

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Surface non-instrumentée

59.6% to 79.9%

doi:10.1111/j.1365-2591.2007.01320.x

The effect of the canal-filled area on the bacterial leakage of oval-shaped canals

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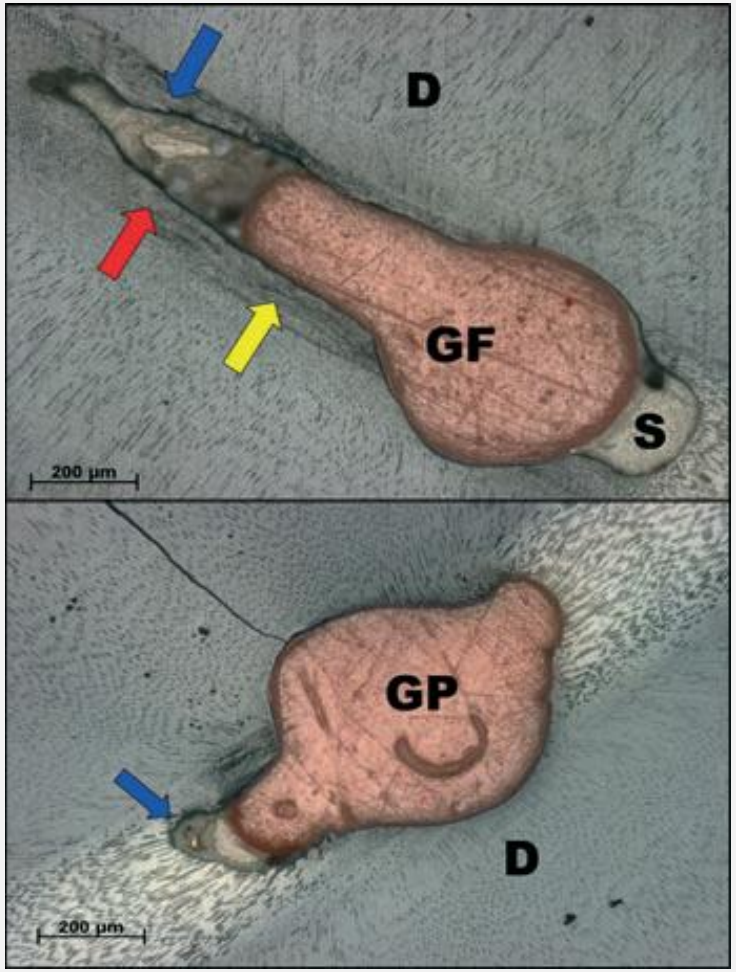
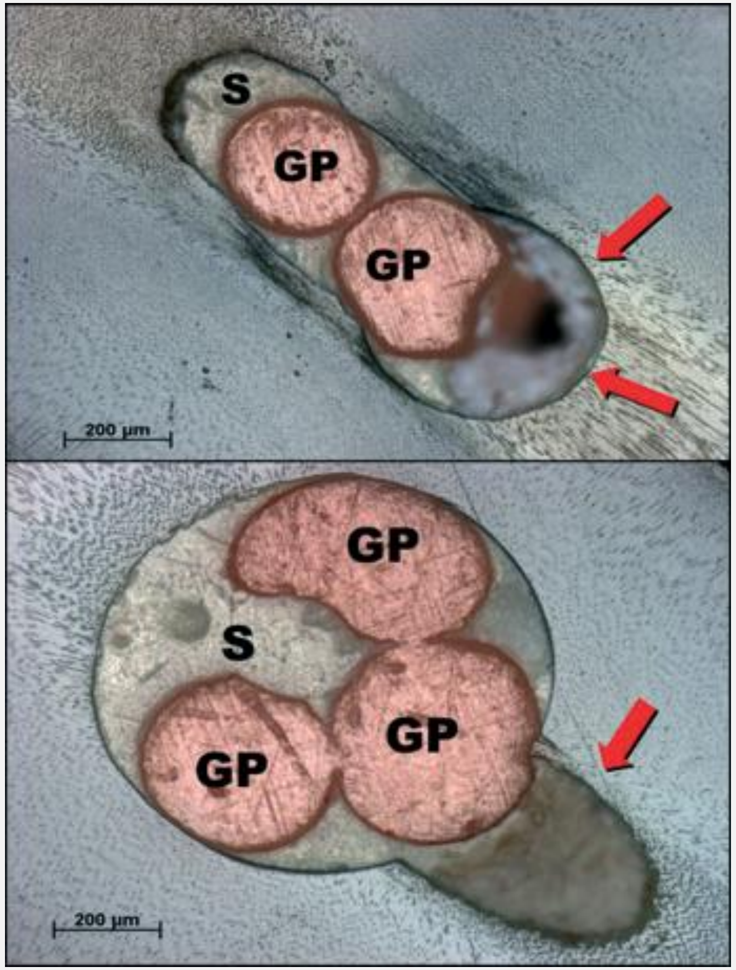
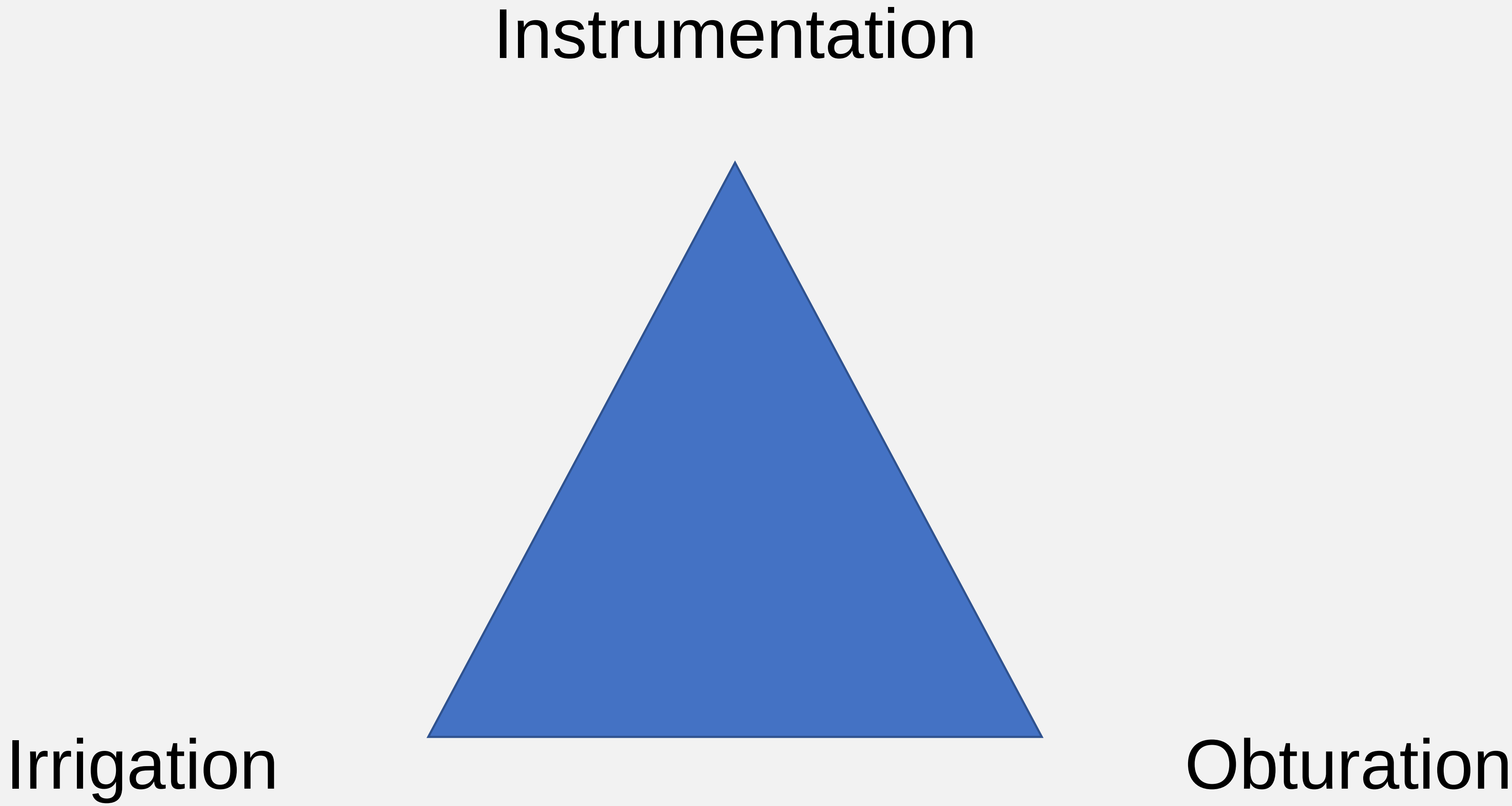





Instrumentation
Irrigation
Obturation

Instrumentation

Travait aseptique

Obturation coronaire

Irrigation

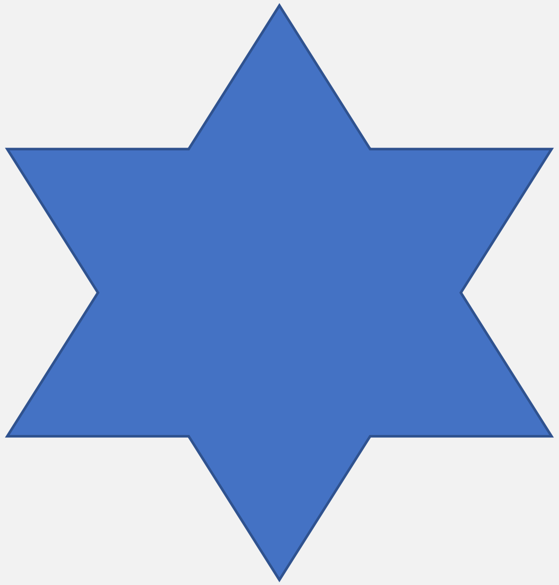
Obturation

Système canalaire

~~Instrumentation~~ Nettoyage en 3D

Travail aseptique

Obturation coronaire



Irrigation
+ Outils

Obturation

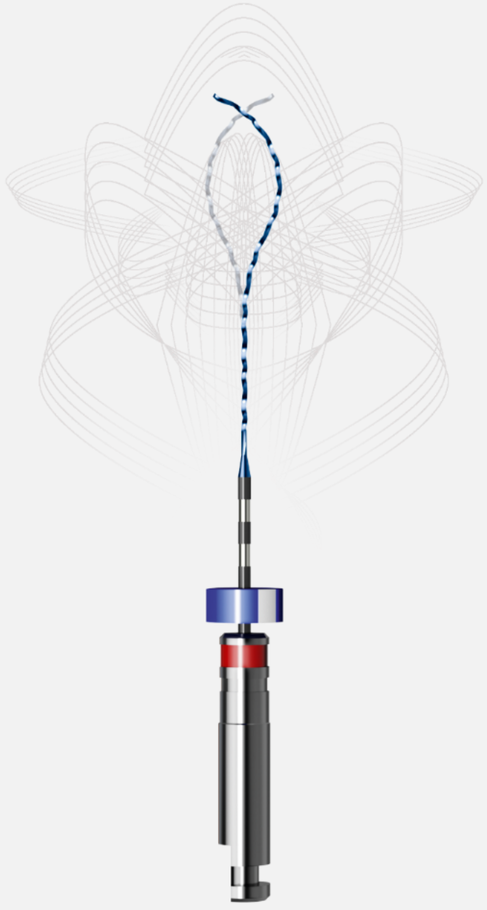
Système canalaire

XP-endo® Shaper

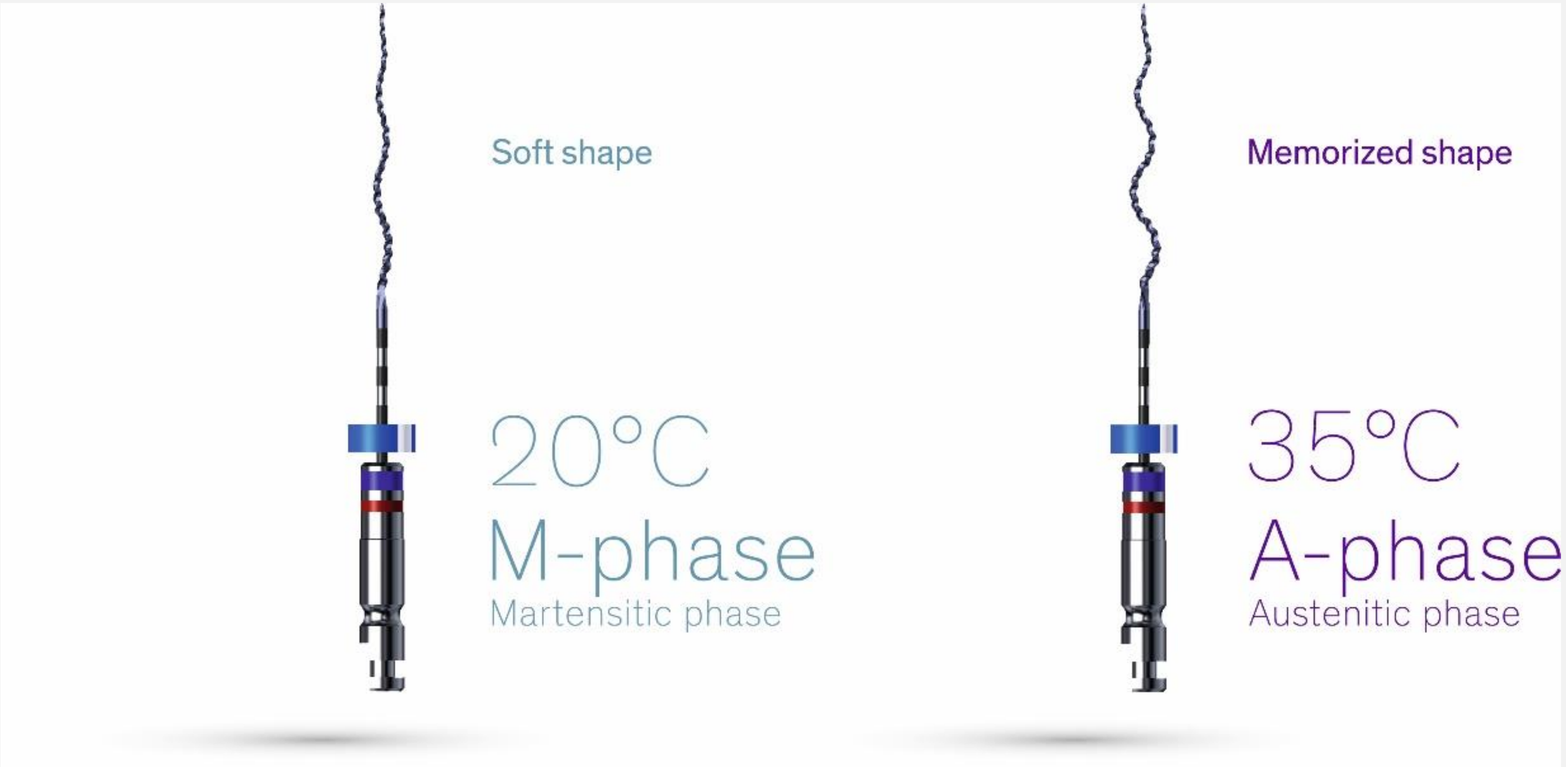
Instrumentation et Retraitement

XP-endo ® Finisher

Irrigation activée



- 2 caractéristiques exclusives : Superélasticité & alliage à mémoire de forme
- Changement de forme en fonction de la température
- Haute résistance à la fatigue cyclique grâce à un petit diamètre ISO et une faible conicité



Courtesy of Dr. Gilberto Debelian

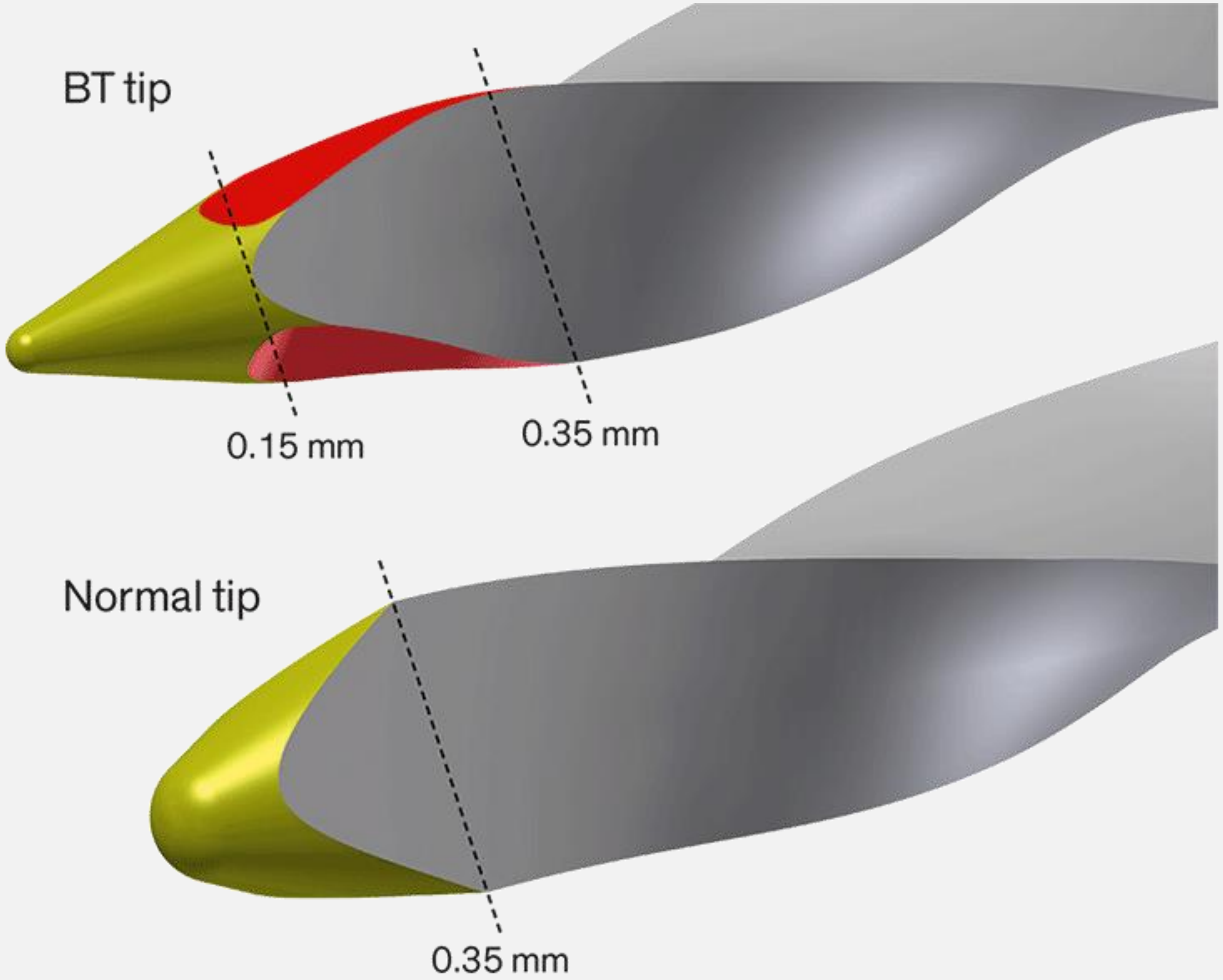
Noyau métallique #30 conicité 1%

20°C
M-phase
Phase Martensitic

35°C
A-phase
Phase Austenitic

Après expansion une concitié de 8 % peut être atteinte

Booster Tip



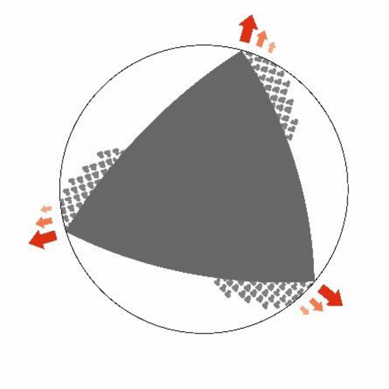
- Création de turbulence grâce à la rotation continue à vitesse élevée (800 rpm)
- Excellent evacuation des débris

Instrument conventionel

Débris compactés

Stress exercé sur les parois canalaires

Espace disponible dans la lumière du canal

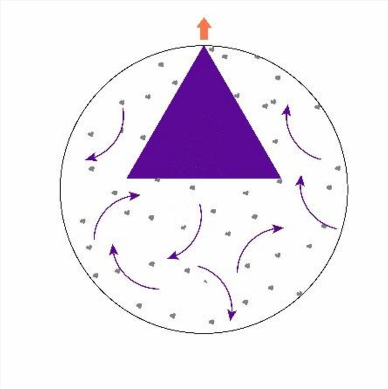


XP-endo Shaper

Débris (pas de compactage)

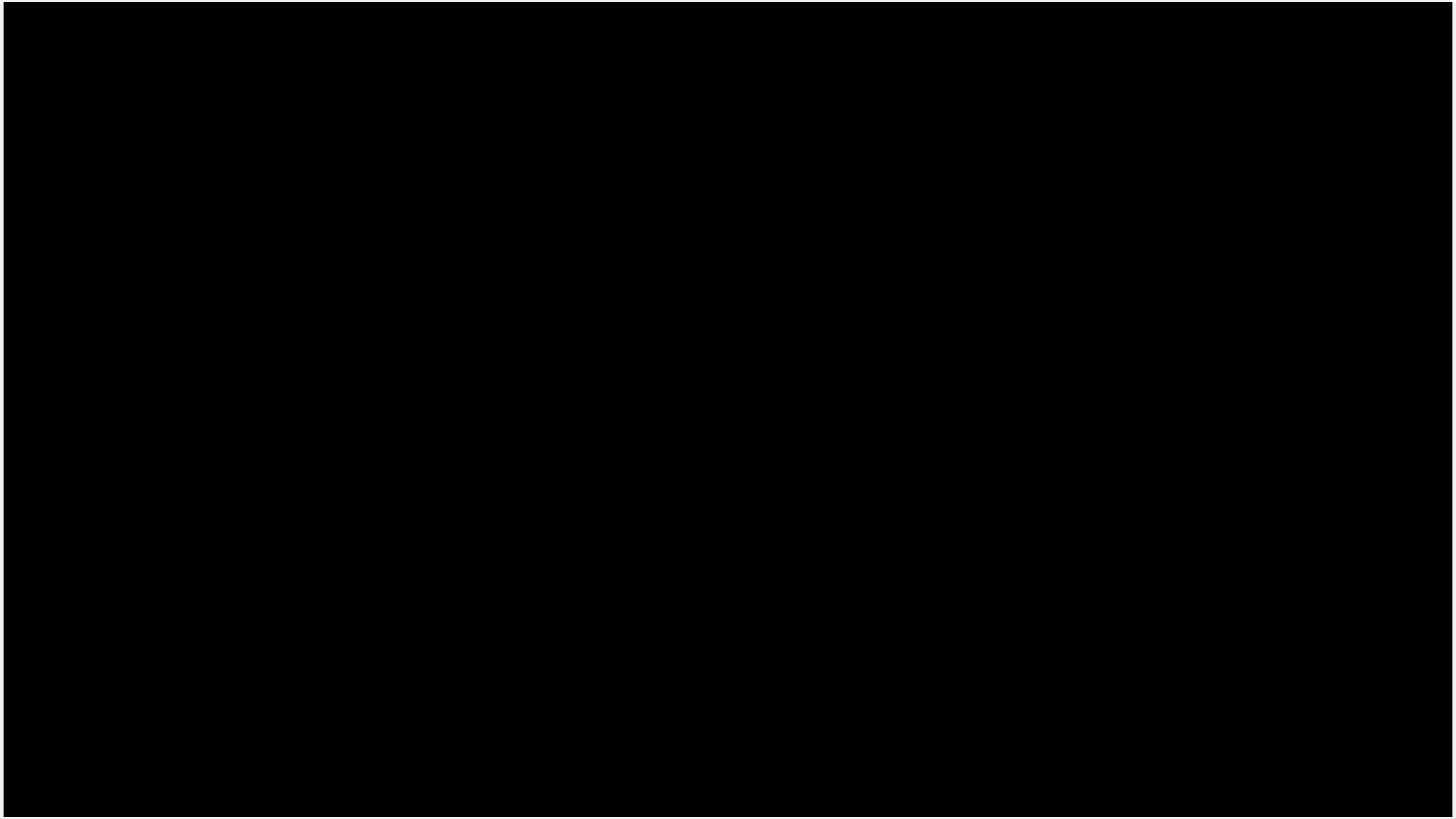
Stress exercé sur les parois canalaires

Espace disponible dans la lumière du canal

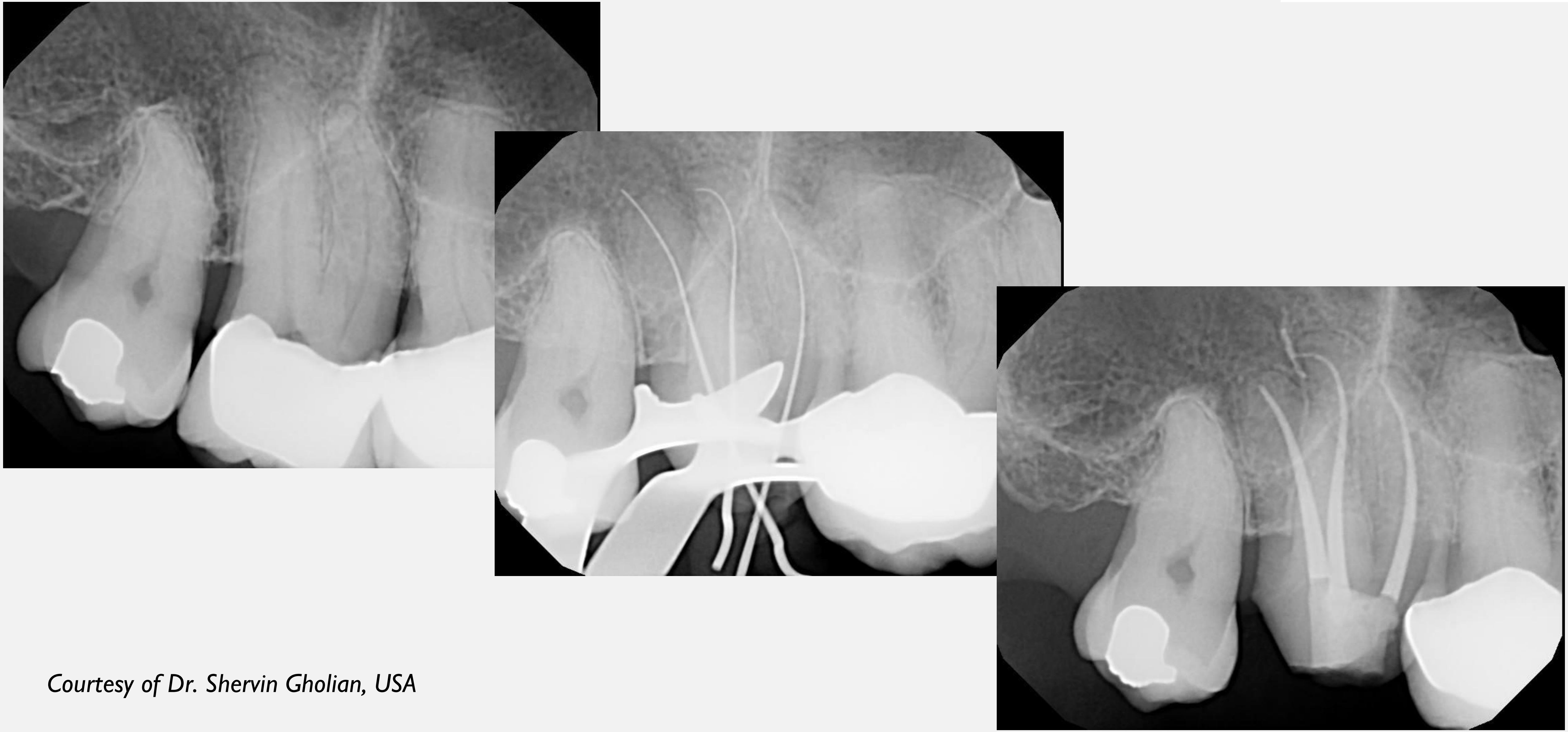


Vitesse recommandée: 800 tr/m
Couple: 1 Ncm

- Réaliser un cathétérisme de min. 15/.02 avant d'utiliser le XP-S
- Dans les dents pluriradiculées, commencer par le canal le plus large.
- Chaque instrument doit être utilisé en effectuant de longs et doux mouvements longitudinaux.
- Irriguer abondamment pendant tout le protocole



Patient, 71 ans, douleurs à la mastication, carie distal sous la couronne - pulpite



Courtesy of Dr. Shervin Gholian, USA

Irrigation et activation

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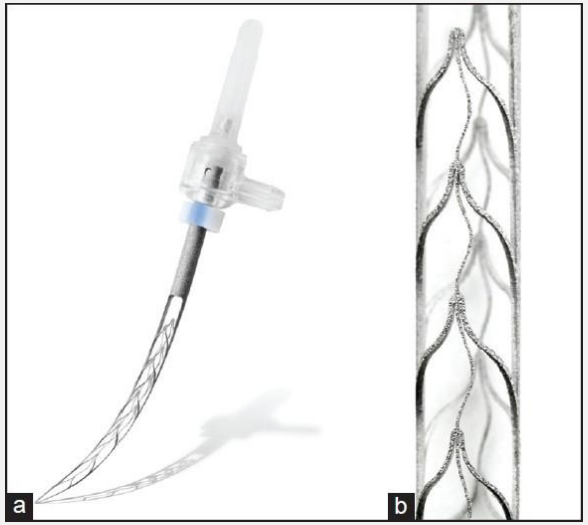
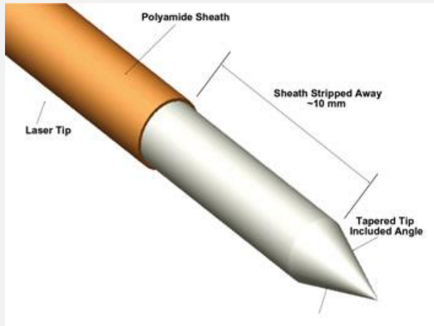
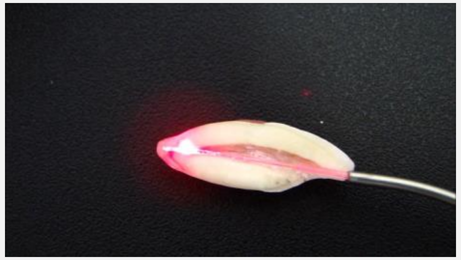
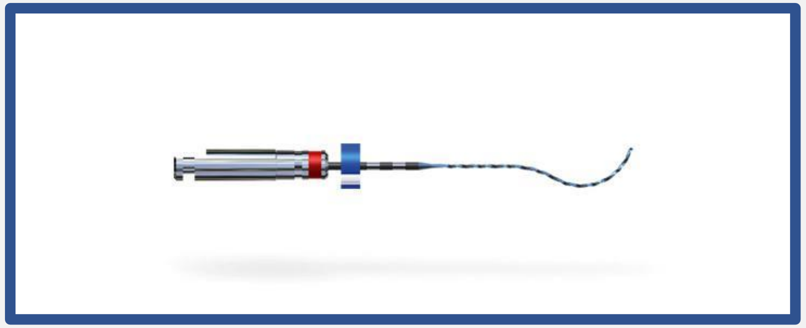
- ➢ Needle 30G
- ➢ EndoRince
- ➢ Ultrason
- ➢ VDW sonic
- ➢ SAF
- ➢ PIPS
- ➢ Laser
- ➢ XPendo Finisher





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MaxWire

Température ambiante: Martensitic Phase - soft

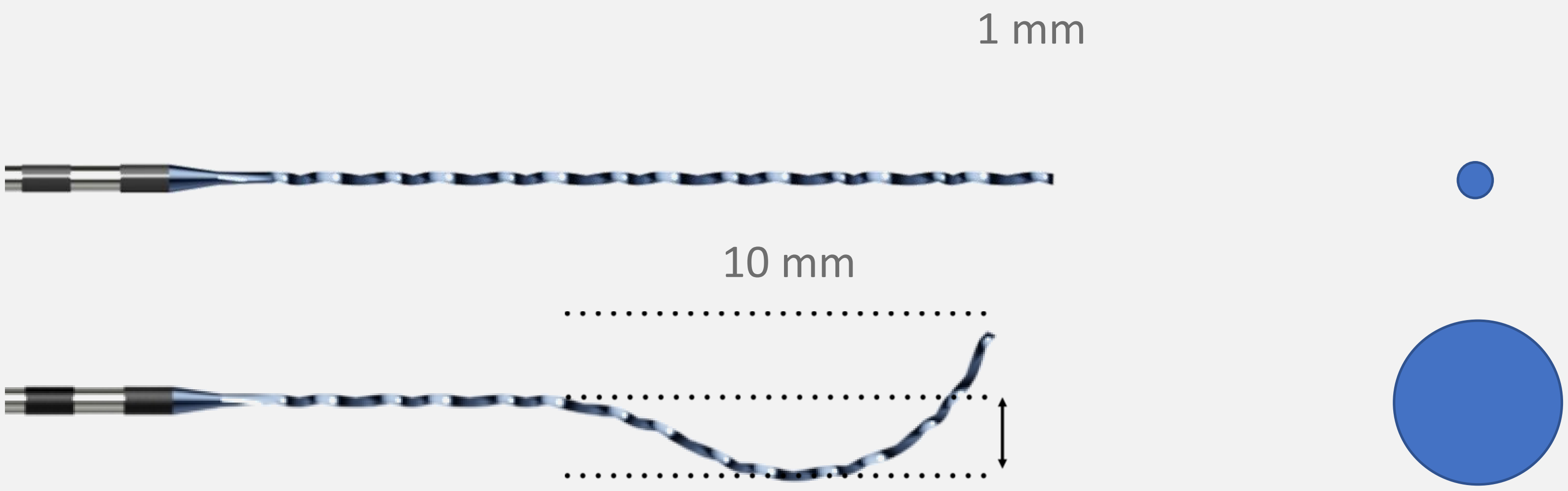
#25/.00

M-Phase

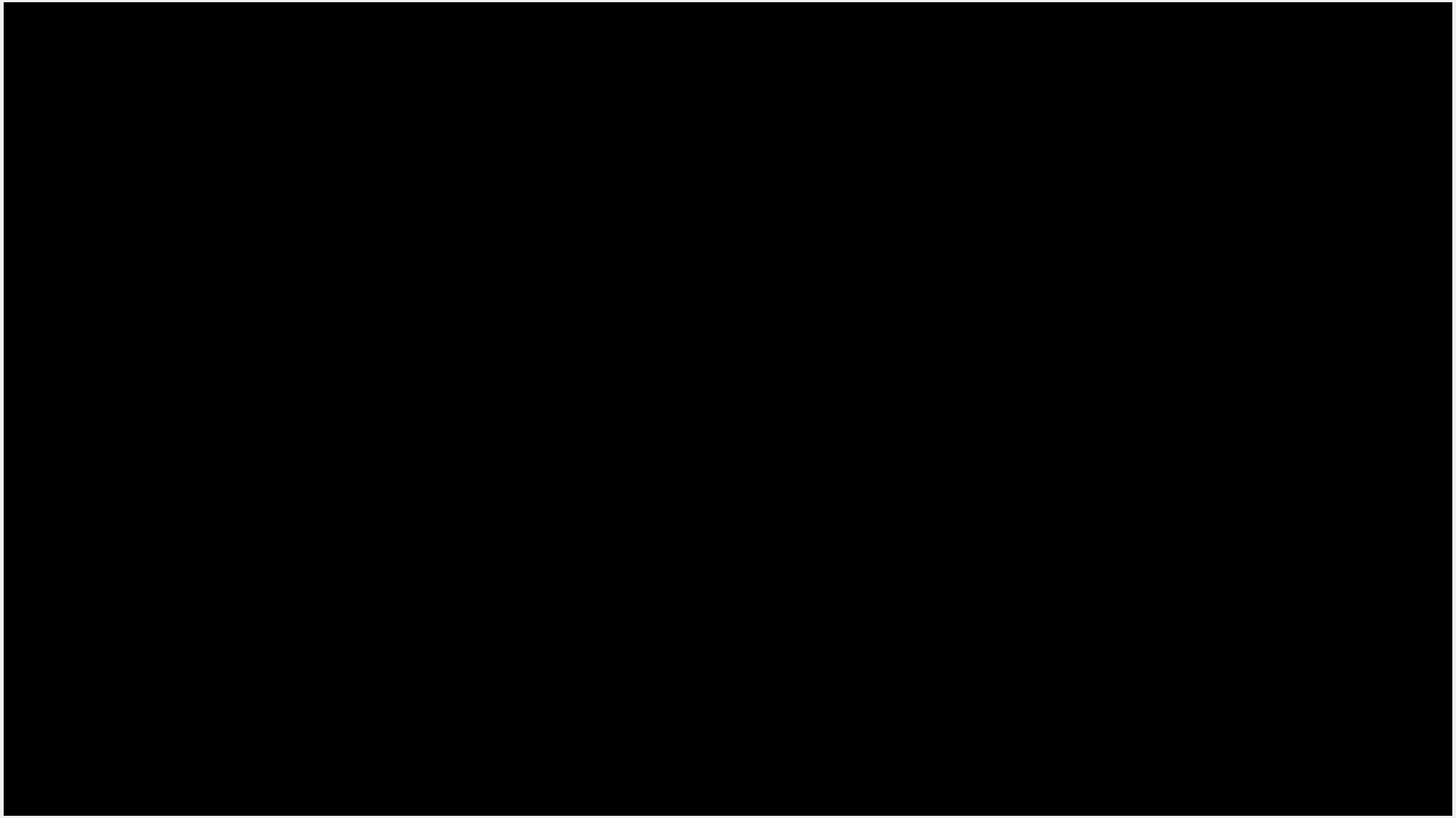
35°C Full Austenitic transformation - superelastic

A-Phase

Surface balayée par la point (non coupante)



Expansion total de 3 à 6 mm



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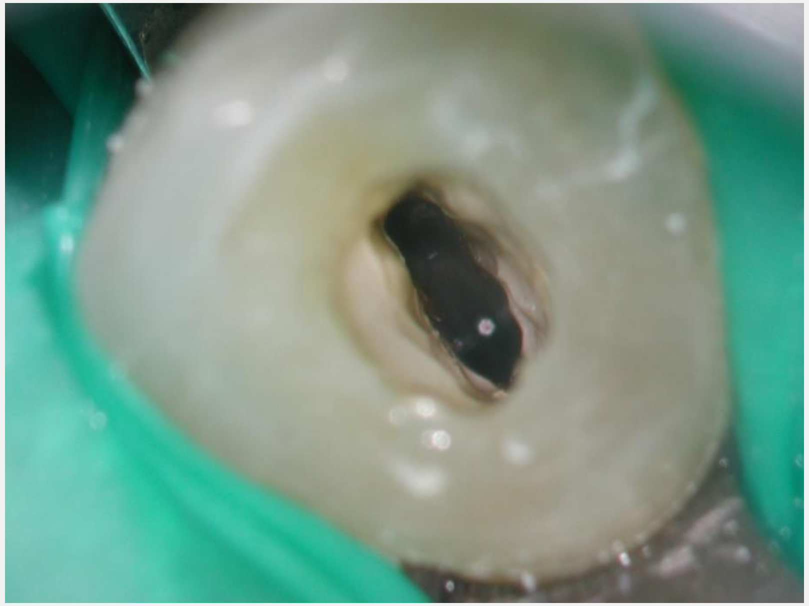
Cas clinique: Dent 23 – irrigation avec NaOCl et application de XP endo Finisher



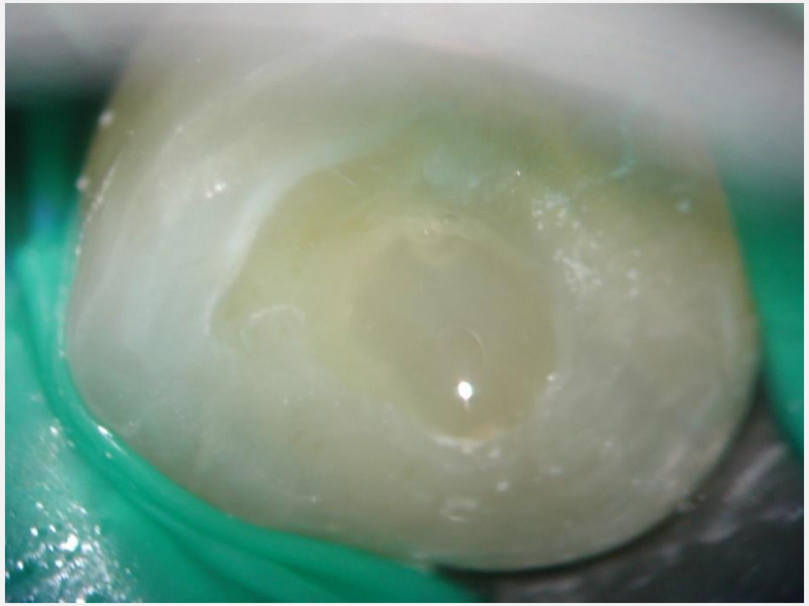


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TABLE 1. The Mean ± Standard Deviation of the % Increase in Volume, % Increase in Surface Area, % of Untouched Surfaces, Debris, and Dentin Removed after Preparation with XP Shaper or Vortex Blue

	Apical third		Middle third		Coronal third		Total	
	XP	VB	XP	VB	XP	VB	XP	VB
% volume increase (mm^3)	62.4 ± 25.6	43.5 ± 29.2	57.7 ± 19.2[a]	29.1 ± 19.1[b]	31.9 ± 30[c]	11.2 ± 10.6[d]	41.3 ± 24.6*	19.6 ± 14.4
% surface increase (mm^2)	20.4 ± 10.5	15.6 ± 11	10.1 ± 3.4[a]	6 ± 4.9[b]	7.6 ± 5.2[c]	2.7 ± 4.5[d]	12.7 ± 9.2*	8.3 ± 9.2
% untouched surface	30.7 ± 11.6	47.4 ± 10.3	39.6 ± 8.3[a]	56.2 ± 5.5[b]	40.8 ± 8.5	64.3 ± 13.3	38.6 ± 8.1*	58.8 ± 8.5
Debris (mm^3)	0.01 ± 23.6	0.05 ± 0.06	0.03 ± 0.02	0.05 ± 0.03	0.06 ± 0.04	0.07 ± 0.03	0.10 ± 0.05	0.16 ± 0.07
Dentin removed (mm^2)	0.26 ± 0.09	0.32 ± 0.27	0.70 ± 0.15[a]	0.36 ± 0.14[b]	0.77 ± 0.29[c]	0.30 ± 0.19[d]	1.73 ± 9.2*	0.98 ± 0.49

VB, Vortex Blue; XP, XP Shaper.

Data are presented as total as well as at the coronal, middle, and apical third of the canal. Different superscript letters in each row indicate statistical significance.

*Indicates statistical significance in the total.

Azim et al, JOE 2017
XP Shaper, A Novel Adaptive Core Rotary Instrument: Micro–computed Tomographic Analysis of Its Shaping Abilities

Efficacy of 4 Irrigation Protocols in Killing Bacteria Colonized in Dentinal Tubules Examined by a Novel Confocal Laser Scanning Microscope Analysis

CrossMark

Adham A. Azim, BDS,[*1] Hacer Aksel, DDS,*[*2] Tingting Zhuang, MA,*[†] Terry Mashtare, PhD,*[†]
Jegdish P. Babu, PhD,[*] and George T.-J. Huang, DDS, MSD, DSc*[*]

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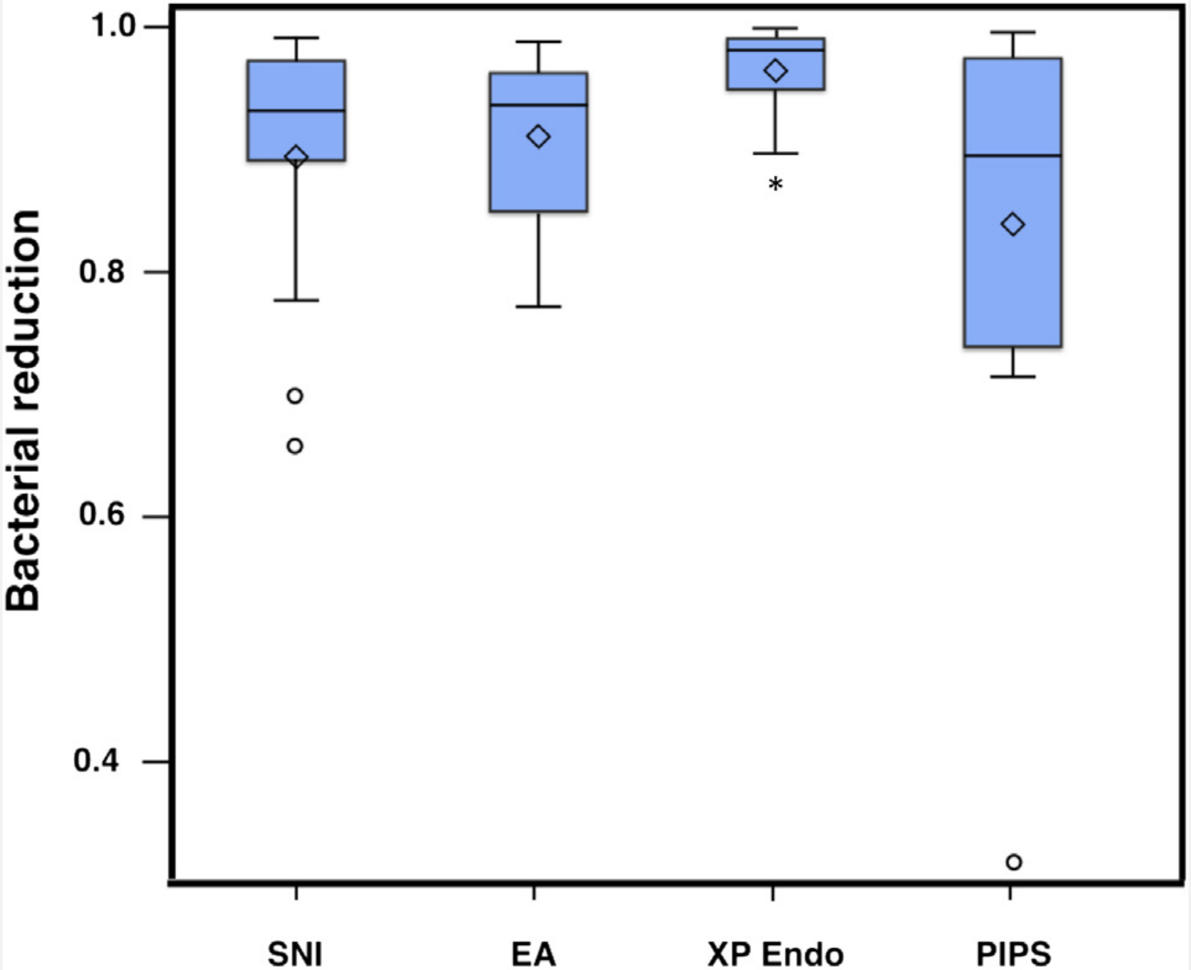
SNI standard needle irrigation

EA sonically agitating with EndoActivator

XP Endo finisher

Erbium: yttrium aluminum garnet laser (PIPS)



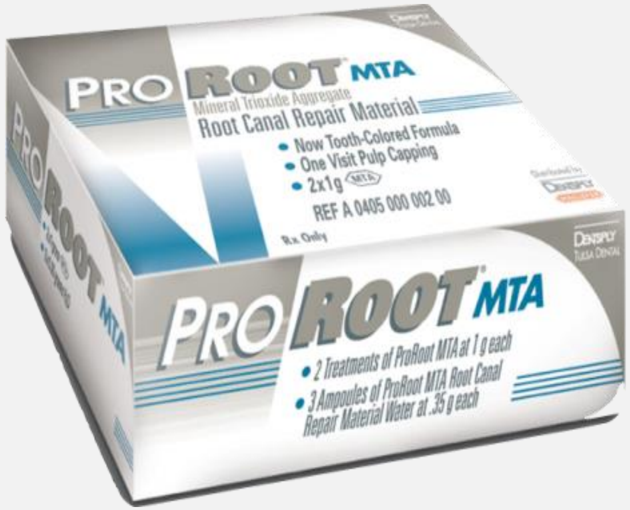
TotalFill

Premixed Bioceramic Endodontic Materials

Premier bioceramic: ciment à base de silicate de calcium hydraulique patenté pour l'endodontologie est le mineral trioxide aggregate (MTA; Dentsply Tulsa Dental Specialties, Johnson City, TN, USA)

Dérivé du Portland cement

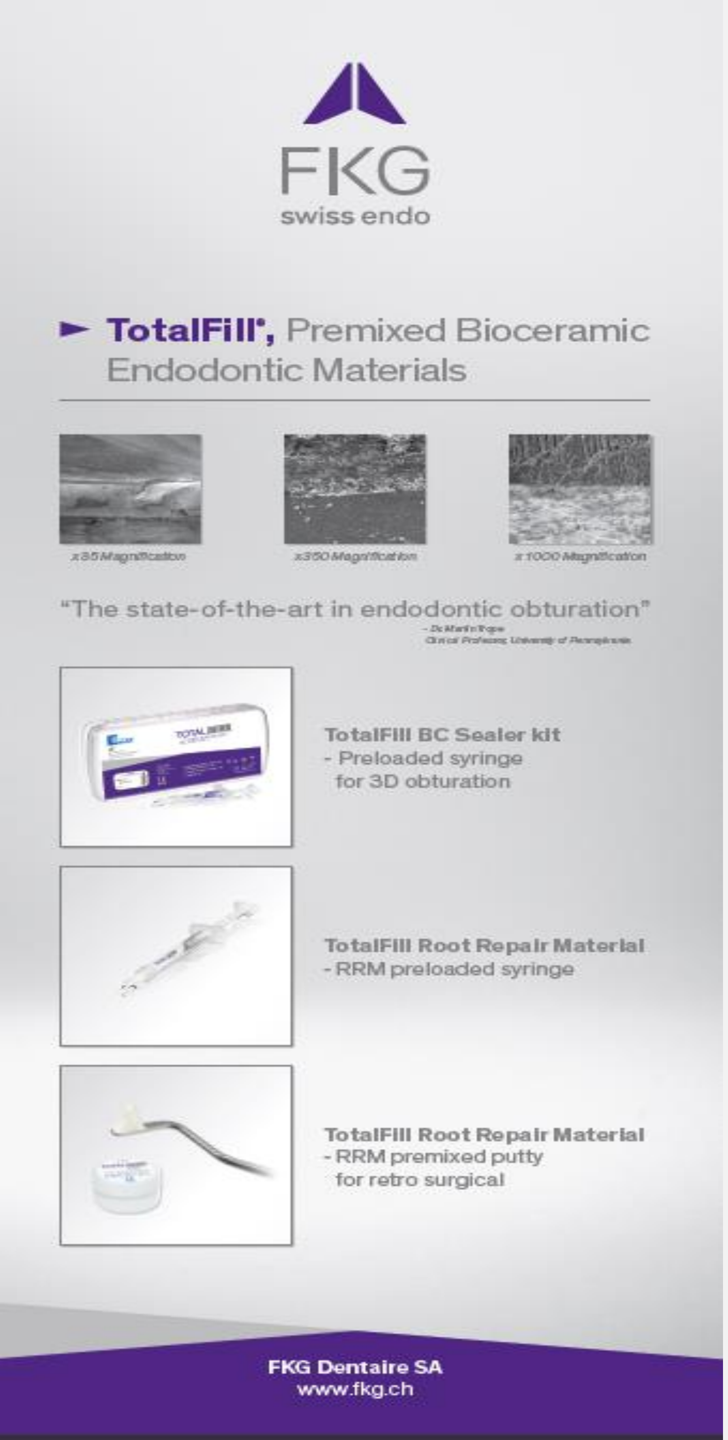
Biocompatible, capacité régénérative, propriété antibactérienne



• MTA (Dentsply ou PD Vevey)

• Biodentine (Septodont)

• Bioaggregate, iRoots (IBC), Endosequence,
  Total Fill RRM



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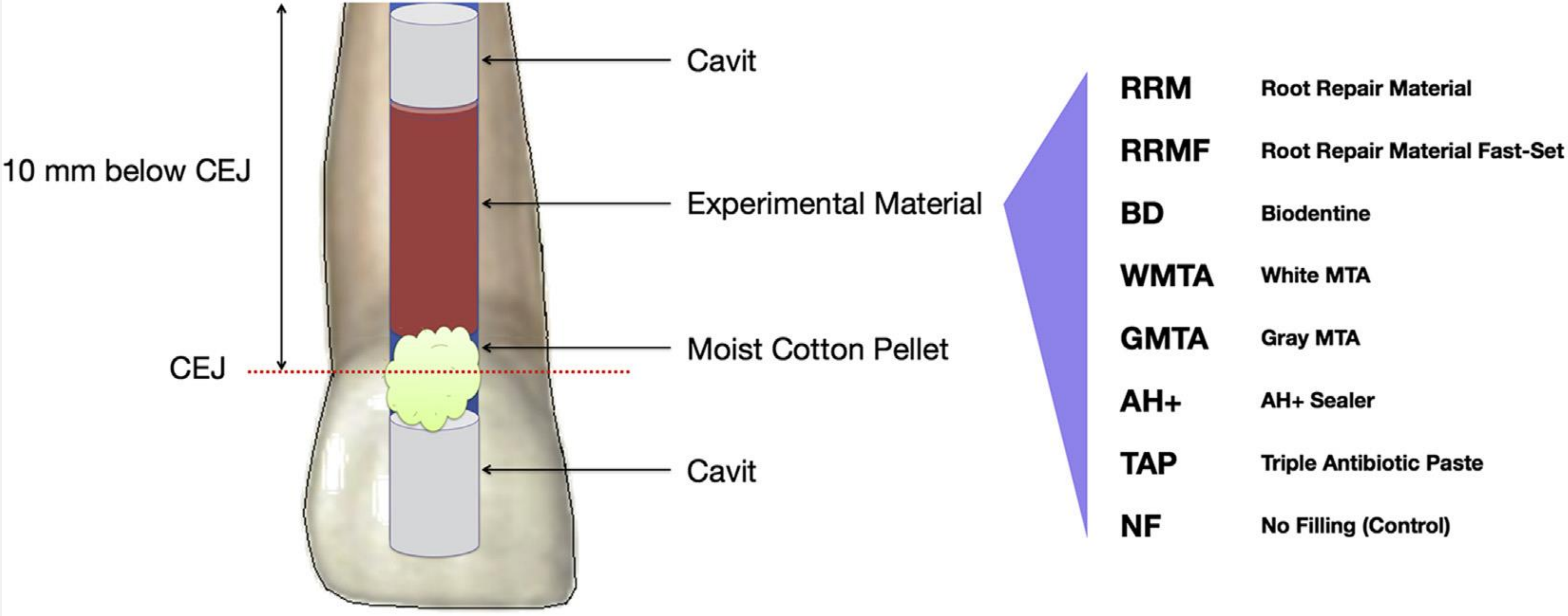
- Liaison entre le ciment et la dentine
- Liaison entre le ciment et les Total Fill BC Points
- Augmentation de la résistance a la fracture
- Limitation de la croissance des micro-organismes

Spectrophotometric Analysis of Coronal Tooth Discoloration Induced by Various Bioceramic Cements and Other Endodontic Materials.

Kohli et al. 2015 Journal of Endodontics



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Case clinique: patiente 40 ans, douleurs après 3 composites, dents 14 15 16

Coiffage indirect sur la 16 avec MTA, composite direct sur 14 et 15

Apexification de 11 et 21

Patient de 9 ans

Dent 11 et 21: parodontite apicale après accident

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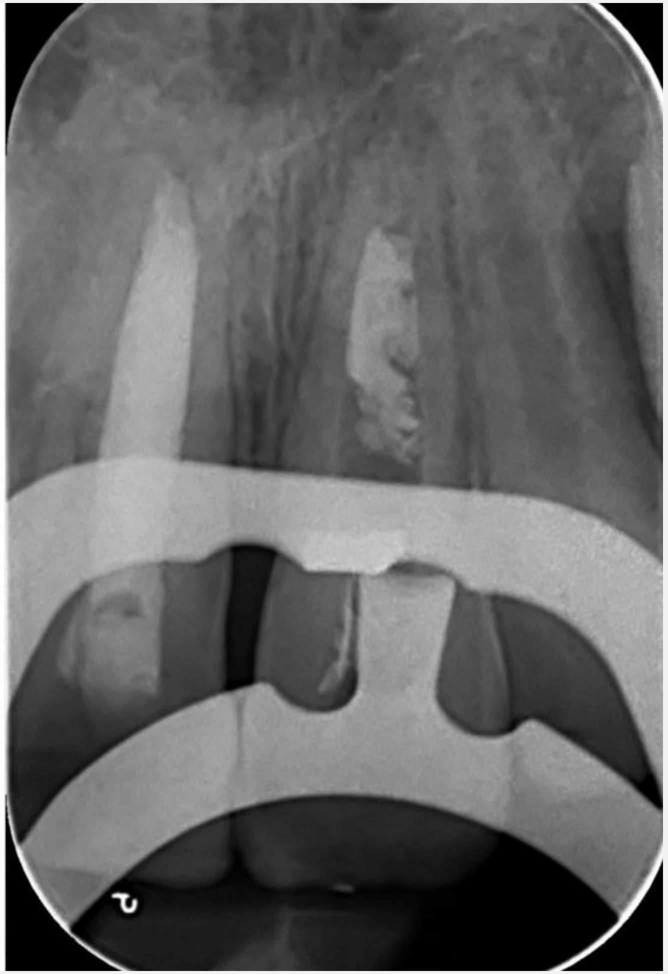
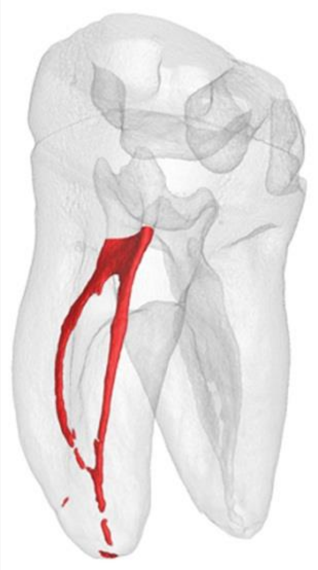
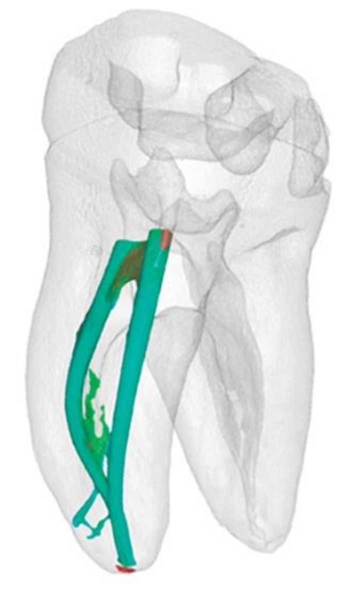


TotalFill BC Sealer : Premixed Bioceramic Endodontic Materials





Cas clinique: patiente 48 ans, dent 36 avec pulpite et nécrose

- Test froid négatif et douleurs différées

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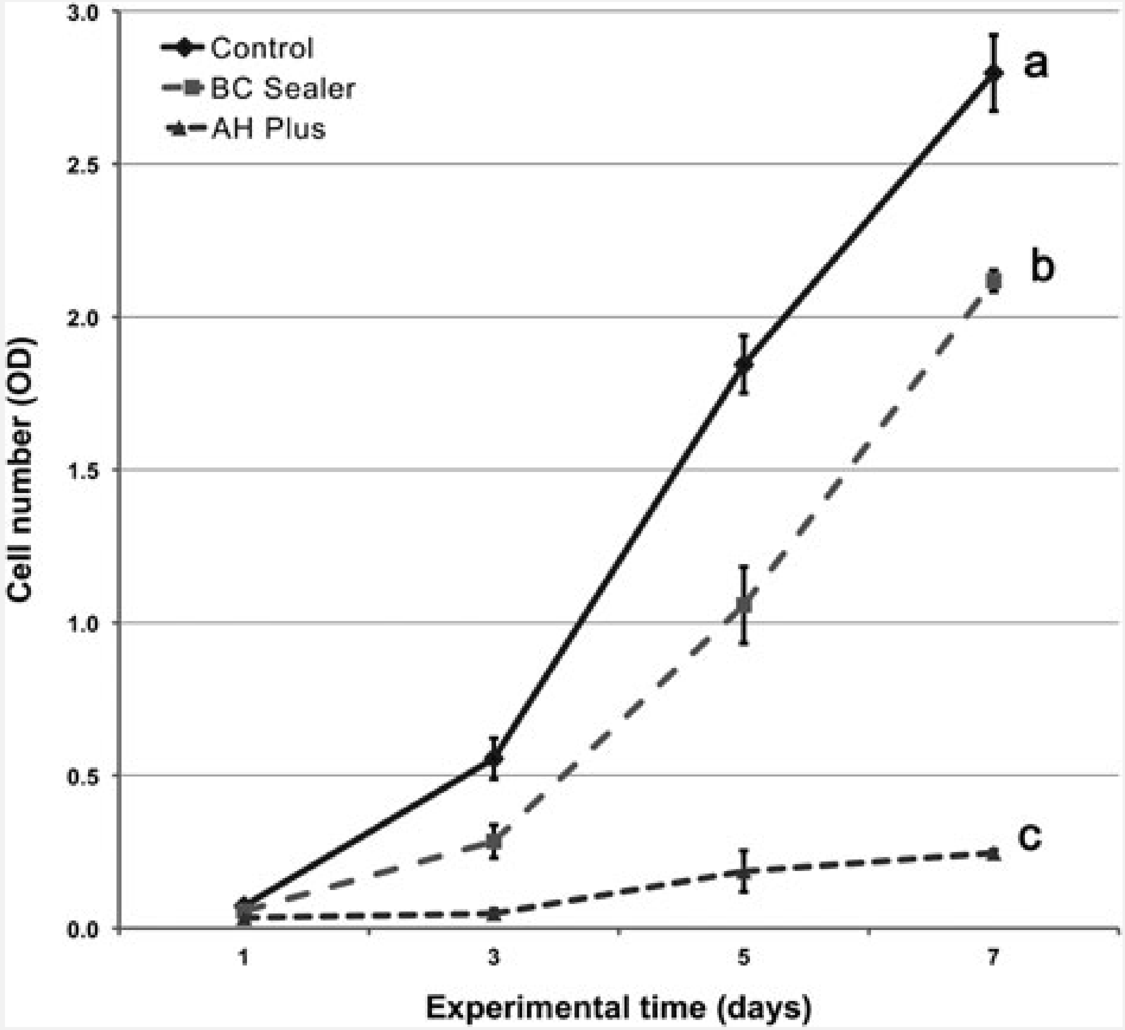
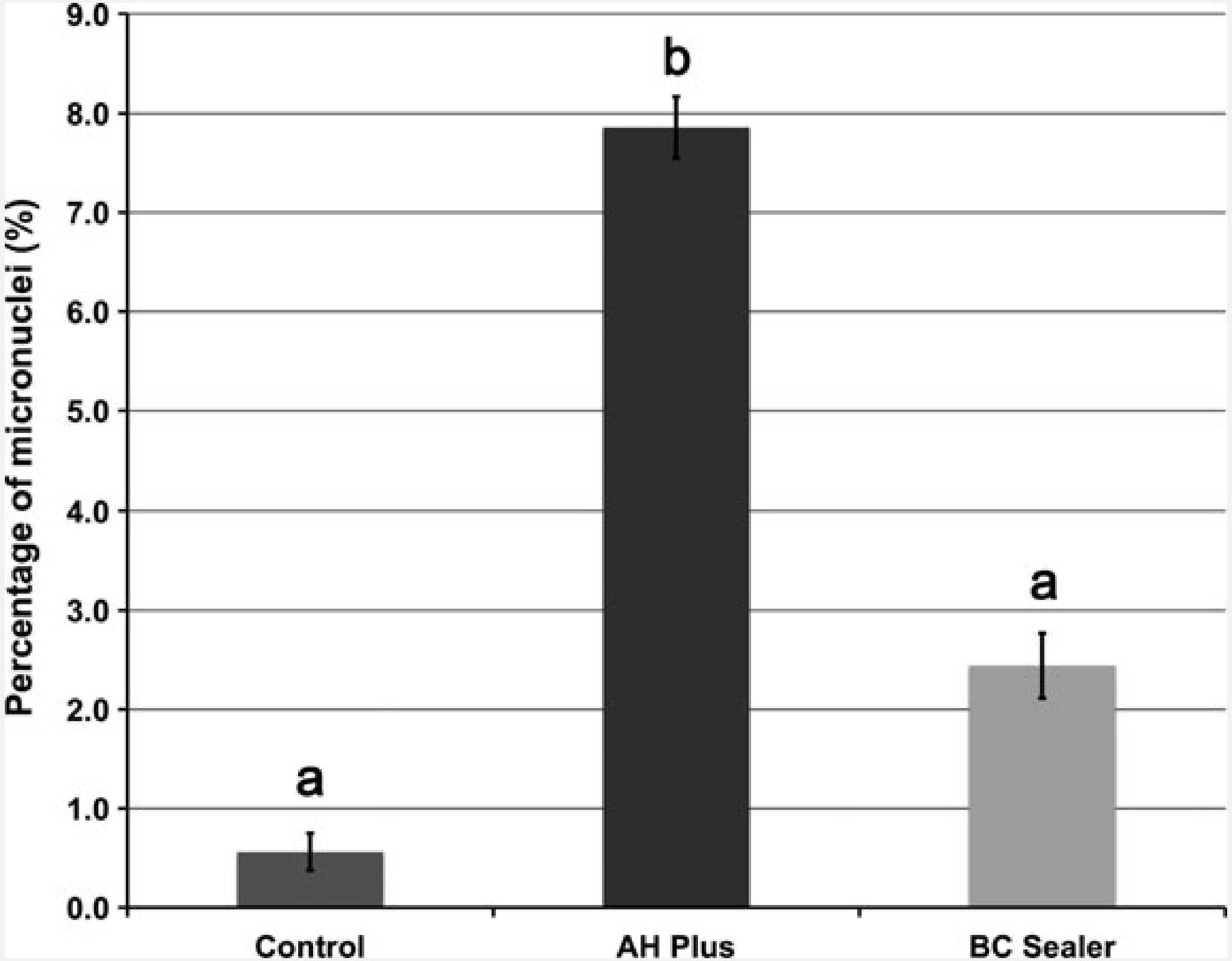
Cytotoxicity, genotoxicity and antibacterial effectiveness of a bioceramic endodontic sealer.
Candeiro et al. International Endodontic Journal 2015





Dentin Moisture Conditions Affect the Adhesion of Root Canal Sealers

Emre Nagas, DDS, PhD, M. Ozgur Uyanik, DDS, PhD,* Ayhan Eymirli, DDS,**
Zafer C. Cebreli, DDS, PhD,† Pekka K. Vallittu, DDS, PhD,‡ Lippo V.J. Lassila, DDS, PhD,‡
*and Veli Durmaz, DDS, PhD**

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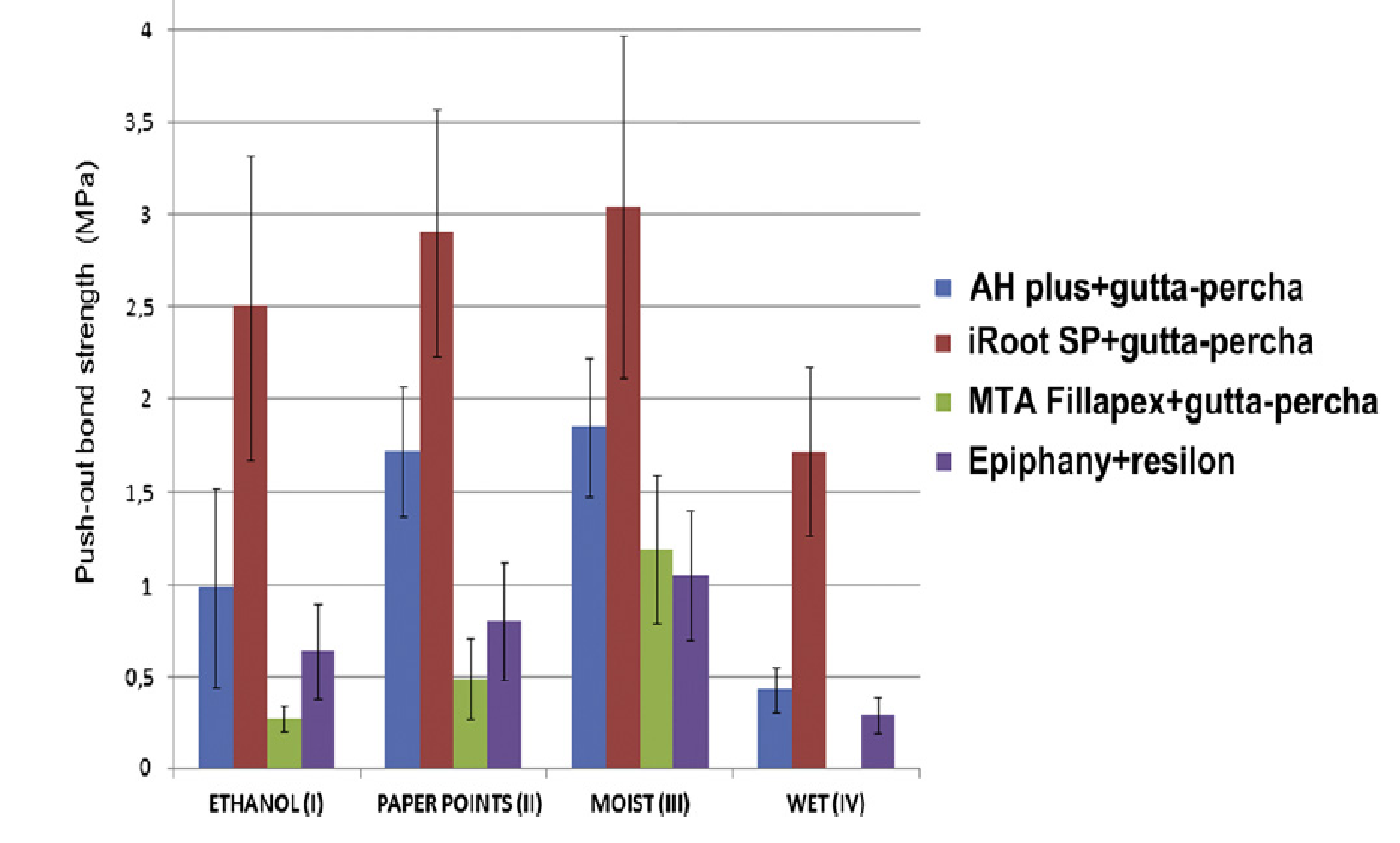

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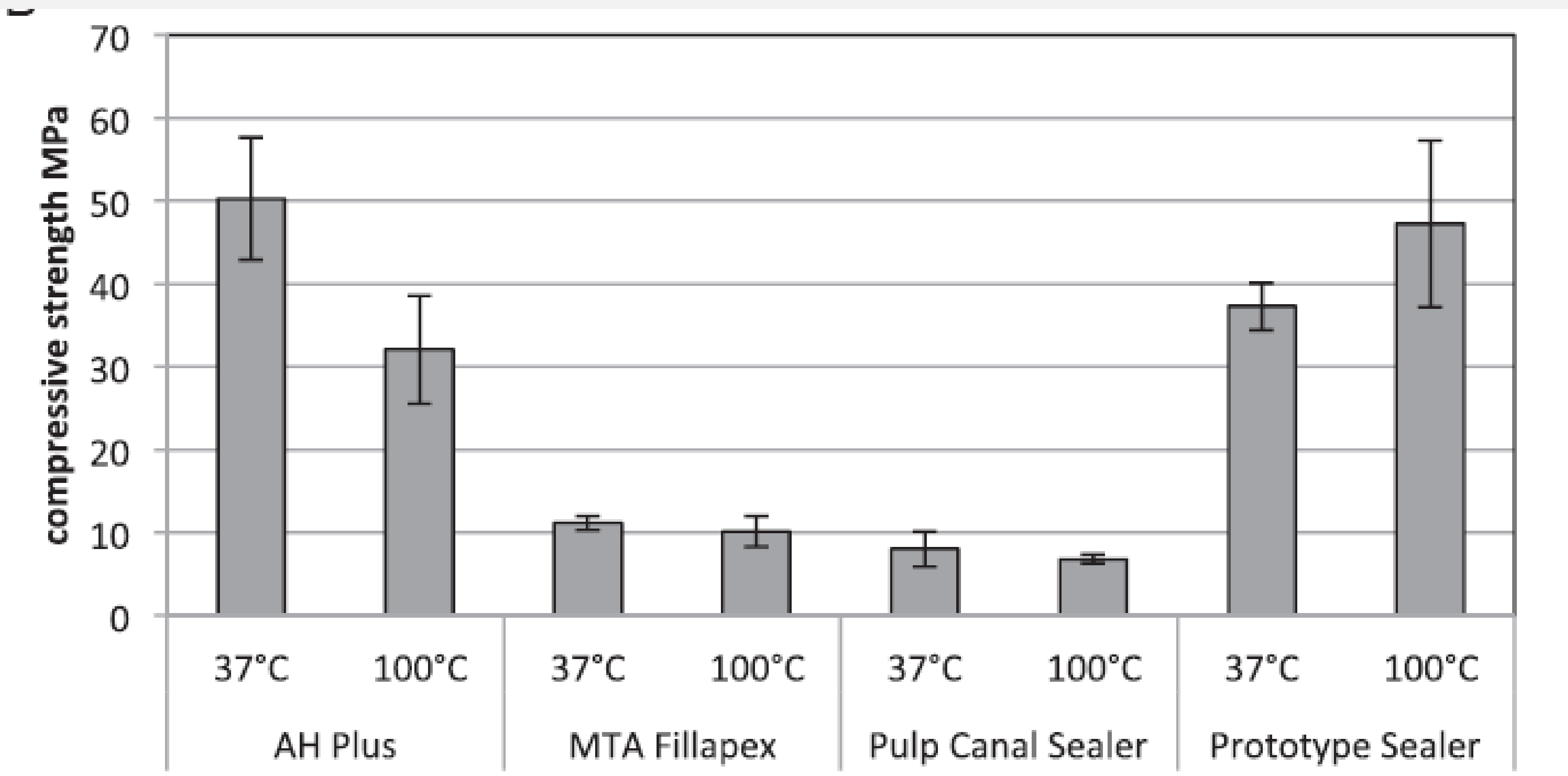
Investigation of the Effect of Sealer Use on the Heat Generated at the External Root Surface during Root Canal Obturation Using Warm Vertical Compaction Technique with System B Heat Source

Raqueli Viapiana, DDS, MsD, * *Juliane Maria Guerreiro-Tanomaru, DDS, PhD,* * *Mario Tanomaru-Filho, DDS, PhD,* * *and Josette Camilleri, BChD, MPhil, PhD*†



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Accident avec avulsion de 11, 21 et 22

Application de MTA dans résorption interne (5 ans)

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