Guilan University of Medical Sciences

Faculty of Dentistry

ROTARY SYSTEMS

DR. SAMANE HAJIZADEH

1. HISTORY OF NI-TI FILES
2. DEFINITIONS FOR ROTARY FILES
3. BASIC STEPS IN USING ROTARY INSTRUMENTS
4. CAUTIONS IN USING ROTARY FILES
5. DIFFERENT ROTARY SYSTEMS

HISTORY OF NI-TI FILES

STAINLESS STEEL

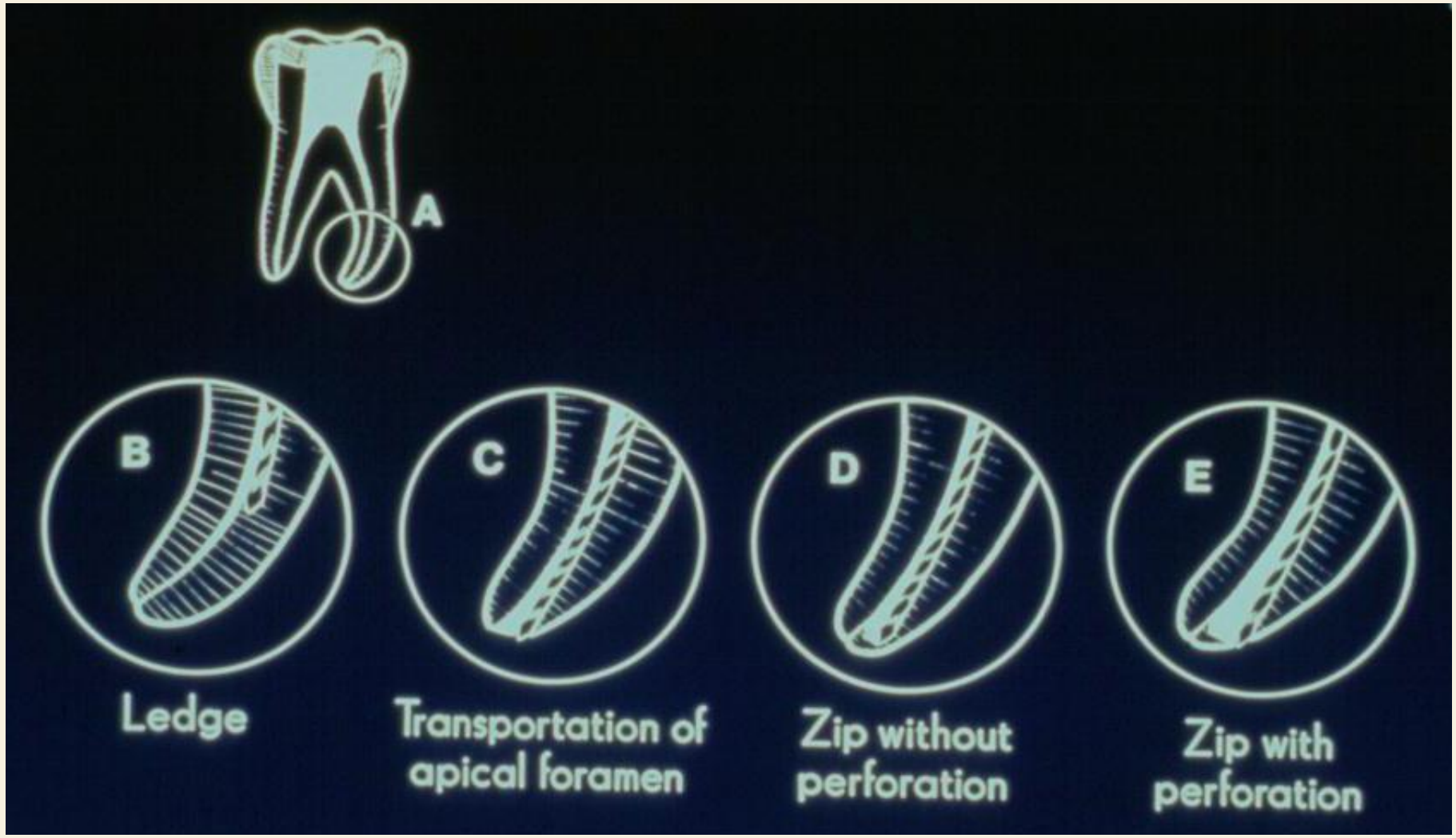
ADVANTAGES

- Corrosion resistance

DISADVANTAGES

- Stiffness in nature
- Porn to fracture
- Low resistance to cyclic fatigue

1. Errors in canal preparation



2. TIME CONSUMER

3.UNPLEASANT FOR PATIENT AND PRACTITIONER

TRY TO MAKE RCT A PIECE OF CAKE

- easier
- faster
- safer.

NICKEL TITANIUM ALLOY

- Faster instrumentation → engine driven
- Stainless Steel → cyclic fatigue, stiffness
- Flexibility , Less errors → Ni-Ti Alloy

INVENTION OF NITI INSTRUMENTS

Revolution in Endodontic 1990,s

Buehler&Wang,US,1960

55% [by weight] Ni and 45% Ti

NI-TI

ADVANTAGES

- Low modulus of elasticity
- Specific flexibility
- Superelasticity
- Shape memory
- Fracture resistance
- Corrosion resistance

DISADVANTAGES

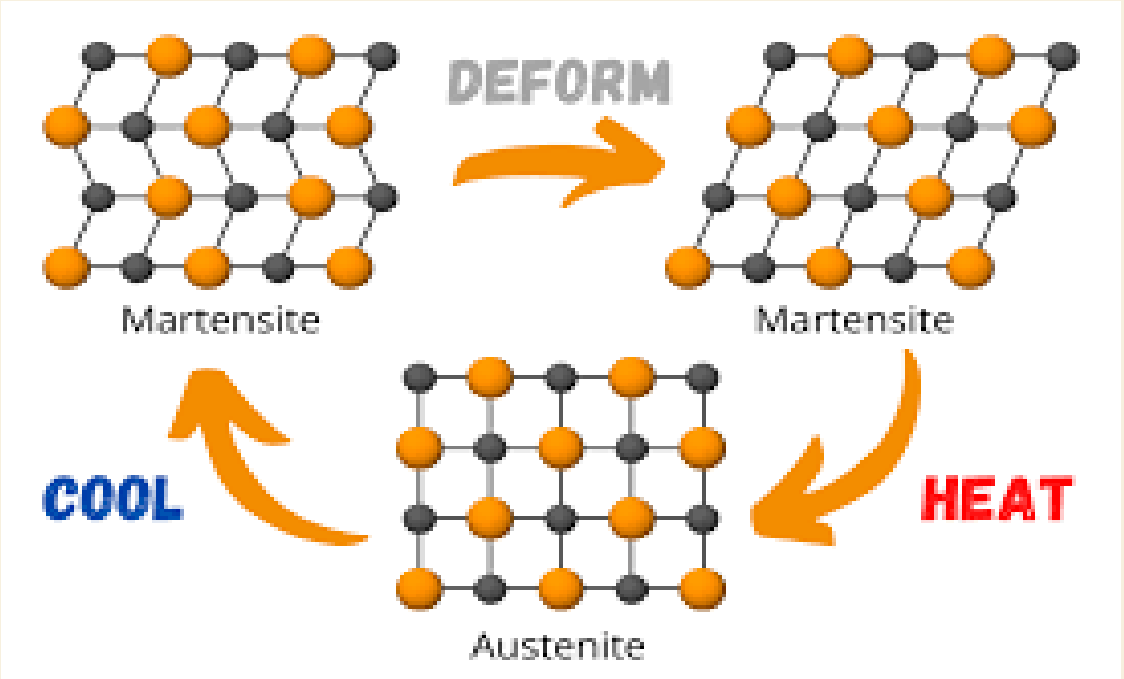
- Poor cutting efficiency
- No signs of fatigue before fracture

NI-TI ALLOY

Superelasticity / Shape memory

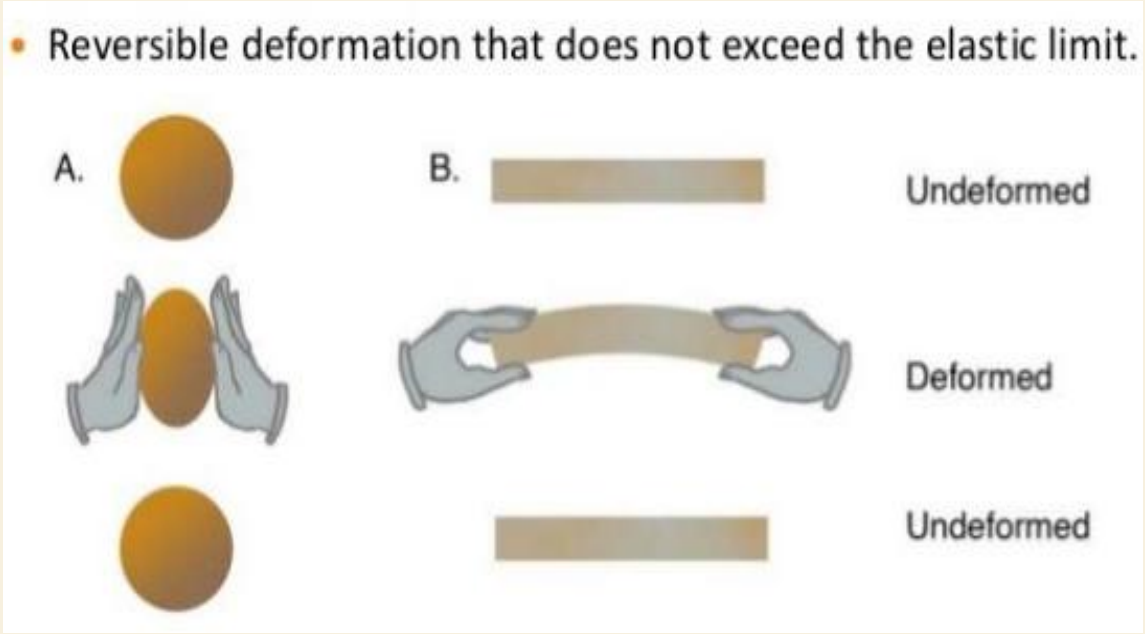
Austenitic phase / Martensitic phase

stress, cooling

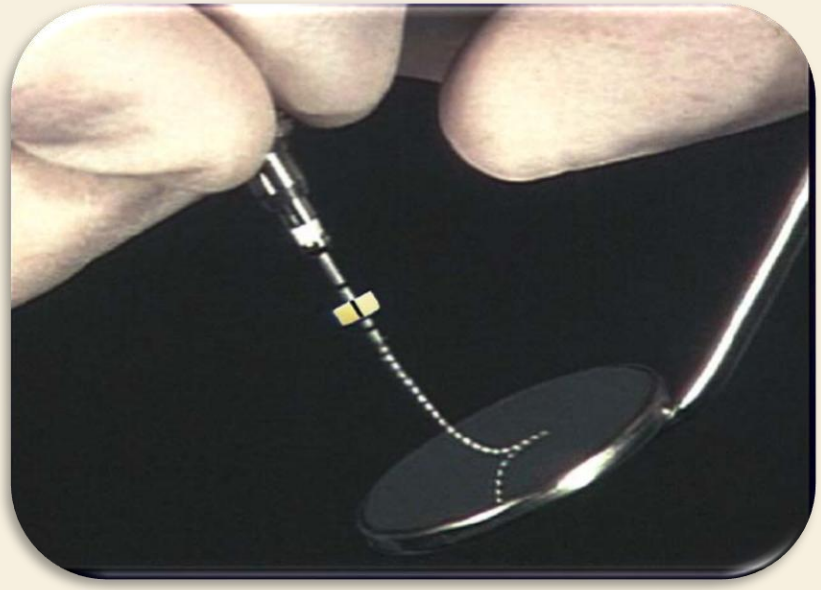


SUPERELASTICITY

- Superelasticity is caused by the austenite transforming into the martensite form.
- The strain remains constant during this transformation until the whole niti mass converted to the martensite form → endo of superelasticity
- Reversible deformation → elastic deformation
- Plastic deformation
- File separation



SHAPE MEMORY



- The original shape is resotred after heat application or autoclaving procedure

HEAT-TREATED NITI ALLOYS

- ✓**M-Wire:** **ProTaper Next**, Reciproc and WaveOne
- ✓**R-phase:** **Twisted file**

} Mainly contain **austenitic phase**

- ✓**CM-Wire:** **ProTaper Gold**, Vortex Blue, Hyflex CM ang EDM

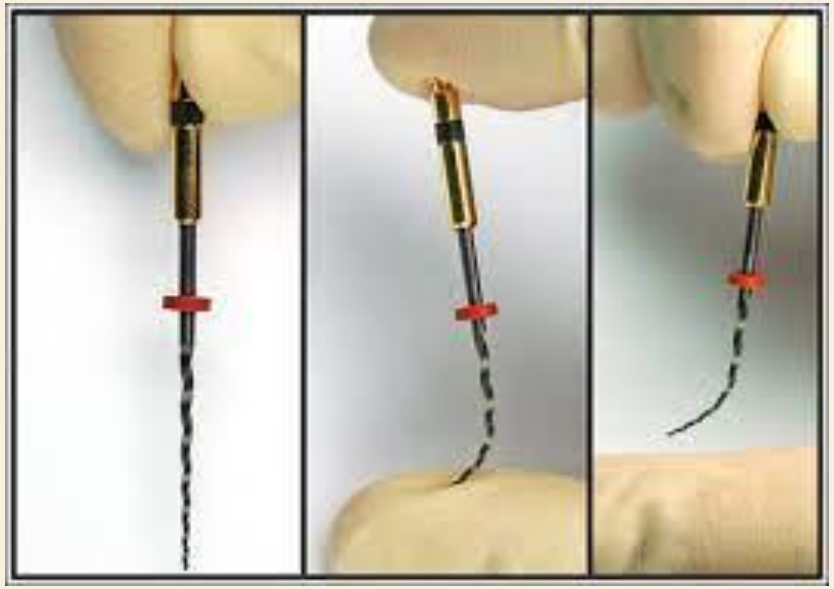
} Stable **Martenistic** phase

NICKEL-TITANIUM FILES

M-wire

- Lower modulus of elasticity
- More flexible → curved canal
- Higher cyclic fatigue
- High fracture resistance(300%)
- No shape memory
- **ProTaper Next**, Reciproc and WaveOne

CONTROLLED MEMORY WIRE (2010)



- Stable Martenistic phase
- extreme flexibility
- 300-800% more fatigue resistant
- **Shape memory** → no rebound effect after unloading
- **Pre bending** before placing in a curved canal
- Heat application or autoclaving procedure → back to original shape
- Increased tendency of plastic deformation → single use
- **ProTaper Gold**, Vortex Blue, Hyflex CM ang EDM

DEFINITIONS FOR ROTARY FILES

ROTARY SYSTEMS

❖ Rotary Files (Engine Files):

- Grinding (machining) a NiTi Wire
- Latch type files: Flex Master, Profile, Protaper, GT, Mtow, Hero, Race, K3…Hyflex, Neoniti, V Taper, Twisted file, One shape

❖ Rotary Handpieces (low speed):

Turbine 40000,Angel 4000, rotary 400 rpm (rotation per minute)

A)Endodontic Handpieces:

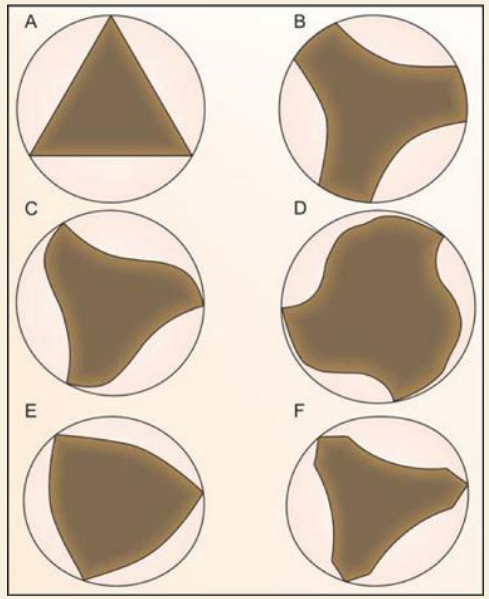
- Pneumatic → connection to Airmotor
- Electrical → connection to Micromotor → better: adjustable speed

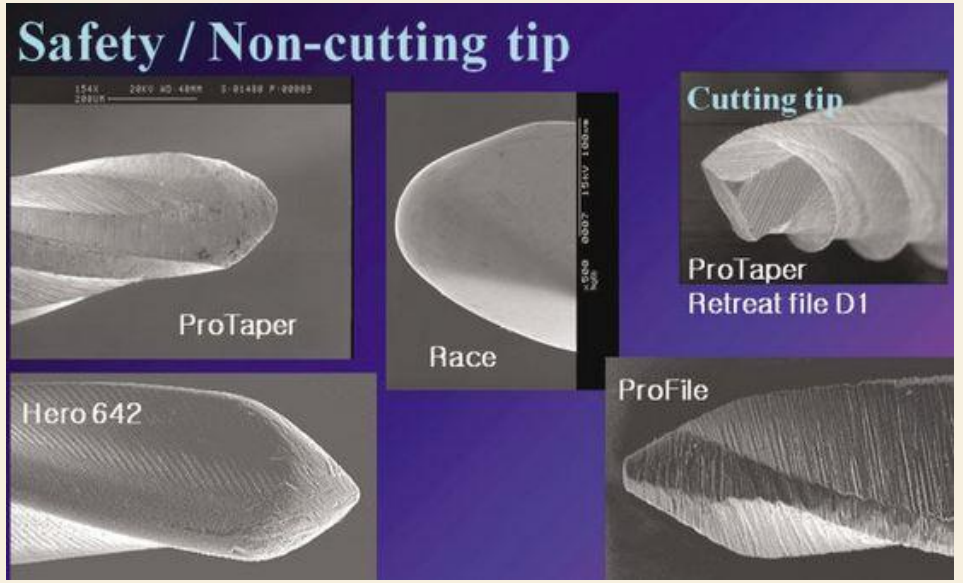
B) Intelligent Devices:

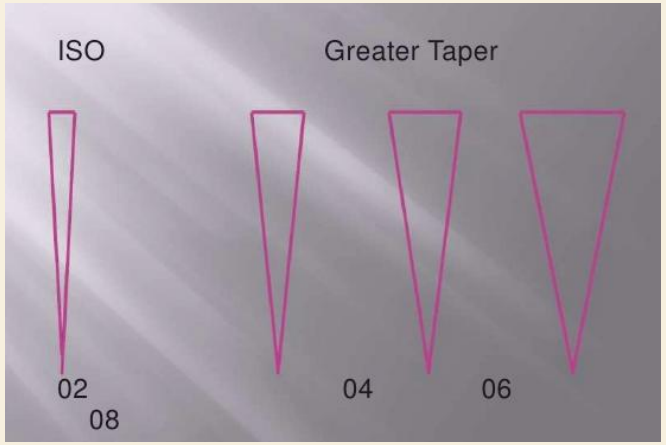
- Electronic Handpieces
- Cordless Electronic Handpieces

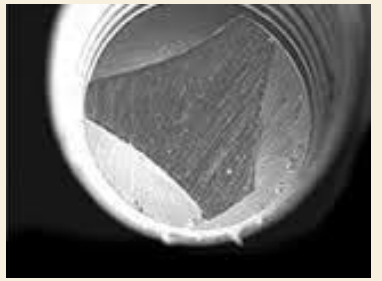
COMPONENTS OF A FILE

- Cross section
- Tip
- Taper
- Cutting edge
- Pitch
- core
- Flute
- Land
- Rake angle
- Cutting angle
- Helix angel



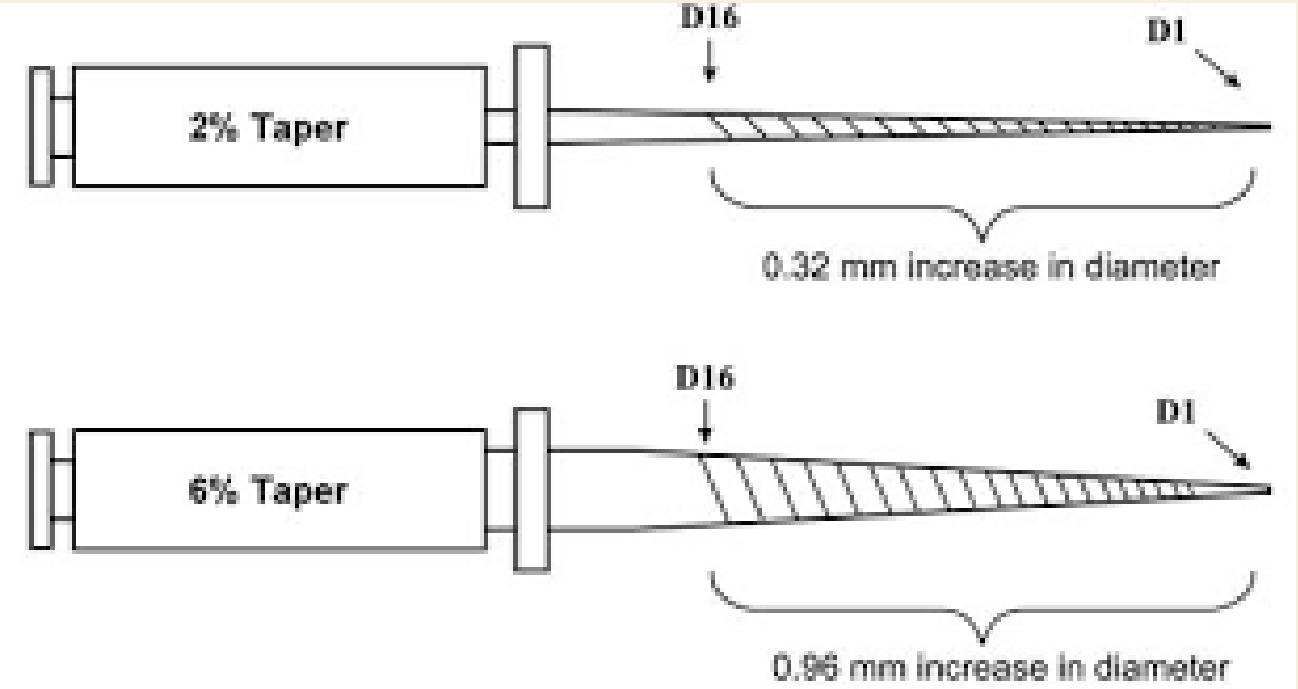






TAPER

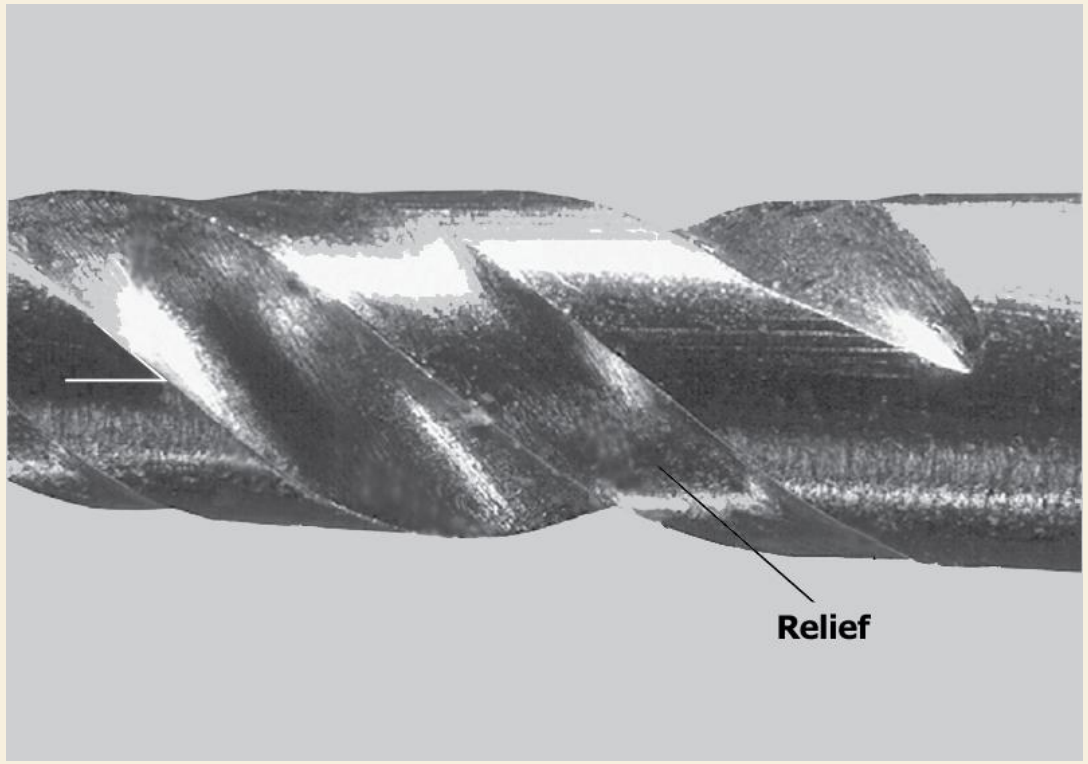
- Amount which the file diameter increases each millimeter along its working surface from the tip toward the file handle.
- #.02 taper = 2% taper

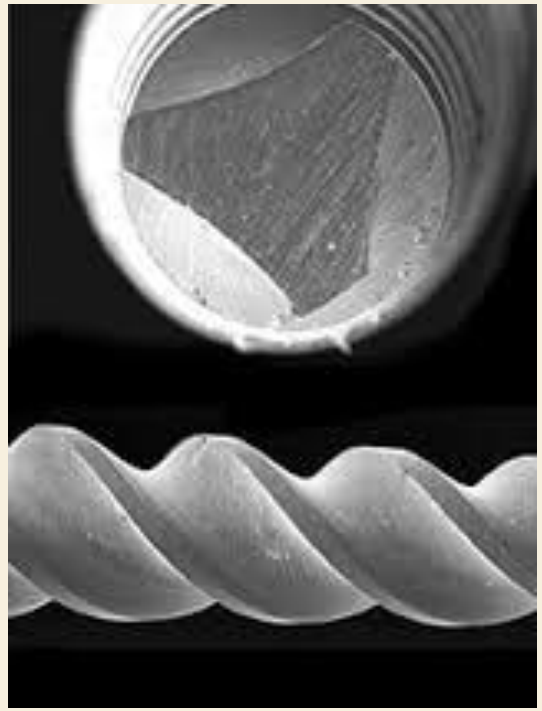


FLUTE

The groove in the working surface used to collect **soft tissue and dentin chips** removed from the wall of the canal.

It's effectiveness depends on its depth, width, configuration, and surface finish.





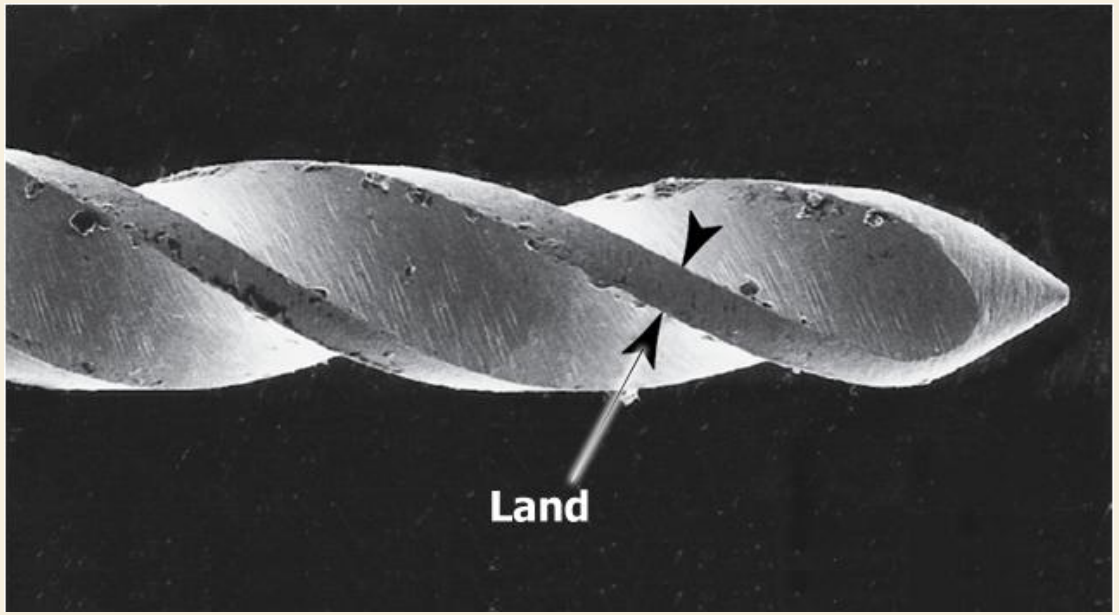
LEADING EDGE = CUTTING EDGE=BLADE

- The surface with the **greatest diameter** that follows the groove (where the flute and land intersect).

- Deflects chips from the wall of the canal and severs or snags soft tissue.
- Its effectiveness depends on its angle of incidence and sharpness.

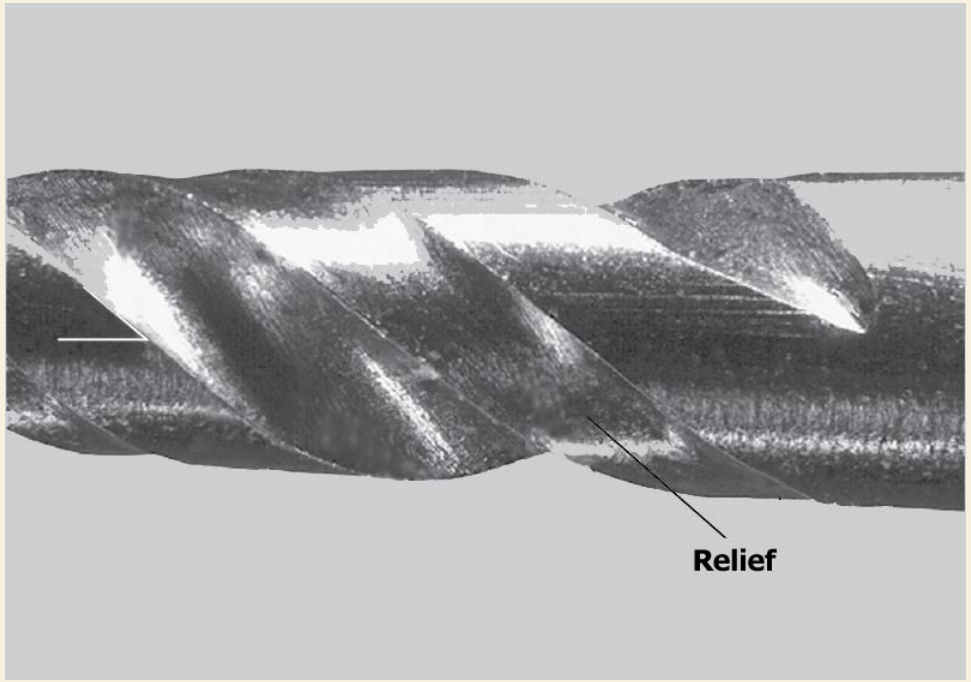
LAND

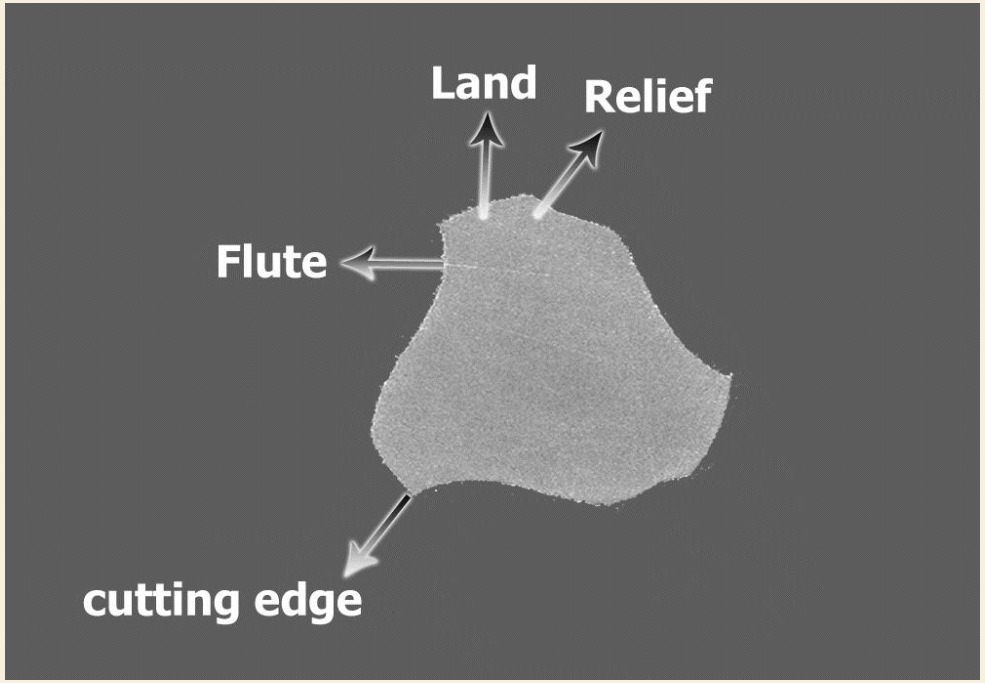
- If a surface projects axially from the central axis as far as the cutting edge between flutes, this surface is called the land (or sometimes the **marginal width**)



RELIEF

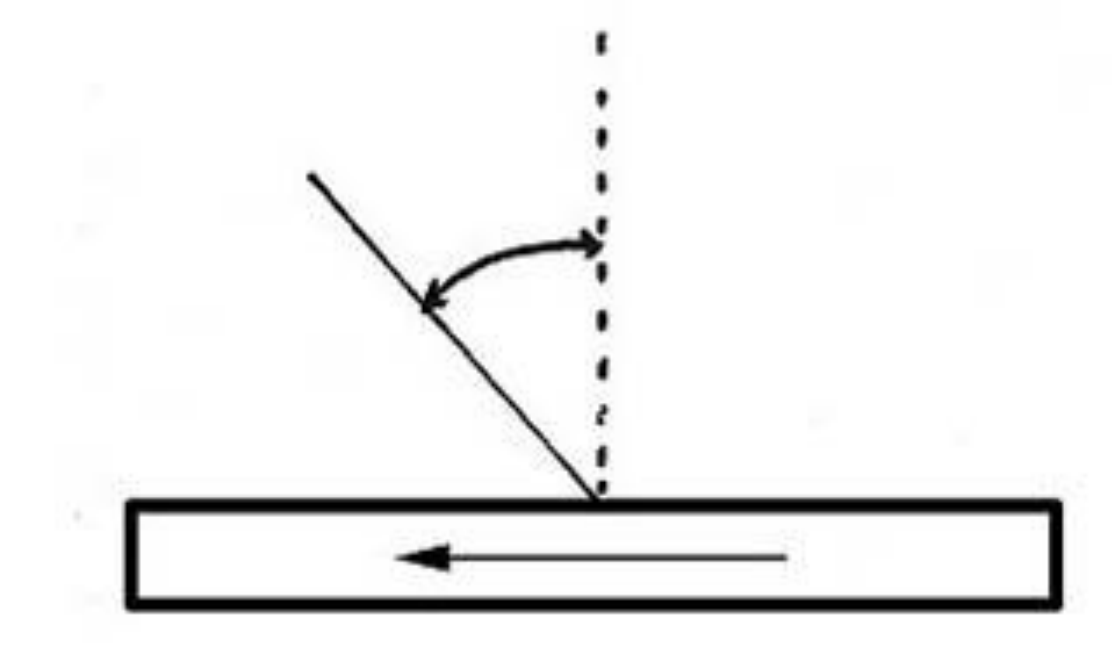
- To **reduce frictional** resistance, some of the surface area of the land that rotates against the canal wall may be reduced to form the *relief*

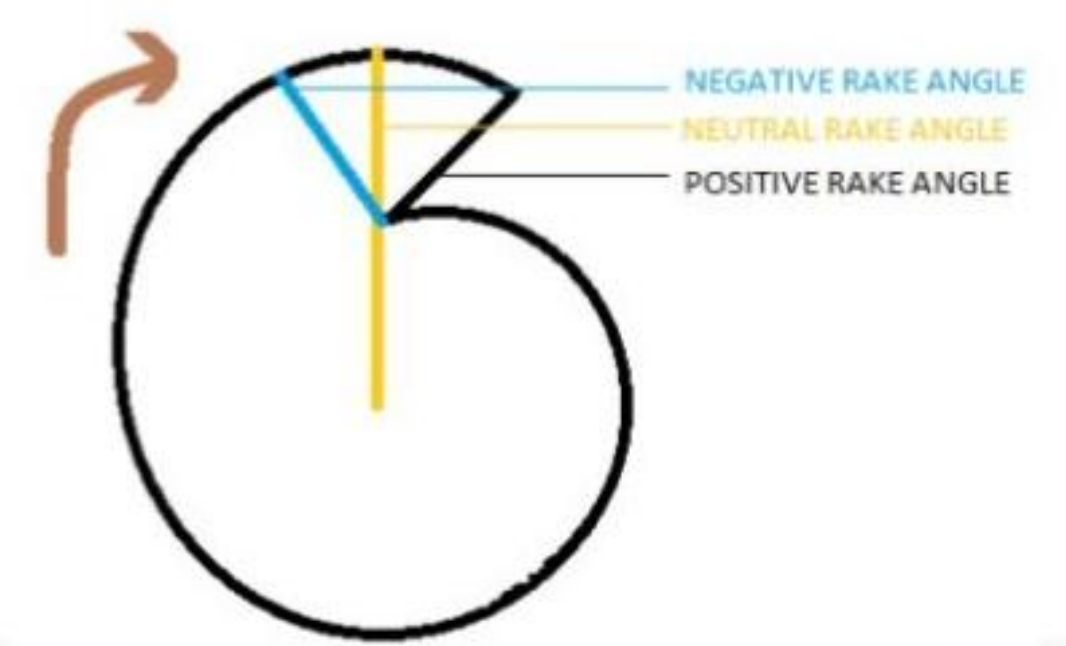




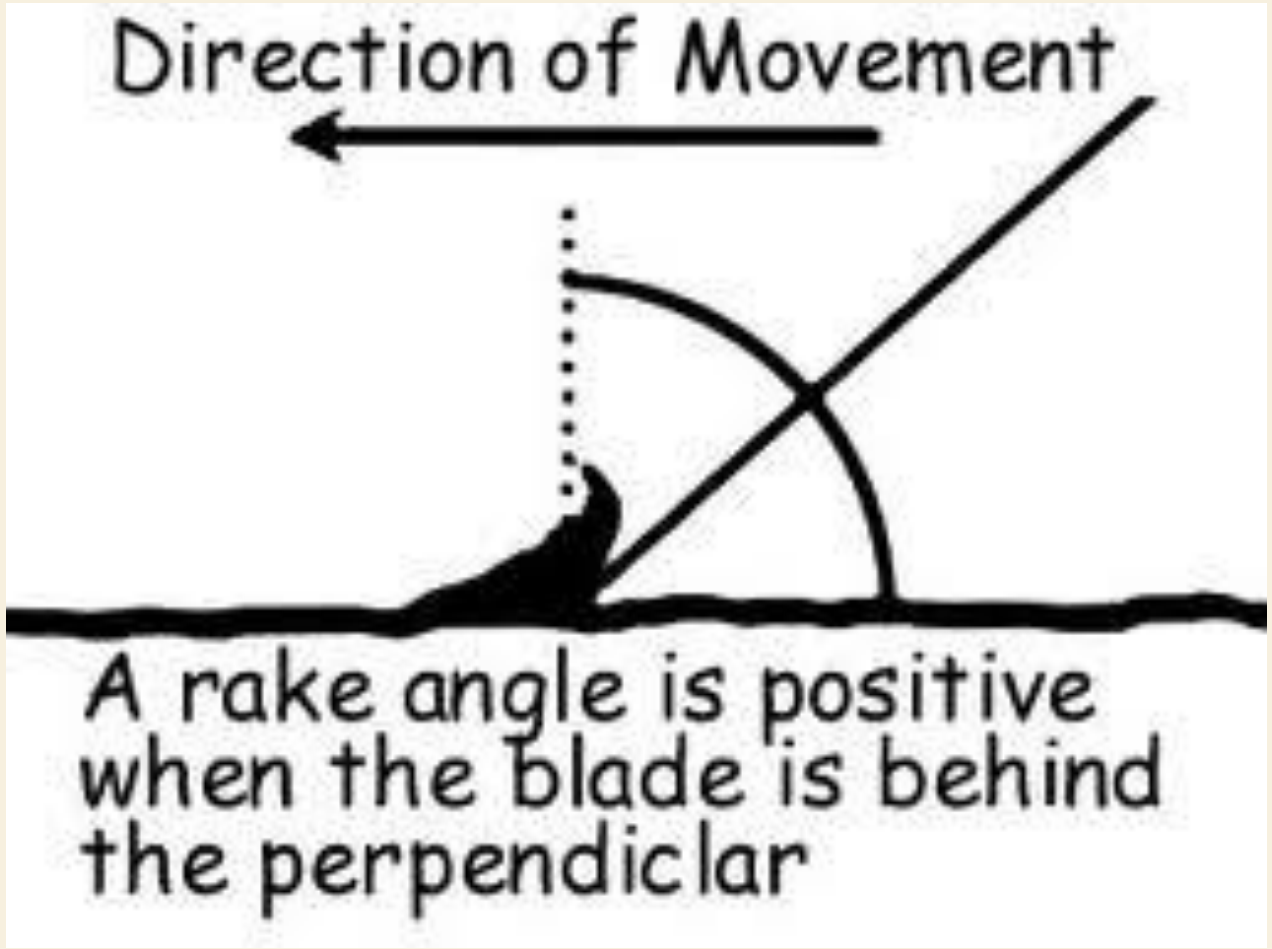
RAKE ANGLE

The angle between the leading edge of a cutting tool and a perpendicular to the surface being cut.



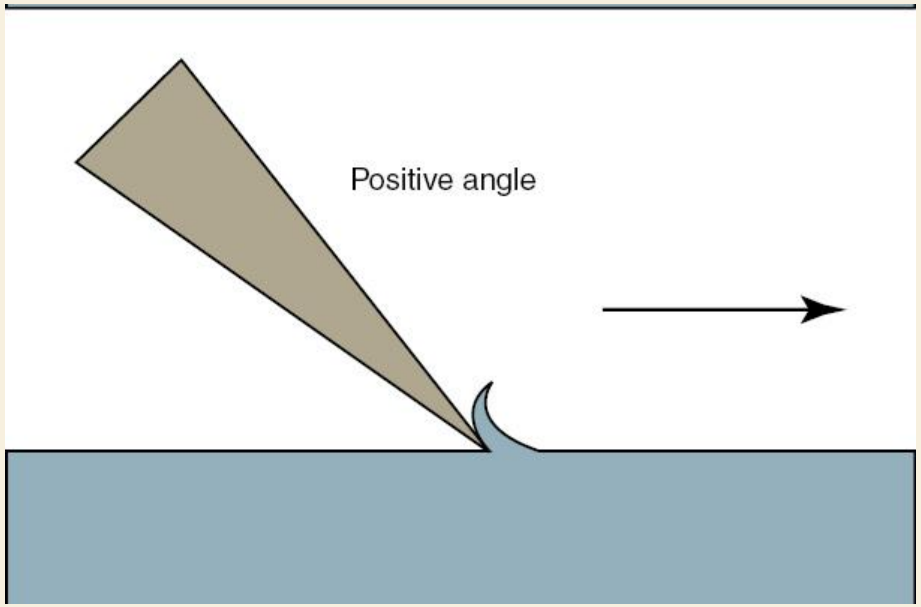


CUTTING ANGLE



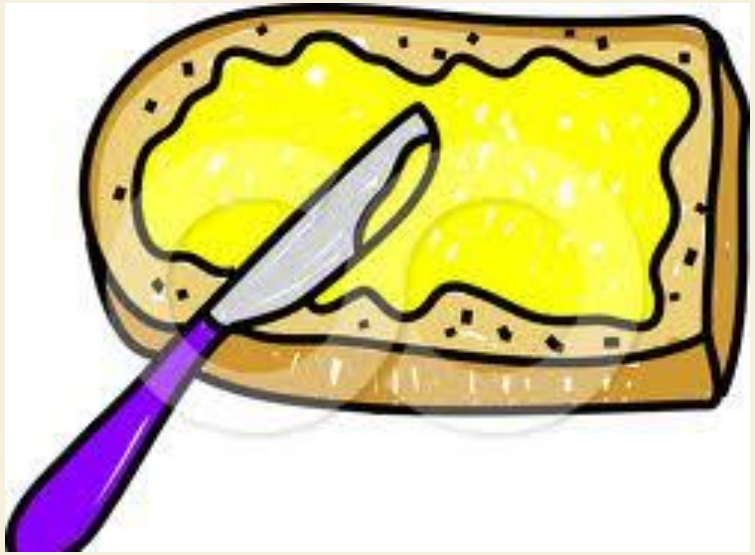
RAKE ANGLE

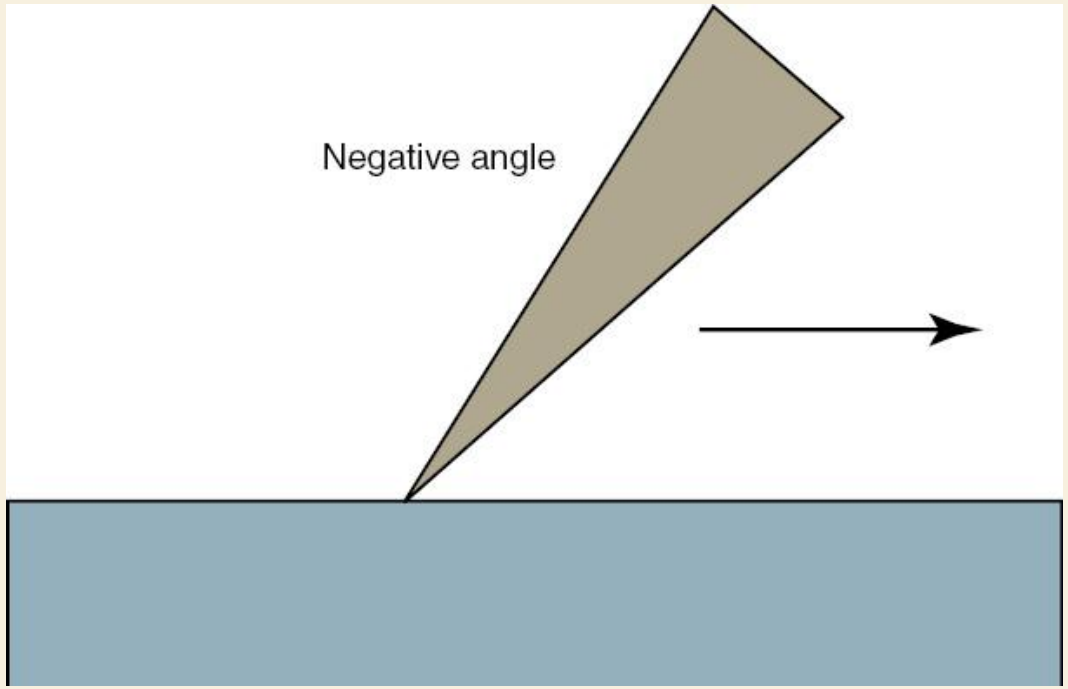
- Positive Rake angle :
- This cuts so readily → digging into the work-piece. Efficient cutting with little or no smear layer.



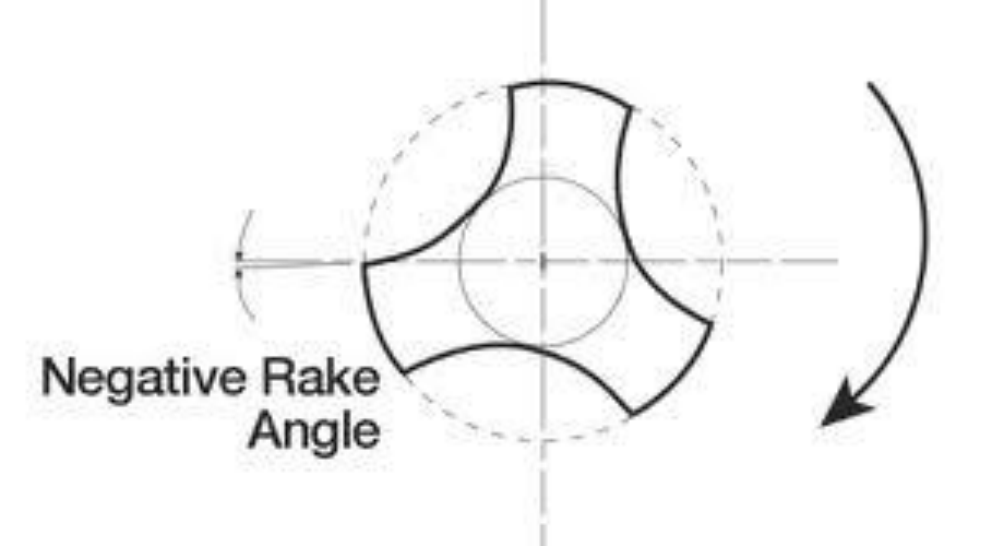
NEGATIVE RAKE ANGLE

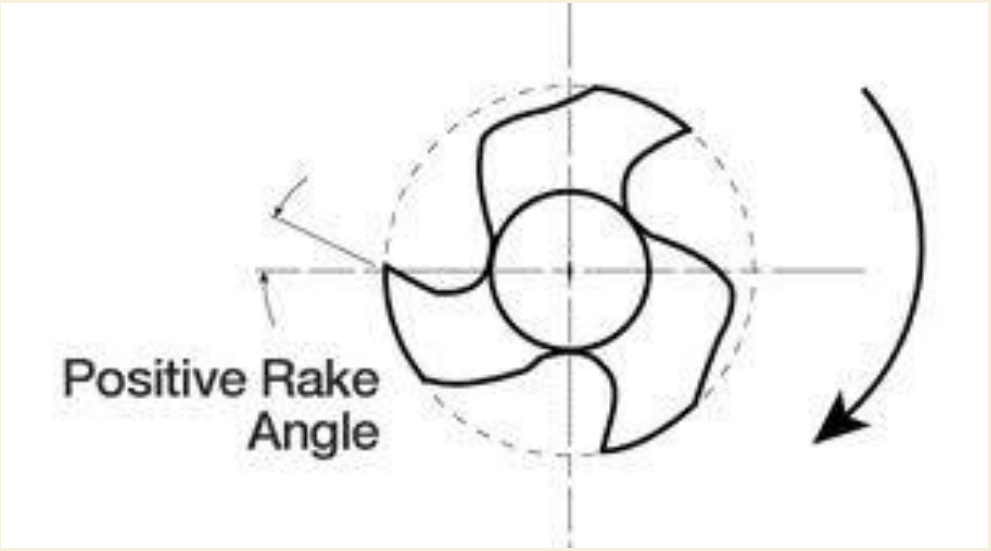
- Cut by applying downward pressure which creates a compression wave ahead of the blade
- spreading butter on your toast
- scraping paint with a plane blade.



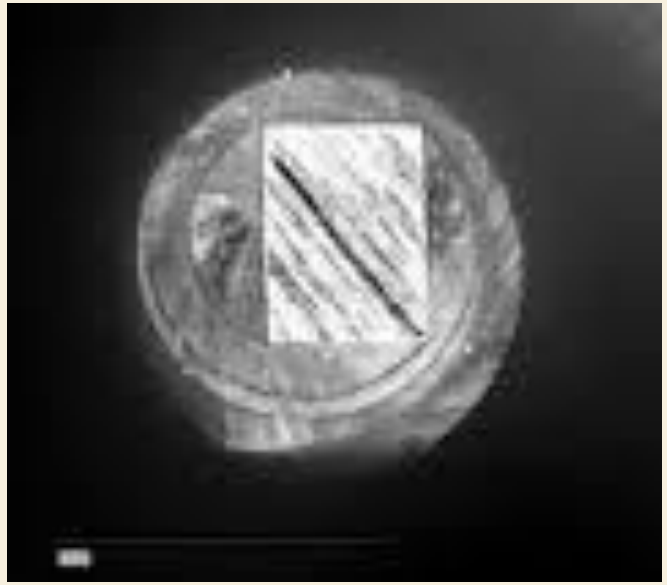


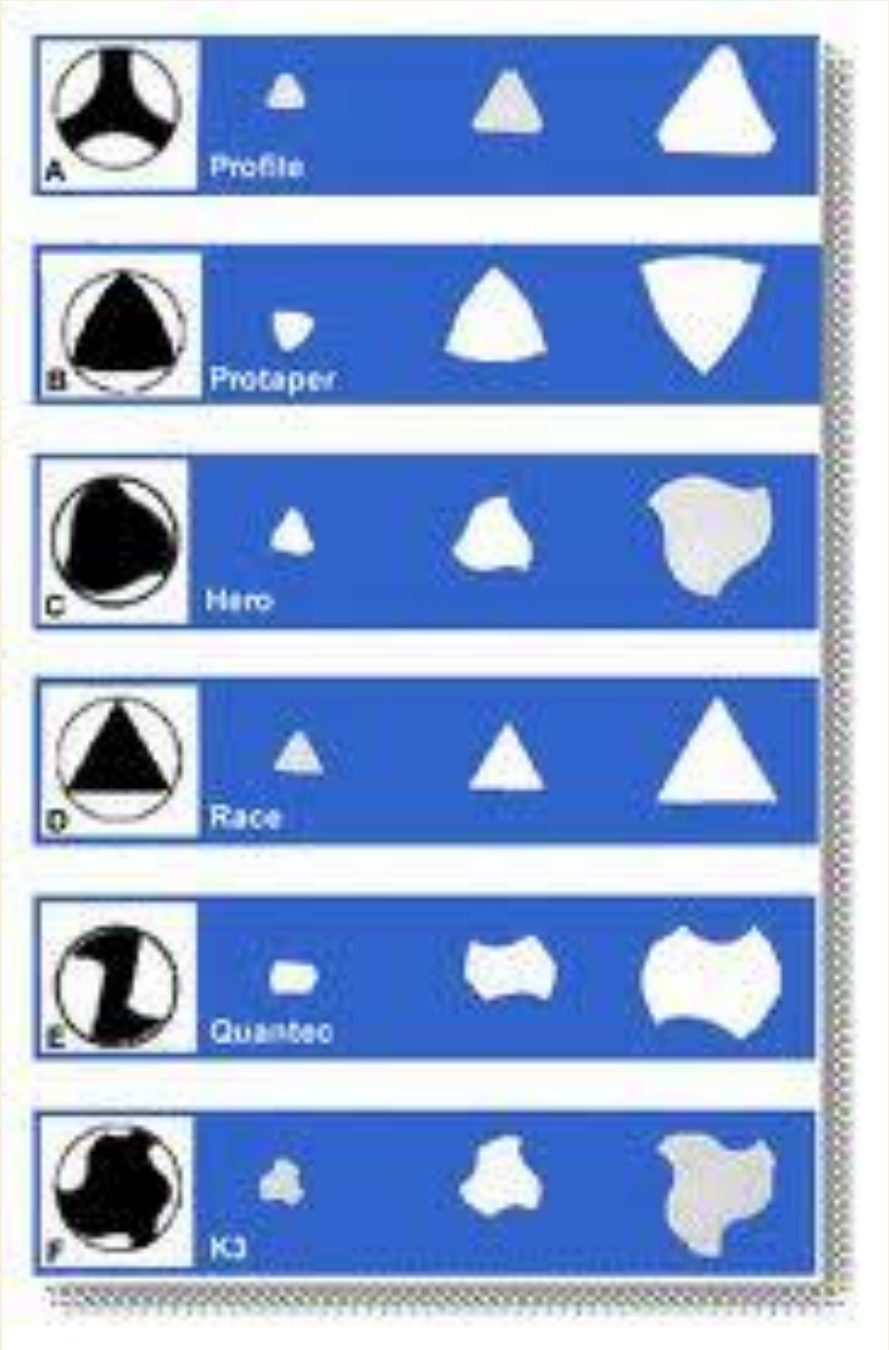
RAKE ANGLE



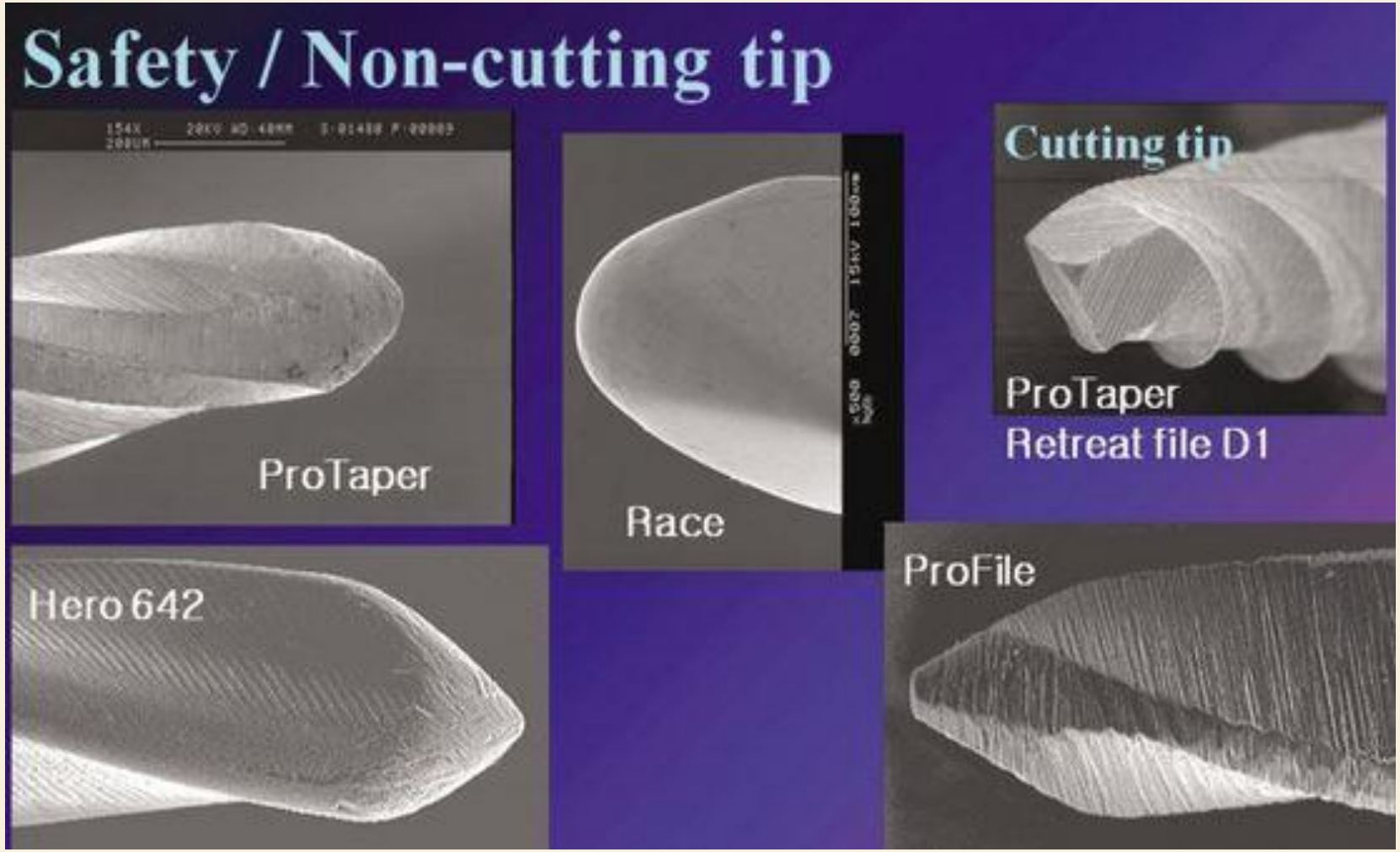


CROSS SECTION





TIP DESIGN


Safety / Non-cutting tip
ProTaper
Race
Cutting tip
ProTaper
Retreat file D1
Hero 642
ProFile

SPEED

- Each instrument: a specific rotational **speed** and a suggested amount of maximum **torque**.
- Slow-speed handpieces that rotate at 150 to 500 rpm
- Most of the rotary systems suggest:

250-350 rpm

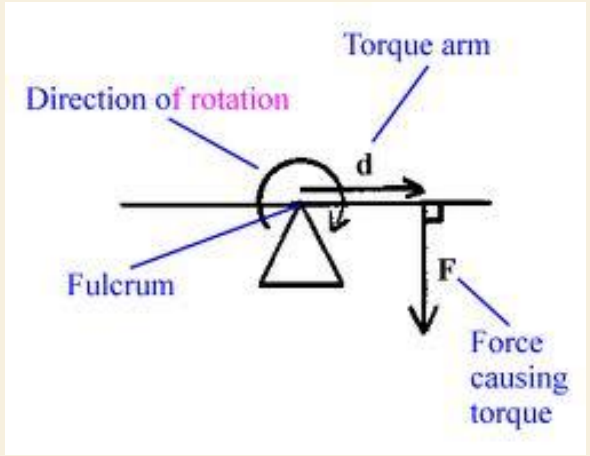
Some exceptions : Light speed / RaCe, HERO

1200 rpm / 500-600 rpm

TORQUE

- A measure of the force acting on an object causing that object to rotate about an axis
- 2.5 Ncm=25mNm

$$T = F \times R$$



ELECTRIC MOTORS

AIR MOTORS

- **Speed** control : not variable
- **Torque** control: variable → maximum torque
- Manufacturer Laboratory
- Smaller files → less torque
- Alarm torque:

✓ **Error Sound**

✓ **Display**

✓ **Auto Reverse** (torque control)

3

BASIC STEPS IN USING NI-TI ROTARY INSTRUMENTS

CLINICAL CONSIDERATIONS

DO'S	DON'TS
Assess canal anatomy thoroughly	Instrument blindly
Achieve straight line access prior to instrumentation	Staying in canals for long
Follow crown-down sequence	Use of same files repeatedly
Use glide path for patency of canal	Forceful instrumentation
Use files for 5 to 10 seconds only	Rotation for too long
Adequate irrigation and lubrication	Dry instrumentation
Wipe flutes after each use	Use of unclean files
Examine files before, during and after use	Use files without inspection

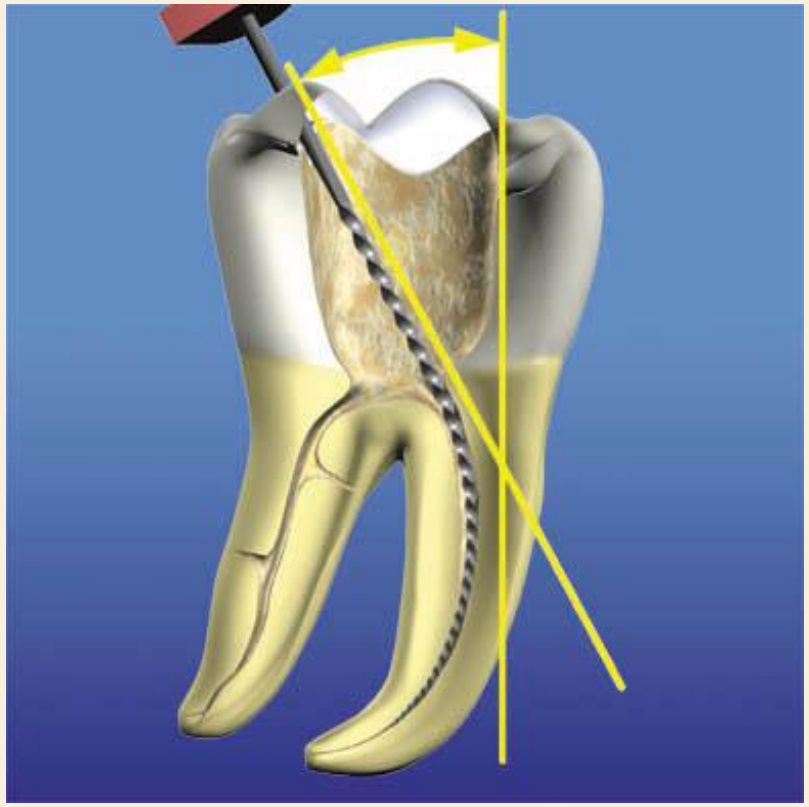
WHAT TO DO

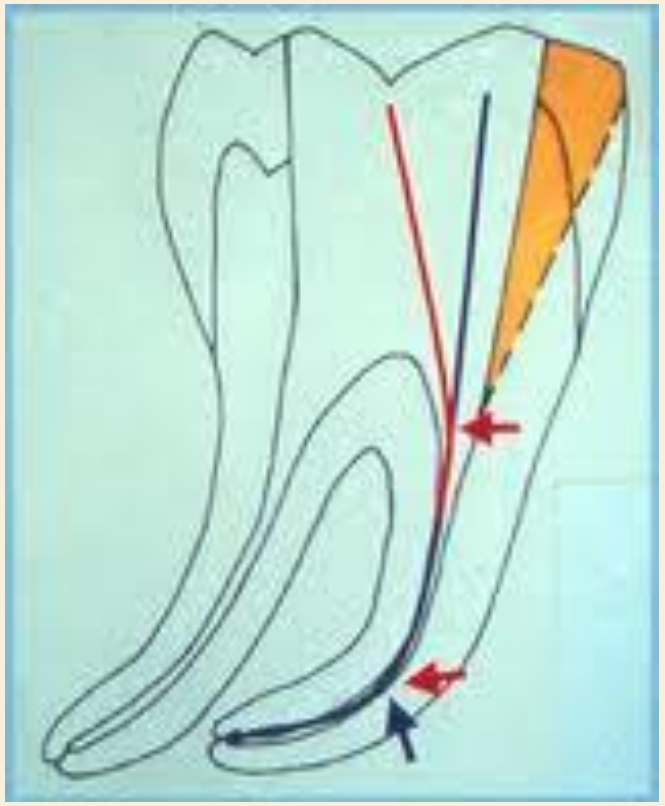
RADIOGRAPHIC EVALUATION

- *Dentin Thickness (Danger zone)*
- *Curvatures*
- *Calcifications*

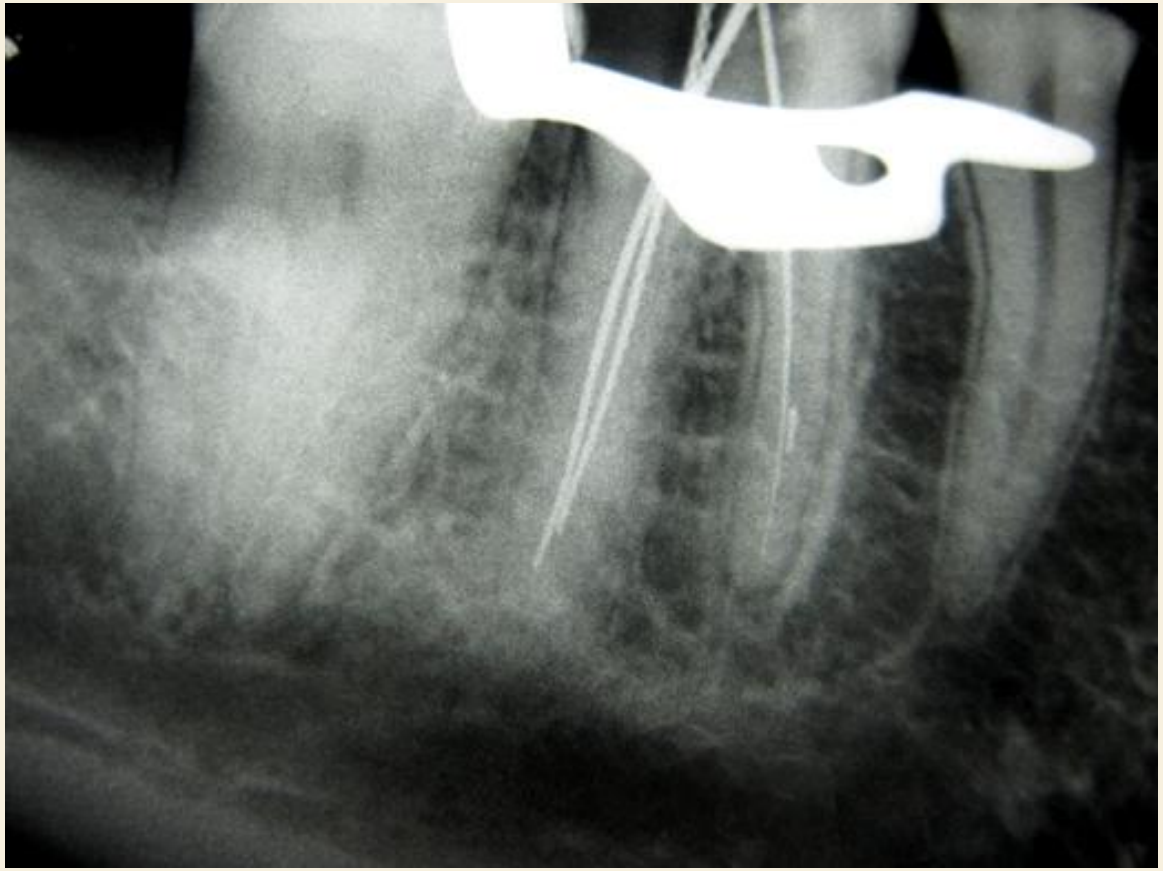
GOOD ACCESS CAVITY/SLA

- Preparing a **Good access cavity** to achieve **SLA** to the apical third part of the canal





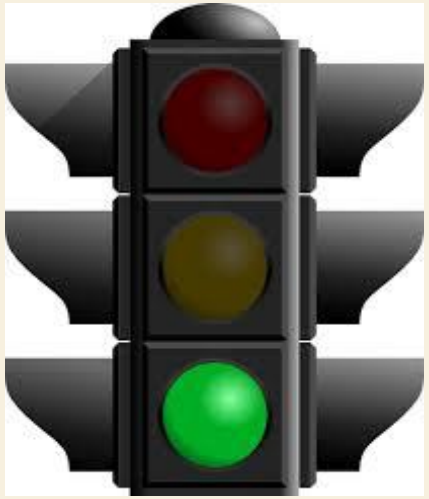
FOLLOW PRODUCER PROTOCOL



Study the Producer *Instructions for use*

WHAT TO DO

- Glide path: Negotiate the canal with a hand k-File before using the rotary file
- Copious **irrigation** and **lubricants**
- **Active the file** before insertion
- **Up and Down movements** not more than *3* mm.
- 3 penetration cycle (not more than 5-10 seconds)
- **Clean the flutes**
- **See the file** for any changes before use
- **Mark the used file** after instrumentation



SMD (SAFETY MEMO DISK)

4

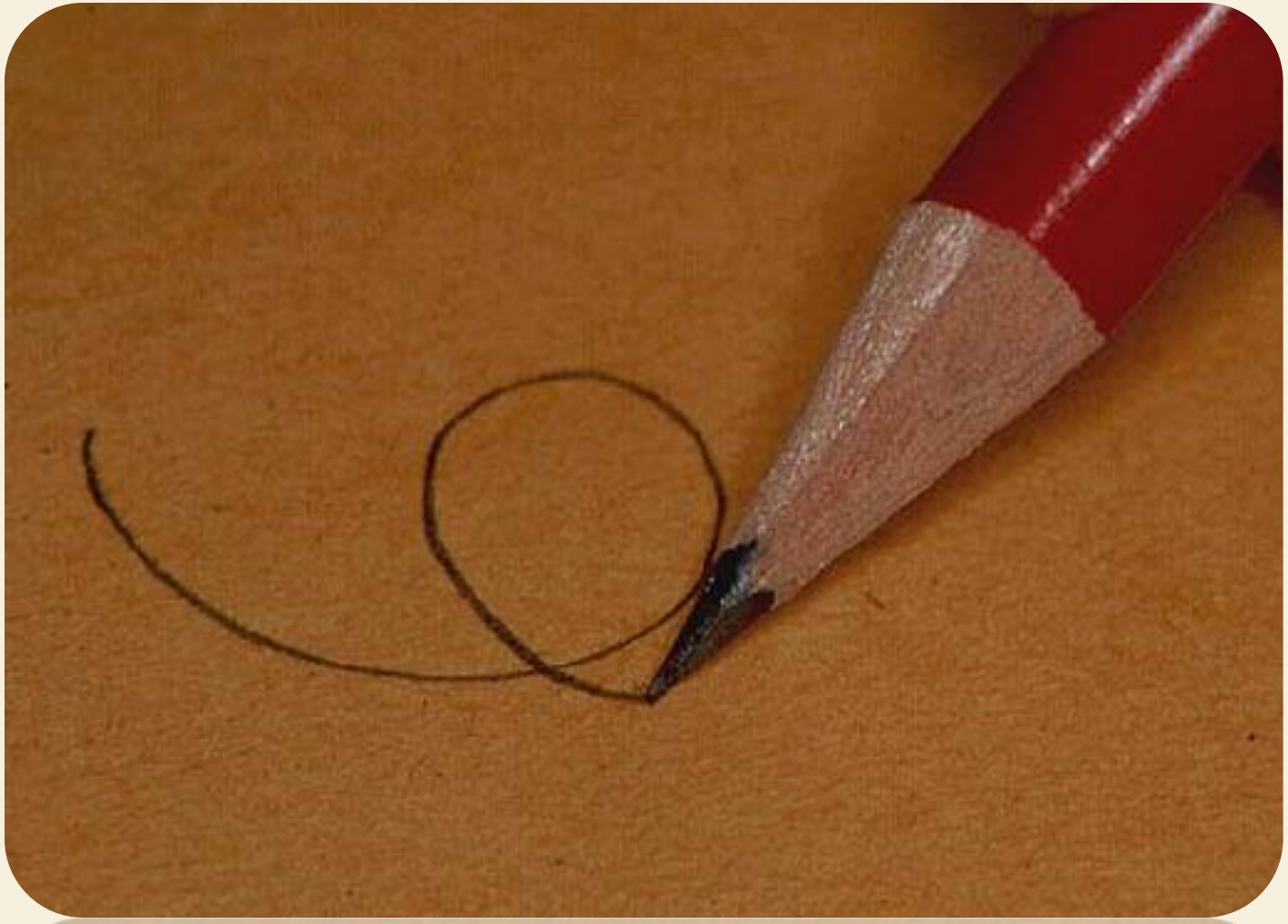
CAUTIONS IN USING ROTARY FILE

WHAT TO AVOID

WHAT TO AVOID

- Poor Access = Errors
- Never force a Rotary file

HOW MUCH PRESSURE?



WHAT TO AVOID

- Don’t pass the **Ledge**
- Avoid using the rotary file in **sever curvatures**
- Avoid **sudden changes** in the direction
- Avoid using in **Type II canals** up to WL in both canals
- Never **Overuse** the file

HANDLING

THREE BASIC HANDLING PARADIGMS

- Up and down : Basic paradigm
- Stall and withdraw: RaCe
- Brushing: Protaper and Orifice openers

CANAL PREPARATION TECHNIQUES WITH ROTARY FILES

- Crown Down technique :

  Most of the rotary files

- Single length technique :

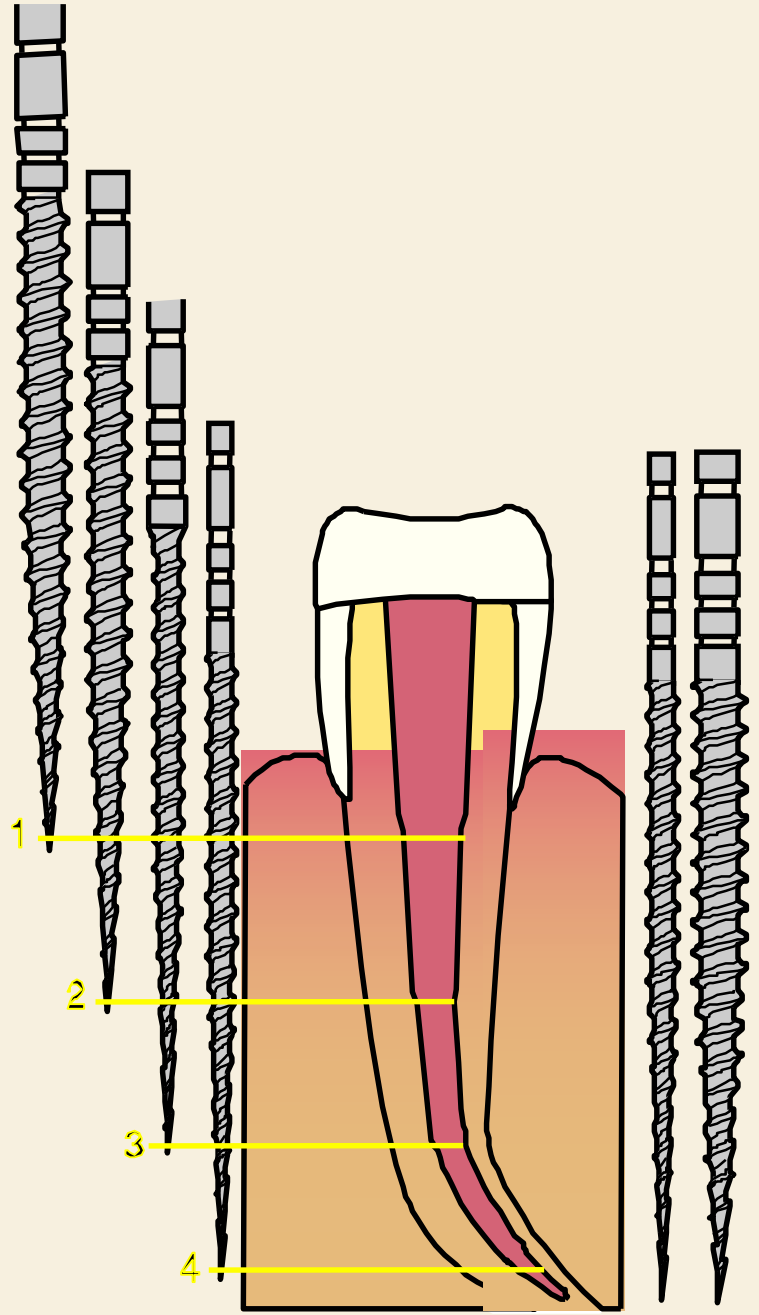
  Protaper / Mtwo /TF

- ✓ Hyflex

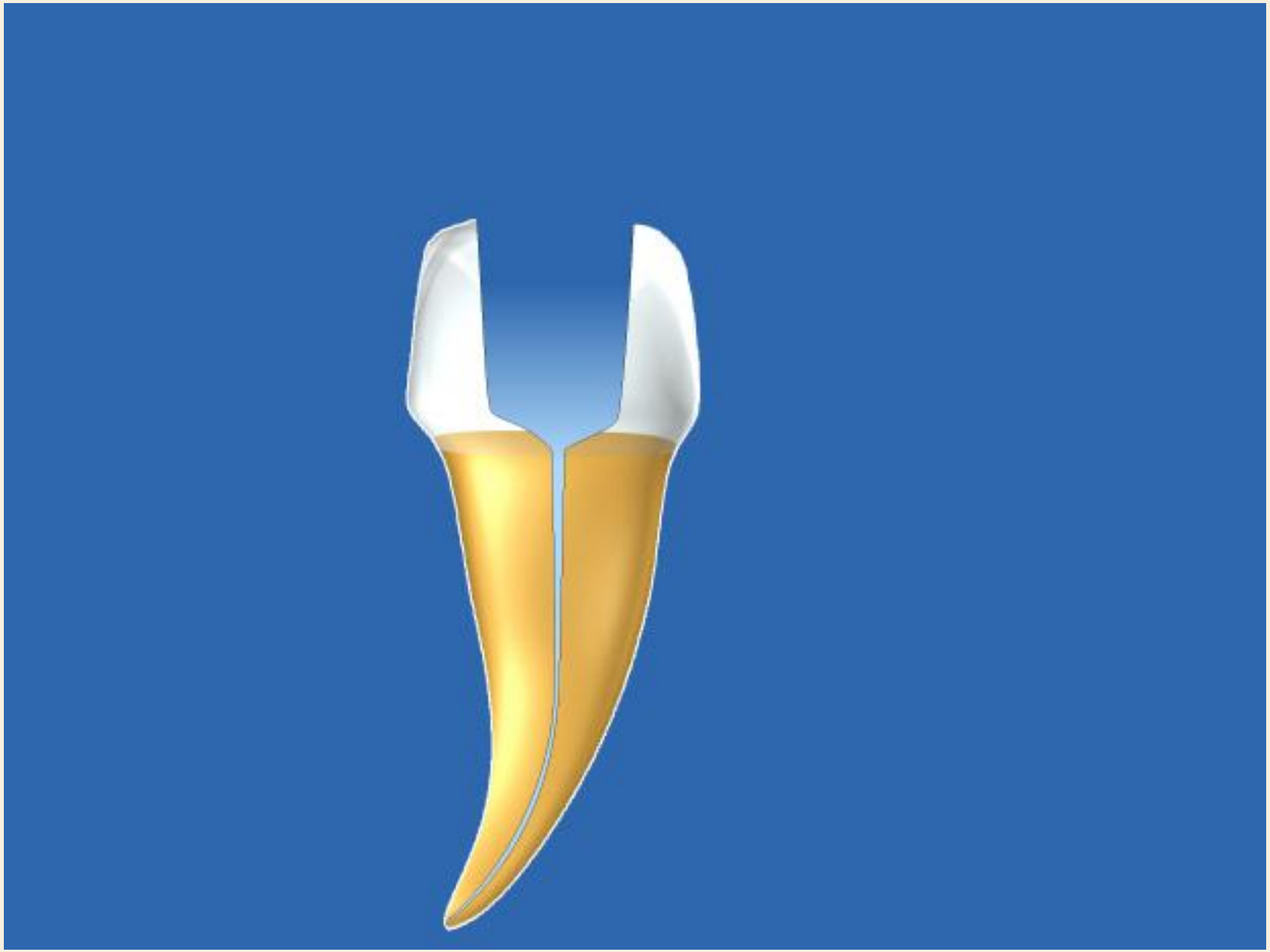
CROWN DOWN PROCEDURE

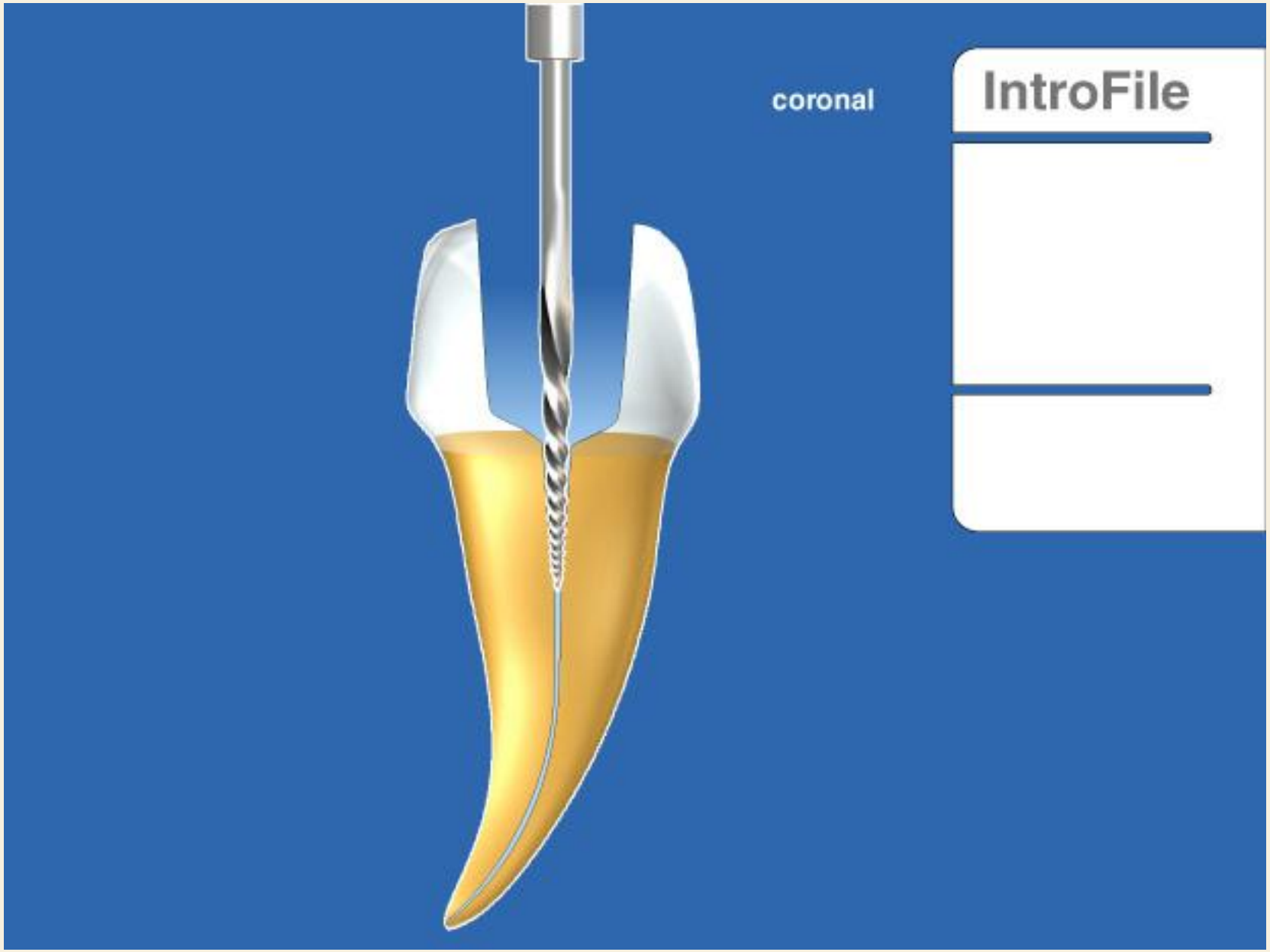
- Provisional WL determination
- Pre-enlargement: Coronal instrumentation (Gates Glidden,Orifice openers)
- Exact WL determination.
- Gradually apically penetration of instruments from **larger to smaller** size ,once reached WL shaping is finished with 3 size larger than the first instrument reached the WL.

Crown-Down



Apical Enlargement

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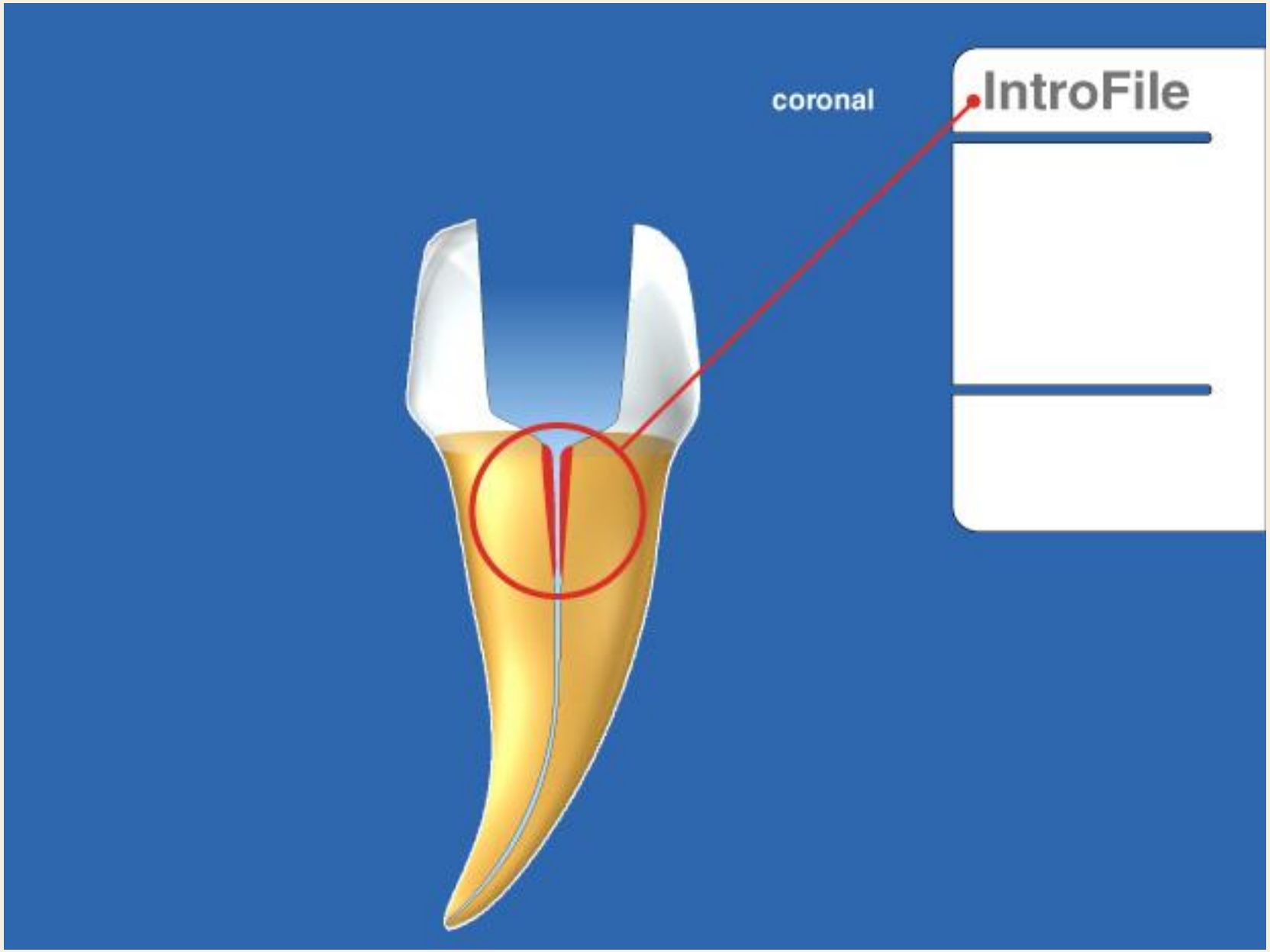
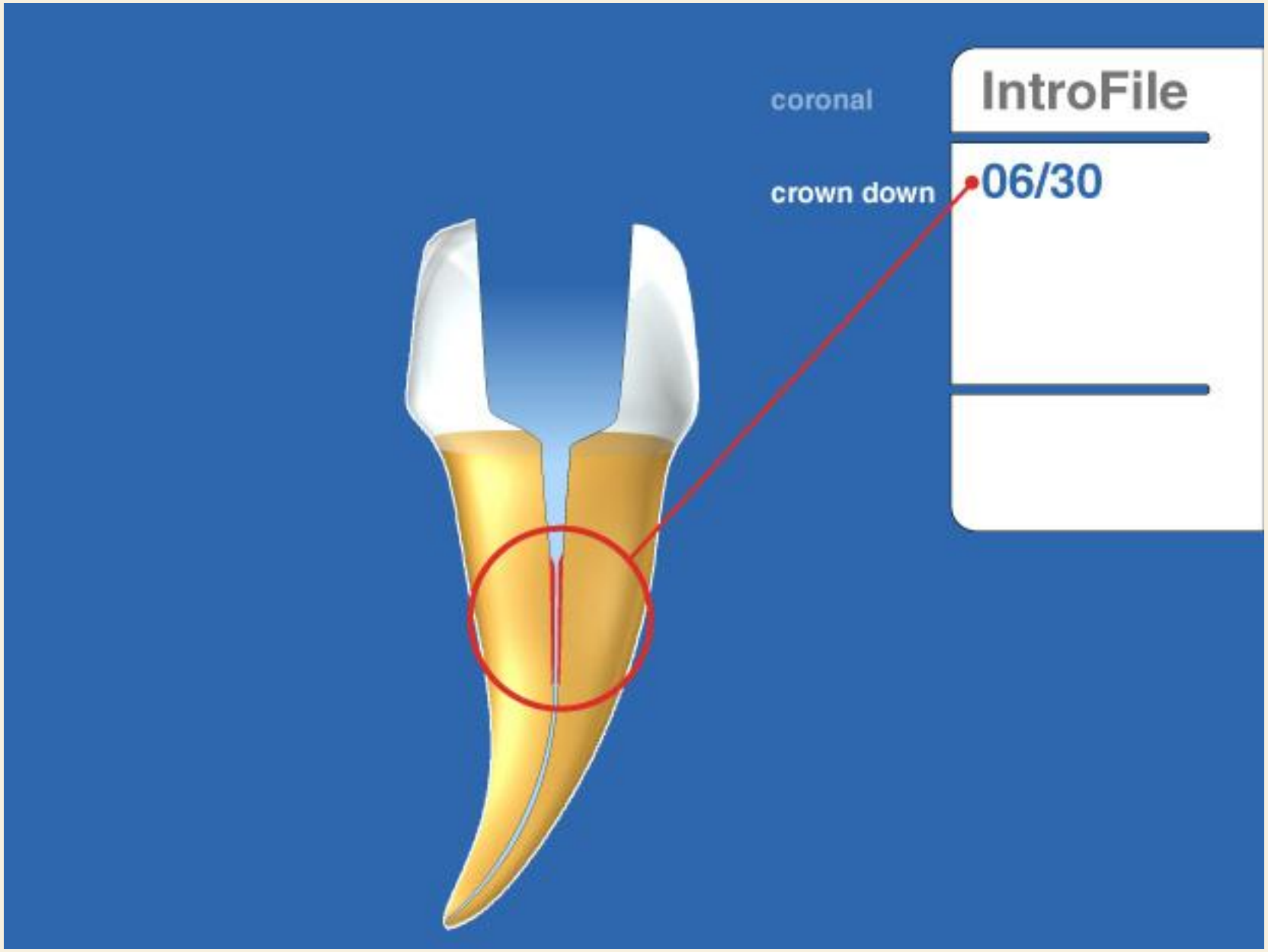
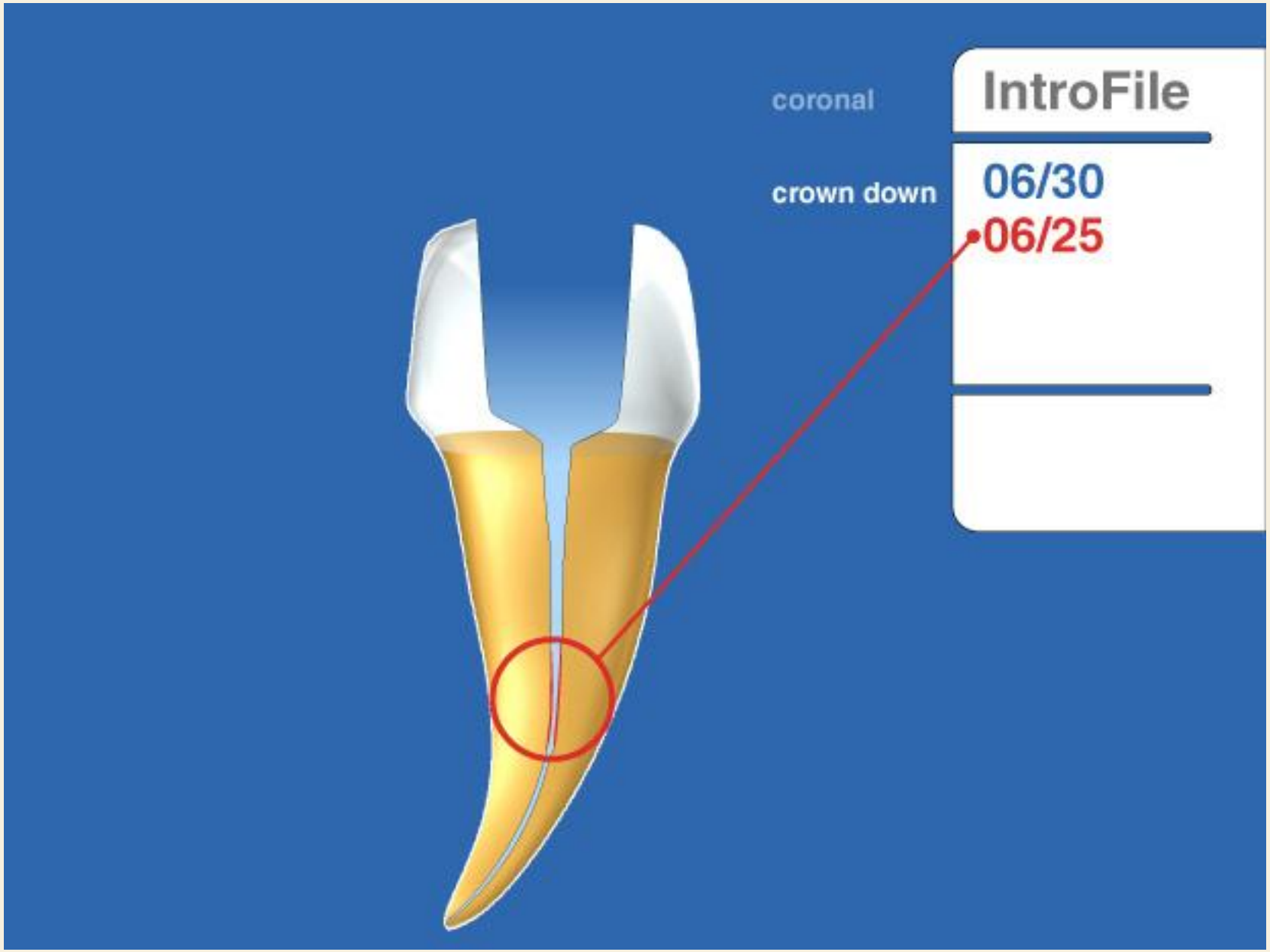
IntroFile


coronal
IntroFile


coronal
crown down
IntroFile
06/30


coronal
crown down
IntroFile
06/30


coronal
crown down
IntroFile
06/30
06/25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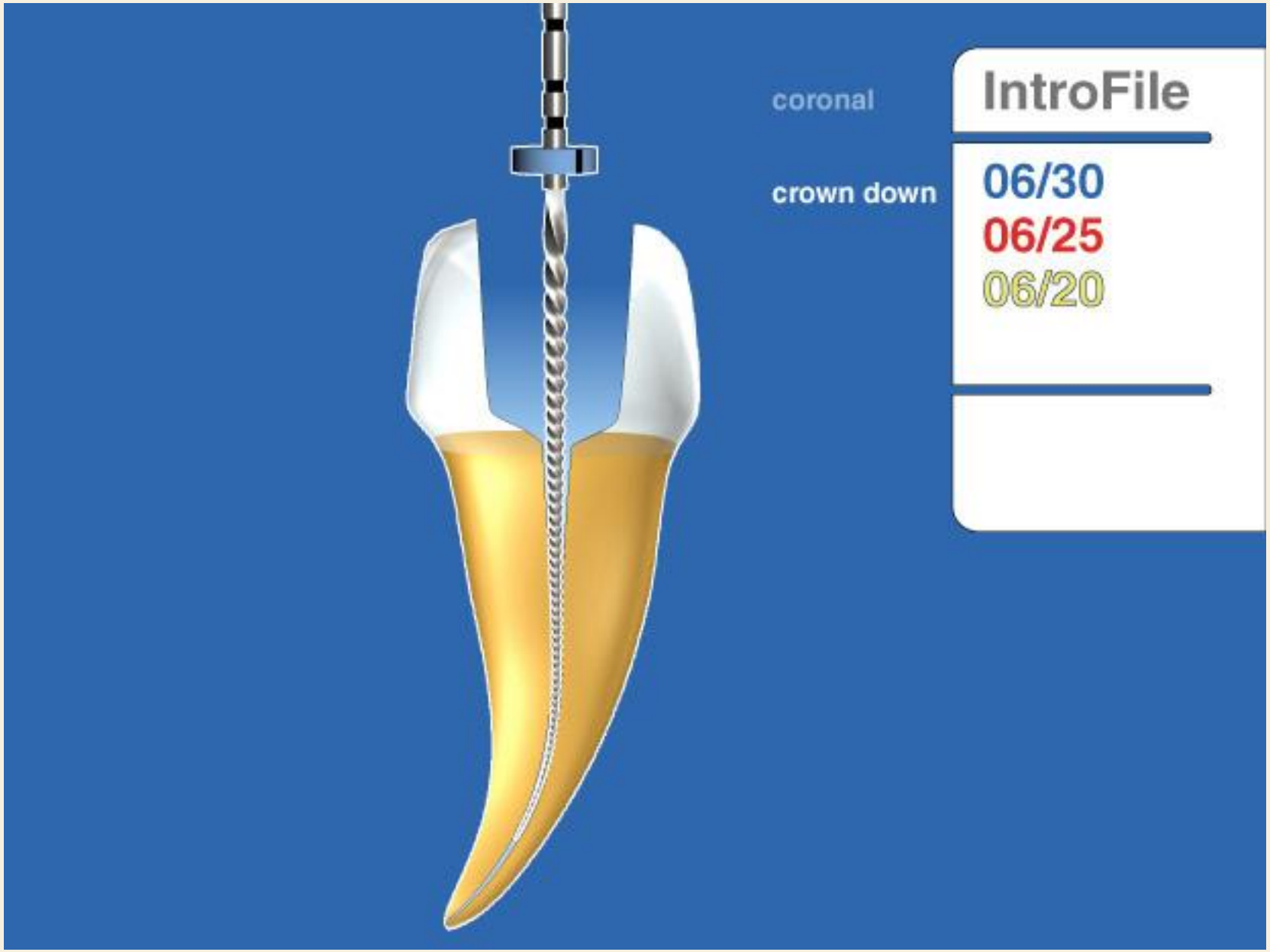
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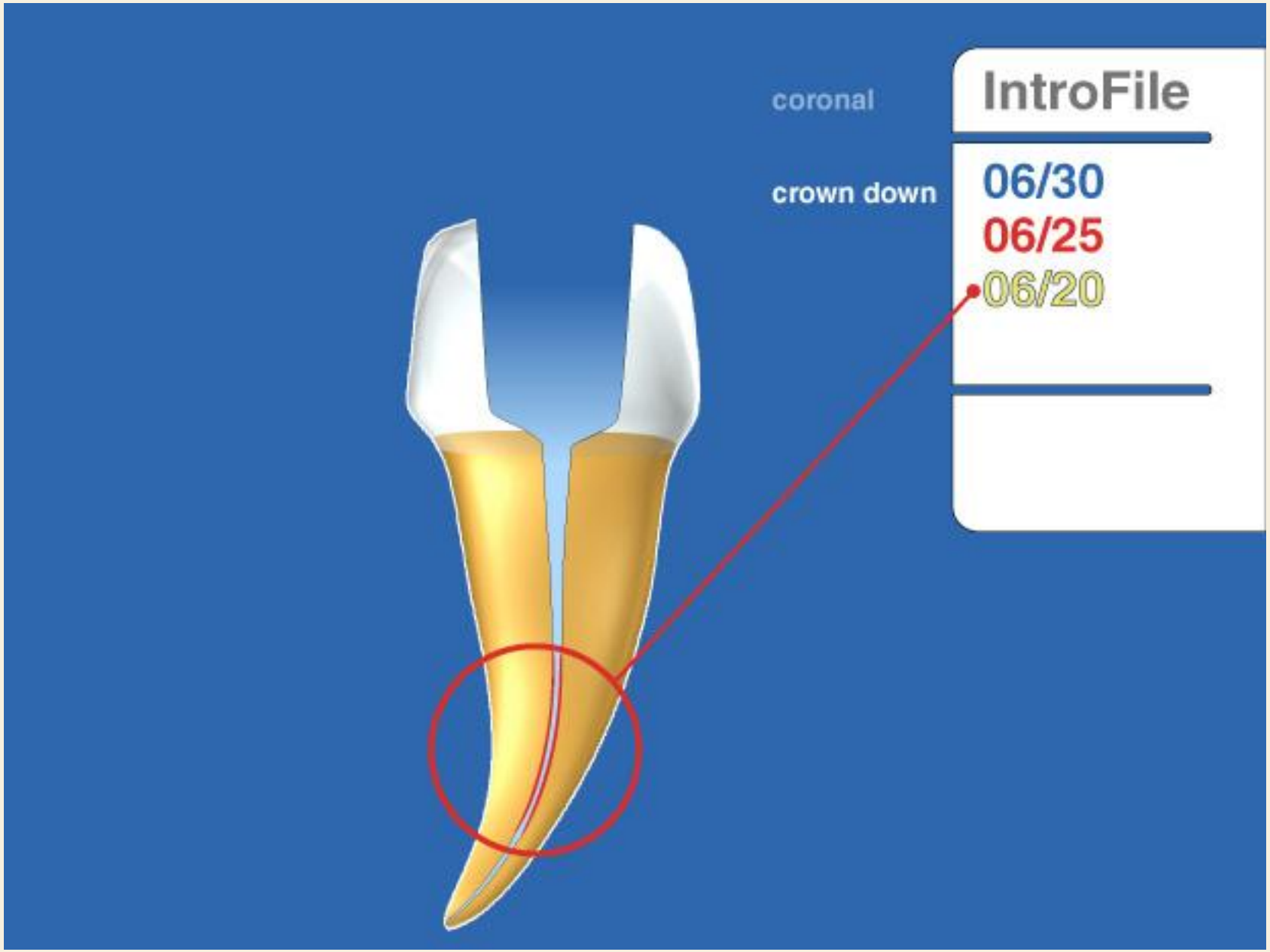
coronal
crown down
IntroFile
06/30
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coronal
crown down
IntroFile
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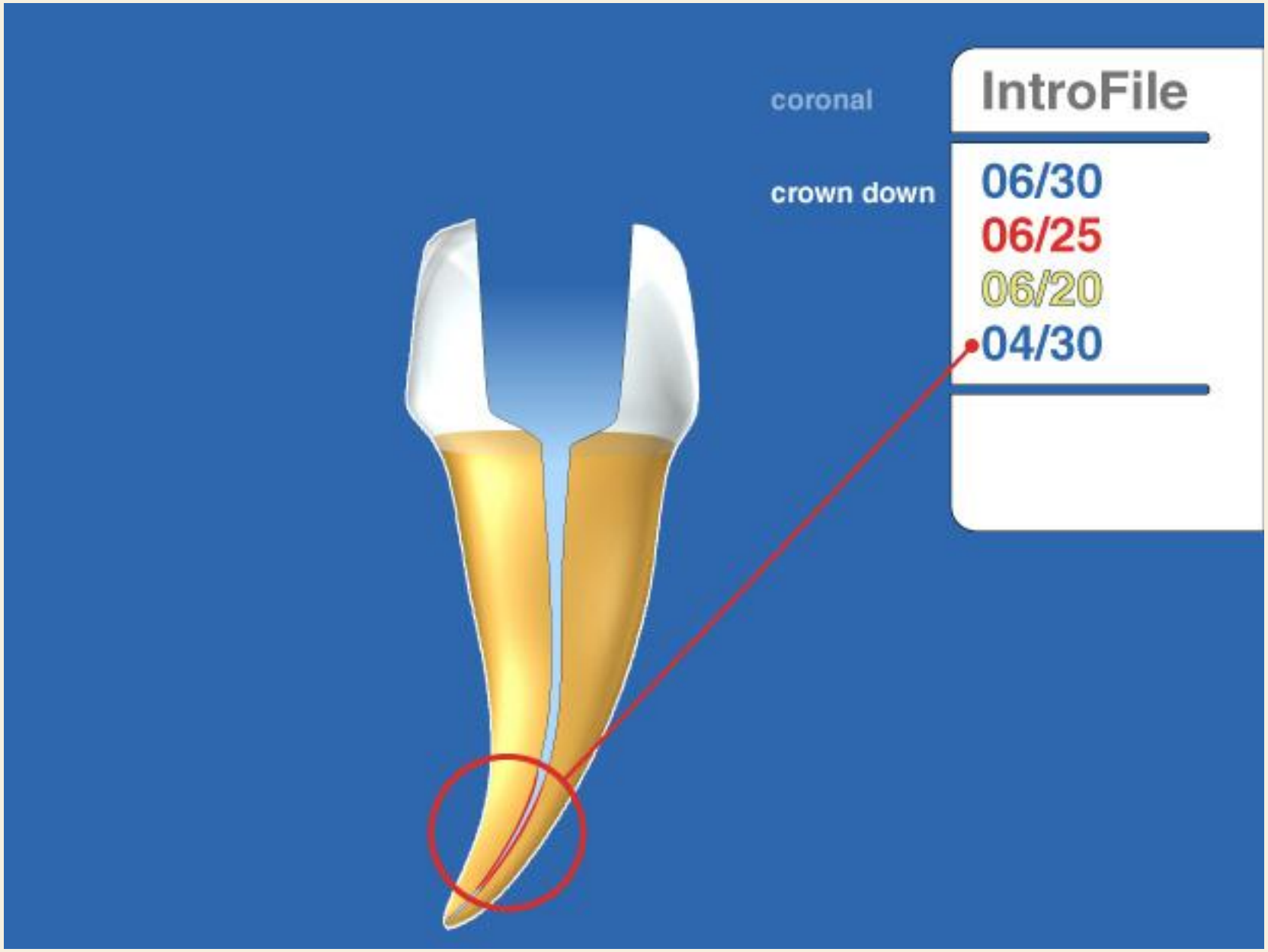
coronal
crown down
IntroFile
06/30
06/25
06/20
04/30


coronal
crown down
IntroFile
06/30
06/25
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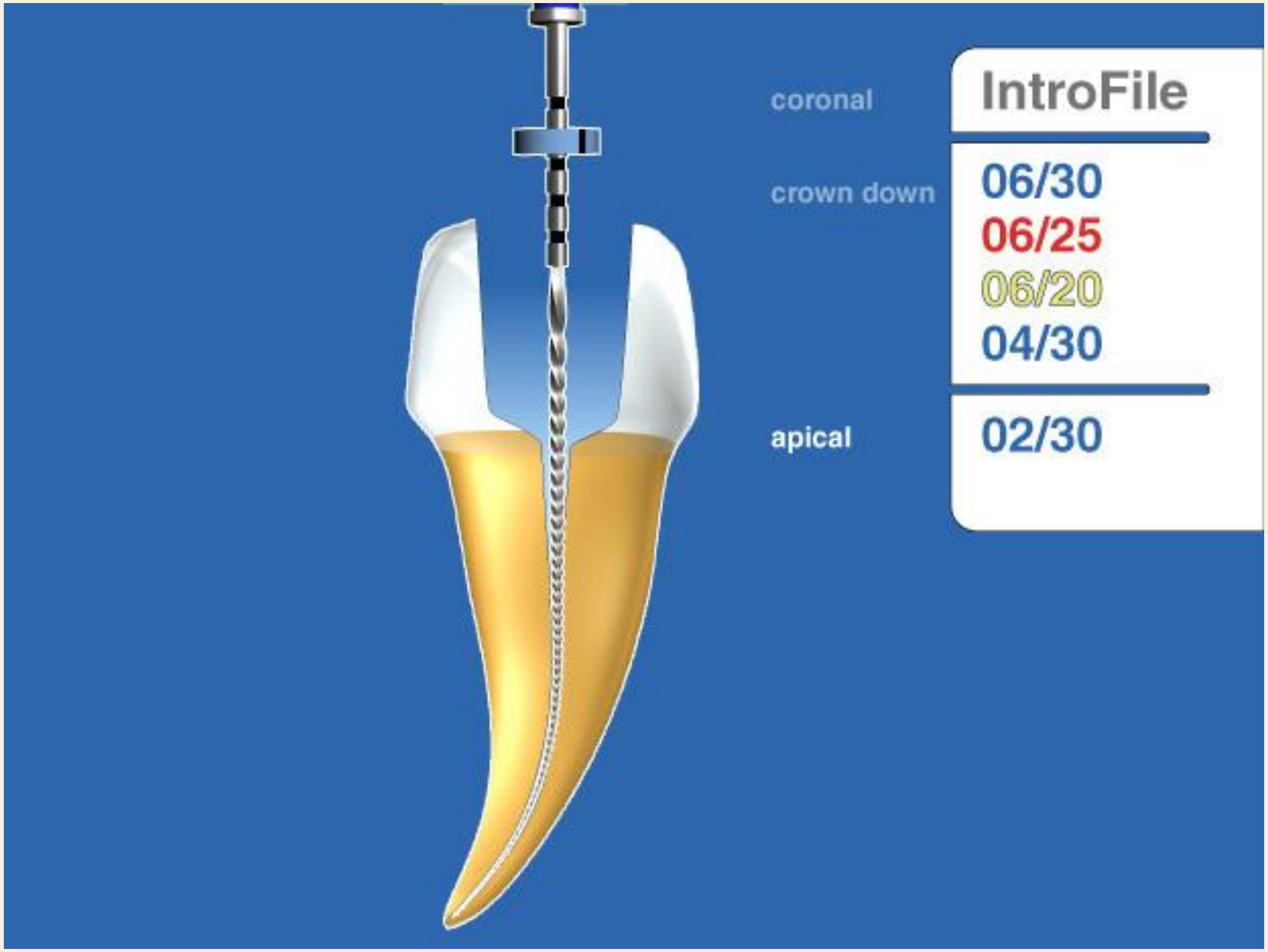
04/30


coronal
crown down
apical
IntroFile
06/30
06/25
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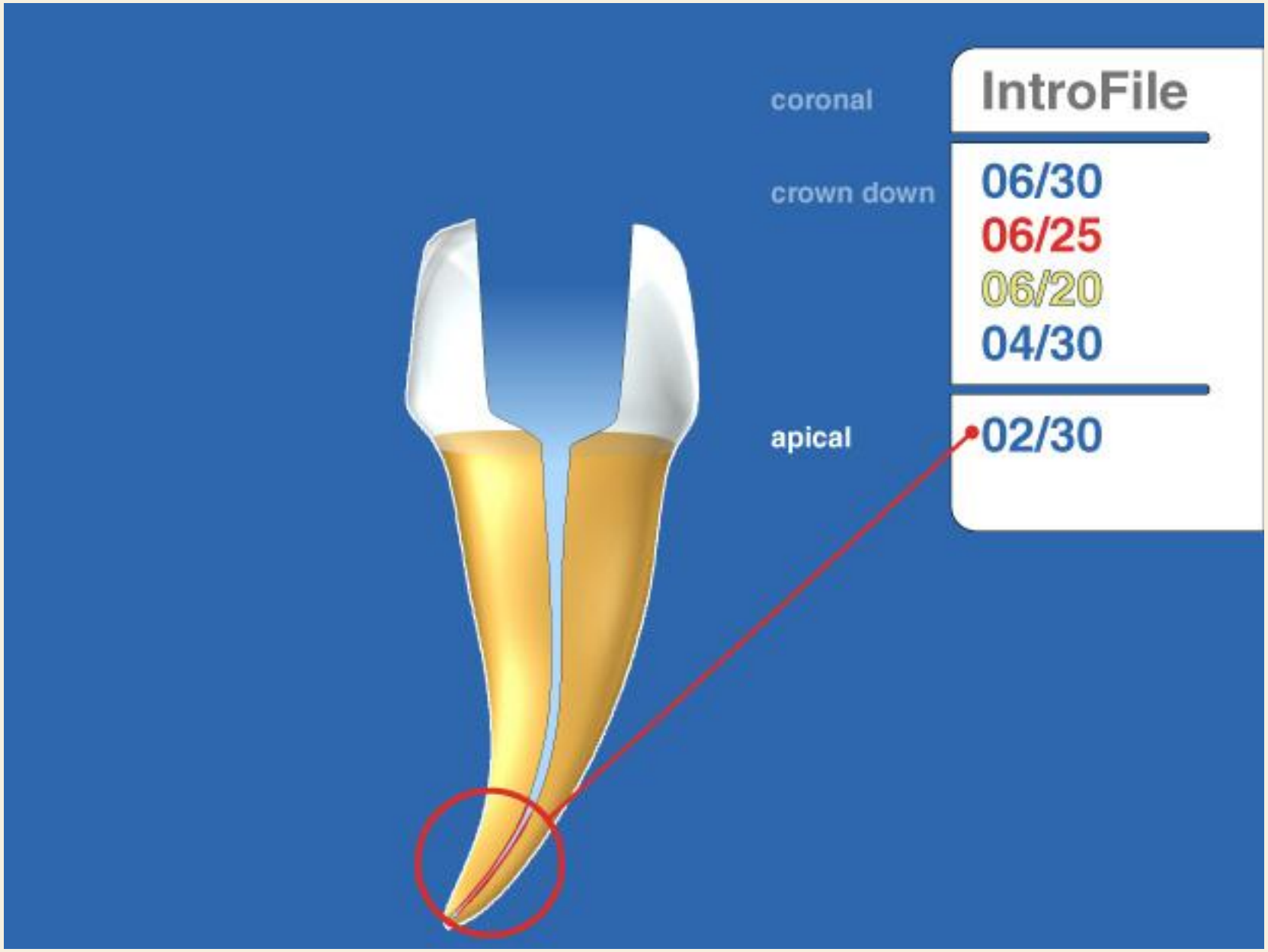
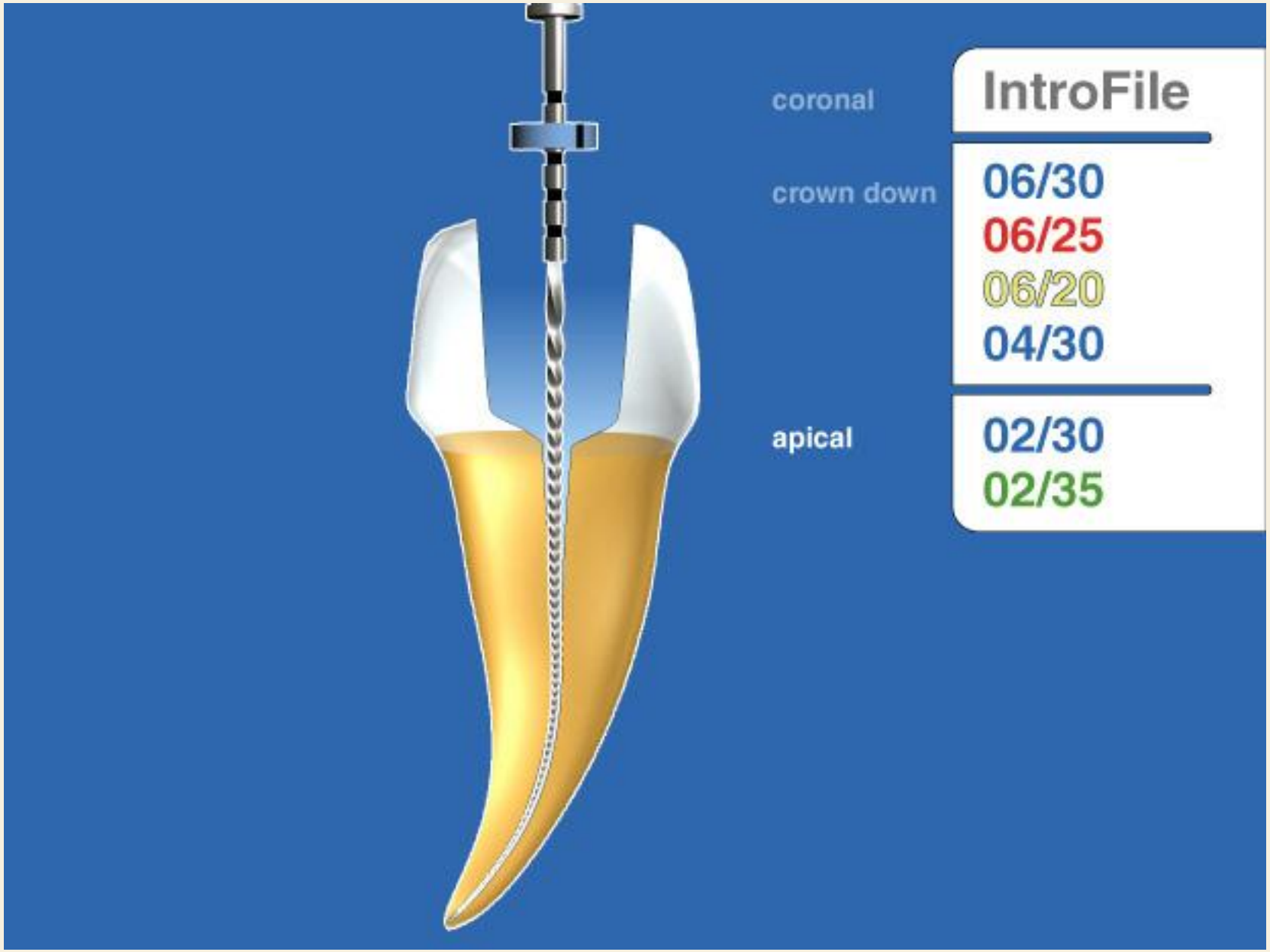
04/30
02/30

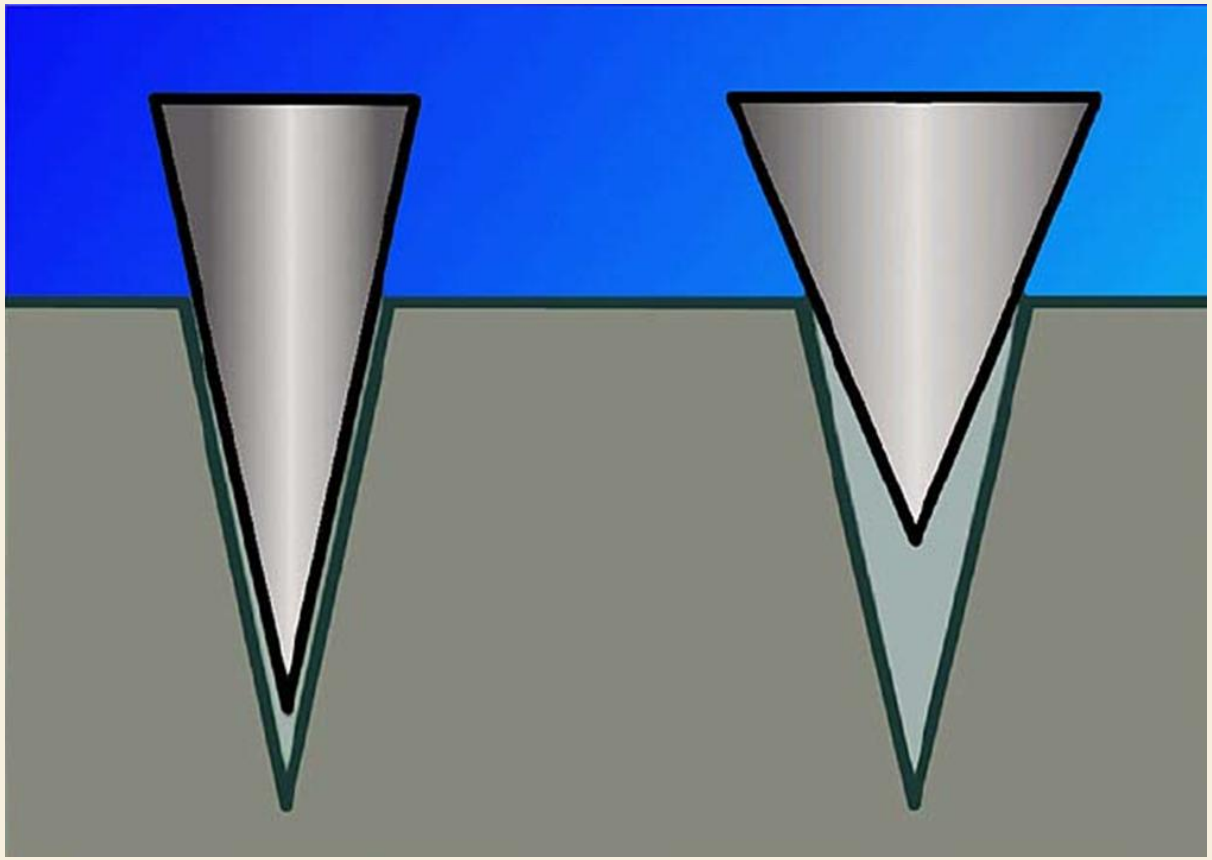

coronal
crown down
apical
IntroFile
06/30
06/25
06/20
04/30
02/30


coronal
crown down
apical
IntroFile
06/30
06/25
06/20
04/30
02/30
02/35

WHY CROWN DOWN TECHNIQUE?

To avoid separation

TAPER LOCK



- Frist coronal then apical with smaller files
- Reduces friction → no taper lock
- Reduces file fracture

NITI FRACTURE

- **Torsional fracture:**

  Rotating a locked file

- **Fatigue fracture:**

  Prolonged rotation in a curved canal

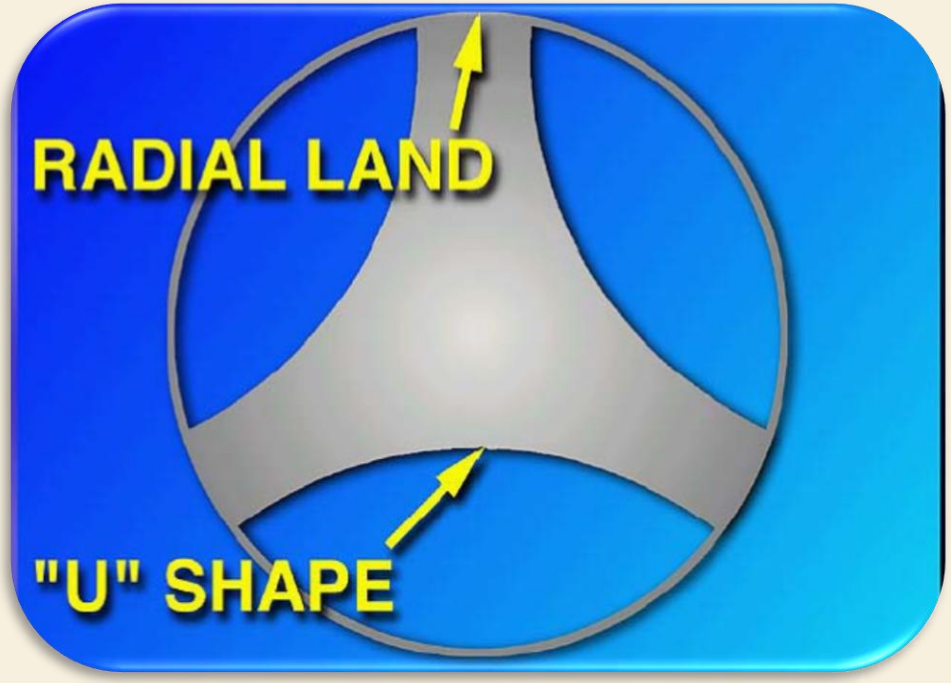
  Cyclic Compression and tension

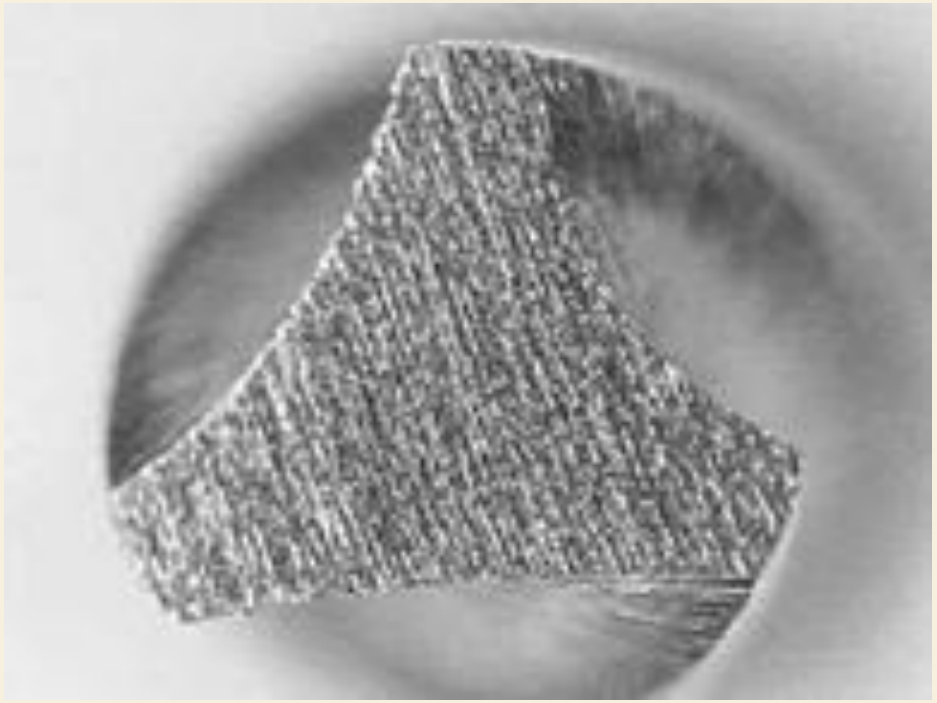
5

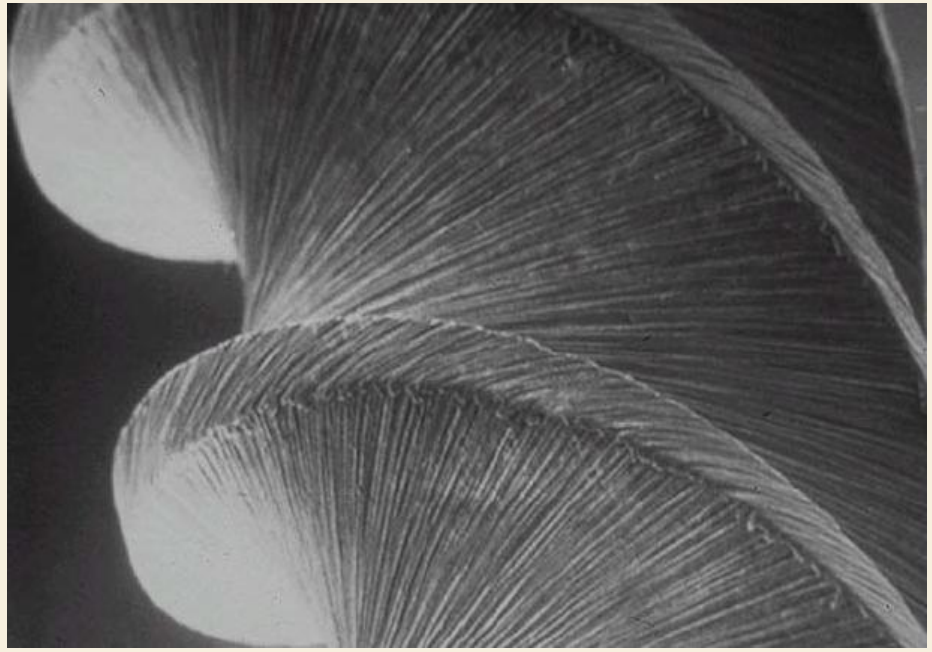
ROTARY FILES

PROFILE 1993

- Non-cutting tip .
- U-shape space between radial land
- Crown-Down








DENTSPLY
MAILLEFER
PROFILE®

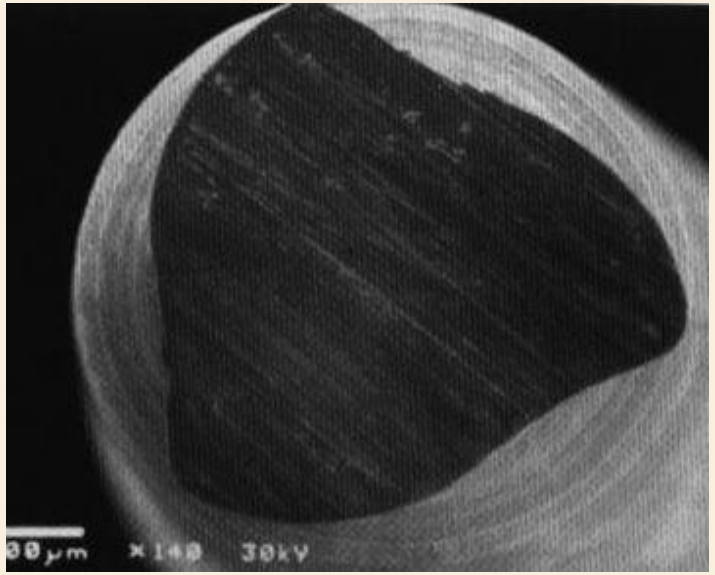

PROFILE O.S.
PROFILE .06
PROFILE .04


O.S.3
O.S.2
.06 25
.06 20
.04 25
CROWN-DOWN
"WL"
.02
15
.04
20
.04
25
...
.06
20
...

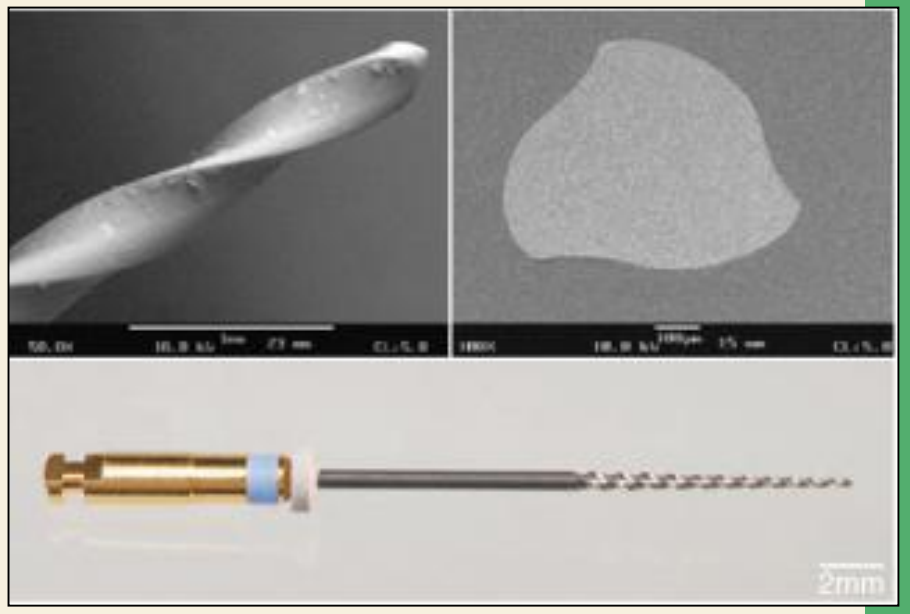
HERO 642

(High Elasticity In Rotation)

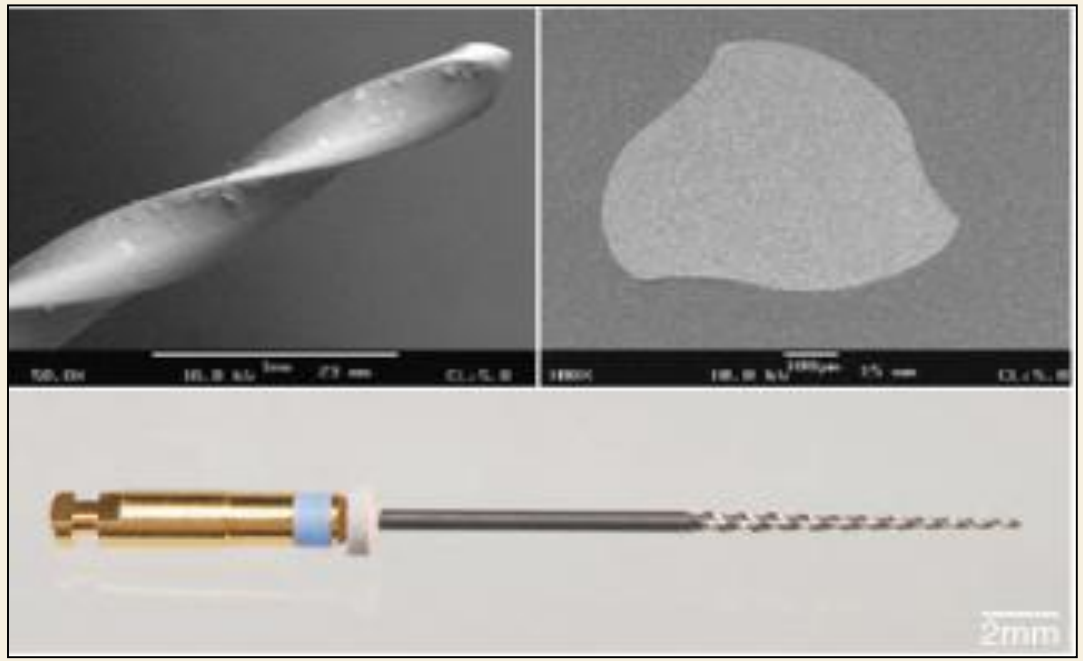
Miro-Mega
France



CHARACTERISTICS:



- ✓ Triple Helix design like hedstrom file
- ✓ **Positive rake angle**
- ✓ No radial land
- ✓ Non-cutting tip



No. of instruments/ set	Tip sizes	Size increments	r.p.m. (recommended)	Lengths
12	20, 25, 30 with .02, .04, and .06 taper; 35 to 45 with .02 taper	5	300-600, with minimal axial force	21, 25 mm

HERO

A. Easy canals
(straight - curves < 5°) BLUE SEQUENCE

diameter	6%	4%	2%
N. 30	1/2 - 2/3 WL	WL minus 2 mm	WL

WL = Working Length

Diameter	6%	4%	2%
N.25	1/2 - 2/3 WL	WL minus 2 mm	WL
N.30		WL minus X	WL

C. Difficult canals
(curves > 25°) YELLOW SEQUENCE

diameter	6%	4%	2%
N. 20	1/2 - 2/3 WL	WL minus 2 mm	WL
N. 25		WL minus X	WL
N. 30			WL

HERO-SHAPER

- #20 - T=4% - L=25mm
- #25 - T=4% - L=25mm
- #30 - T=4% - L=25mm
- #20 - T=6% - L=21mm
- #25 - T=6% - L=21mm
- #30 - T=6% - L=21m
- Crown-down : coronal 6%-apical 4%
- **3 cutting edges**
- **Non-cutting tip**
- Shorter cutting blade + Variable pitch**(higher tapers have longer pitch)**

➢ **Advantageous:**

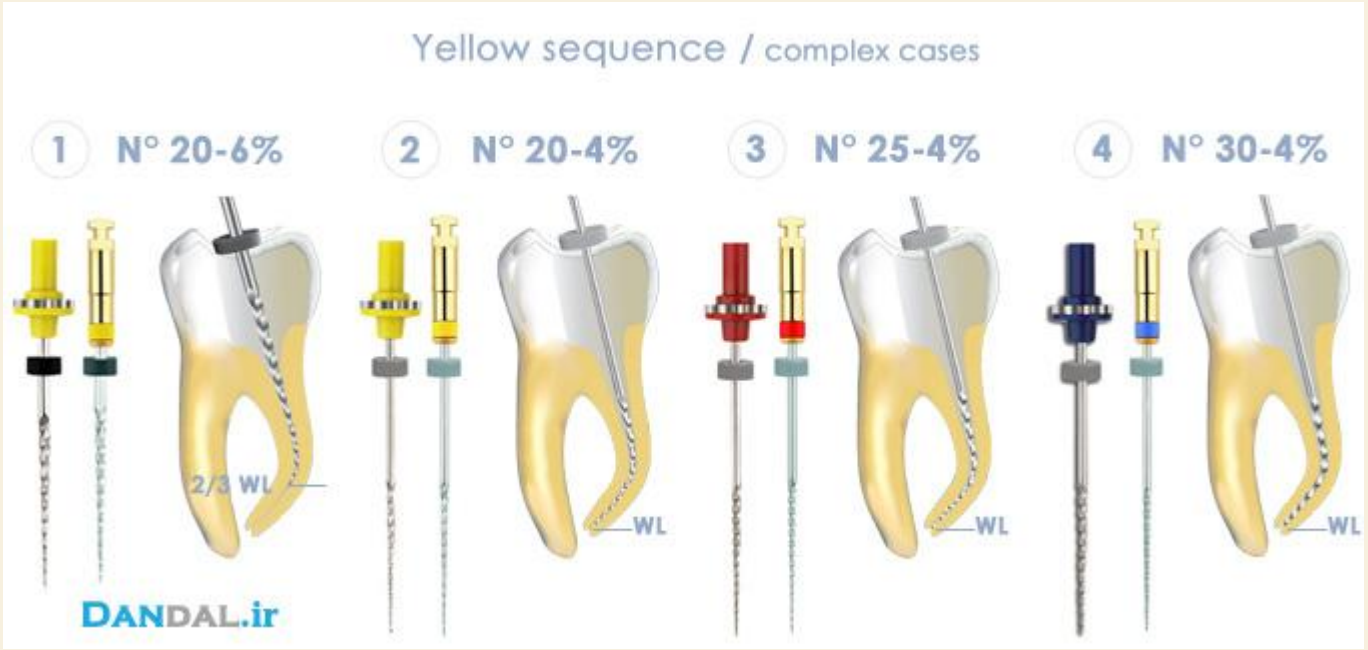
✓ **Less screwing in effect**

✓ **Efficient, flexible**

Blue sequence / easy cases

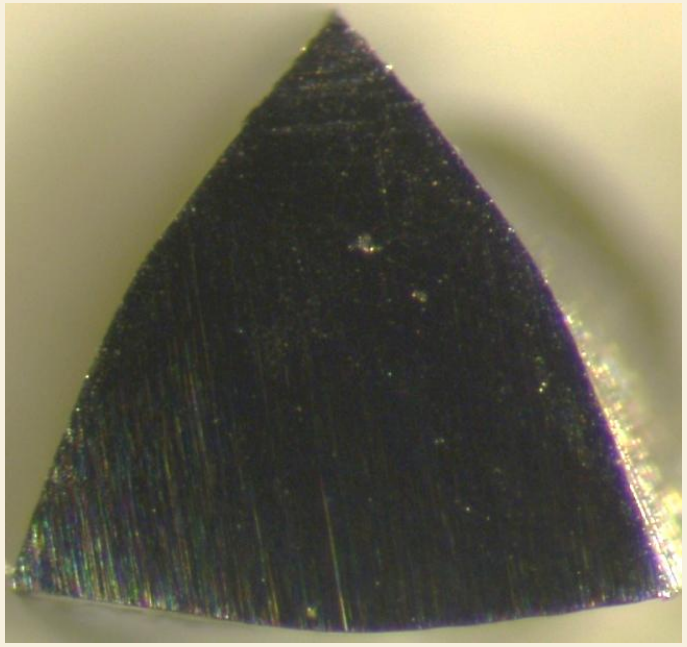
Red sequence / intermediate cases

Yellow sequence / complex cases

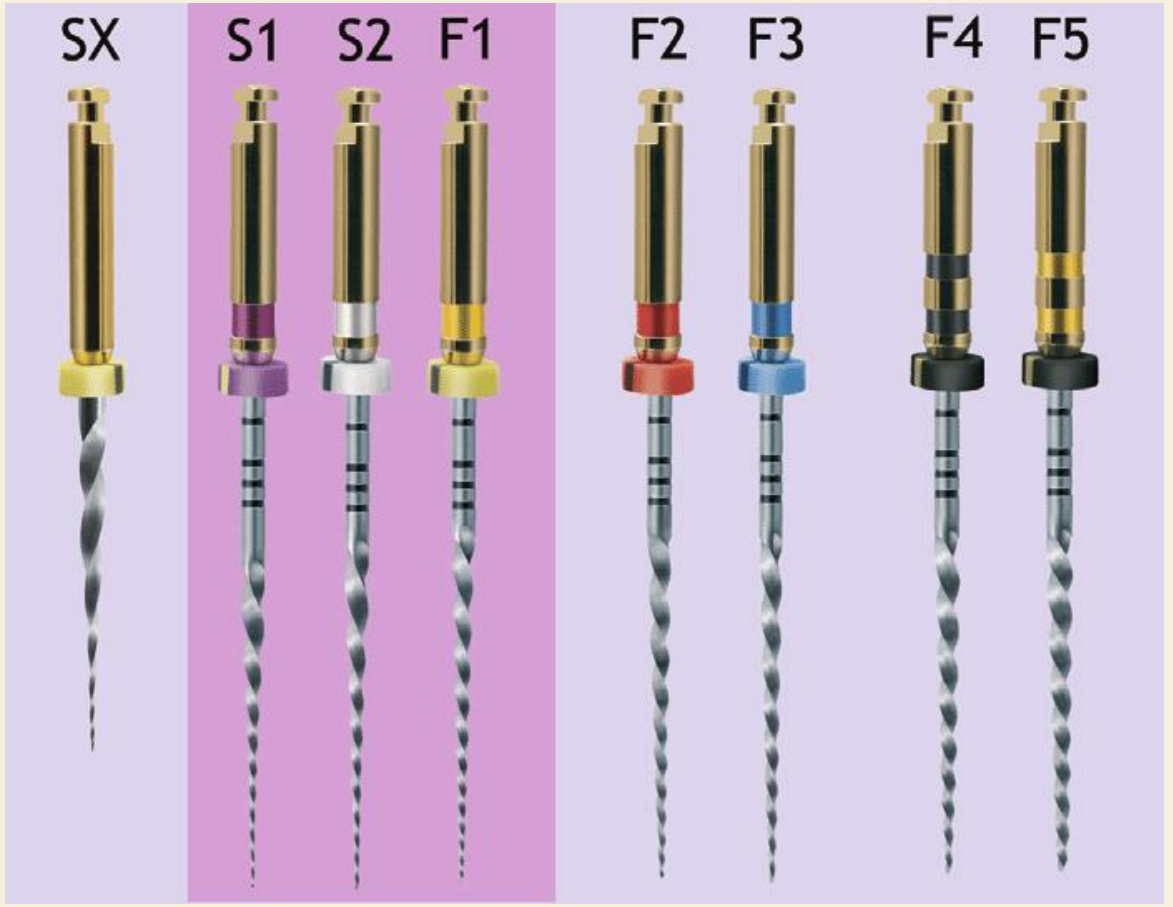


PROTAPER

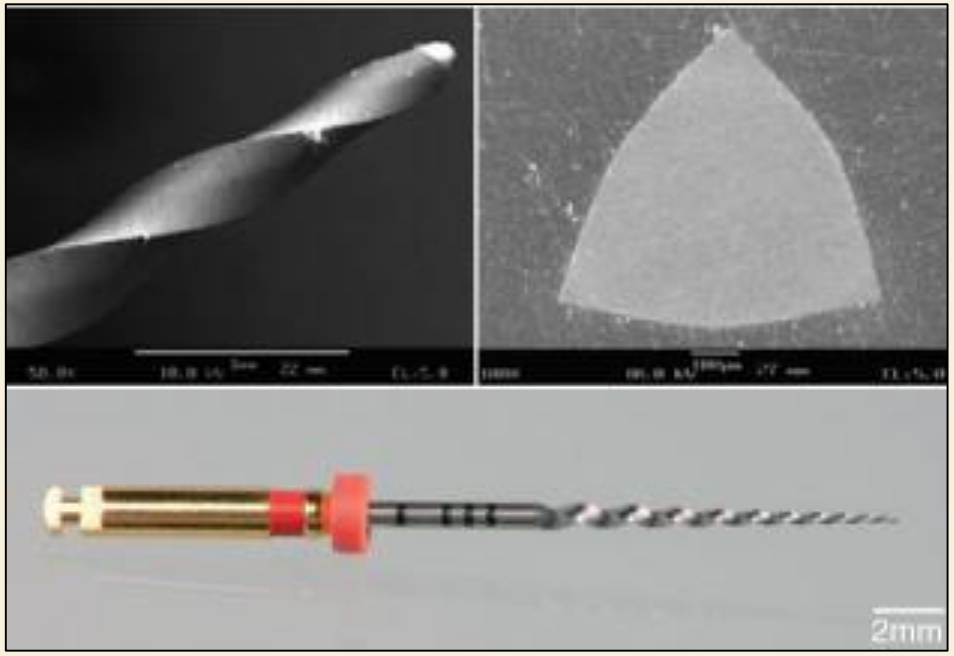
PROTAPER UNIVERSAL



No radial land
Positive Rake angle → fragile



PROTAPER GOLD

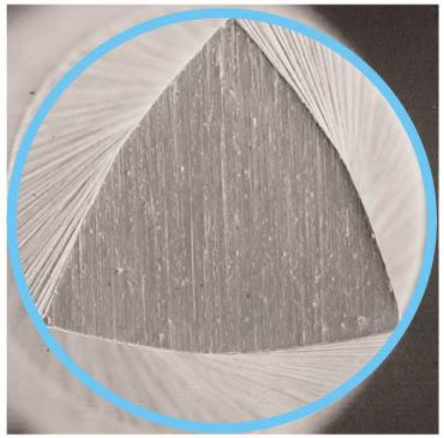


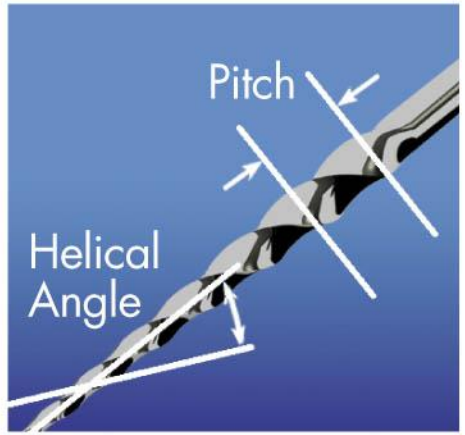
No. of instruments/ set	Tip sizes	Size increments	r.p.m. (recommended)	Lengths
6 (3 shaping files; SX, S1, S2; 3 finishing files; F1, F2, F3)	19-30	Vary along the working part of an individual instrument	150 to 350 minimal axial force, low to medium torque to fracture, varying working torque	19, 21, 25 mm

ProTaper Design Features

➢ **Shaping files:**

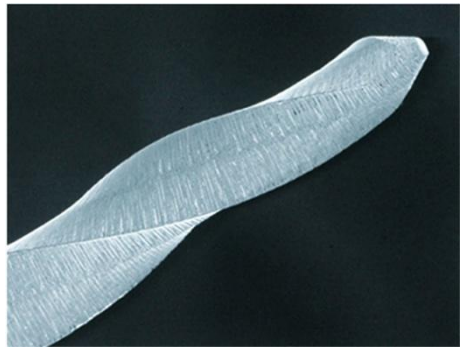
- 14 mm cutting part
- Cutting tip
- Increasing taper toward the handle
- Brushing technique

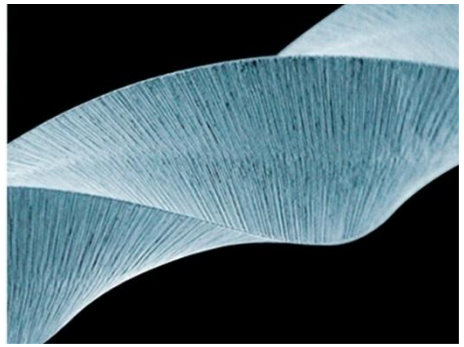




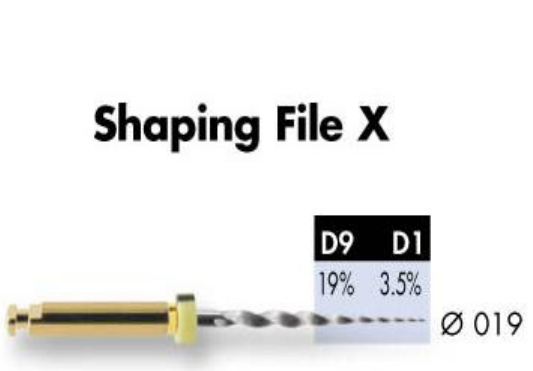
➢ **Finishing Files :**

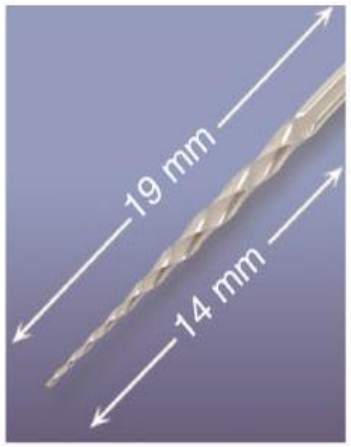
- 16 mm cutting part
- Non-cutting tip
- Decreasing taper
- Non-brushing

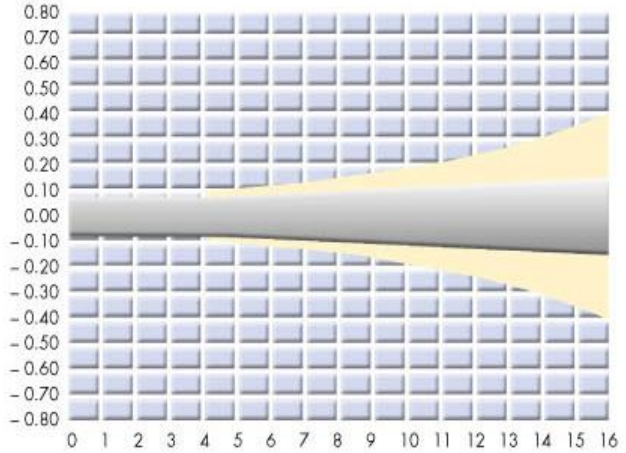




PROTAPER™ Features and Advantages





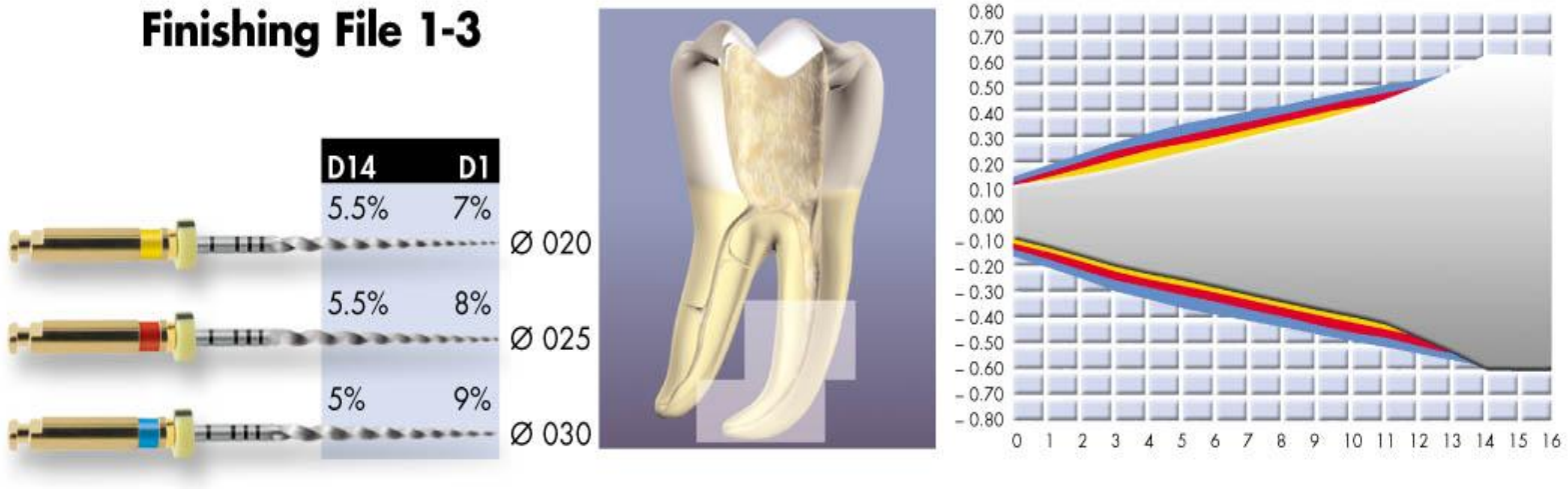


Shaping File X

PROTAPER™ Features and Advantages

Shaping File 1-2

PROTAPER™ Features and Advantages



Finishing File 1-3

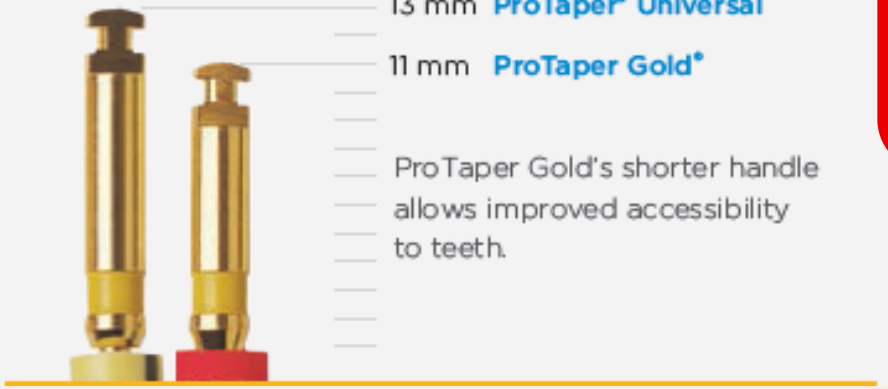
PROTAPER GOLD

ProTaper Gold® shaping files pre-enlarge canals and are designed to be used with the same familiar outstroke brushing technique.

SX
0.19 / .04v

S1
0.18 / .02v

S2
0.20 / .04v

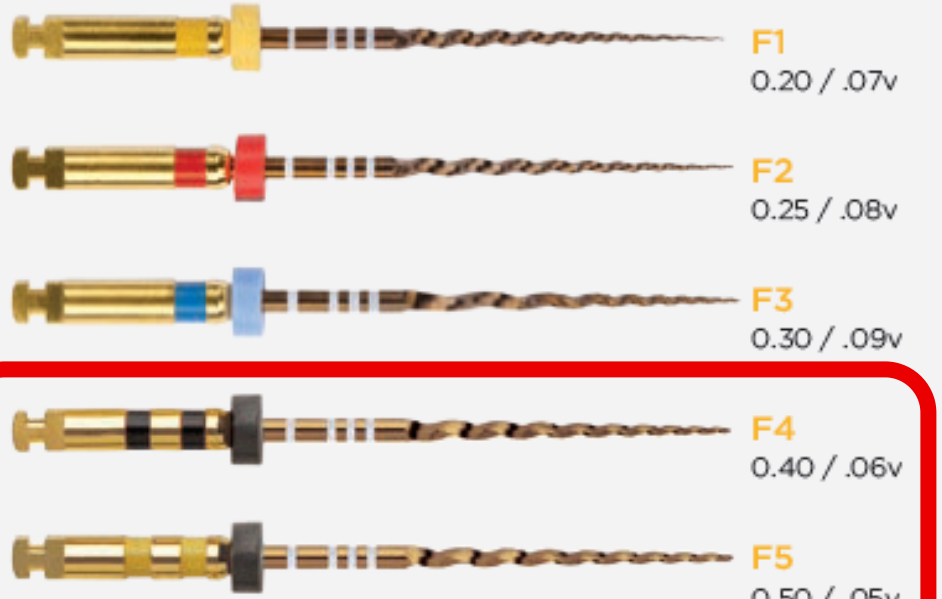


13 mm **ProTaper® Universal**

11 mm **ProTaper Gold®**

ProTaper Gold's shorter handle allows improved accessibility to teeth.

ProTaper Gold® finishing files are more flexible so you can shape and finish each canal with a complete system approach.



F1
0.20 / .07v

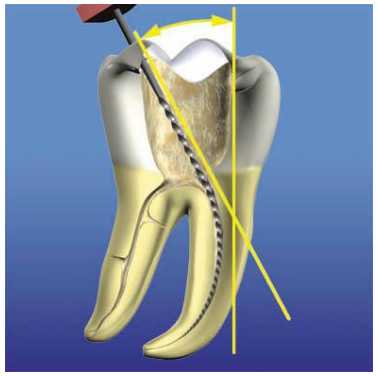
F2
0.25 / .08v

F3
0.30 / .09v

F4
0.40 / .06v

F5
0.50 / .05v

The ProTaper™ technique



1

- ✓ **Explore the root canal** with a SS #10K hand file
- ✓ Until it is a few mm short of the estimated W.L.
- ✓ NaOCI for all initial negotiation procedures.

2

- ✓ **S1** just short of the depth of the hand files
- ✓ Enlarge the coronal 2/3 of the canal
- ✓ Irrigate
- ✓ 10K hand file to break up debris and then re-irrigate.

PROTAPER The PROTAPER™ technique

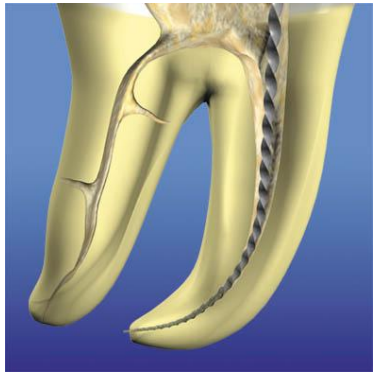
3

Sx → brushstroke → selectively away from furcal danger → better SLA

Light resistance → brush out

2/3 of the overall length of its cutting blades are below the orifice

Don't forget to irrigate.



4

Pre-enlargement 2/3 coronal →

Precurved 10K hand file→ negotiate the rest of the canal → patency, confirm WL.

Use S1 to length

The ProTaper™ technique

5

Irrigate and use **S2**

Typically go to full WL on the first pass.

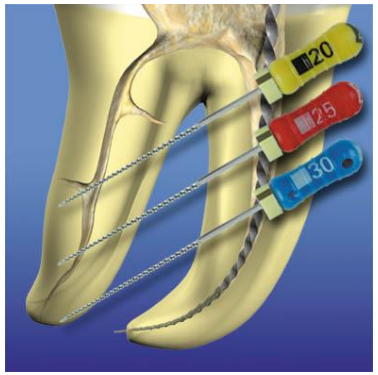
Irrigate.

6

2/3 coronal is prepared → 1/3 apical

F1 carefully take to WL and immediately withdraw

PROTAPER™ The PROTAPER™ technique



7 **Gauge the size of the foramen** by placing a 20 K hand file to length

If snug at WL → obturate

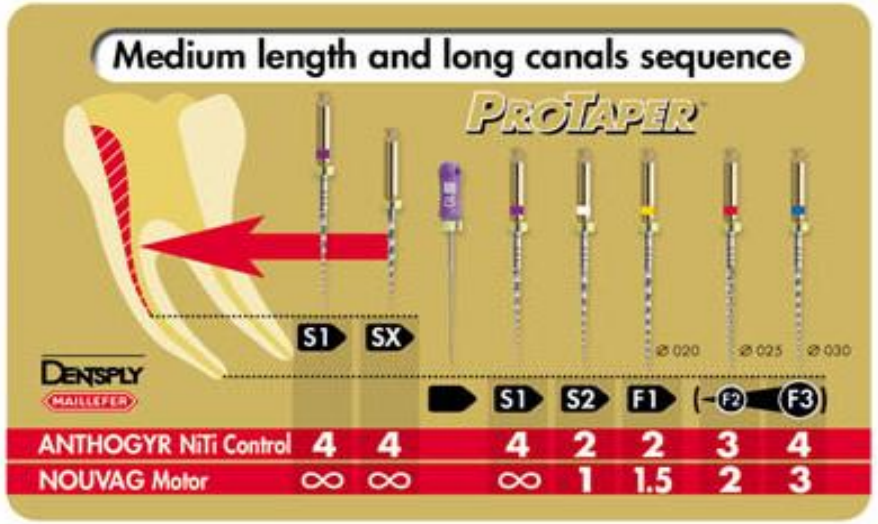
If it is loose → use F2

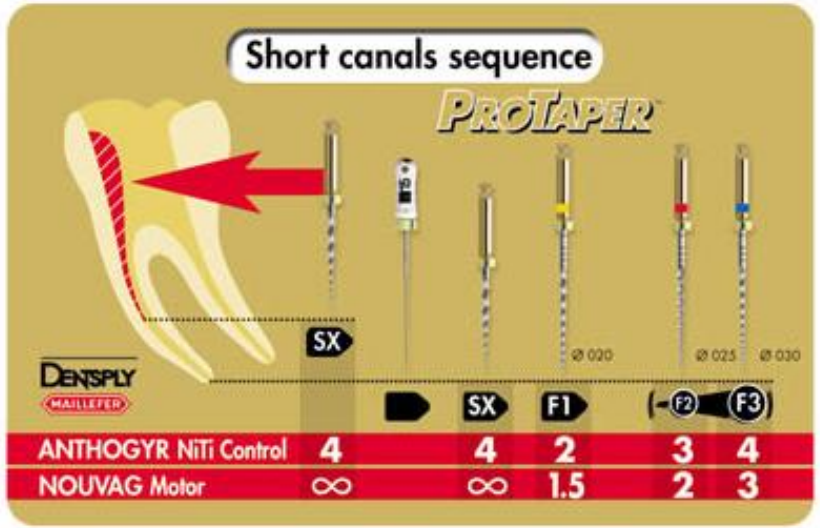
25 K hand file

8 **If it is loose use F3**

Normally, this would be as large as you would prepare a **calcified and/or curved canal.**

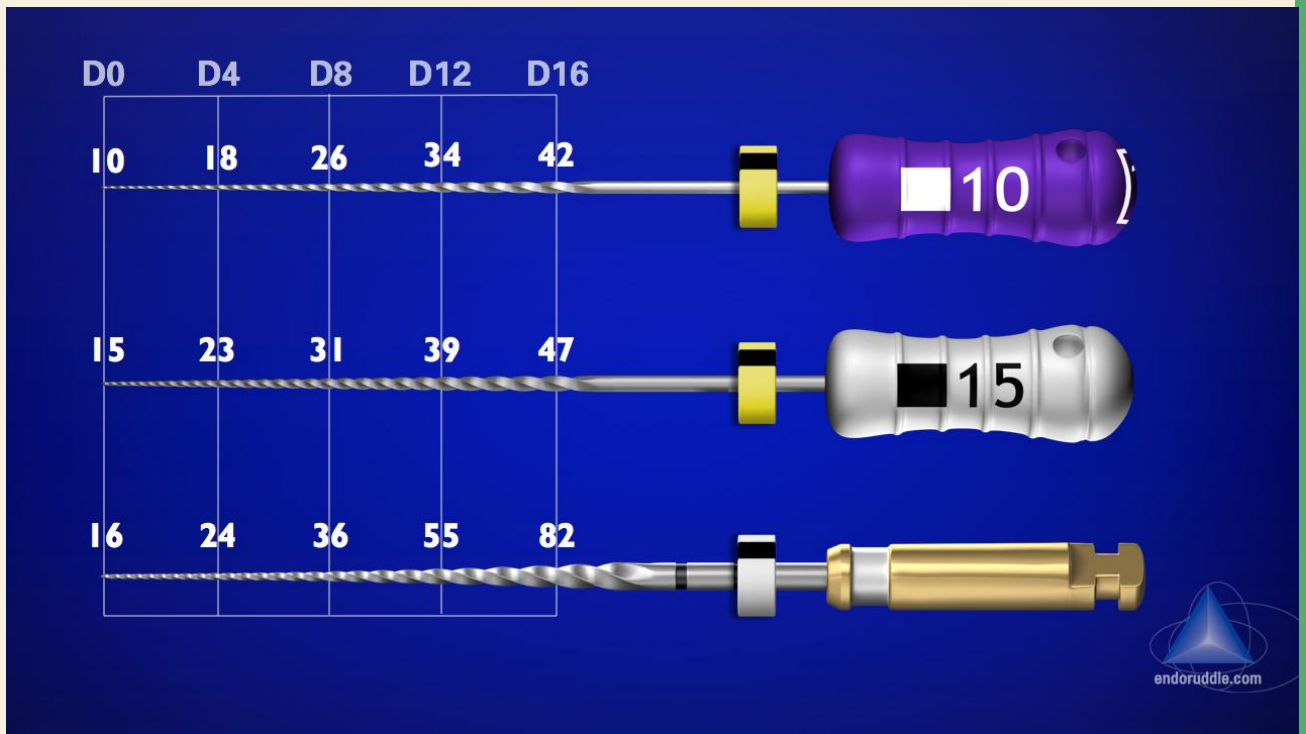
PROTAPER™ Working sequences





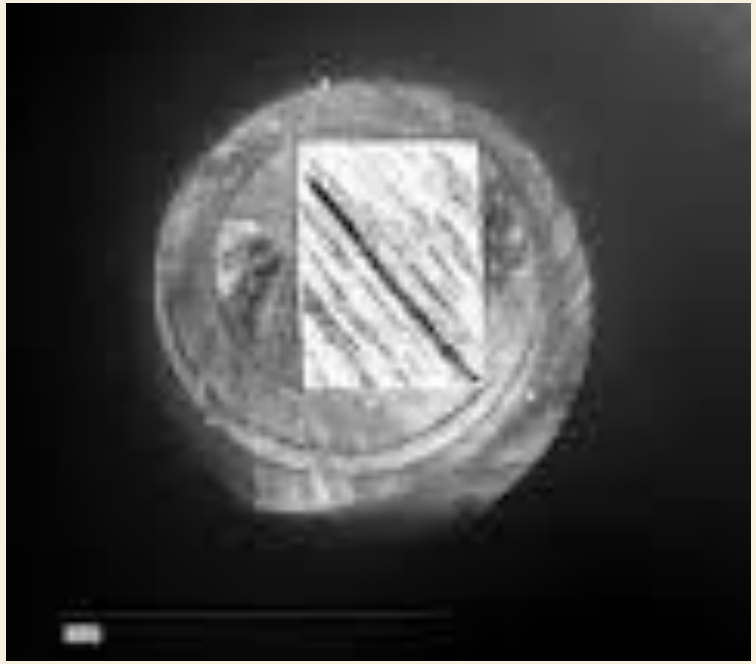
PROGLIDER

- One File Glide Path
- #16, Variable Taper
- **M-Wire**
- Strength ad Flexibility → stay on track in curves
- Presterilized blister pack

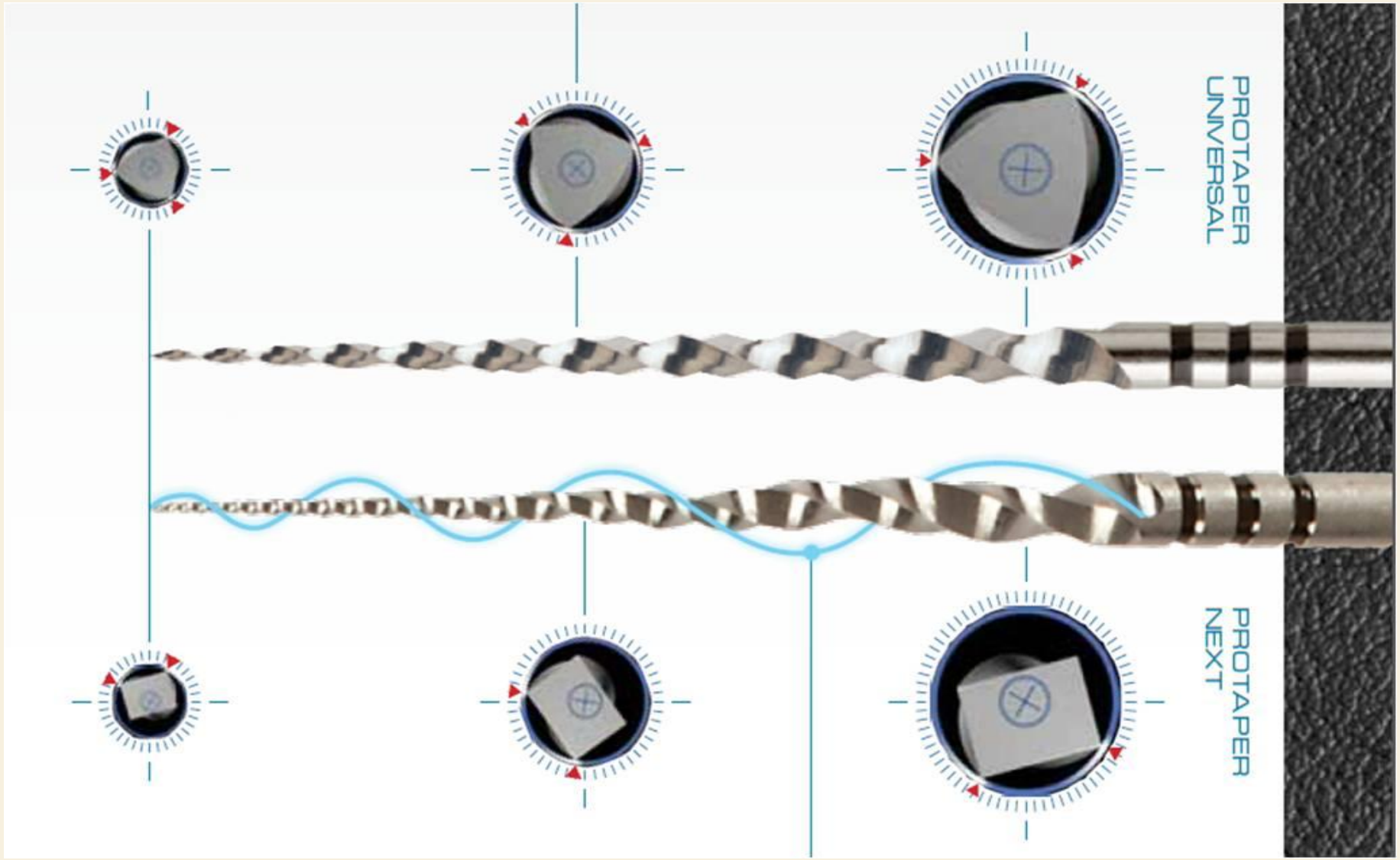


PROTAPER –NEXT SERIES

- 2012
- **M-wire**
- 2 shaping, 3 optional

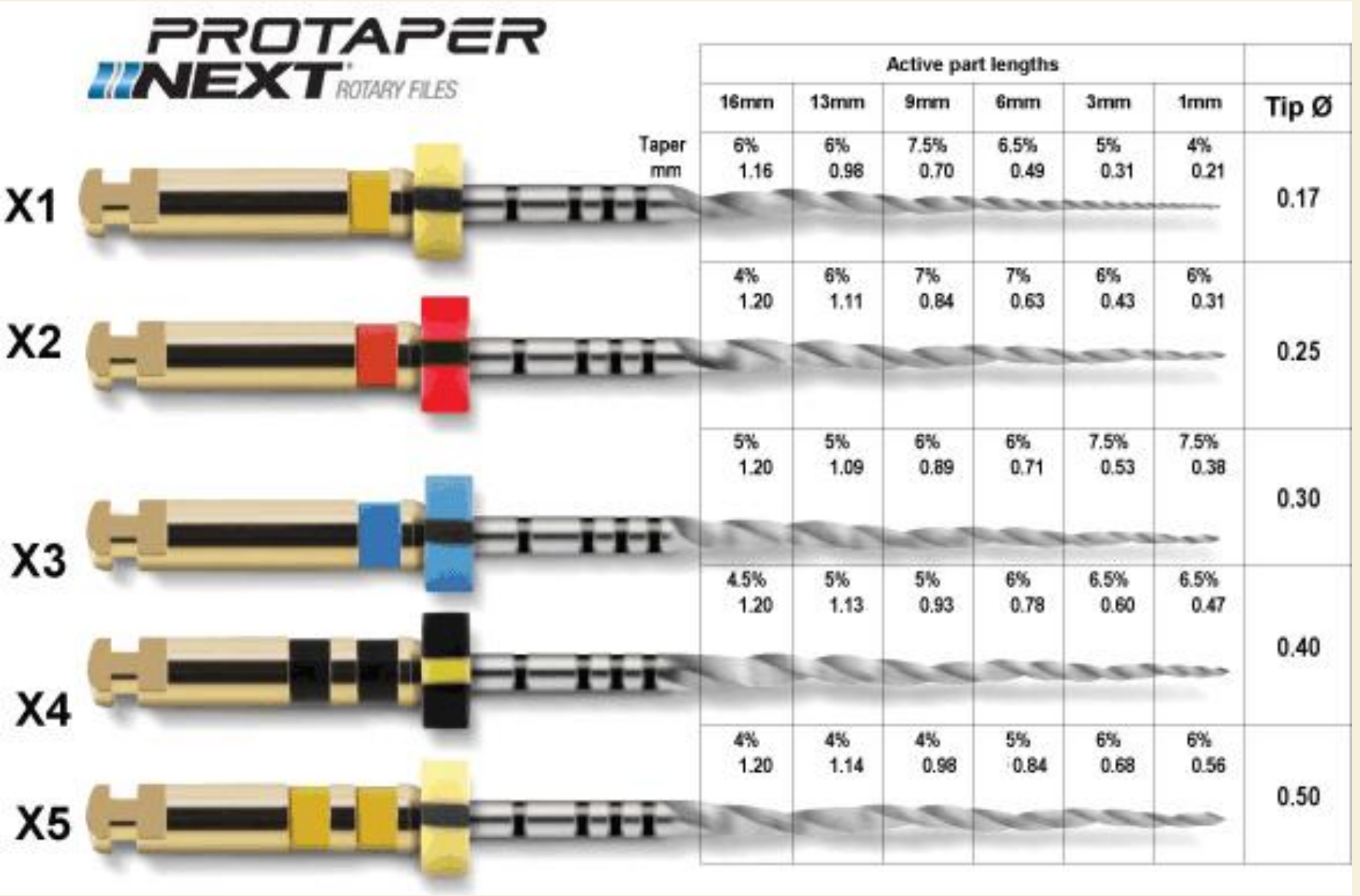


COMPARISON WITH PROTAPER



SEQUENCE

PROTAPER NEXT ROTARY FILES

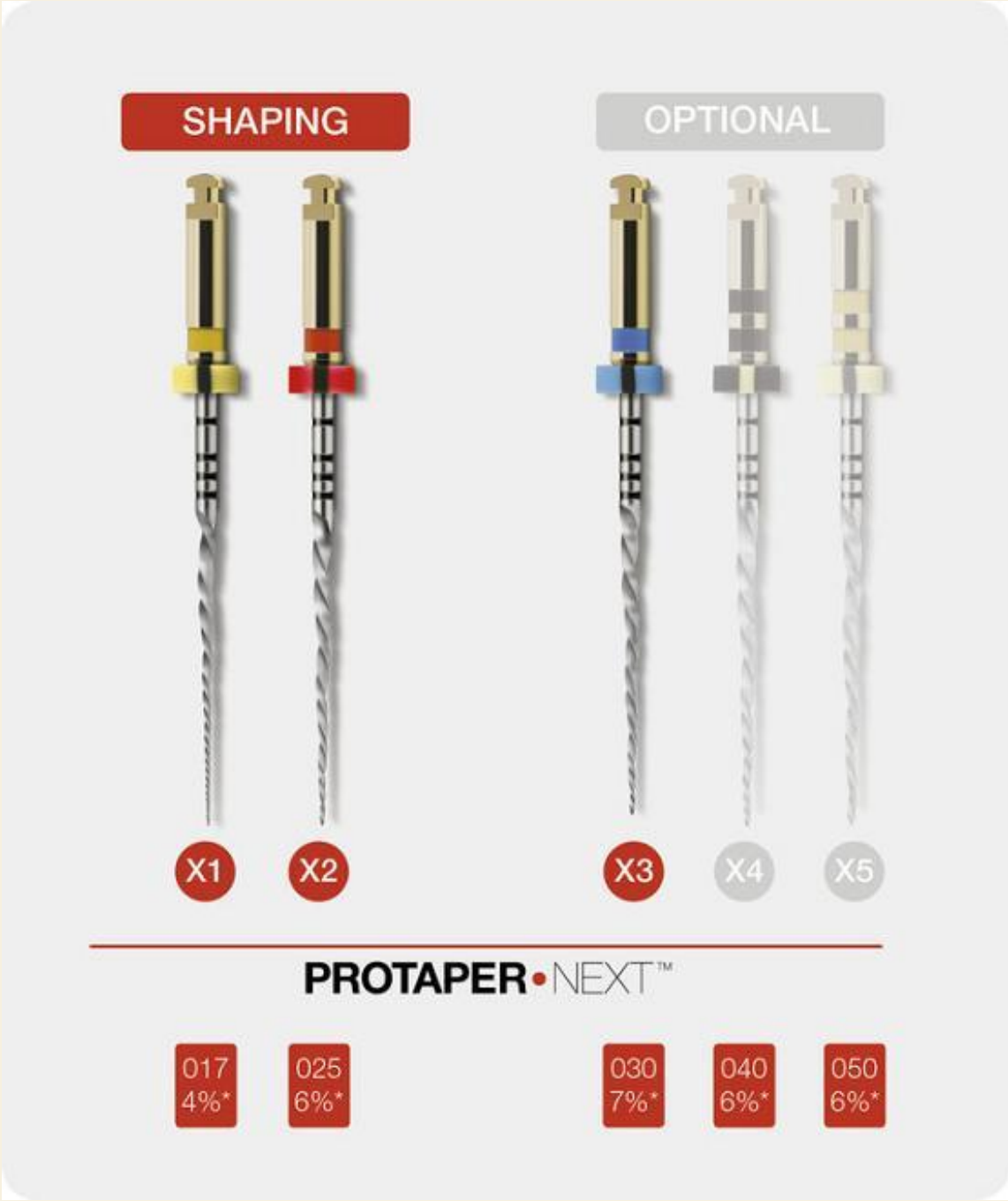


	Taper mm	Active part lengths						Tip Ø
		16mm	13mm	9mm	6mm	3mm	1mm	
X1		6% 1.16	6% 0.98	7.5% 0.70	6.5% 0.49	5% 0.31	4% 0.21	0.17
X2		4% 1.20	6% 1.11	7% 0.84	7% 0.63	6% 0.43	6% 0.31	0.25
X3		5% 1.20	5% 1.09	6% 0.89	6% 0.71	7.5% 0.53	7.5% 0.38	0.30
X4		4.5% 1.20	5% 1.13	5% 0.93	6% 0.78	6.5% 0.60	6.5% 0.47	0.40
X5		4% 1.20	4% 1.14	4% 0.98	5% 0.84	6% 0.68	6% 0.56	0.50

PROTAPER NEXT HANDLING

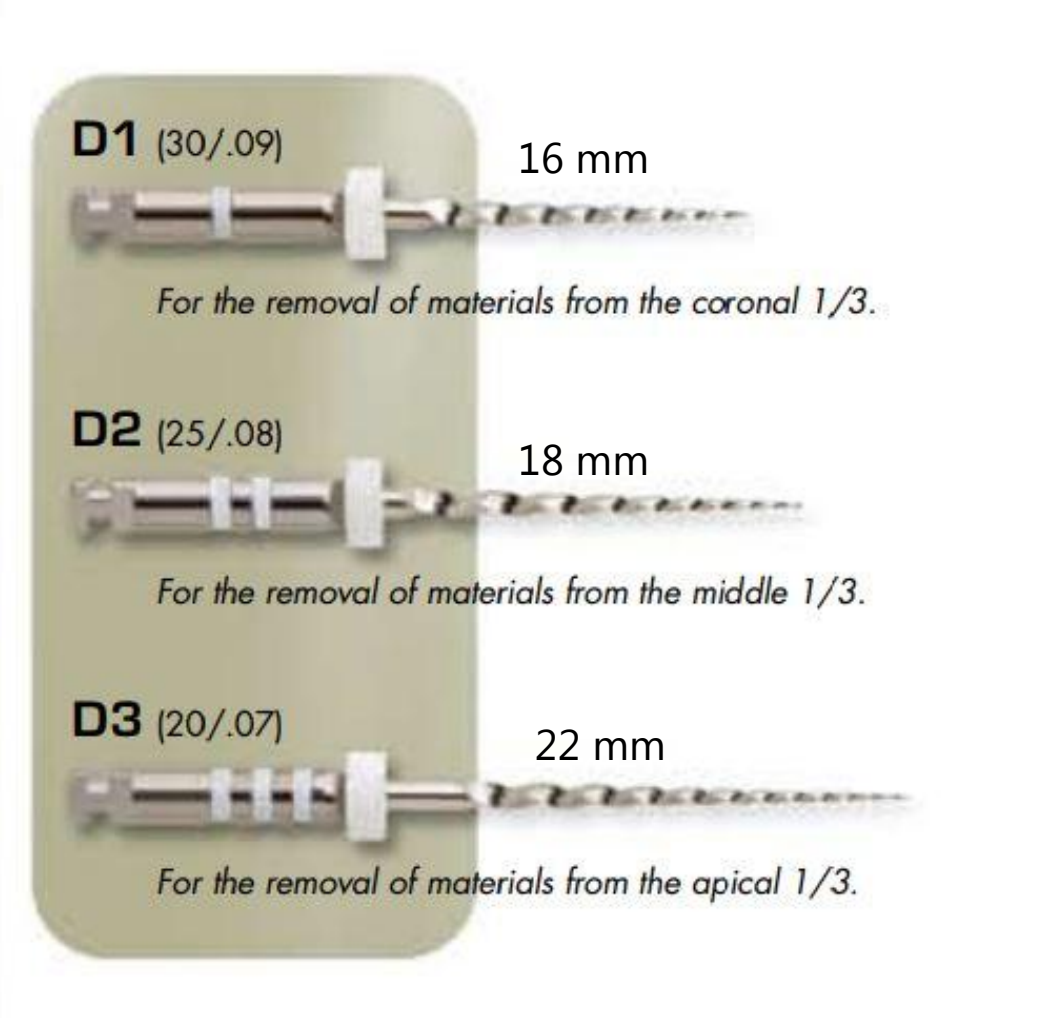
Single length technique

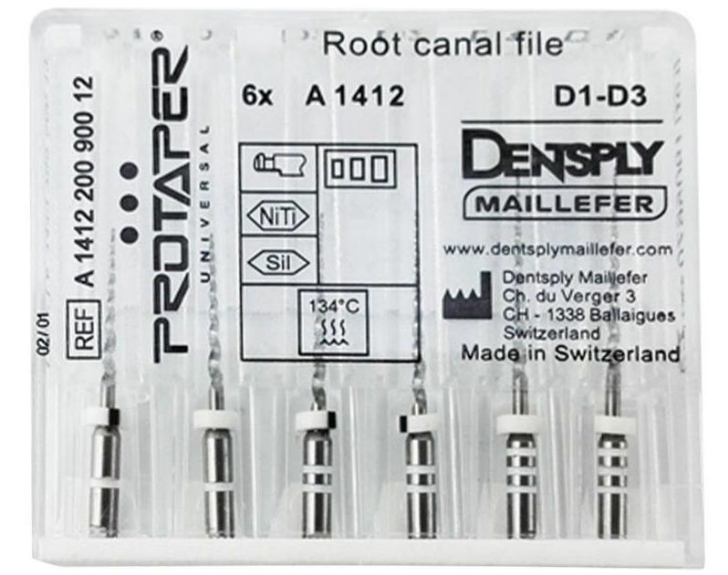
- Glide path by small sized Hand files
- X1(017/04): **Brushing** → WL
- **X2**(025/06)
- **Apical** is **covered with debries**
- 25 Hand file is snug
- the file is loose → X3,X4,X5.



PROTAPER RETREATMENT FILES

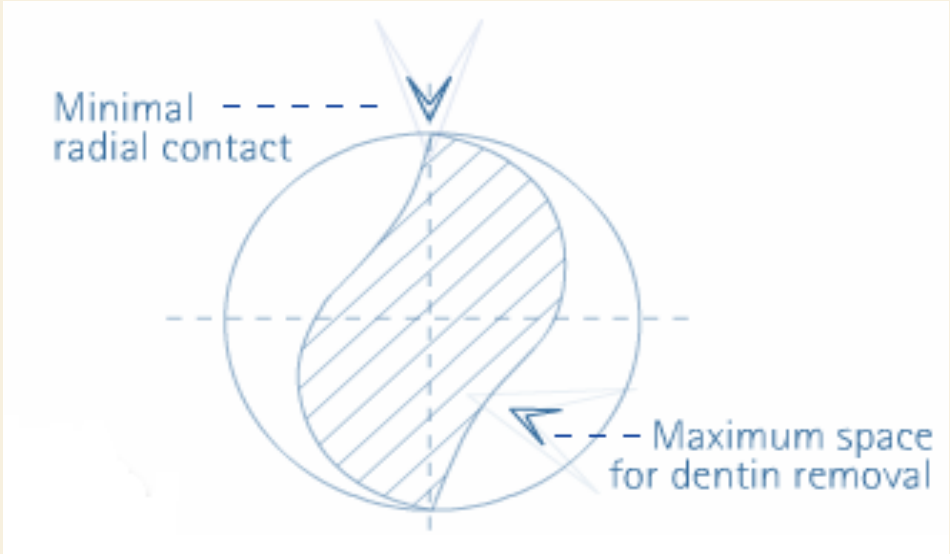
Cutting tip





M TWO SYSTEM

- 2004
- Rake angle is positive
- Tip is non- cutting
- Single length technique




Mtwo Taper .04 1 Ring
Mtwo Taper .05 2 Rings
Mtwo Taper .06 3 Rings
Mtwo Taper .07 4 Rings
Depth markings
Silicone stopper
Taper rings
Instrument markings

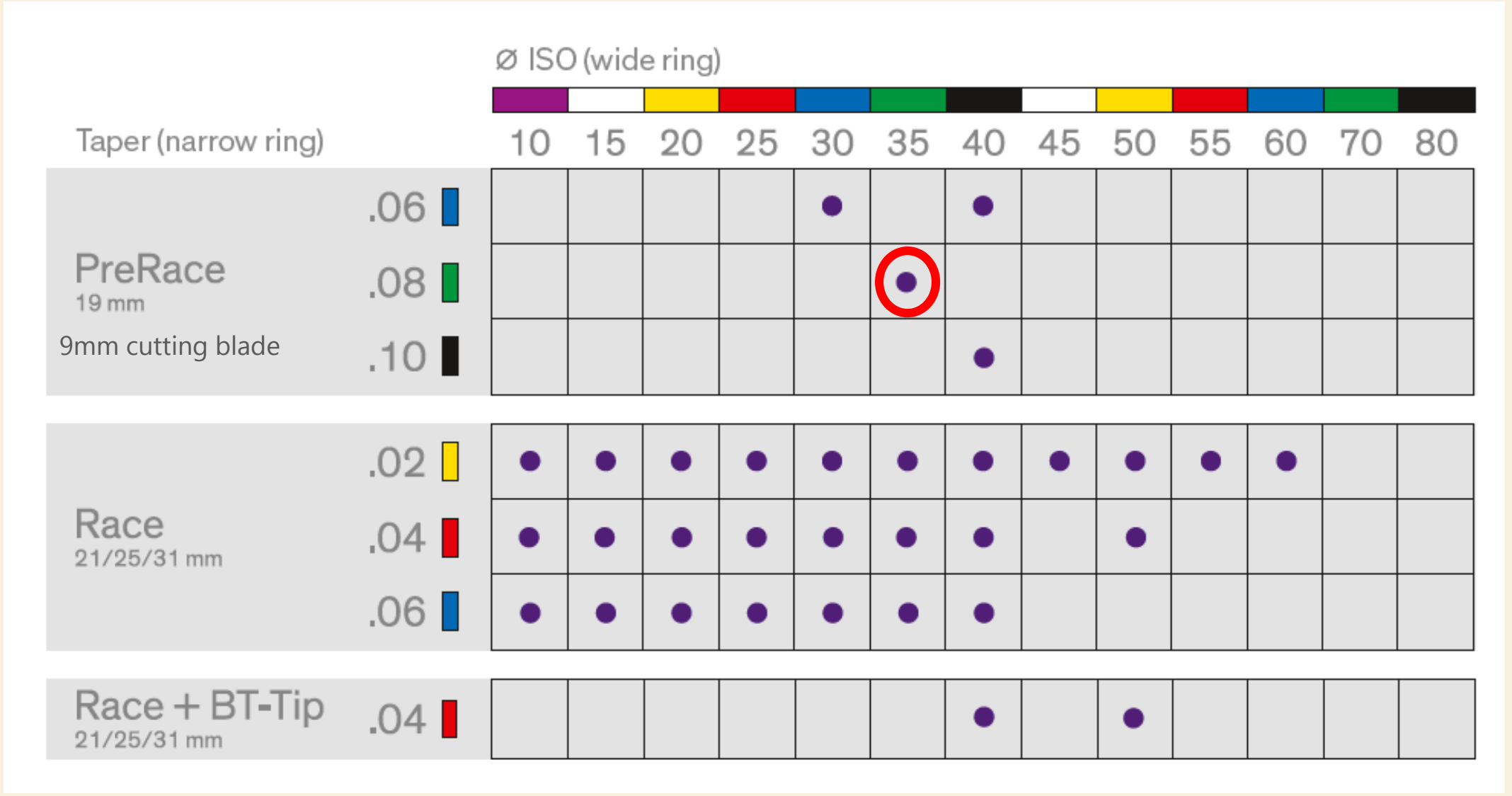

mtwo
10/.04
15/.05
20/.06
25/.06
30/.05
35/.04
40/.04
25/.07
VDW

RACE

Reamer with Alternating Cutting edge

1999

RACE


Ø ISO (wide ring)
Taper (narrow ring)
10 15 20 25 30 35 40 45 50 55 60 70 80
PreRace
19 mm
9mm cutting blade
.06
.08
.10
Race
21/25/31 mm
.02
.04
.06
Race + BT-Tip
21/25/31 mm
.04

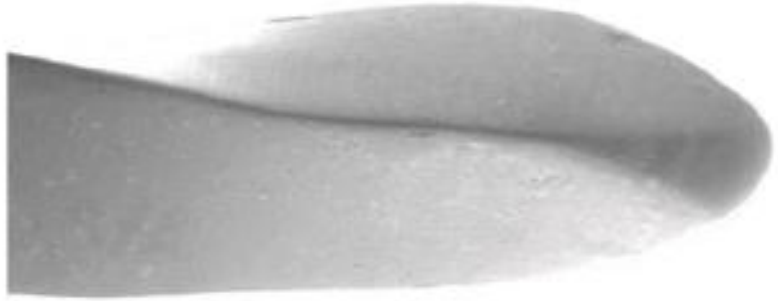
RACE

Non screw-in design

Alternating cutting edges →better control

Triangular cross section

Sharp edges → optimum cutting
Thin core→ increased flexibility



Electro-polished

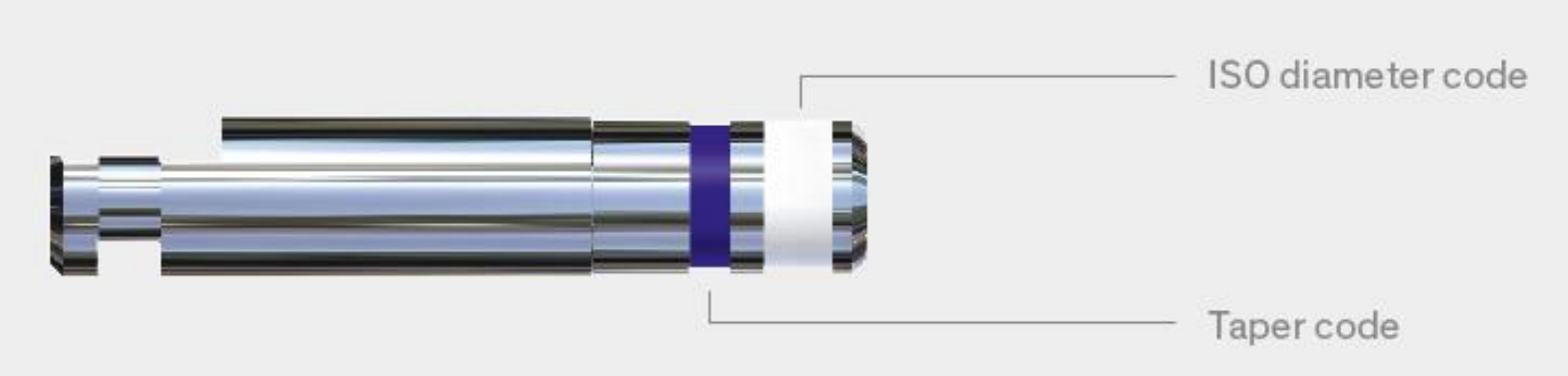
Reducing micro-crack
Corrosion and fatigue Resistance

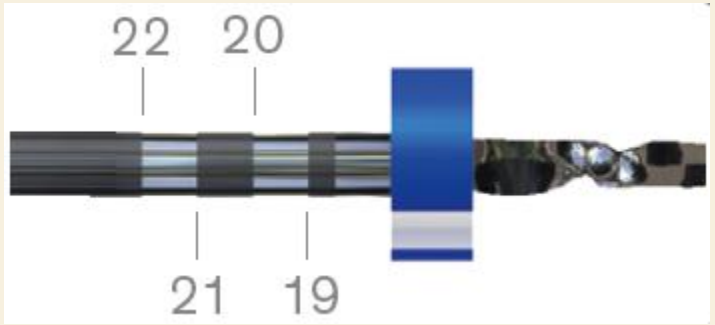
RACE

Exclusive rounded safety tip

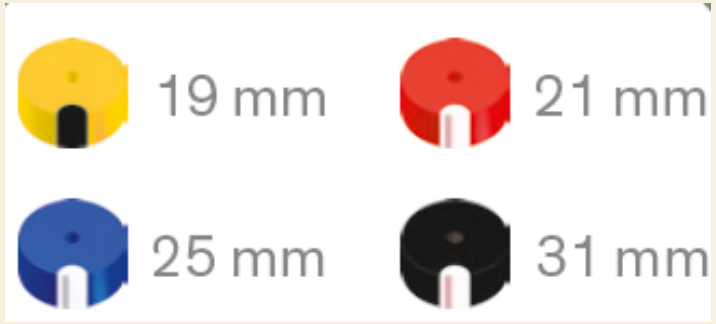
- Centering in the canal
- **Less risk of perforations** and ledges
- DR1 :active tip

RACE





Silicone Endo stop



RACE

Optimal use of Race instruments

- Speed: **600-1'000 rpm**
- Torque: **0/5-1 Ncm for RaCe files**
- **1/5 Ncm for PreRace**
- Gentle back and forth strokes
- Light touch, let the instrument do the work.
- Work for 3-4 seconds at a time, then withdraw.
- Clean the blade and irrigate the canal.

GLIDE PATH

Scout Race:

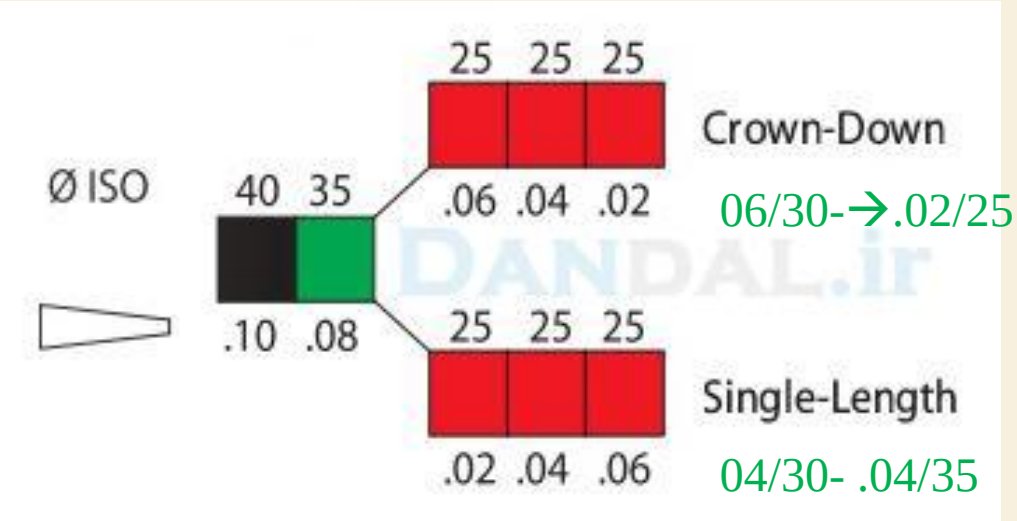
- 10, 15 and 20 , 2% taper: straight, with severe curvature or «S» type.

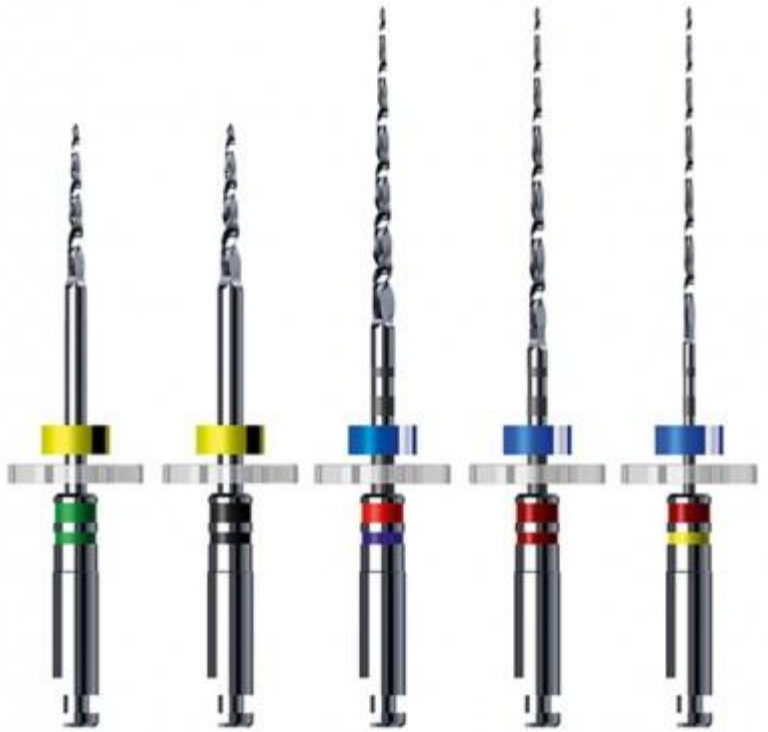
Race ISO 10: calcified or narrow canals

- 10 : .02, .04 and .06 taper, when manual K files of ISO 06 or 08 cannot progress further

EASY-RACE

2 Speed: 400-600 rpm
Torque: 1.5 Ncm





RACE

1. RaCe

2. iRaCe

3. BioraCe

4. BT-RaCe:

5. D-RaCe

I-RACE

R1,R2,R3

- final apical size of **ISO 30/.04**

❖iRace Sequence

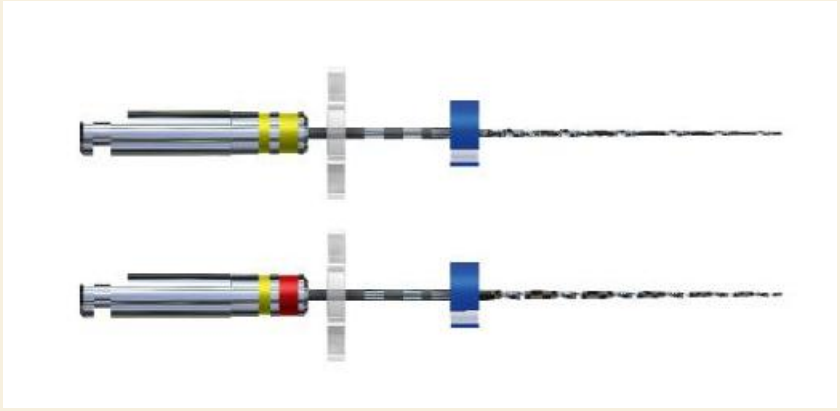
Majority of cases (straight, slightly curved or wide canals):

- **R1** 15/.06,
- **R2** 25/.04
- **R3** 30/.04

❖Complementary iRace Plus Kit

More difficult cases (highly curved, narrow or calcified canals):

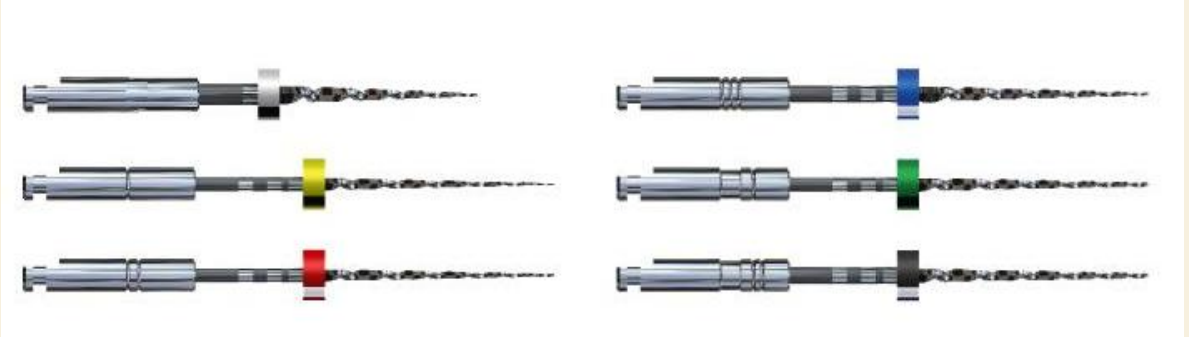
- **R1a** 20/.02
- **R1b** 25/.02



R1a,R1b

- ✓ **21, 25, 31 mm**
- ✓ **600 rpm (minimum 400 rpm)**
- ✓ **1.5 Ncm**

BIORACE



✓To achieve adequate elimination of bacteria from the root canal

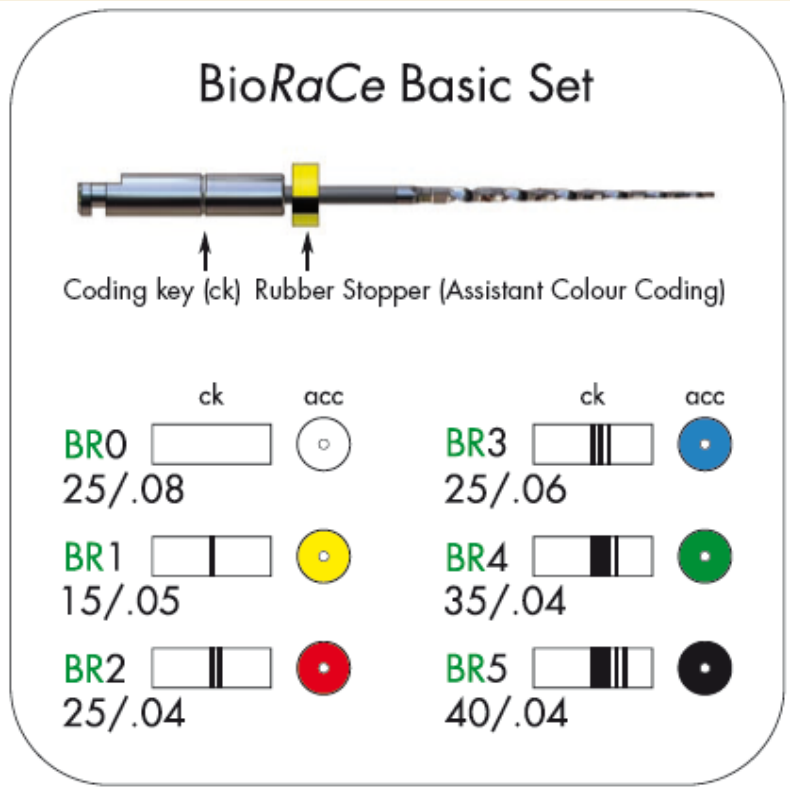
✓**Minimum apical size ISO 35 or 40**

✓ Lengths: 21, 25, 31 mm

✓ Recommended speed**: 600 rpm**

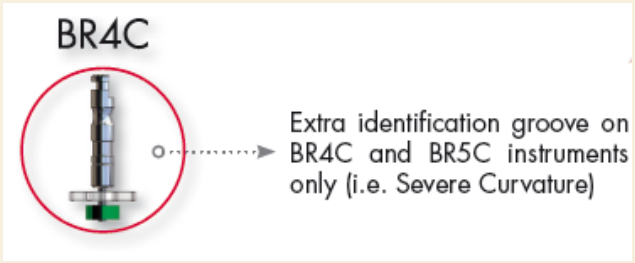
✓ Torque: 1.5 Ncm

✓ No SMD



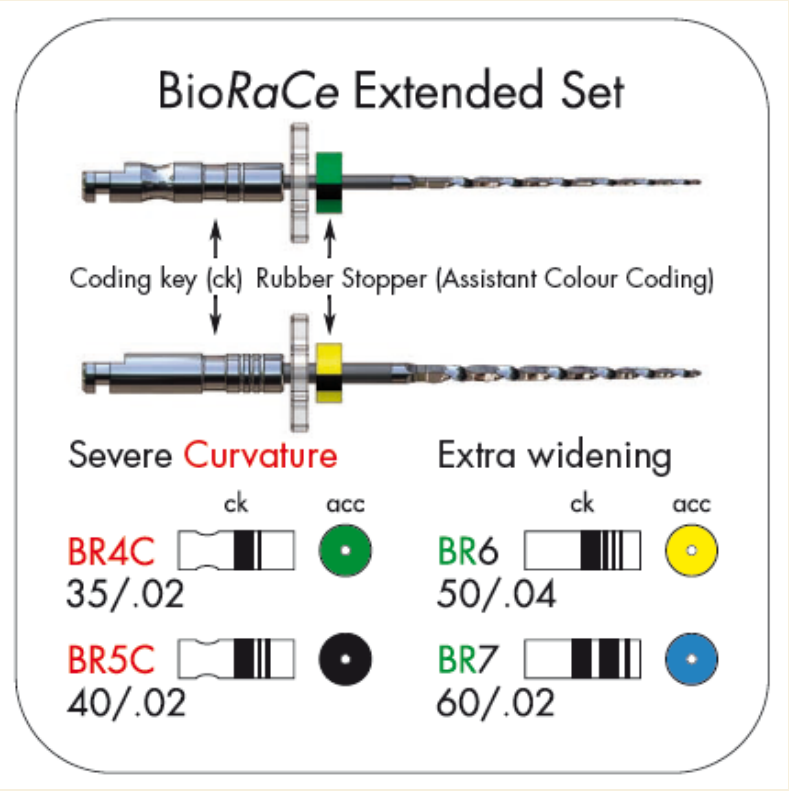
COMPLEMENTARY BIORACE EXTENDED SET:

a. Canals with severe apical curvature



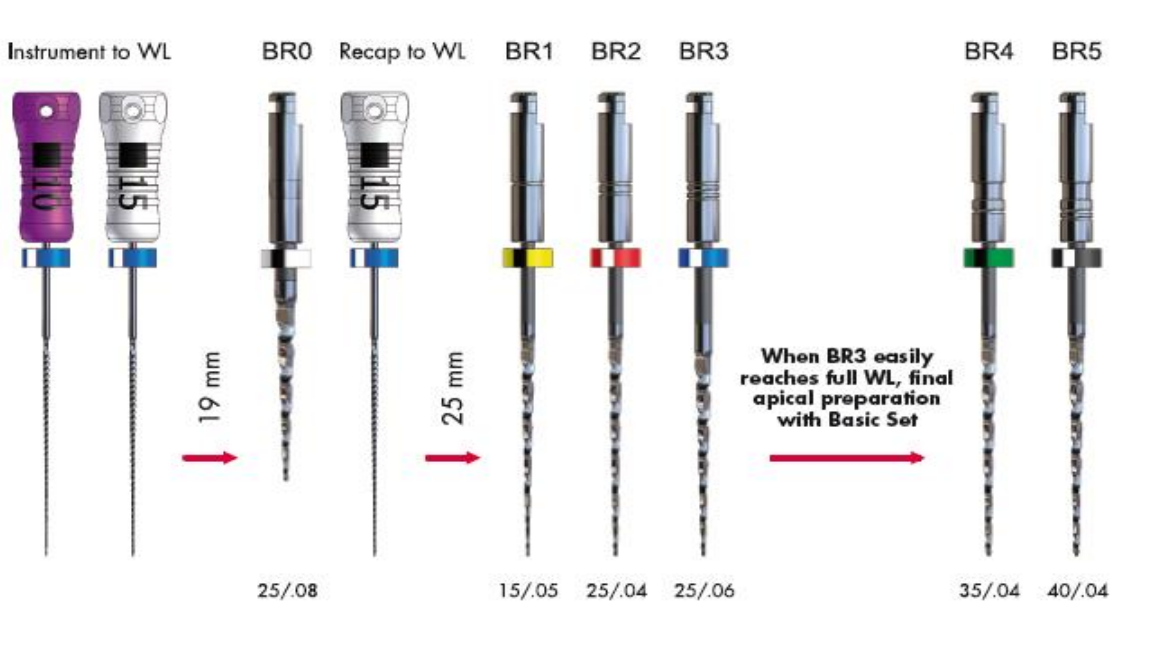
b. Large canals

- ✓ Lengths: 21, 25, 31 mm
- ✓ Recommended speed: 600 rpm
- ✓ Torque: 1.5 Ncm



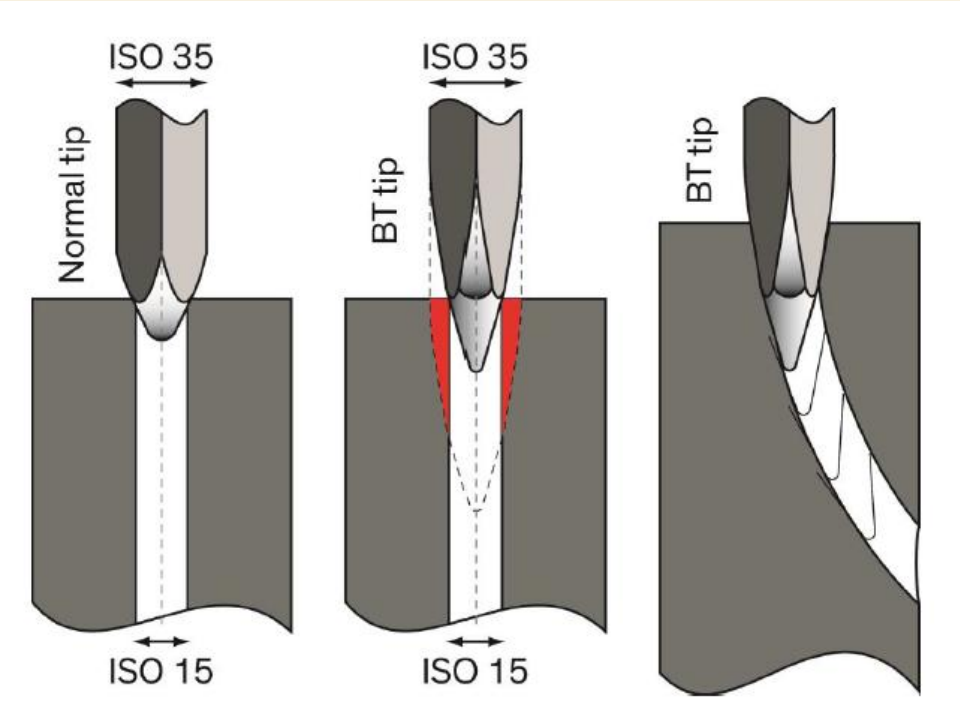
BIO RACE

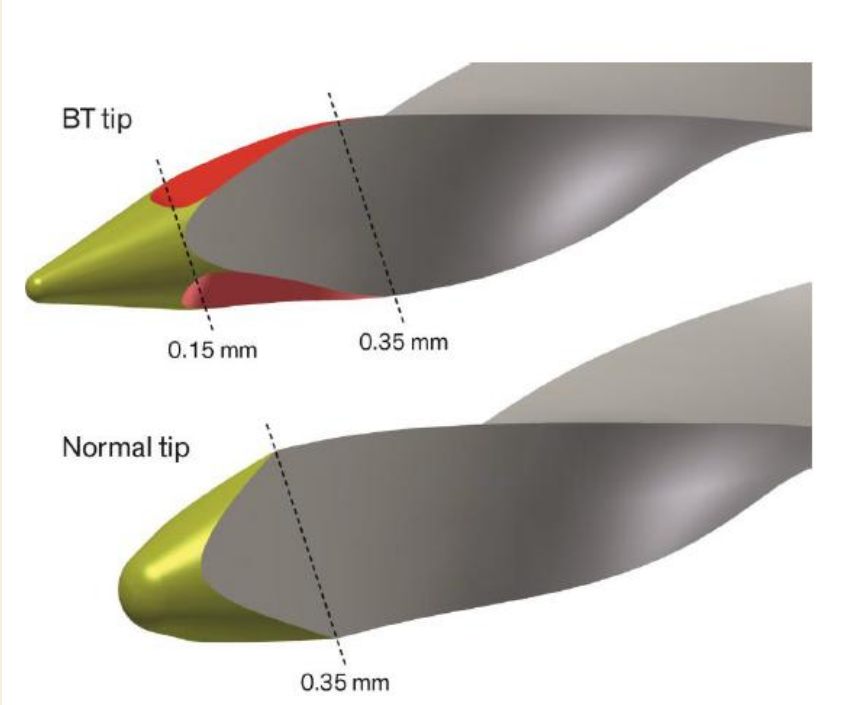
- Starts with Orifice Opener **25-%8** for coronal 2/3 and continue with **15-%5, 25-%4**
- For most canals 25-%6
  - narrow 35-%2-40-%2
  - Wide 35-%4-40-%4



BT-RACE SEQUENCE

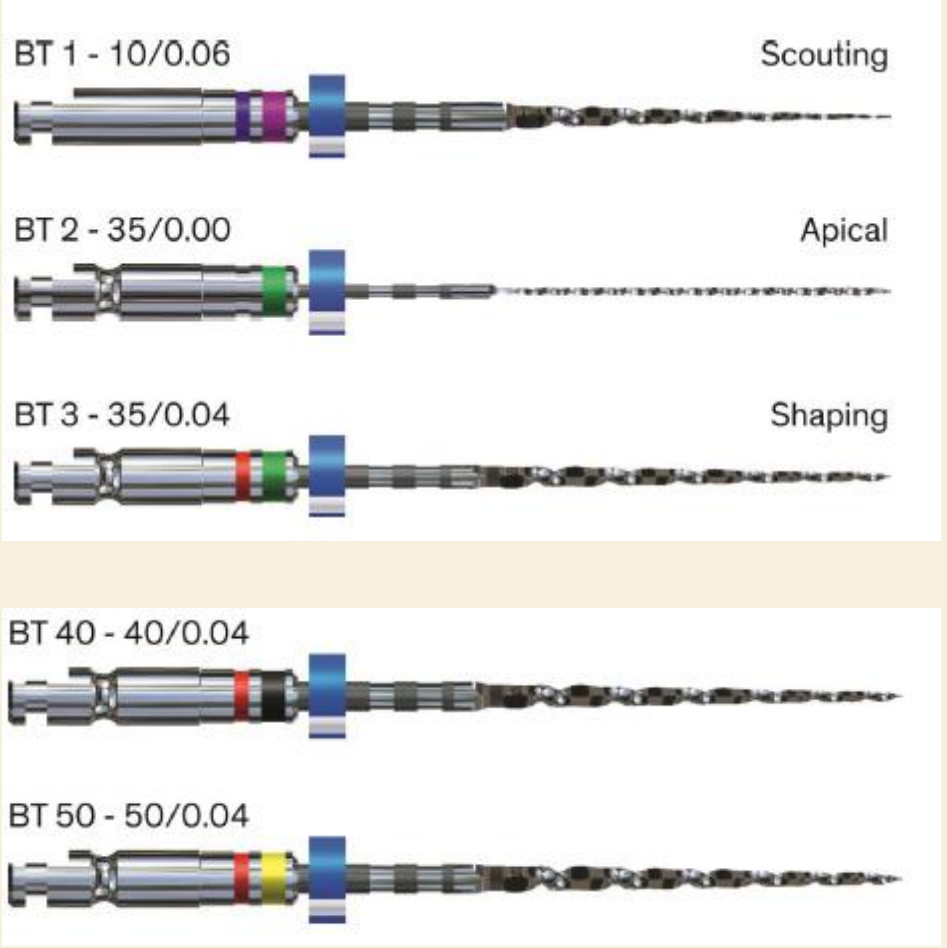
- Biological & Conservative
- **“Booster Tip”** (BT-Tip) patented by FKG:
- A non-cutting tip from 0 to 0.15 mm diameter
- The cutting edges start from 0.15 mm and upwards on the file





BT-RACE SEQUENCE

- ✓Lengths: 21, 25, 31 mm
- ✓Speed of **800 – 1000 rpm**
- ✓Torque: 1.5 Ncm
- ✓Delivered in a sterile blister
- ✓Single use
- ✓Glide path: 15,2% manual or Scout Race



BT-Race XL

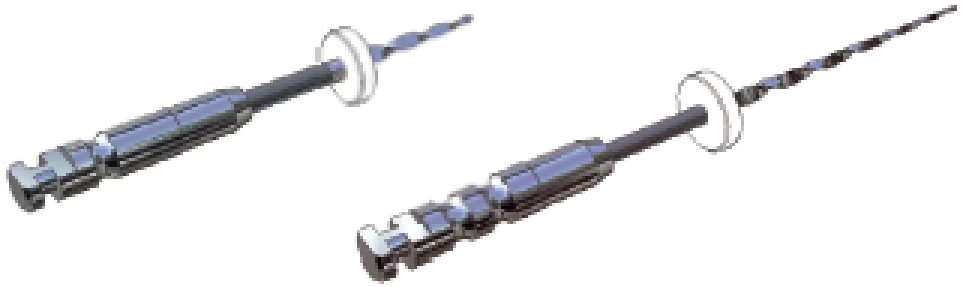
D-RACE

- **DR1: 1'000 rpm (minimum 800 rpm)**
- **DR2: 600 rpm (minimum 400 rpm)**
- Torque: 1.5 Ncm
- DR2: single use

DR1 - Access

» ISO 030/0.10 - L.15/8 mm

» active tip



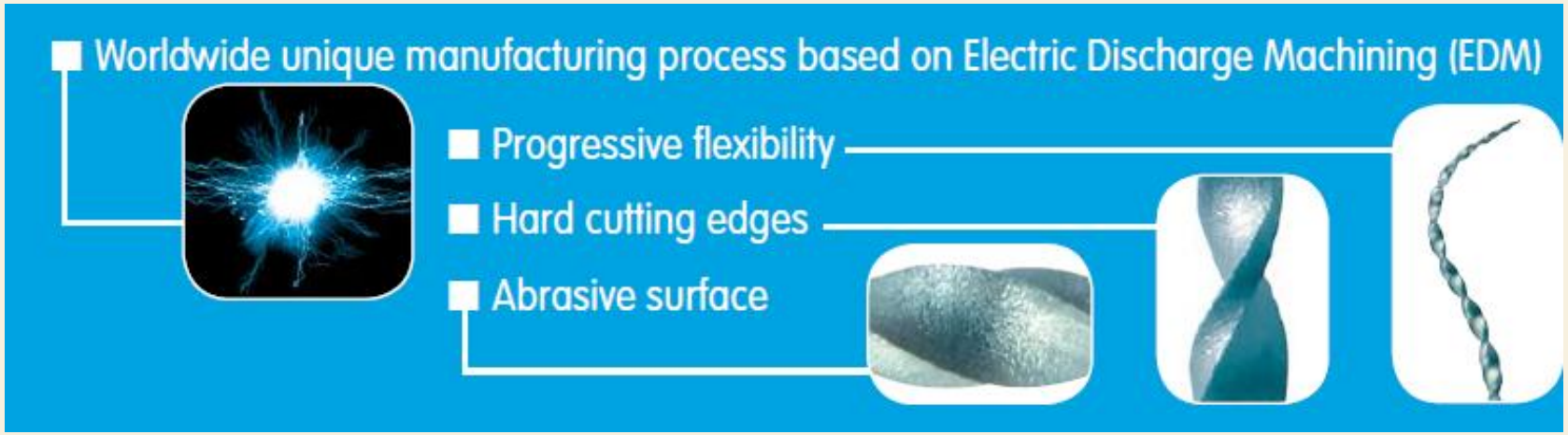
DR2 - Full path

» ISO 025/0.04 - L.25/16 mm

» safety tip

NEONITI

MANUFACTURING PRINCIPLE



precurving

to negotiate :

✓ a **difficult access** or

✓ a **ledge**

EDM process consists of sparks produced by high energy and high frequency electric discharges between the metal workpiece (e.g. NEONITI file) and an electrode (e.g. the cutting wire). This leads to locally melting and evoporating the workpiece material resulting in the finished product desired geometry.

ADVANTAGES

- ✓ Anti-screwing effect
- ✓ High **cutting** efficiency
- ✓ High flexibility
- ✓ High resistance to **fracture**
- ✓ Efficient **cleaning** to the apex
- ✓ **Retreatment**

NEONITI

One file system

Neoniti C1 n°25/.12 Orifice opener		15 mm
Neoniti GPS n°15/.03 Pathfinder		21 mm 25 mm 31 mm
Neoniti A1 n°20/.06 Shaper for difficult canals		21 mm 25 mm 31 mm
Neoniti A1 n°25/.06 Shaper		21 mm 25 mm 31 mm
Neoniti A1 n°40/.04 Finisher for large canals		21 mm 25 mm 31 mm

(calcified, narrow, curved)

DESIGN MANUFACTURING & HEADQUARTERS IN FRANCE

NEONITI

non-sterile packaging
Do not sterilize more than 5 times

Recommended use

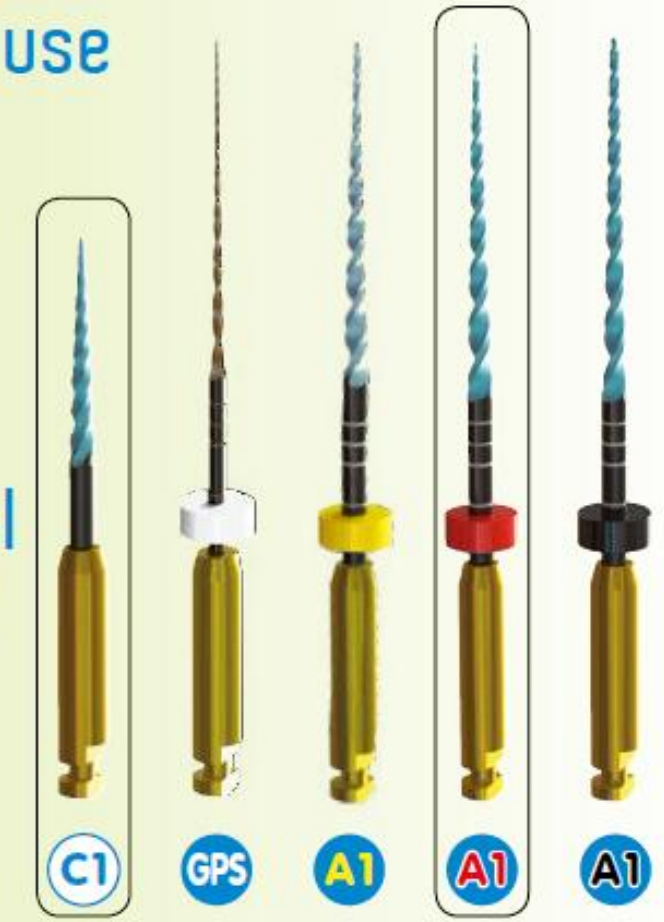
- Crown down technique
- Continuous rotation
- Speed 300 - 500 rpm
- Torque limit 1.5 N. cm
- Constantly irrigate
- Frequently wipe the file

Filling the canal

We generally recommend to use Gutta Percha points Size n°25 - Taper .06

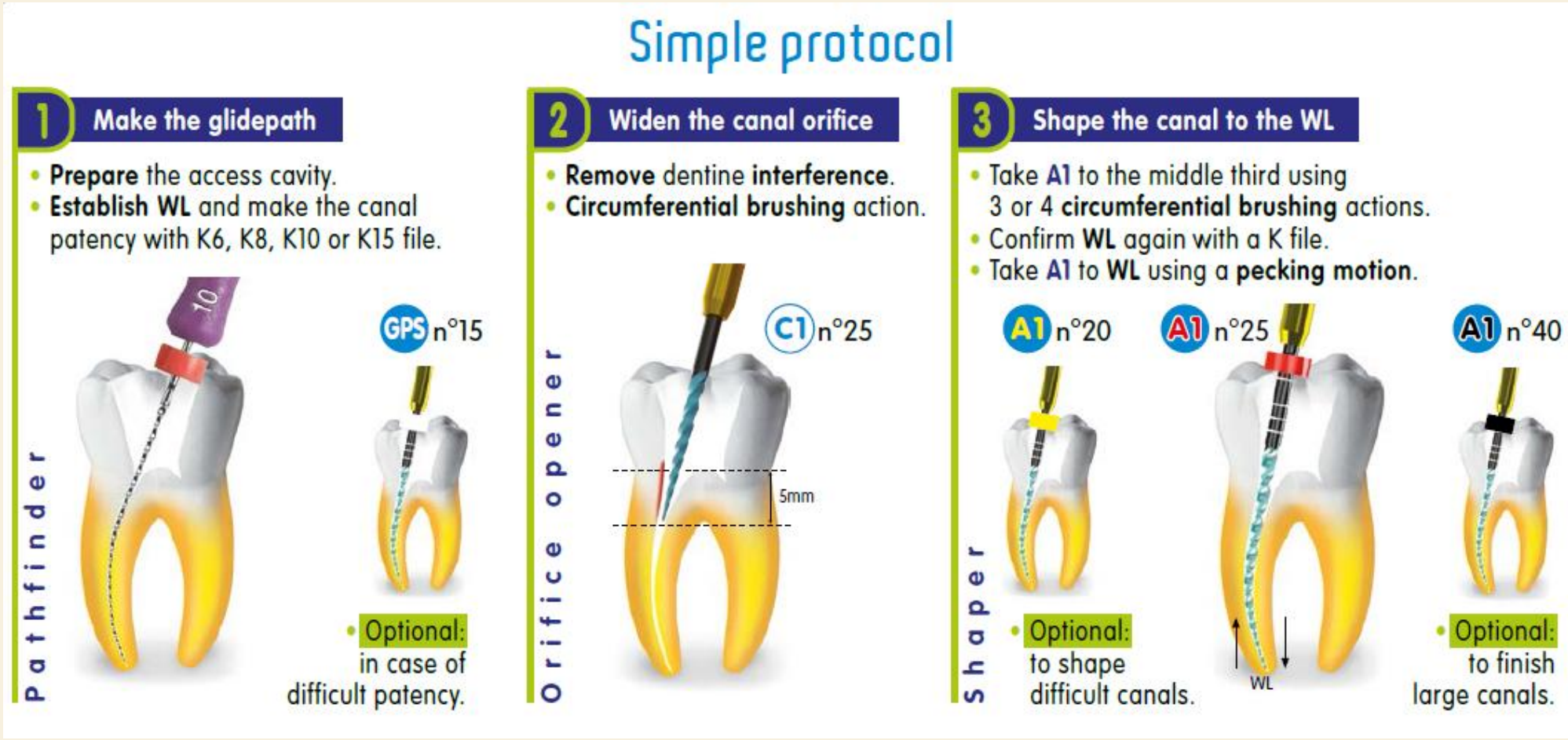
For further information

Please refer to the instruction manual



Size	n°25	n°15	n°20	n°25	n°40
Taper	.12	.03	.06	.06	.04
Available lengths L15	15mm	-	-	-	-
Available lengths L21	-	21mm	21mm	21mm	21mm
Available lengths L25	-	25mm	25mm	25mm	25mm
Available lengths L31	-	31mm	31mm	31mm	31mm

NEONITI


Simple protocol
1 Make the glidepath
• Prepare the access cavity.
• Establish WL and make the canal patency with K6, K8, K10 or K15 file.
Pathfinder
10
GPS n°15
• Optional: in case of difficult patency.
2 Widen the canal orifice
• Remove dentine interference.
• Circumferential brushing action.
Orifice opener
C1 n°25
5mm
3 Shape the canal to the WL
• Take A1 to the middle third using 3 or 4 circumferential brushing actions.
• Confirm WL again with a K file.
• Take A1 to WL using a pecking motion.
Shaper
A1 n°20
• Optional: to shape difficult canals.
A1 n°25
WL
A1 n°40
• Optional: to finish large canals.

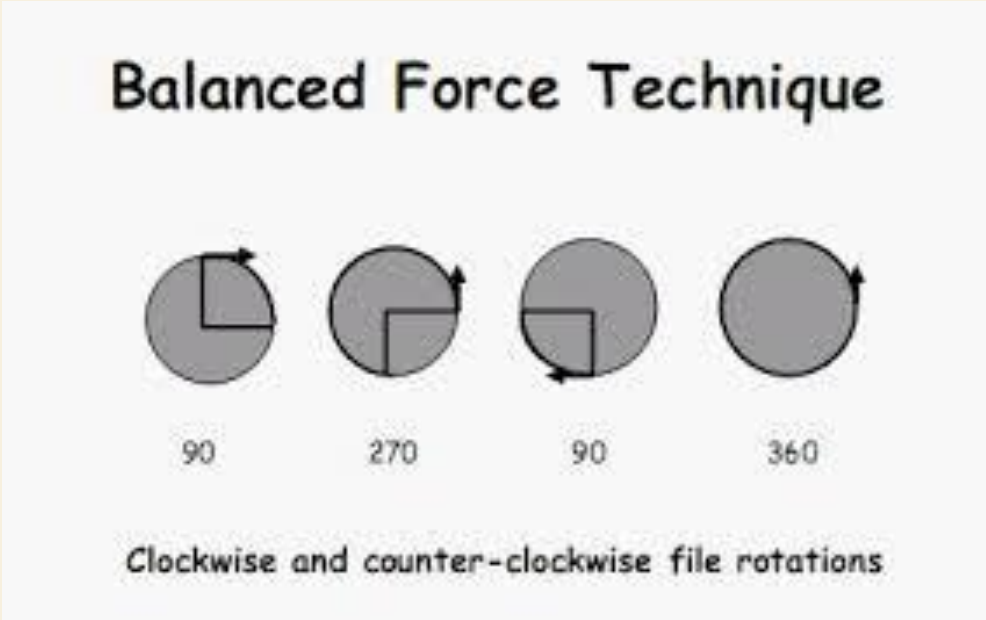
RECIPROCATION

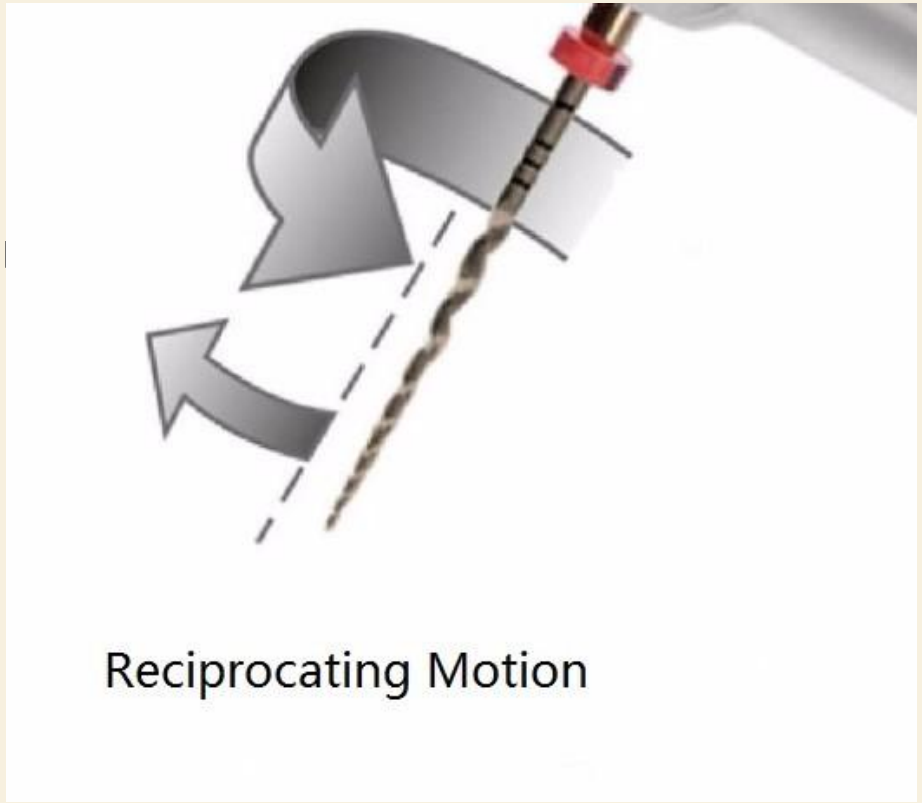
NEW ENGINE DRIVEN INSTRUMENTS

Reciprocating Motors

Taper lock, fatigue fracture, screwing → reciprocating

Reciproc / Wave-one

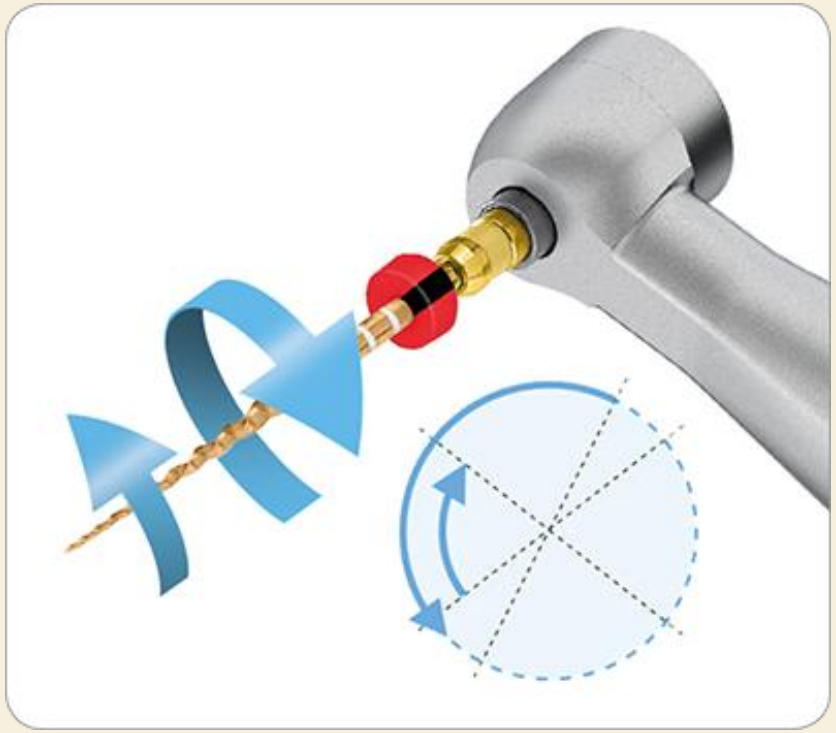


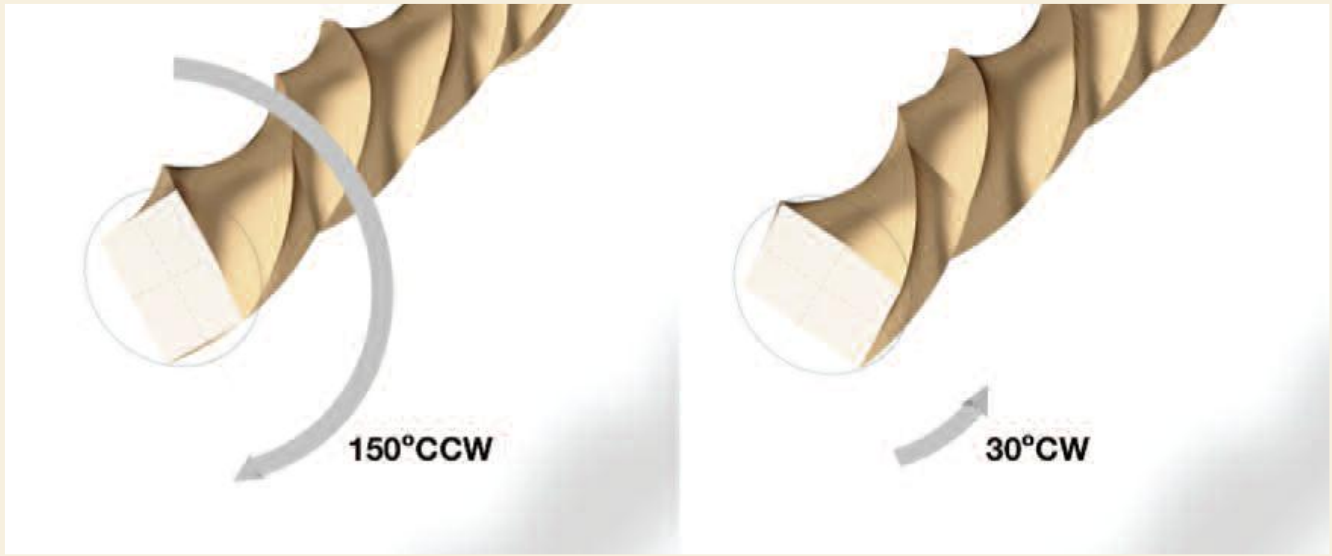


Reciprocating Motion

RECIPROC / WAVE-ONE

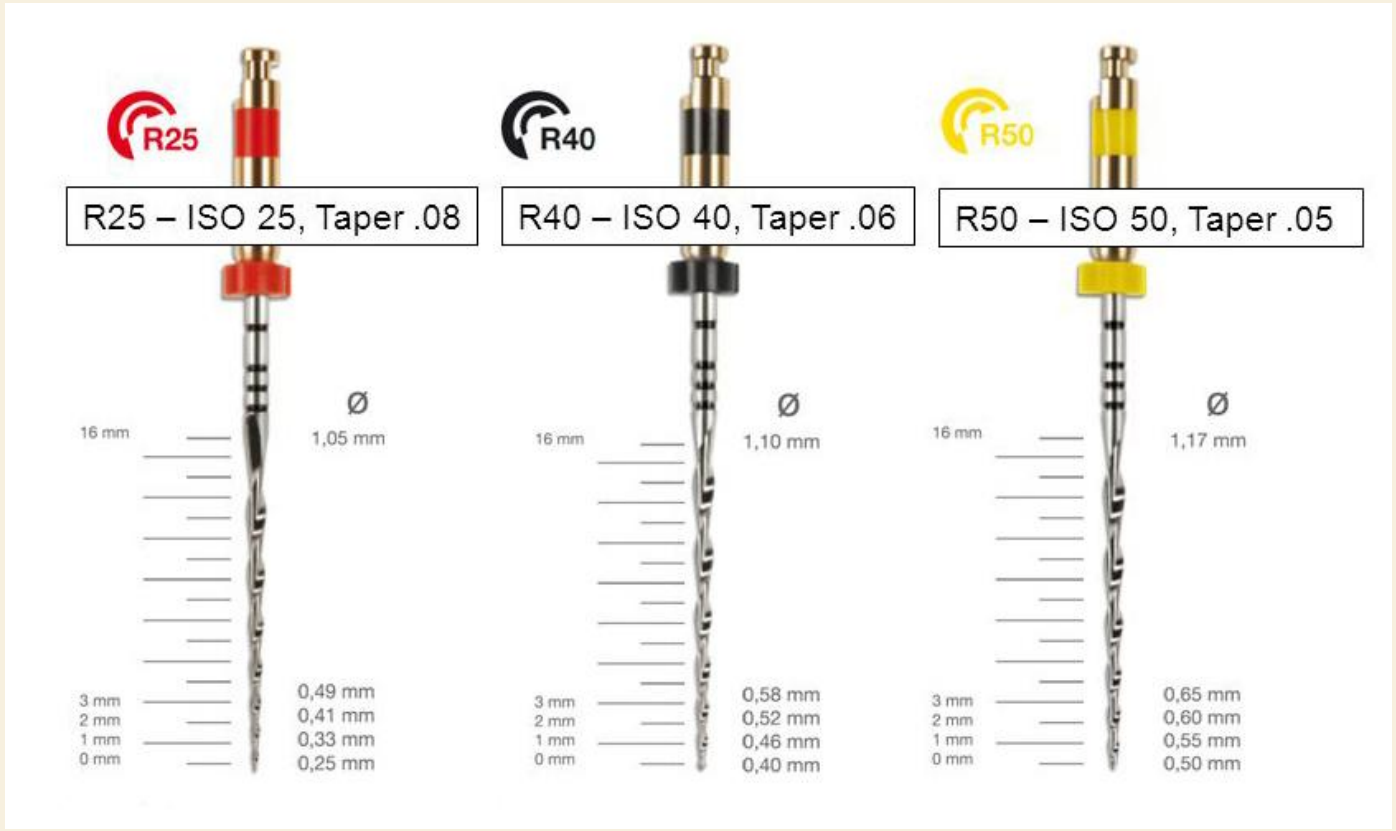
- 150-170 ccw, 30-50 cw
- Left leaning flute → **cutting in cw** direction
- Pushes the debris apically → clean the file





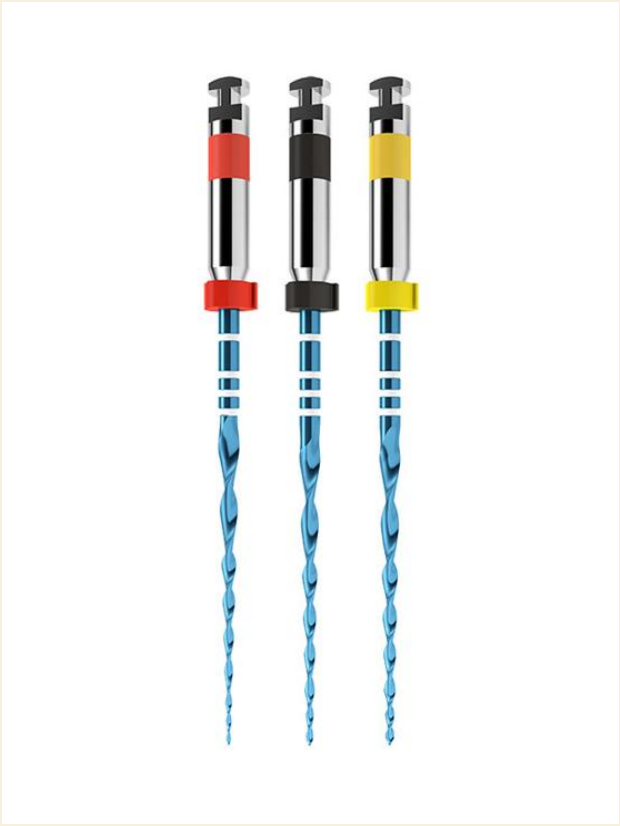
m-wire®
nickel titanium

RECIPROC FILES



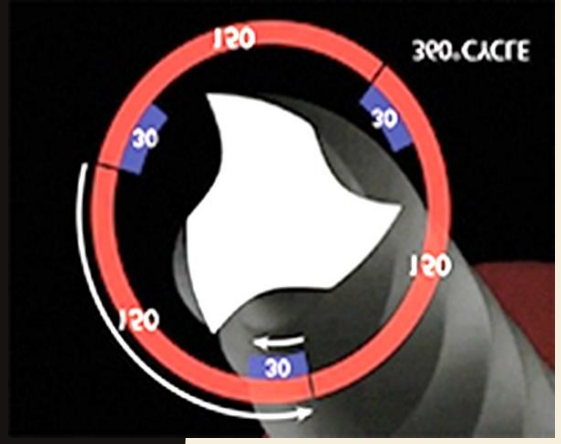
R-Pilot

Reciproc Blue



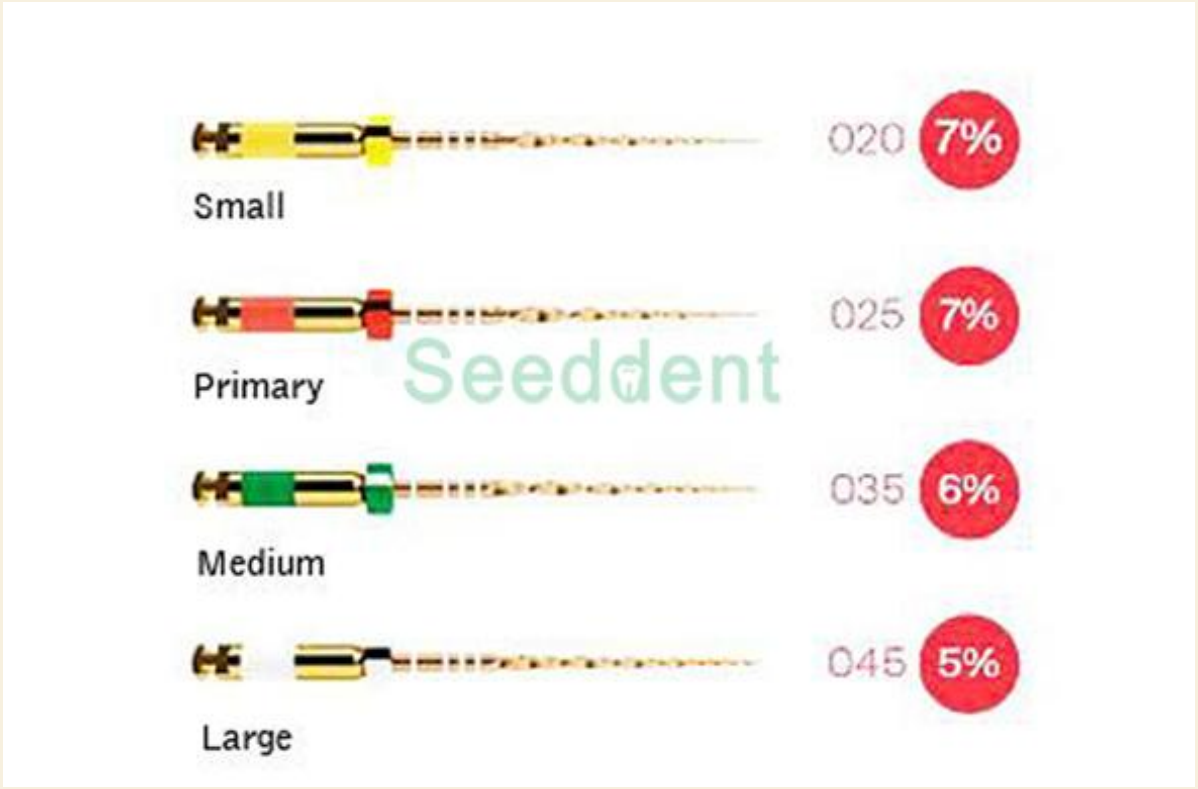
VDW®

#12, constant 4% taper
reciprocation motion
M-Wire alloy
S-shaped cross-section


120
300.CACTE
30
30
120
120
30

WAVE ONE


Small #021 .06
Primary #025 .08
Large #040 .08


020 7%
Small
025 7%
Primary
Seeddent
035 6%
Medium
045 5%
Large


GOLD GLIDER
#16
2 3 4 5 6
% Taper

SHAPING TECHNIQUE

- SLA
- Estimate the WL
- **Glide path** with 0.10 K-file until resistance met
- Use lubricant and irrigants
- Gently **pecking motion** in short (**2-3 mm)amplitudes**
- 2 to 3 pecking motions → clean →until the **2/3** coronal is shaped
- Negotiate the apical third with 0.10 K-file
- Take the **wave one file to the WL**.
- If apical flutes are **not covered** with dentin go to the bigger size file

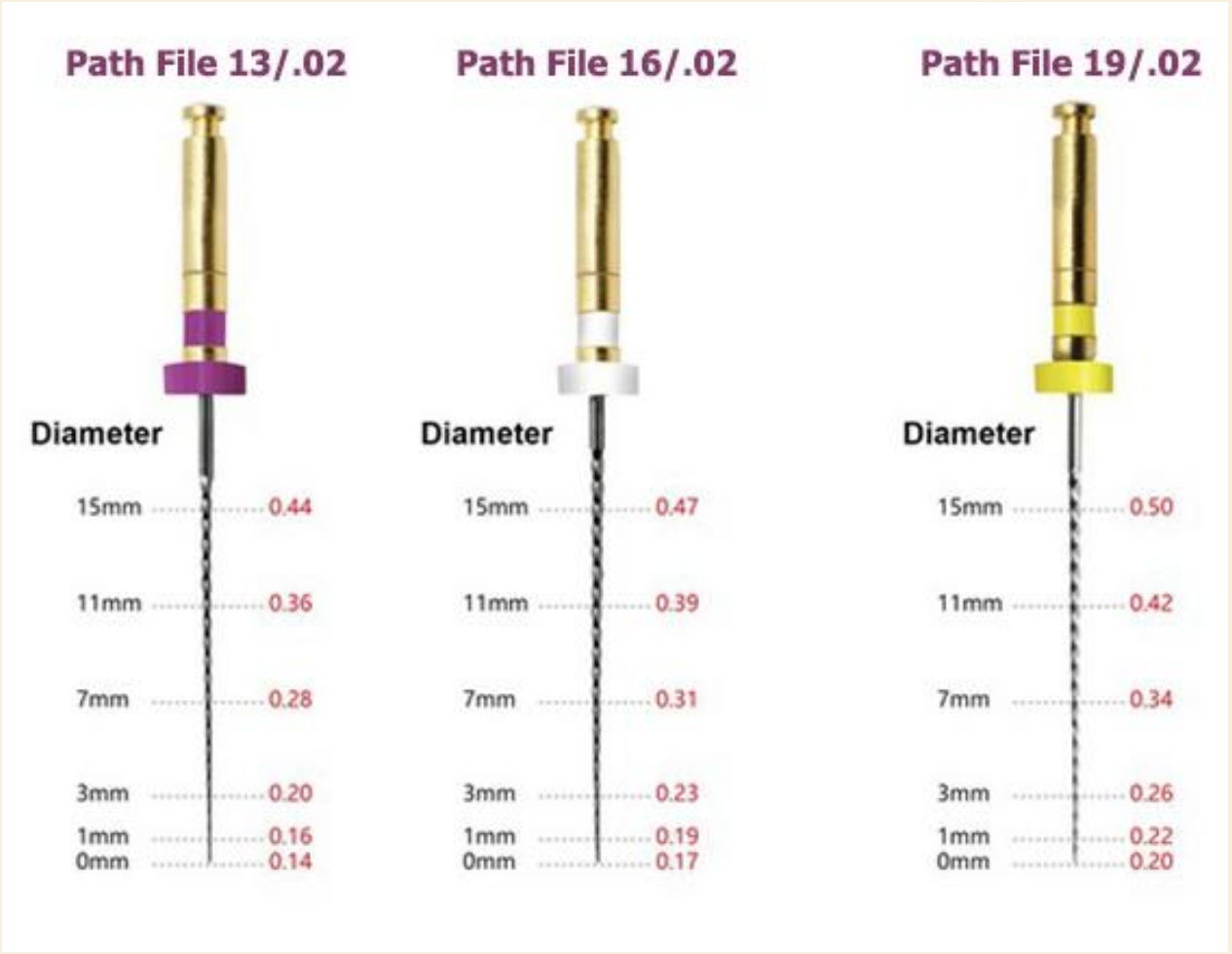
SP1

SP1 - V-TAPER GOLD

M3

M3 - PATH

- Speed: 350 rpm
- Torque: 1.5 Ncm

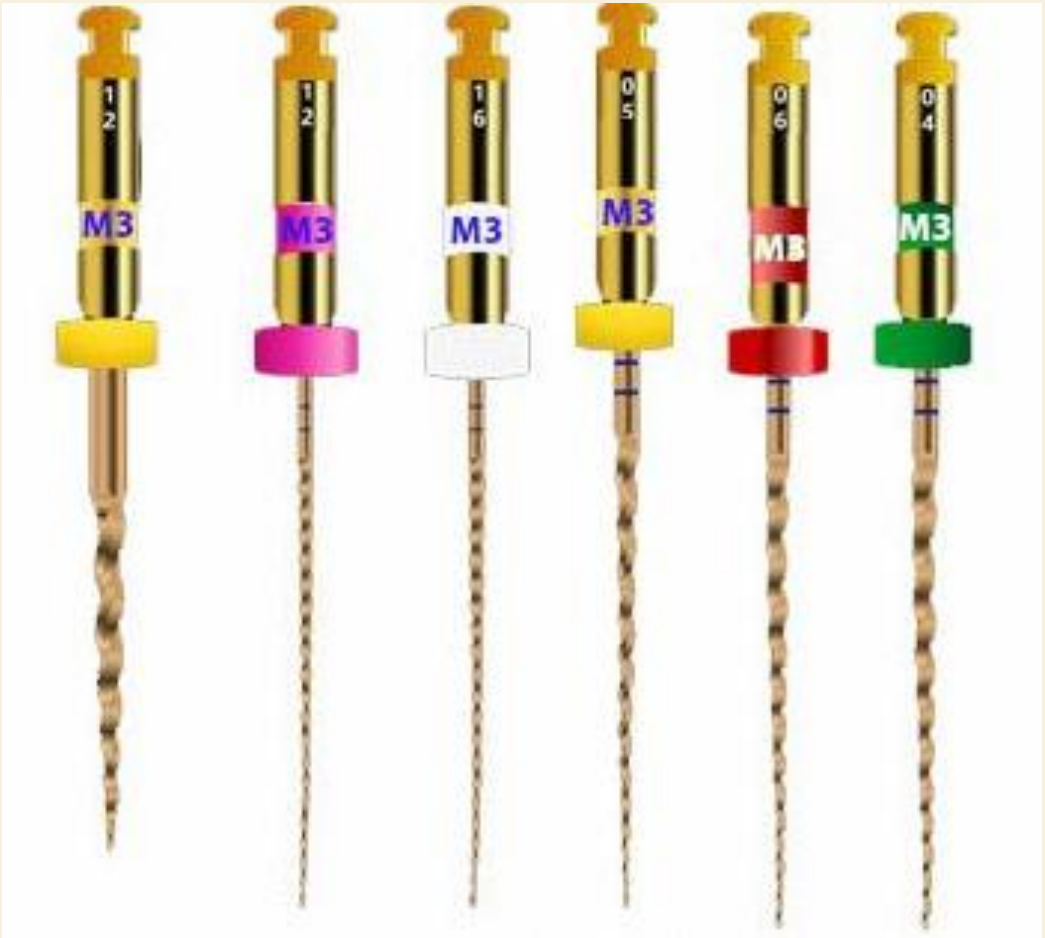


M3 - PRO GOLD 2017

- **CM wire :** Resistant to Cyclic fatigue/ High flexibility
- 10,15,20,25,30, 35: 4%,6% → 25mm
- 40, 50: 4% → 25mm
- **17: 8%,12% → 19mm**
- Speed: 300-350 rpm
- Torque: 1-2.5 N.cm
- Assort:
- 19 – 2% path file
- 15 - 6%
- 25 – 4%
- 25- 6%
- 35 – 6%

M3 PRO GOLD 2018

- Assort:
- 17-12%
- 12- 2%
- 16- 4%
- **18- 5%**
- 25- 6%
- 35 – 4%
- **CM wire**
- Resistant to Cyclic fatigue
- High flexibility



M3 - L BLUE 2017

- 25mm
- LB 15*6
- LB 20*7
- LB 25*8
- Multi taper
- Rotary and reciproc (180cw-60ccw)
- Maximum torque: 2 N/cm
- Maximum speed 500 rpm

✓ Fracture resistant

✓ Good Cutting

✓ Less transportation of ledge

➢ Negotiation with K file 10,15

➢ Open file : 350 rpm, 3 N.cm

➢ One file system

➢ Irrigation, recaptulation

M3 - L BLUE 2018

- 25mm
- LB 20*7
- LB 25*8
- **LB 35*8**
- Multi taper
- **Rotary and Reciproc (180cw-60ccw)**
- Maximum torque: 2 N/cm
- Maximum speed 500 rpm

✓ Fracture resistant

✓ Good Cutting

✓ Less transportation of ledge

M3 - IMMATURAL

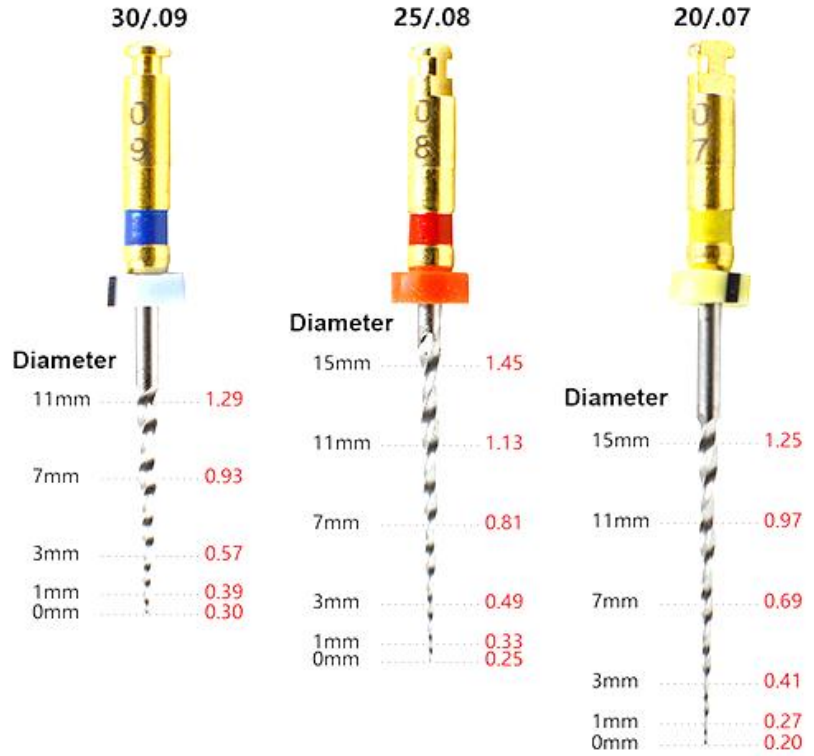
UDG
UNITED DENTAL GROUP
M3

- 20, 25. 30 → 4%
- 16 mm

- Speed: 350 rpm
- Torque: 1.5 N.cm

M3 - RT

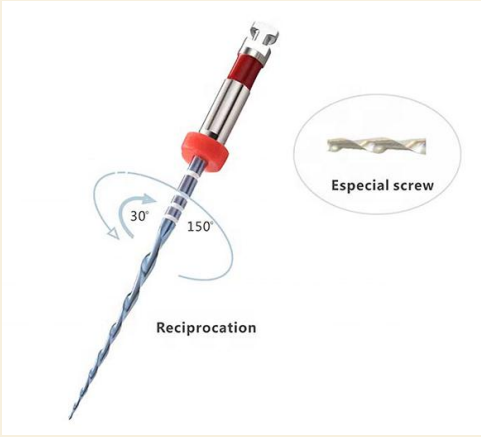
- Speed: 350 rpm
- Torque: 2 N.cm



DENCO

DENCO

- D-SHAPER
- D-SUPER FILES
- SUPER FILE
- SUPER FILE II
- SUPER FILE III
- Kids Files : 17mm → 25*4, 25*6, 30*4, 40*4
- Only one file: **reciprocating** motion, R25, R40, R50 ➡



- Preshaper
- PRO-FLEXI FILES
- D-Files
- PA-Files: #13,16,19-2%
- Pro-Path : #16 variable taper ⇨

DENCO


DENCO®
FDA CE 0197
D-Super Files
NITI
Length
25mm
Size
F1
For Dental Use Only
SHENZHEN DENCO MEDICAL CO., LTD
Add:Room 301, No. 8 1st road of Xiawei Industrial Zone, Guanhu Street, Longhua, 518110, Shenzhen, China
www.denco-supply.com
EC REP
LOT D-P11219
Made in China


DENCO® CE 0197 FDA
Super Files III
(NITI Heat Activation)
Length Size
25mm SX-F3
134°C
6
Max.600rpm
For Dental Use Only
LOT SF5983
SHENZHEN DENCO MEDICAL CO., LTD.
Add.:6th Floor, C Building, Yasheng Industrial Park, Guangming, 518107 Shenzhen, China
http://www.denco-supply.com
EC REP
Made in China


Thanks for your attention