DR GIANLUCA FUMEI

LA NUOVA SOLUZIONE ALL'ODONTOIATRIA MODERNA:

DALLA PREPARAZIONE ALLA OTTURAZIONE CANALARE

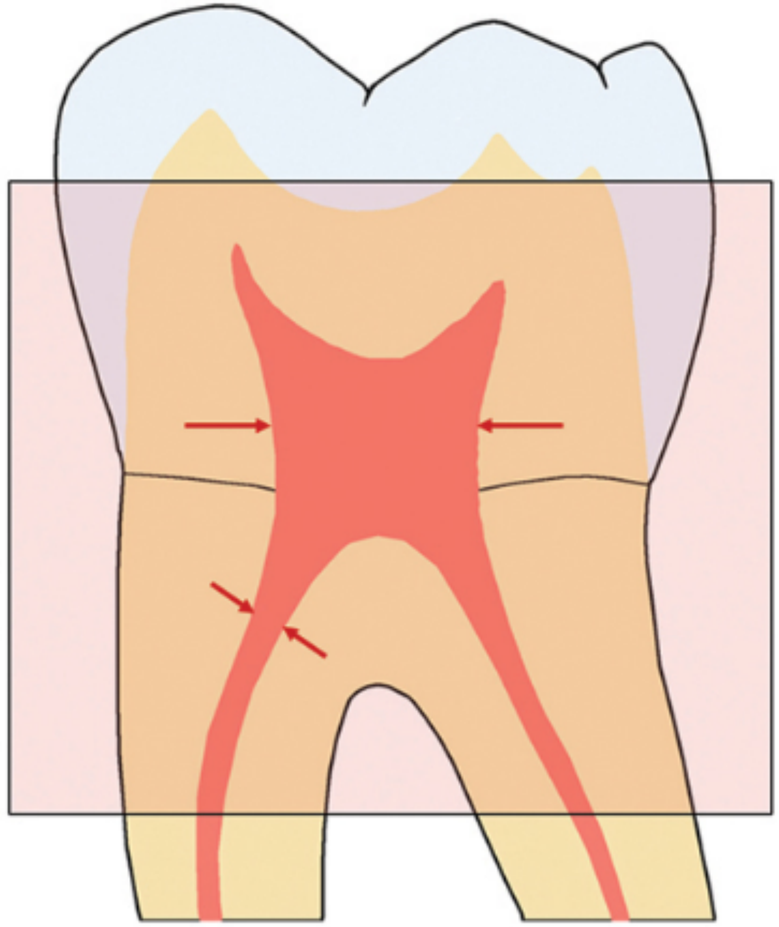
Minimally Invasive Endodontics

Preservare la massima quantità di tessuto dentale durante la terapia endodontica

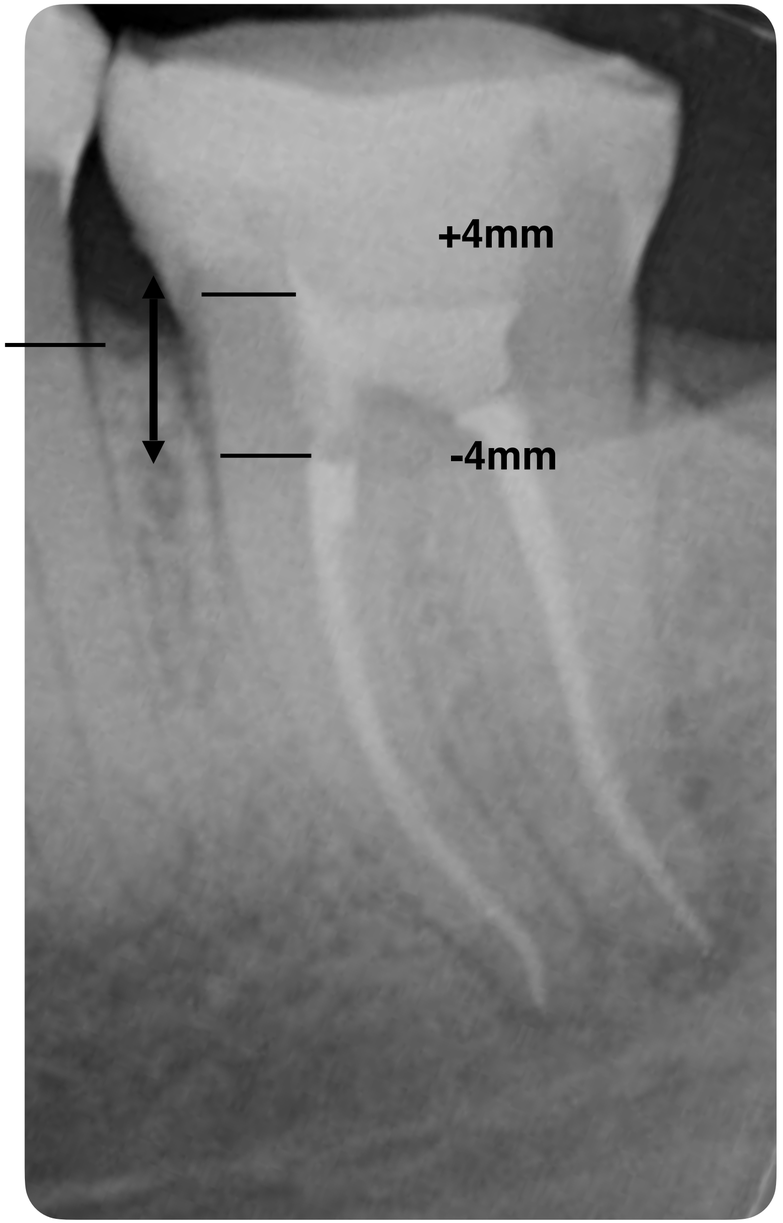
"Evitare" la frattura degli strumenti rotanti

CONSERVAZIONE DELLA

DENTINA PERICERVICALE



1. LA DENTINA PERICERVICALE È LOCALIZZATA GENERALMENTE A 4MM CORONALMENTE E APICALMENTE ALLA CRESTA ALVEOLARE
2. LA DENTINA PERICERVICALE È INSOSTITUIBILE



Strumentazione Endodontica

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An Initial Investigation of the Bending and Torsional Properties of Nitinol Root Canal Files

Harmeet Walia, BDS, MDS, MS, MS, William A. Brantley, BS, MS, PhD, and Harold Gerstein, BS, DDS

Root canal files in size #15 and triangular cross-sections were fabricated from 0.020-inch diameter arch wires of Nitinol, a nickel-titanium orthodontic alloy with a very low modulus of elasticity. A unique manufacturing process was used in which the fluted structure of a K-type file was machined directly on the starting wire blanks. The Nitinol files were found to have two to three times more elastic flexibility in bending and torsion, as well as superior resistance to torsional fracture, compared with size #15 stainless steel files manufactured by the same process. The fracture surfaces for clockwise and counterclockwise torsion were observed with the scanning electron microscope and exhibited a largely flat morphology for files of both alloy types and torsional testing modes. It was possible to permanently precurve the Nitinol files in the manner often used by clinicians with stainless steel files. These results suggest that the Nitinol files may be promising for the instrumentation of curved canals, and evaluations of mechanical properties and in vitro cutting efficiency are in progress for size #35 instruments.

It is well known by clinicians that inadvertent procedural errors can occasionally arise during the instrumentation of curved canals. These misfortunes include ledge or zip formation, perforation of the canal, and separation or fracture of the instrument (1). As a consequence, the root canal morphology is adversely altered, a violation of the basic principle that endodontic preparation is to retain the original shape of the canal. Clinicians have adopted various methods to circumvent problems with the preparation of curved canals, such as precurving instruments and using a telescopic filing technique (1–3). Weine (4) has suggested that clinicians might remove the tips of instruments at chairside to make intermediate sizes for use in the preparation of curved canals.

The procedural errors which may occur during the instrumentation of curved canals have a common genesis: the basic stiffness of the stainless steel alloys (5) utilized for the manufacture of root canal files and reamers. Moreover, there is a substantial rise in instrument stiffness with increasing instrument size (6). For example, with the stainless steel files and reamers, the smaller sizes of instruments have considerably greater flexibility and can conform much better to the morphology of curved canals.

While manufacturers have recently marketed a number of new instruments based upon different cross-sectional shapes, design concepts, and fabrication procedures, in a quest for improved cutting efficiency (7) and flexibility (8), all of these brands have been fabricated from stainless steel. In this article we report the first use of an entirely new metallurgical system, Nitinol nickel-titanium orthodontic wire alloy (9), for the fabrication of endodontic files. The Nitinol alloy has a very low modulus of elasticity, only one-fourth to one-fifth the value for stainless steel, and a very wide range for elastic deformation.

The purposes of this initial study were to investigate the feasibility of manufacturing root canal files from Nitinol and to evaluate the bending and torsional properties of these instruments. The results of our laboratory study suggest the possibility of a new generation of files, possessing a degree of flexibility which may be ideally suited for instrumenting curved canals.

MATERIALS AND METHODS

Standard preformed Nitinol arch wire blanks, 0.020 inch in diameter, were obtained (Unitek Corp., Monrovia, CA), and two 2-inch straight segments from each arch wire were used for instrument fabrication. A unique file manufacturing process was used (Quality Dental Products, Johnson City, TN), in which the fluted cross-sectional shape was machined directly on the wire blank, rather than the conventional (10) manufacturing procedure of twisting the ground and tapered blank. For this initial feasibility study, experimental Nitinol root canal files were fabricated in size #15 and triangular cross-sections, for comparison to size #15 stainless steel files with the same cross-sectional shape and manufactured by the same process, which served as the controls.

The Nitinol and stainless steel files were evaluated in the three mechanical testing modes of cantilever bending, clockwise torsion, and counterclockwise torsion, following the experimental methods previously used by Krupp et al. (8). Values of bending and torsional moment were measured with a sensitive torque meter (model 783-C-1; Power Instruments, Inc., Skokie, IL), using a manual-loading experimental procedure and an apparatus based upon the original form of American Dental Association specification no. 28 (11). All specimens were subjected to bending or twisting at a point 3

The forms of the bending curves in Fig. 5 indicate that permanent deformation of the 3-mm apical regions of the stainless steel files began at a bend angle of approximately 30 degrees, but that the apical regions of the Nitinol files were undergoing largely elastic deformation even at bend angles of 90 degrees. The latter was supported by visual observations of the Nitinol files after unloading, where very little, if any, permanent bends were evident.

The Nitinol files also exhibited considerably greater resistance to fracture in torsion than the stainless steel files. For

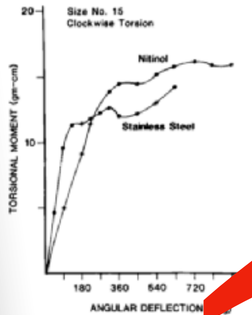
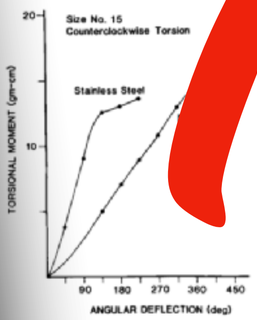


Fig 6. Clockwise torsion test results for the size #15 N
stainless steel files.



ounterclockwise torsion test results for the size #15 Nitinol
less steel files. The two initial data points for the Nitinol files
be determined with the torque meter, and the two plots
drawn to intersect the origin. Both of these considerations
nounced in Figs. 5 and 6.

1988

WALIA et AL JOE

1988

WALIA et AL

Nitinol

Nitinol vs Stainless Steels

Nitinol

More Flexibile

More Resistant

vs

Stainless Steels

NI-TI ROTARY FILE

- Preservare l'anatomia
- Rimanere centrato nel canale
- Efficienza di taglio
- Numero ridotto di passaggi / Sequenza breve
- Resistente

Heat Treated/activated Alloys

Niti Trattato termicamente

- Ridotto ritorno elastico (restoring force)
- Memoria di forma attivata dal calore
- Maggiore resistenza alla fatica ciclica

DENTAL WORLD
ITALIAN MANUFACTURER

SISTEMATICHE NI-TI ROTANTI HEAT ACTIVATED

PRO FLEX NHA

NANO RIVESTITO ATTIVAZIONE TERMICA

NEW ENTRY!!!

NEW ENTRY!!!

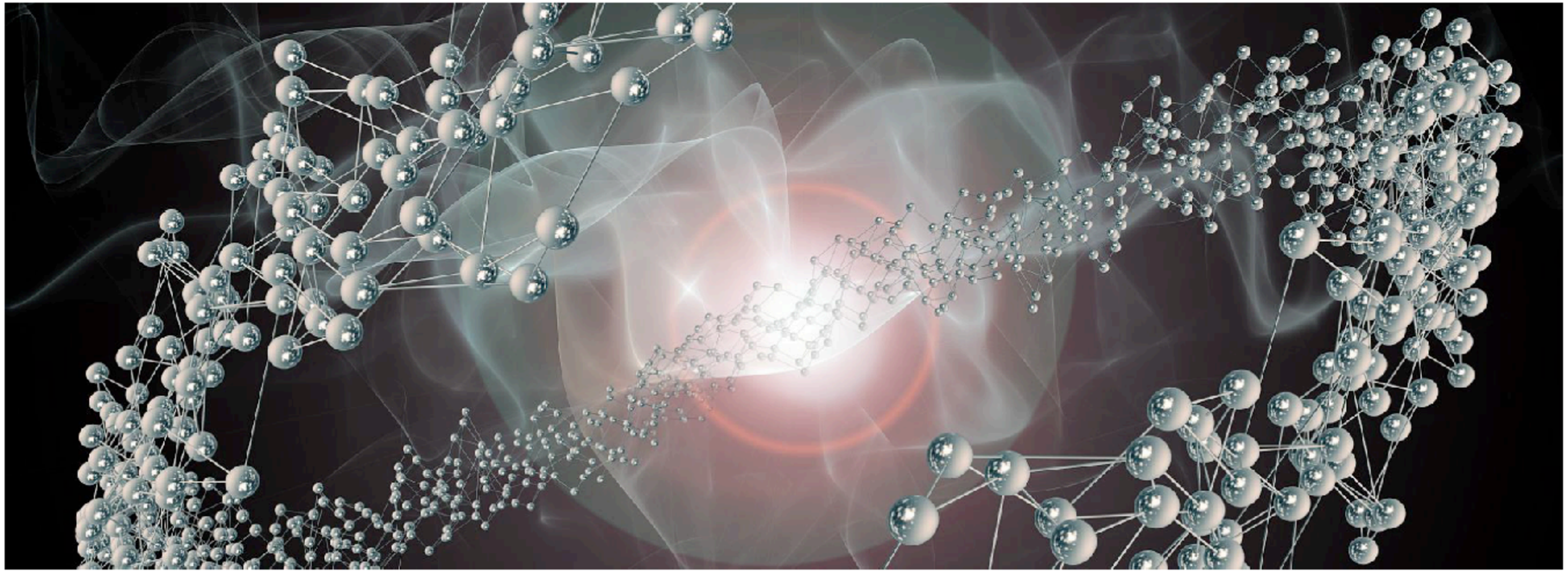
NEW ENTRY!!!

Perché i nanomateriali hanno prestazioni migliori dei materiali tradizionali?

Quando le dimensioni delle particelle che costituiscono una sostanza entrano nella scala dei nanometri, in particolare pochi nanometri, si verificano cambiamenti fondamentali dovuti alla morfologia strutturale tra le particelle interne, che si traducono in una serie di proprietà fisiche più ottimizzate o radicalmente modificate, come la durezza, la tenacità, la resistenza al calore, le proprietà anticorrosione, ecc.

DW DENTAL WORLD
ITALIAN MANUFACTURER

Cos'è il nano-rivestimento

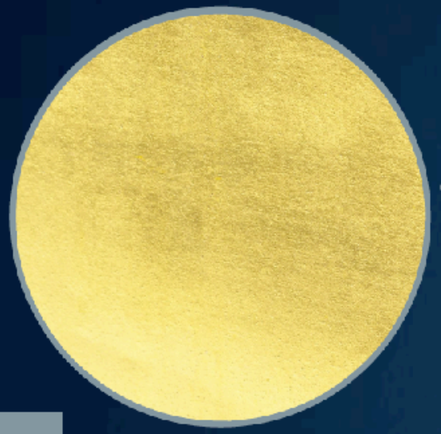


I nano-rivestimenti (noti anche come nano-film) hanno funzioni uniche in termini di proprietà ottiche, elettriche, termiche e meccaniche.

Caratteristiche del nano-rivestimento

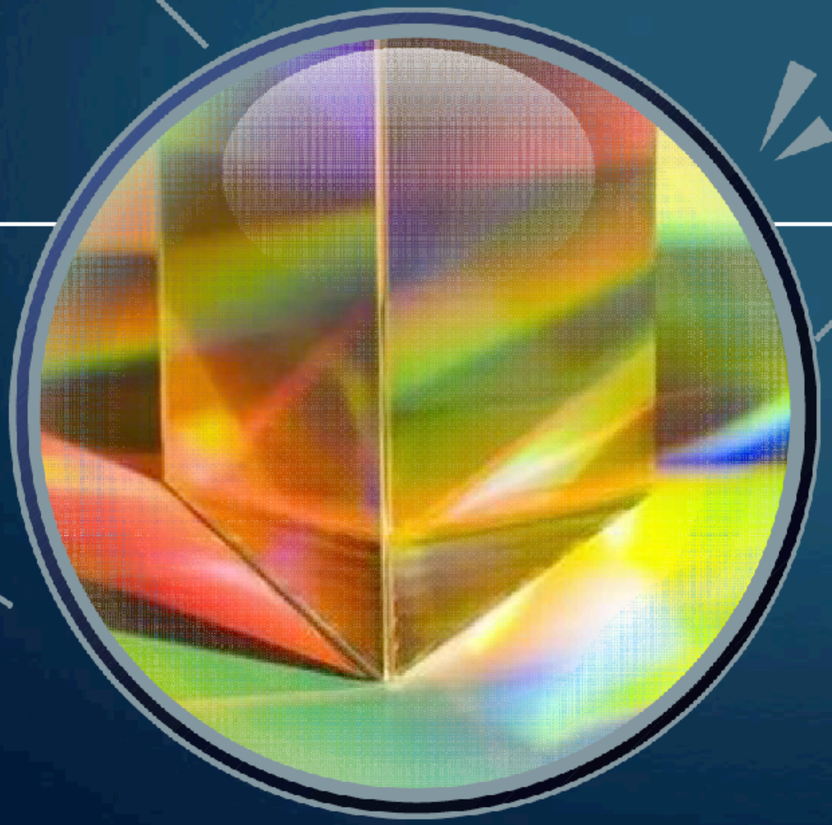
DENTAL WORLD
ITALIAN MANUFACTURER

Materiale metallico

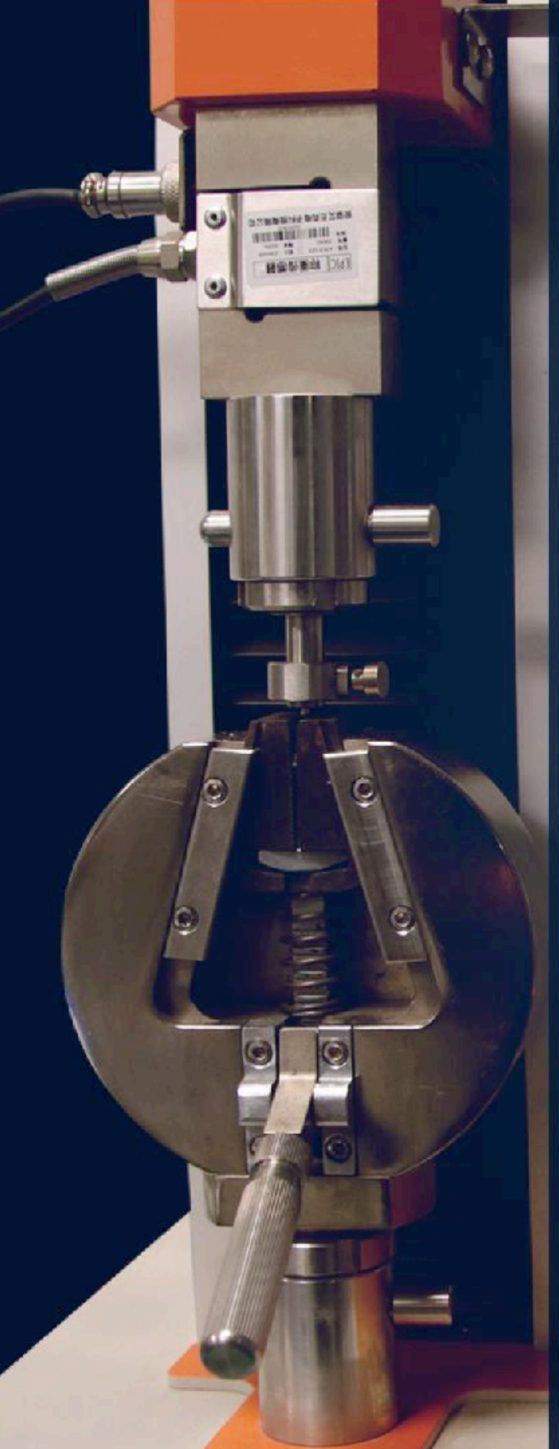


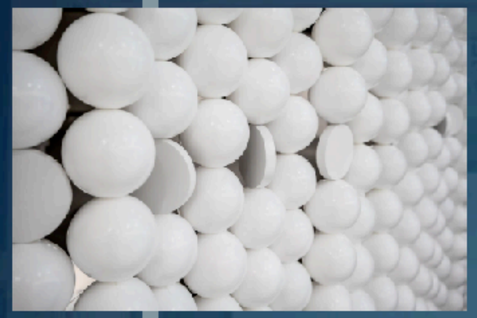
Nitruro di titanio

Il nitruro di titanio (TiN) (talvolta noto come "Tinitc" o "TiNitc" o "TiN") è un materiale ceramico estremamente duro, spesso utilizzato come rivestimento su leghe di titanio, acciaio, carburo e componenti in alluminio per migliorare le proprietà superficiali del substrato. Applicato come rivestimento sottile, il TiN viene utilizzato per indurire e proteggere le superfici di taglio e di scorrimento, per scopi decorativi (grazie al suo aspetto dorato) e come rivestimento non tossico per gli impianti medici. Nella maggior parte delle applicazioni, viene applicato un rivestimento inferiore a 5 micrometri (0,00020 in).



Materiale ceramico





Caratteristiche della ceramica

La durezza del rivestimento è estremamente elevata - più di tre volte la durezza dell'acciaio per utensili e stampi - e può addirittura raggiungere valori superiori a 4000 HV. Il rivestimento è s iciente di attrito.

Lo strato di rivestimen tallo, evitando l'accumulo di detriti e migliorando la qualit ati. Il rivestimento presenta una buona stabilità termica; alcuni rivestimenti possono persino resistere a temperature di lavoro superiori a 1000°C.

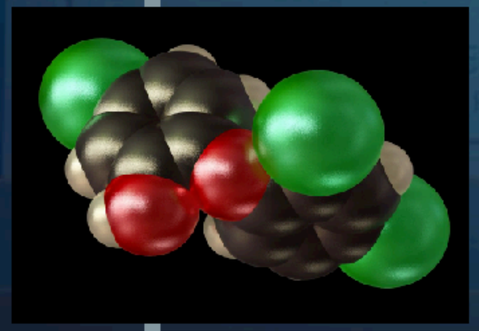
DUREZZA

Caratteristiche del metallo

Tenacia, resistenza agli urti, resistenza agli shock, conduttività e pr superiori.

RESISTENZA

Tinite

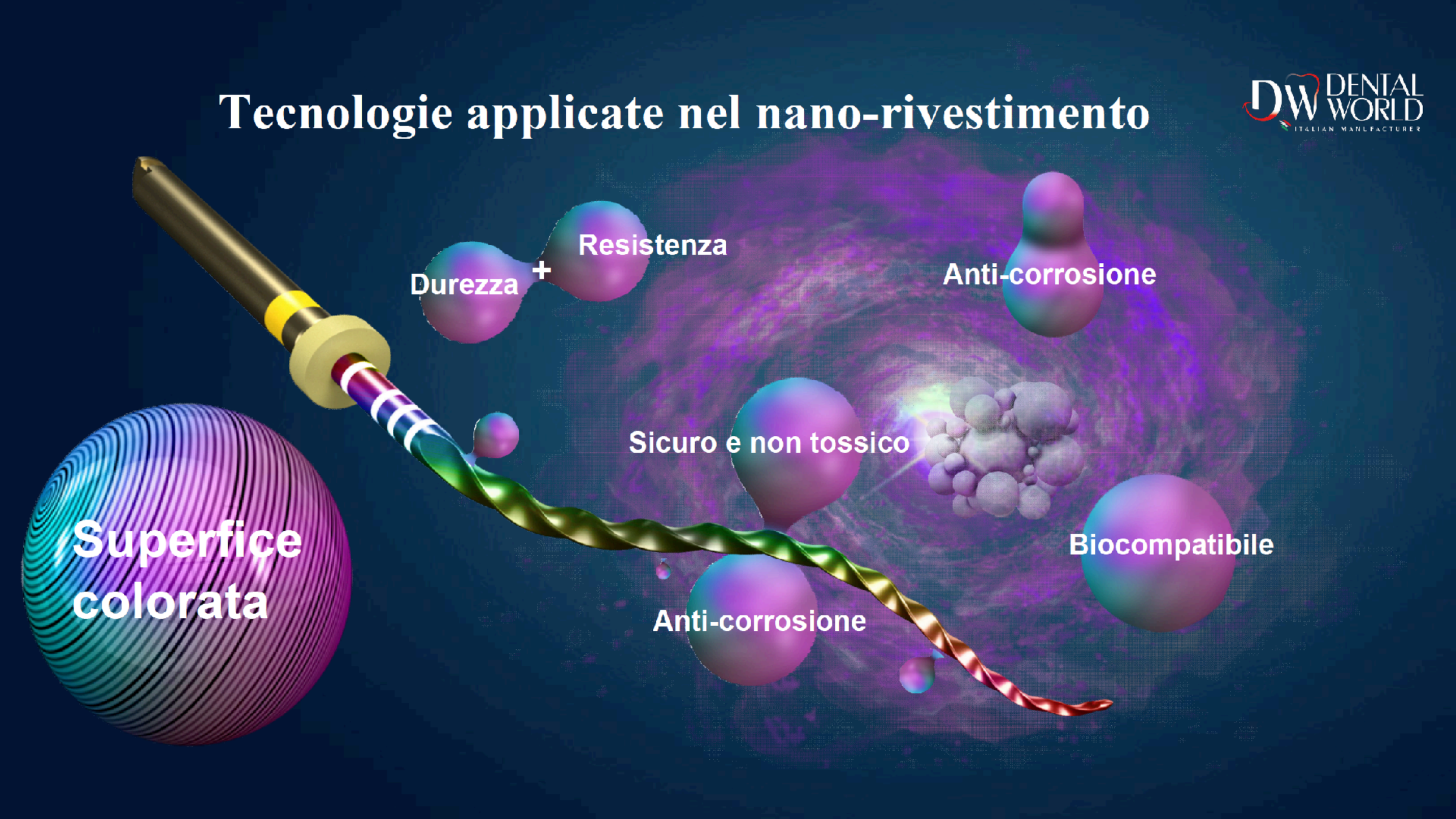


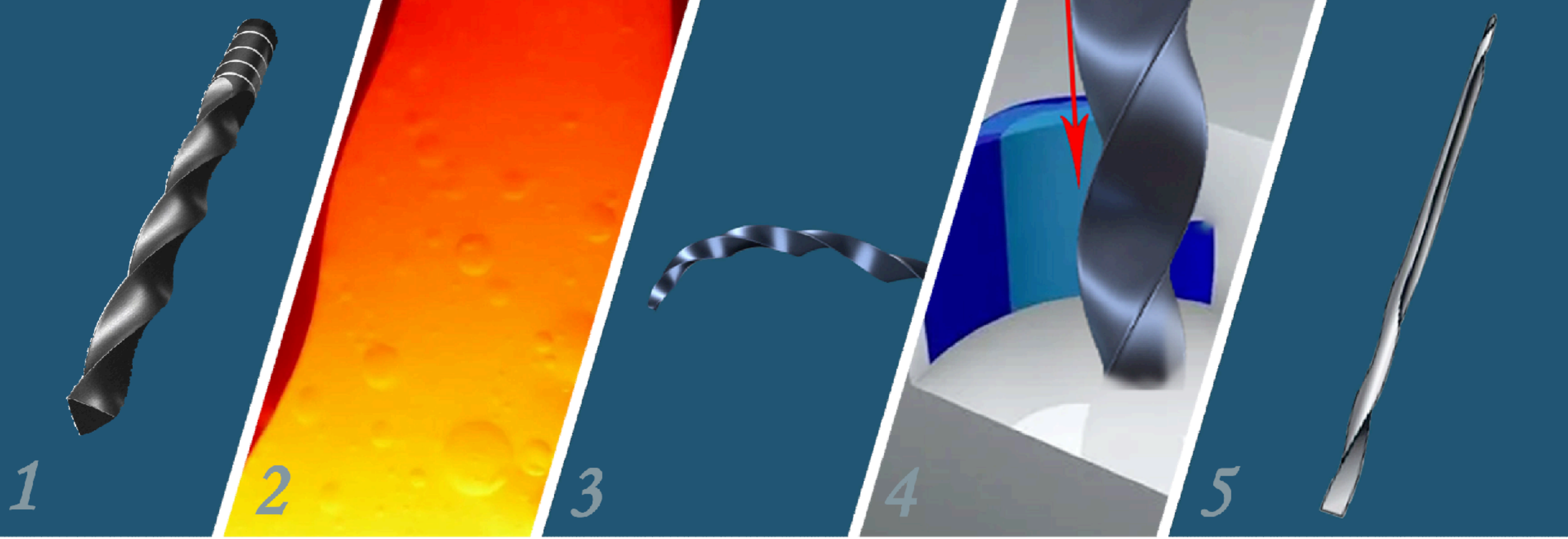
Altre caratteristiche

I grani del rivestimento sono estremamente piccoli e la struttura è eccezionalmente compatta, garantendo una buona resistenza alla corrosione di acidi e alcali.
Il rivestimento è atossi o per l'ambiente, ed è quindi adatto a dispositivi medici, col legli alimenti (ad esempio, macchine per la produzione di su nili.

COMPATTEZZA

Tecnologie applicate nel nano-rivestimento





Strumenti in NiTi | Attivazione termica | Flessibilità | Riduzione dell'efficienza di taglio | Sfilameto

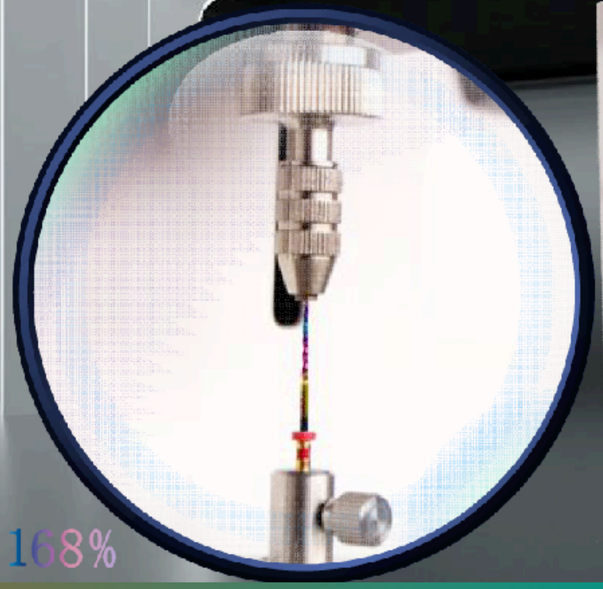
Tecnologia di attivazione termica convenzionale:

DW DENTAL WORLD
ITALIAN MANUFACTURER

Oggi gli strumenti canalari in nichel-titanio sono prodotti con una tecnologia di trattamento termico che rende la lama più flessibile e risolve in gran parte il problema della rottura dello strumento nei canali radicolari curvi. Tuttavia, poiché la lama diventa più flessibile, la sua forza di taglio si riduce e tende a sfilarsi quando incontra canali radicolari calcificati.

Caratteristiche del nano-rivestimento

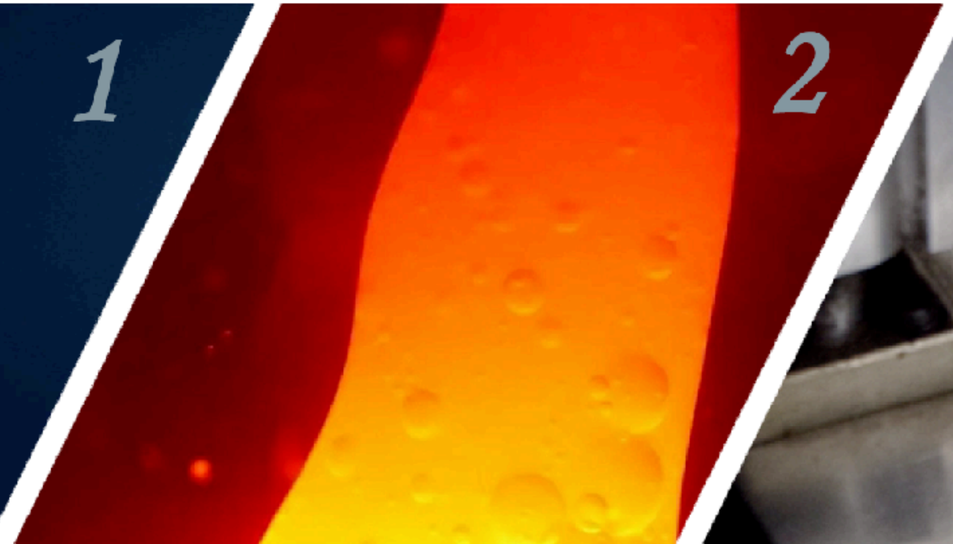
Sulla base del trattamento termico del materiale in nichel-titanio, la tecnologia di tempra laser viene utilizzata per aumentare la durezza superficiale degli strumenti canalari del 168%. Il nano-rivestimento riempie gli interstizi della struttura reticolare sulla superficie, formando una nuova tecnologia di strumenti canalari in nichel-titanio che combina attivazione termica, tempra laser e nano-rivestimento.

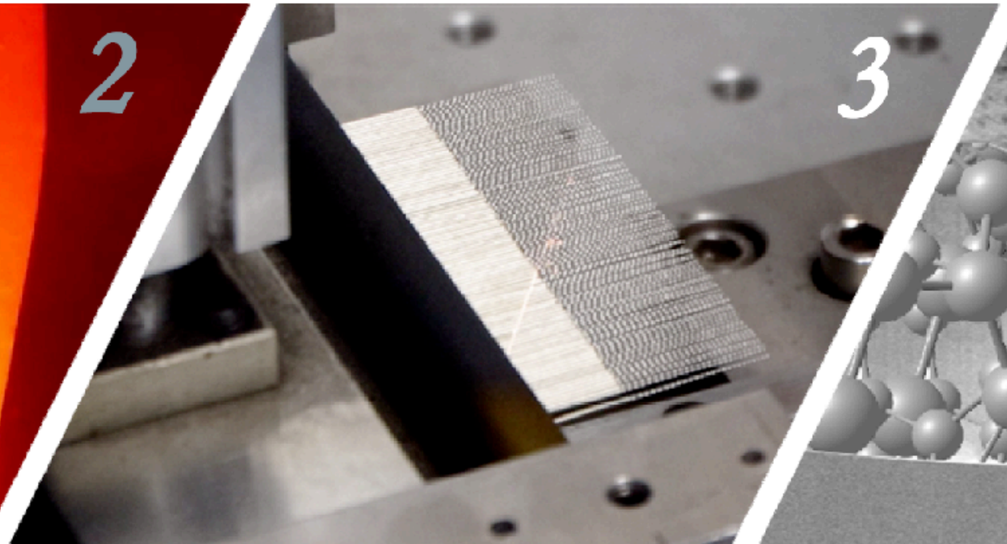


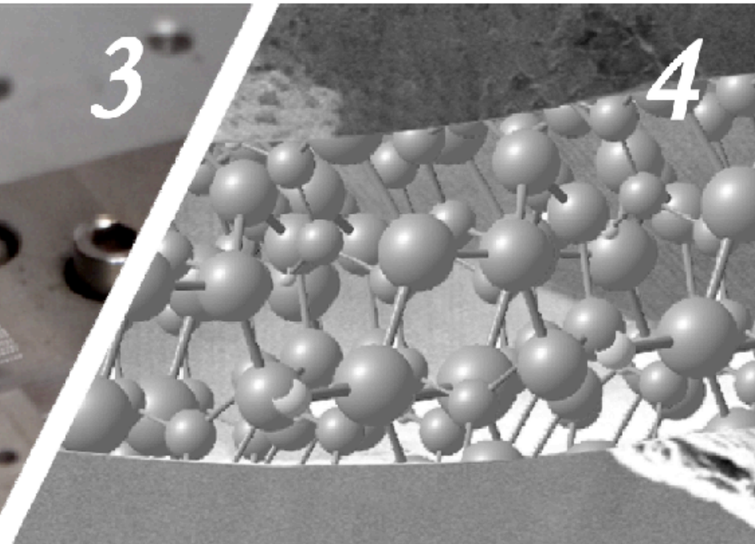
ATTIVAZIONE TERMICA **TEMPRA LASER**

NANO-RIVESTIMENTO

Strumenti in NiTi | Attivazione termica | Tempra laser | Nano-rivestimento





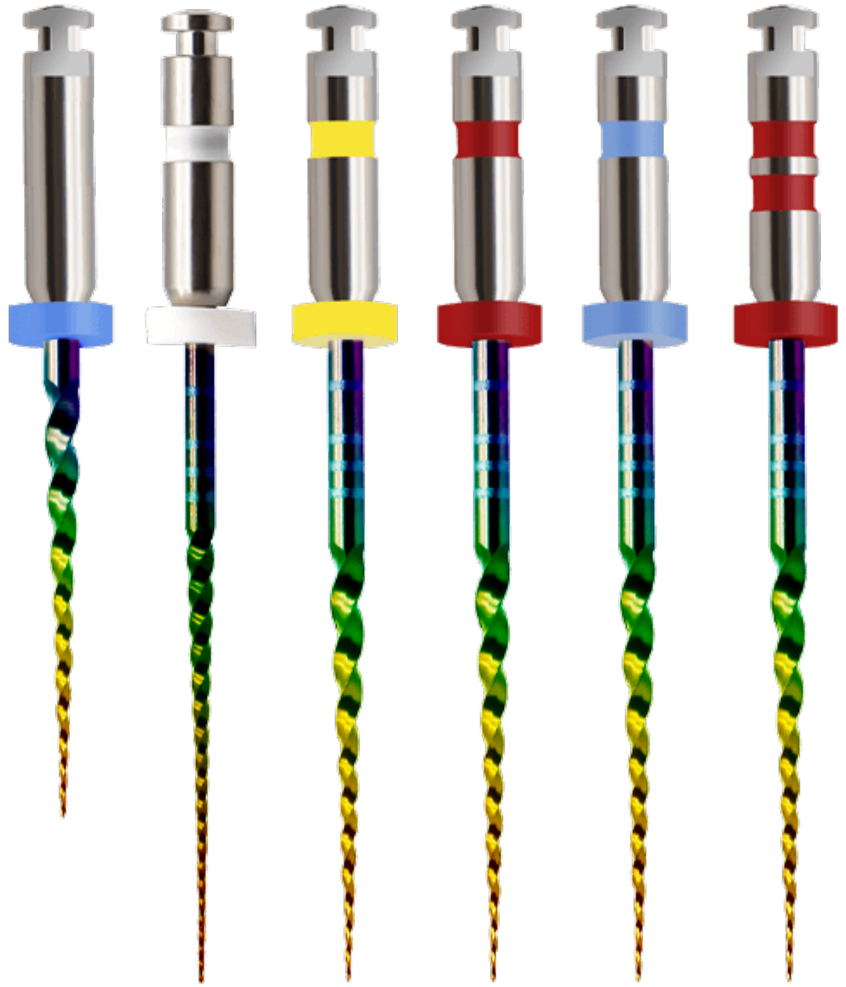


VANTAGGI

- Aumento della resistenza all'abrasione di 3-10 volte.
- Miglioramento della qualità della superficie e riduzione dei difetti.
- Rivestimento sottile e uniforme con un basso coefficiente di attrito.
- Nano-rivestimento sottile, circa 3 µm; pertanto, non influisce sull'accuratezza dimensionale del taglio.

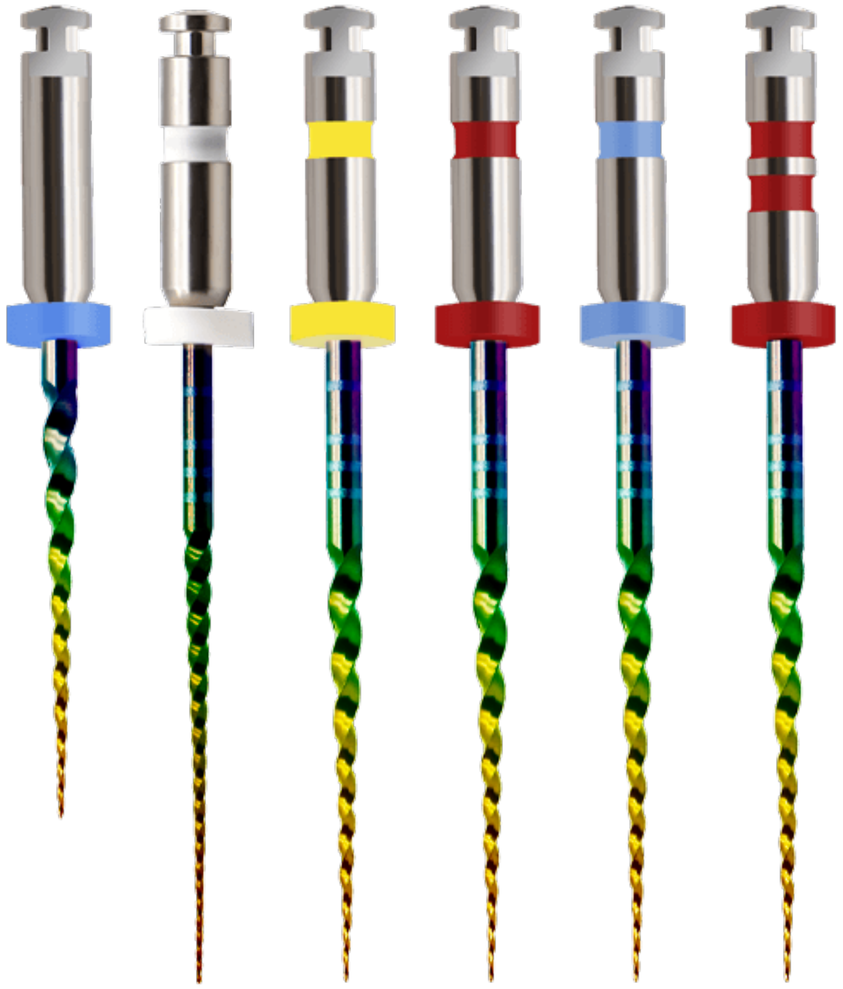
PRO FLEX NHA

NANO RIVESTITO ATTIVAZIONE TERMICA



PRO FLEX NHA

NANO RIVESTITO ATTIVAZIONE TERMICA



CONTROL MEMORY

NiLi Rainbow

Continuous

CONTROL MEMORY

La tecnologia ***Control Memory*** degli strumenti canalari garantisce stabilità e precisione durante la pulizia del canale radicolare anche quando non viene applicata forza sullo strumento.

NI-TI RAINBOW

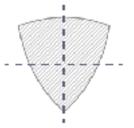
Il nuovo materiale ***Ni-Ti Rainbow*** garantisce resistenza e flessibilità durante il trattamento endodontico, offrendo una maggiore durata e resistenza nella pulizia dei canali radicolari grazie alle sue proprietà avanzate.

ROTAZIONE CONTINUA

Gli strumentini canalari ***Pro Flex NHA*** sono ***compatibili con i motori endodontici a rotazione continua***, garantendo una maggiore velocità di lavoro, una maggiore capacità di rimuovere i detriti durante la sagomatura e una maggior linearità del taglio.

PRO FLEX *NHA*

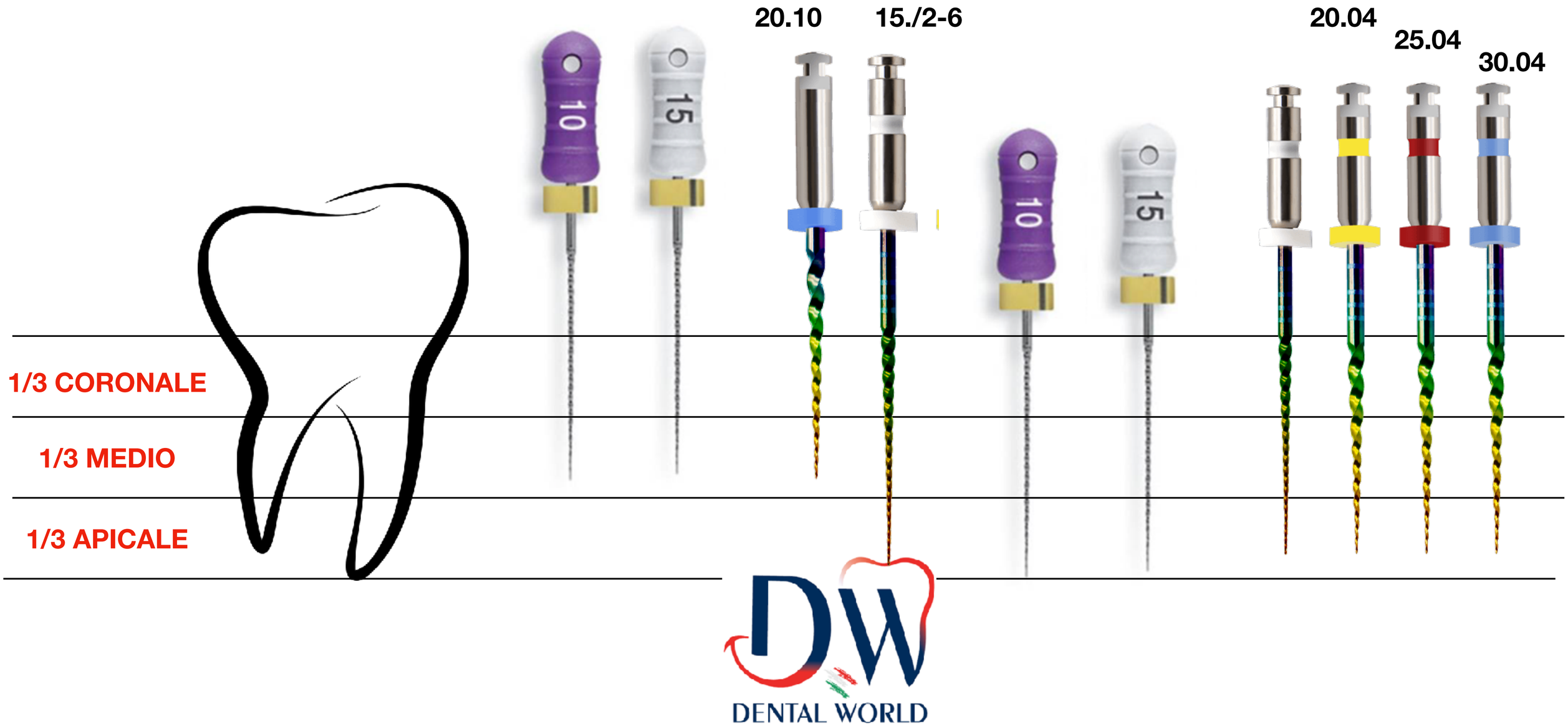
	Ø	%	N/cm	RPM	21 mm	25 mm	31 mm	Cross-section	Match gutta point
R	20	10	2,5	350	17 mm	REF: 144900550			-
○ 016	15	2-6	2,5	300	144900551	144900561	144900571		-
● D1	20	4	2,5	250-300	144900552	144900562	144900572		20/04
● D2	25	4	2,5	250-300	144900553	144900563	144900573		25/04
● D3	30	4	2,5	250-300	144900554	144900564	144900574		30/04
●● D4	25	6	2,5	250-300	144900555	144900565	144900575		25/06
016-D4	--	--	2,5	--	144900556	144900566	144900576		-



Legenda / *Legend*
- Ø Diametro / *Diameter*
- % Conicità / *Taper*
- N/cm Torque
- RPM Velocità / *Speed*

* La velocità e il torque sono indicativi e possono variare a seconda del dispositivo utilizzato e delle preferenze dell'operatore
Speed and torque are approximated and can change in relation to the device and to the operator choices

SEQUENZA PRO FLEX NH.A.



DENTAL WORLD

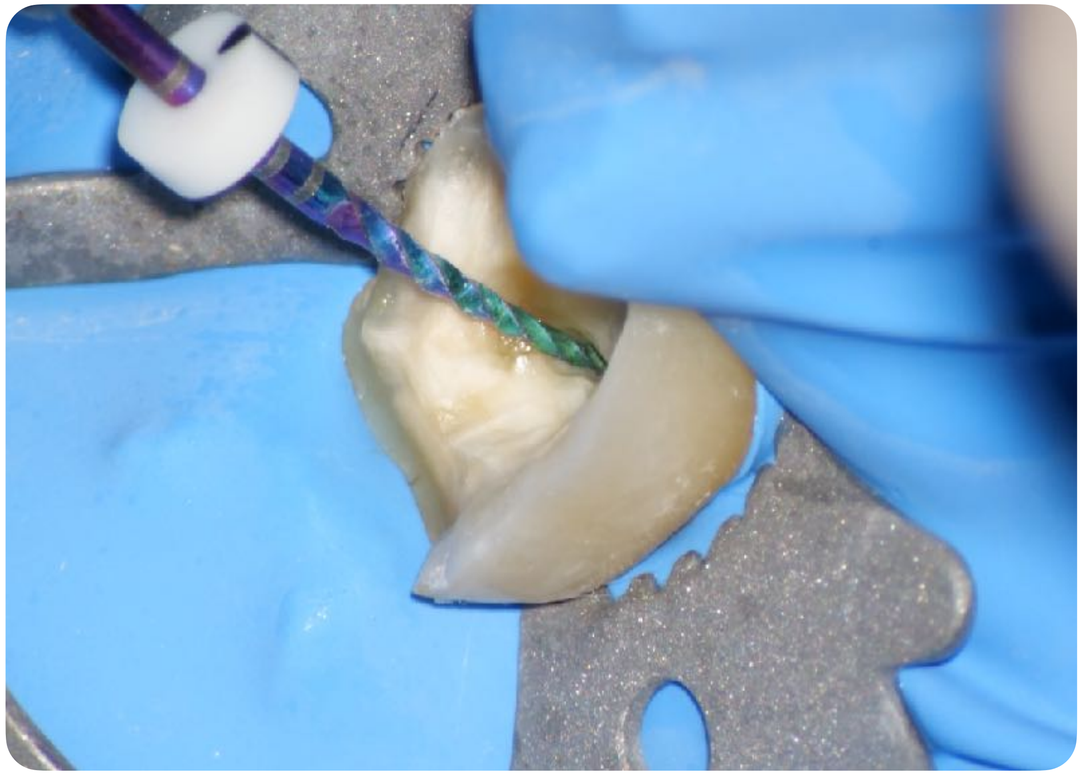
PRO FLEX NHA

NANO RIVESTITO ATTIVAZIONE TERMICA

PREFLARING

PRO FLEX NHA

NANO RIVESTITO ATTIVAZIONE TERMICA

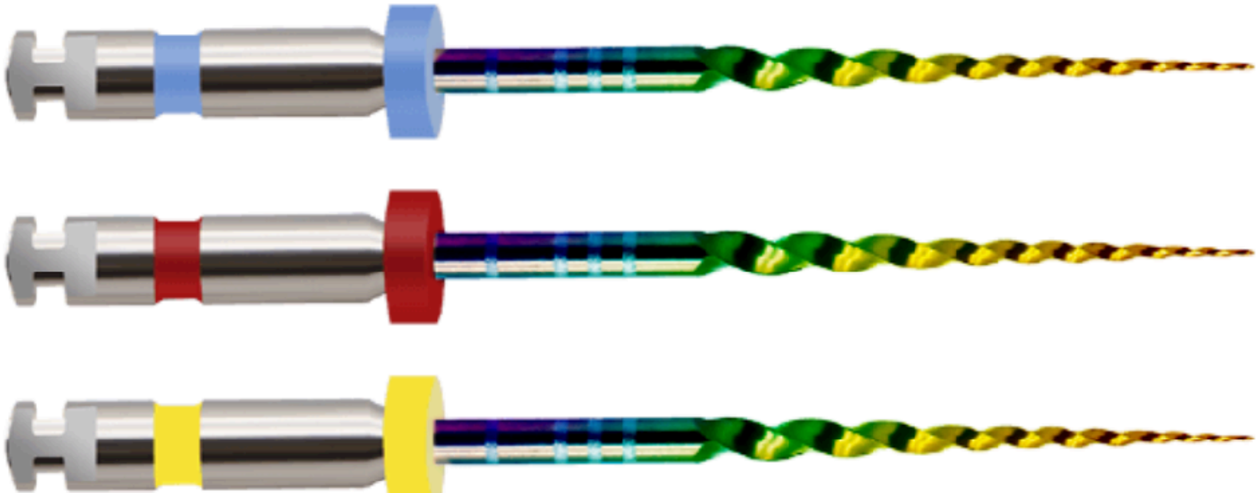


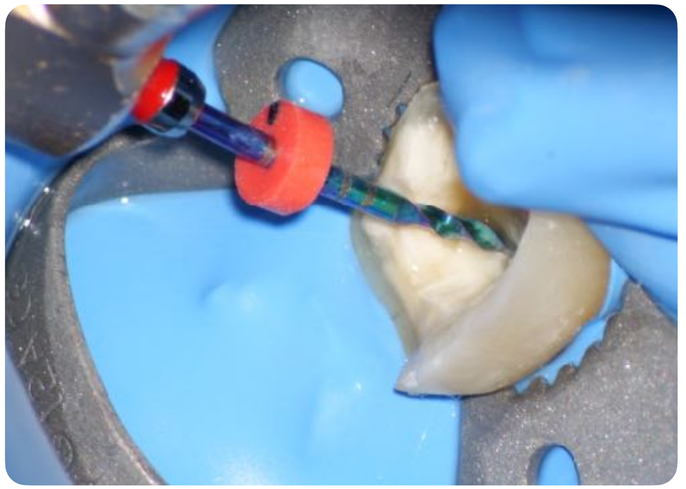
GLIDEPATH

PRO FLEX NHA

NANO RIVESTITO ATTIVAZIONE TERMICA

SHAPING

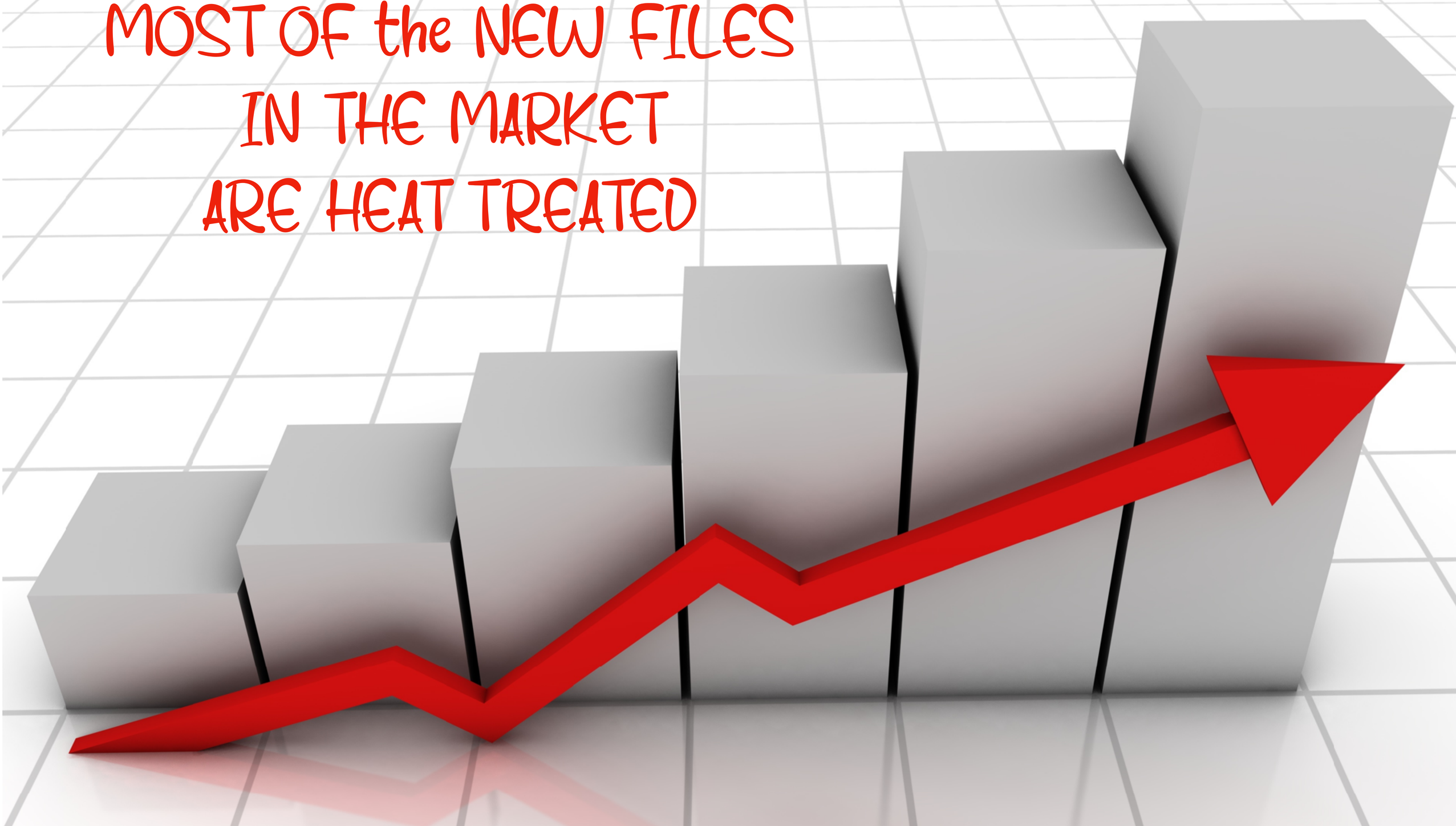




PRO FLEX NHA

NANO RIVESTITO ATTIVAZIONE TERMICA

MOST OF the NEW FILES
IN THE MARKET
ARE HEAT TREATED



Adapting The Anatomy to the File|Sequence ?

Or

Adapting The FileSequence to the Anatomy ?

Vantaggi Clinici

1) Cavità d'accesso conservative

2) Preservazione Dentina

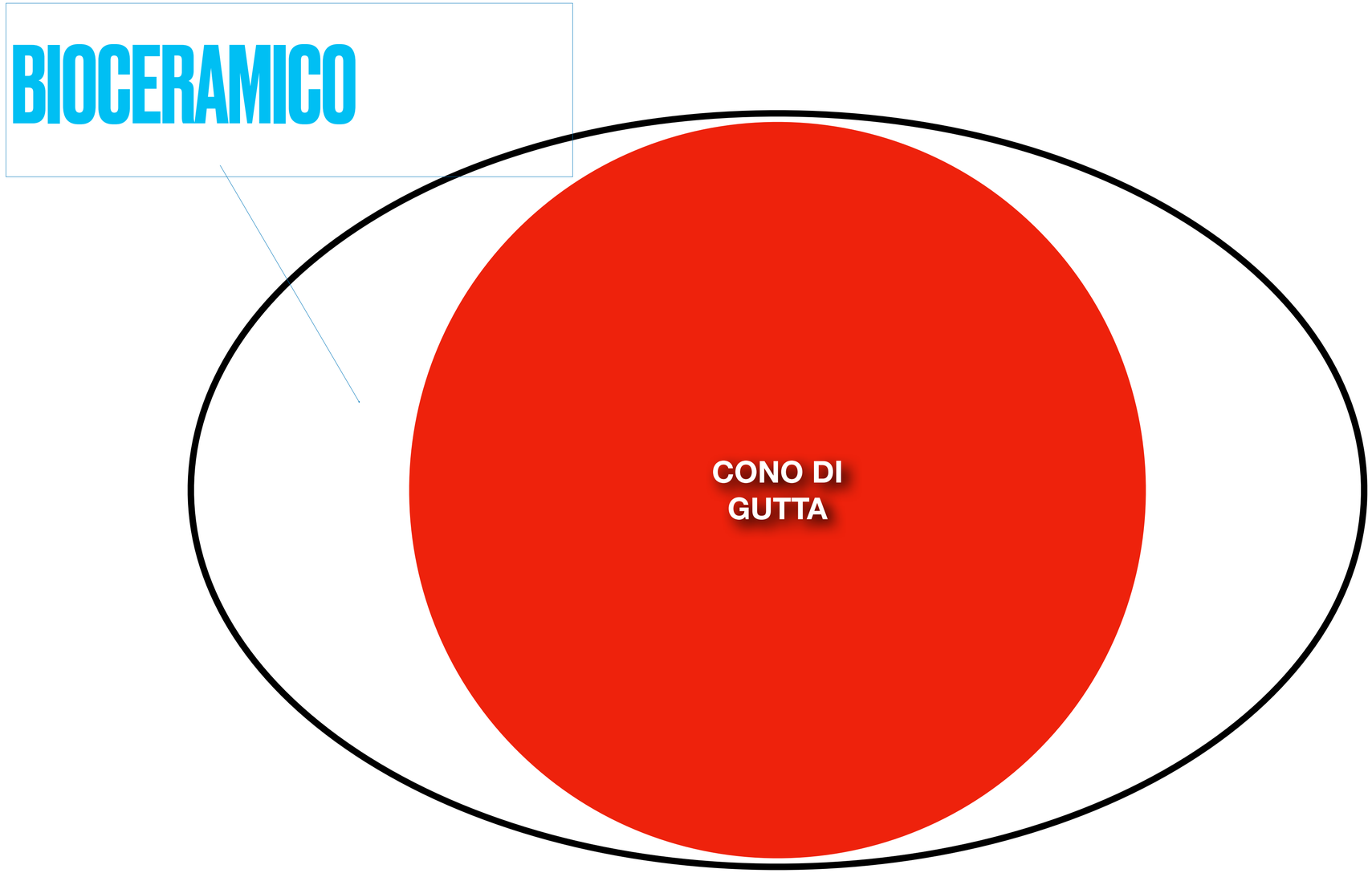
3) Sicurezza nelle curvature

4) Diametri apicali grandi

4) Otturazione Canalare facilitata

CONDENSAZIONE IDRAULICA NO TAPER

Otturazione Canalare: Condensazione idraulica



Otturazione Canalare: Condensazione idraulica

BIOCERAMICO

FILLER

CONO DI GUTTA

CARRIER

QUESTA TECNICA DI CHIUSURA NON RICHIEDE CONICITA' IMPORTANTI COME LA CONDENSAZIONE VERTICALE A CALDO

VANTAGGI

Alta Biocompatibilità
Non tossici
Idrofilici
Radiopacità
Adesione alla dentina
Dimensionalmente Stabili
Bioattivi ed Osteoinduttivi
Bassa risposta infiammatoria
Formazione Idrossiapatite
Antibatterici (ph basico)
Facile utilizzo e manipolazione

I Cementi Bioceramici: chimica

REAZIONE DI IDRATAZIONE

$$2\,(3CaO.SiO_2) + 6H_2O. \rightarrow 3CaO.2SiO_2 + 3H_2O + 3Ca(OH)_2$$

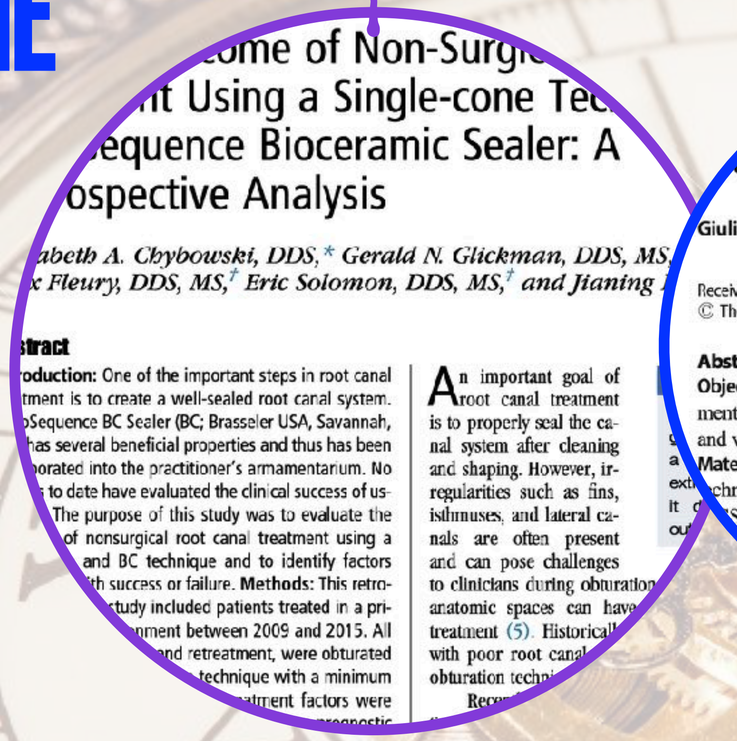
$$2\,(2CaO.SiO_2) + 4H_2O. \rightarrow 3CaO.2SiO_2 + 3H_2O + Ca(OH)_2$$

REAZIONE DI PRECIPITAZIONE

$$7Ca(OH)_2 + 3Ca(H_2PO_4)_2 \rightarrow Ca_{10}(PO_4)_6(OH)_2 + 12H_2O$$

Alti livelli di fluidità e penetrazione nei tubuli dentali

OUTCOME



...ome of Non-Surgi...
...nt Using a Single-cone Tec...
...equence Bioceramic Sealer: A ...ospective Analysis

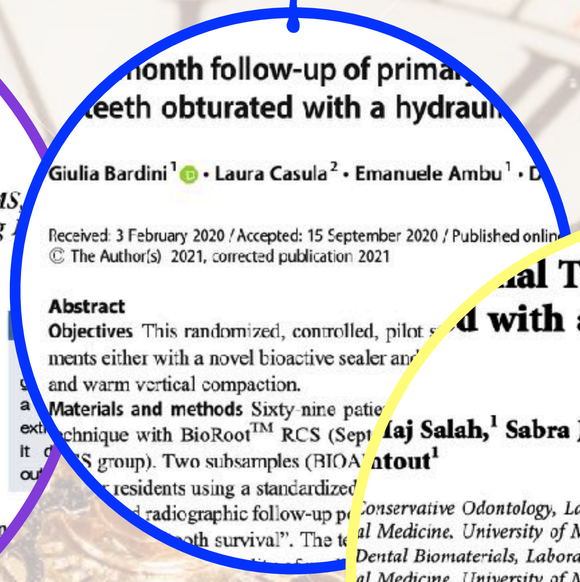
...abeth A. Chybowski, DDS,* Gerald N. Glickman, DDS, MS,...
...x Fleury, DDS, MS,† Eric Solomon, DDS, MS,† and Jianing ...

...tract

...roduction: One of the important steps in root canal ...tment is to create a well-sealed root canal system. ...bSequence BC Sealer (BC; Brasseler USA, Savannah, ...has several beneficial properties and thus has been ...porated into the practitioner's armamentarium. No ...s to date have evaluated the clinical success of us... The purpose of this study was to evaluate the ...of nonsurgical root canal treatment using a ... and BC technique and to identify factors ...th success or failure. **Methods:** This retro... study included patients treated in a pri... ...nment between 2009 and 2015. All ...nd retreatment, were obturated ... technique with a minimum ...atment factors were ...prognostic

An important goal of root canal treatment is to properly seal the canal system after cleaning and shaping. However, irregularities such as fins, isthmuses, and lateral canals are often present and can pose challenges to clinicians during obturation. ...anatomic spaces can have ...treatment (5). Historically ...with poor root canal ...obturation techni...

Recr...



...month follow-up of prima...
...eeth obturated with a hydrau...

Giulia Bardini[1] · Laura Casula[2] · Emanuele Ambu[1] · D...

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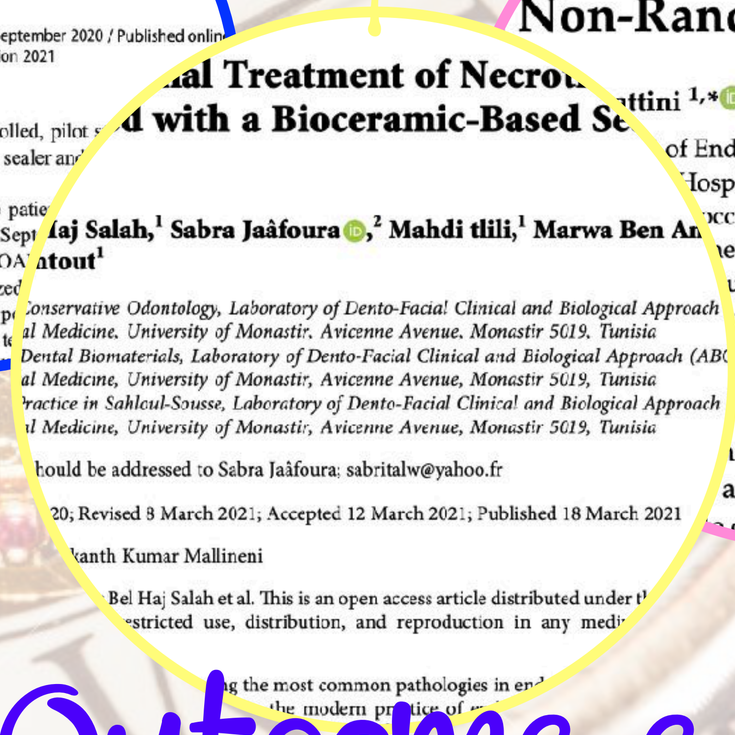
Abstract

Objectives This randomized, controlled, pilot s... ...d
...ments either with a novel bioactive sealer and ...
and warm vertical compaction.

Materials and methods Sixty-nine patie...
...chnique with BioRoot™ RCS (Sept... ...
...S group). Two subsamples (BIOA... ...atout[1]
...residents using a standardized ...
...radiographic follow-up pe...
...oth survival". The te...



...al Treatment of Necrot... ...ttini[1,*], Alan Knight[1], Federico Foschi[1]
...d with a Bioceramic-Based Se...

...of Endodontics, Faculty of Dentistry, Oral & C...
...Hospital, London SE1 9RT, UK; eknight@hotm...
...cci@kcl.ac.uk (F.M.)
...herapeutic Dentistry I. M. Sechenov First ...
...ussia
...ngelo.zavattini@kcl.ac.uk

...aj Salah,[1] Sabra Jaâfoura,[2] Mahdi tlili,[1] Marwa Ben An...
...atout[1]

...Conservative Odontology, Laboratory of Dento-Facial Clinical and Biological Approach ...
...al Medicine, University of Monastir, Avicenne Avenue, Monastir 5019, Tunisia
...Dental Biomaterials, Laboratory of Dento-Facial Clinical and Biological Approach (ABC...
...al Medicine, University of Monastir, Avicenne Avenue, Monastir 5019, Tunisia
...ractice in Sahloul-Sousse, Laboratory of Dento-Facial Clinical and Biological Approach ...
...l Medicine, University of Monastir, Avicenne Avenue, Monastir 5019, Tunisia

...hould be addressed to Sabra Jaâfoura; sabritalw@yahoo.fr

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...kanth Kumar Mallineni

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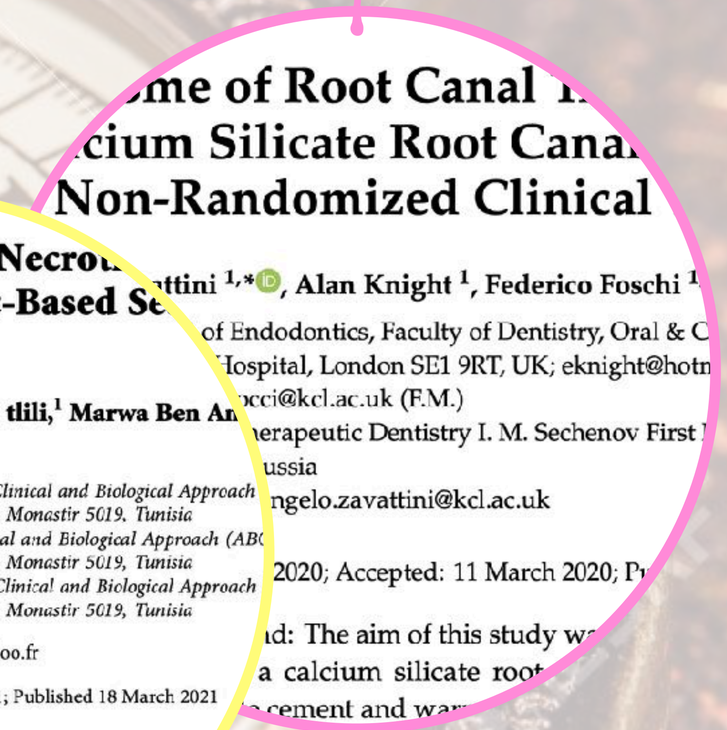
...estricted use, distribution, and reproduction in any medi...

...g the most common pathologies in end...
...the modern pr...



...me of Root Canal ...
...cium Silicate Root Canal...
Non-Randomized Clinical

...2020; Accepted: 11 March 2020; Pu...

...d: The aim of this study wa...
...a calcium silicate root...
...cement and war...

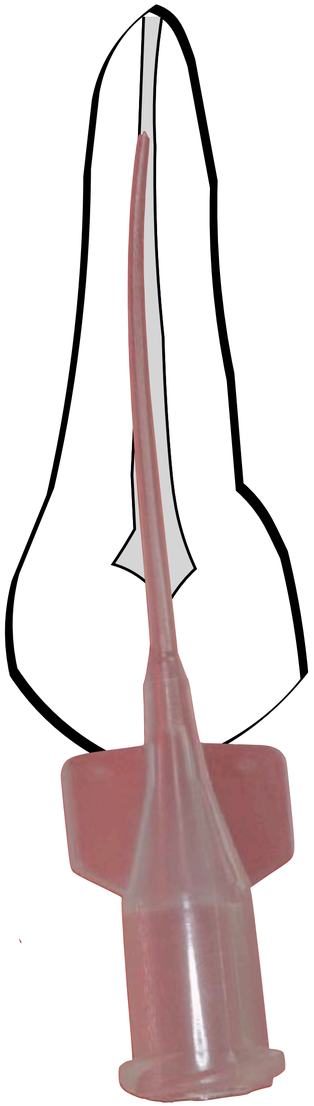
Miglioramento Outcome e Maggior velocità di guarigione

Condensazione idraulica

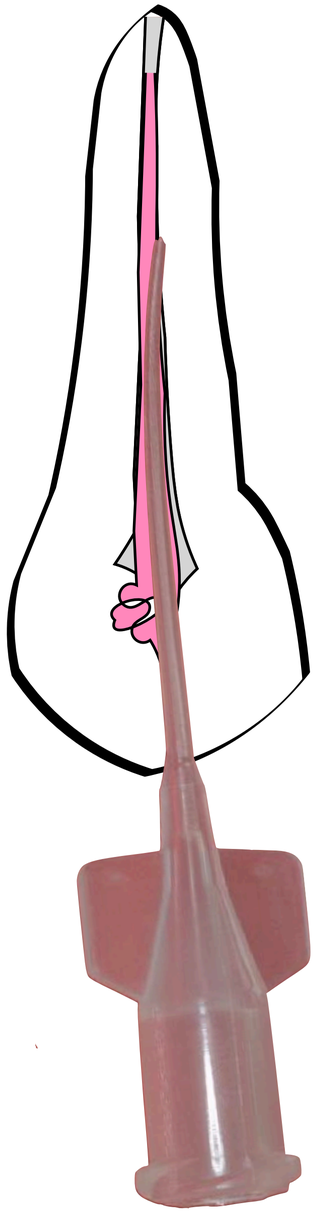
DW DENTAL WORLD
ITALIAN MANUFACTURER

Sealer "Bioceramici"

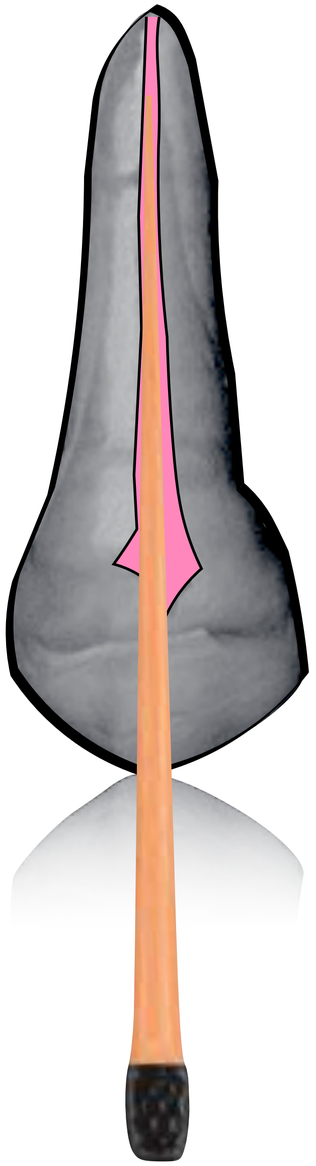
PROVA SIRINGA
3-4 MM DALLA LL



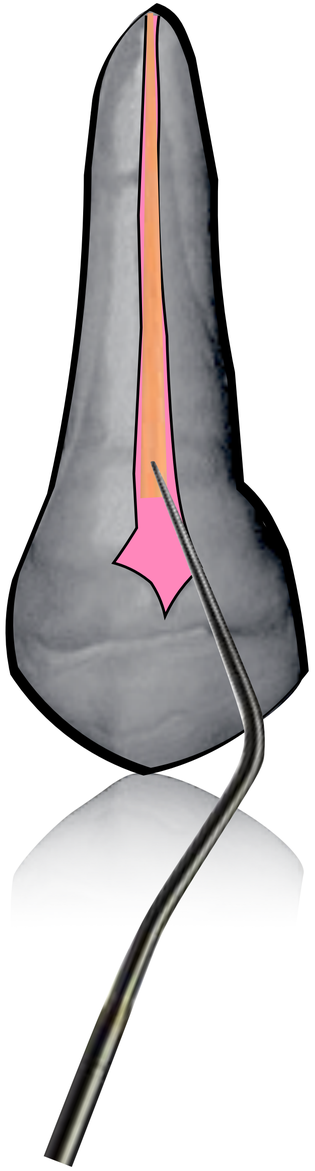
ESTRUSIONE CEMENTO
LENTA RIMOZIONE SIRINGA



INSERIMENTO DEL CONO
ALLA LL DECISA



TEAGLIO DEL CONO
ALL'IMBOCCO CANALARE



PRO FLEX NHA

NANO RIVESTITO ATTIVAZIONE TERMICA

2023

PRO FLEX NHA

NANO RIVESTITO ATTIVAZIONE TERMICA

2023

2024

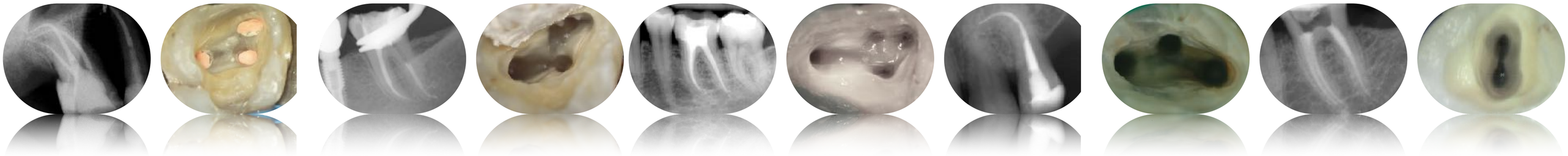
KEY POINT

TRATTAMENTO ENDODONTICO MINI-INVASIVO

RAGGIUNGIMENTO DEGLI OBIETTIVI MECCANICI E BIOLOGICI

FILE ROTANTI NI-TI ATTIVATI TERMICAMENTE E CEMENTI BIOCERAMICI

The end



DR GIANLUCA FUMEI