INFLUENCE OF SETTING ENVIRONMENT ON THE BOND STRENGTH OF THREE CALCIUM SILICATE-BASED MATERIALS TO ROOT DENTIN

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Vienna
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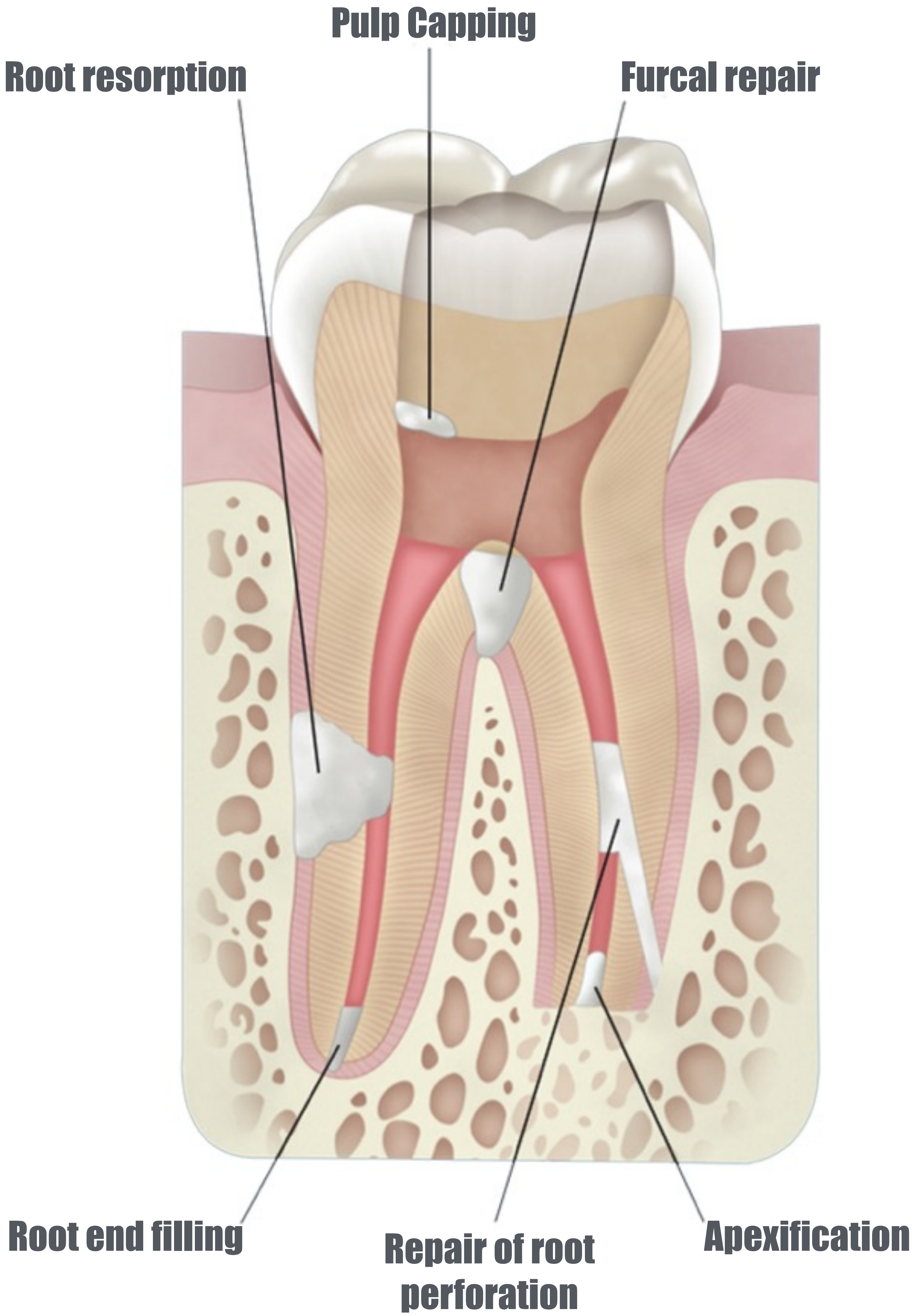
INTRODUCTION



Review Article

Mineral Trioxide Aggregate: A Comprehensive Literature Review—Part I: Chemical, Physical, and Antibacterial Properties

Masoud Parirokh, DMD, MS, and Mahmoud Torabinejad, DMD, MSD, PhD*[†]

Most endodontic failures occur as a result of leakage of irritants into the periapical tissues (1–3). An ideal orthograde or retrograde filling material should seal the pathways of communication between the root canal system and its surrounding tissues. It should also be nontoxic, noncarcinogenic, nongenotoxic, biocompatible with the host tissues, insoluble in tissue fluids, and dimensionally stable (4, 5). Furthermore, the presence of moisture should not affect its sealing ability; it should be easy to use and be radiopaque for recognition on radiographs (4). Because existing restorative materials used in endodontics did not possess these "ideal" characteristics (4), mineral trioxide aggregate (MTA) was developed and recommended initially as a root-end filling material and subsequently has been used for pulp capping, pulpotomy, apexogenesis, apical barrier formation in teeth with open apexes, repair of root perforations, and as a root canal filling material. MTA has been recognized as a bioactive material (6) that is hard tissue conductive (7), hard tissue inductive, and biocompatible. Several reviews have been published about MTA's chemical properties, biocompatibility, and clinical applications (8–10). Only one article has extensively studied MTA and addresses

Parirokh M, Torabinejad M. Mineral trioxide aggregate: a comprehensive literature review Part I: chemical, physical, and antibacterial properties. Journal of endodontics. 2010;36(1):16-27.

INTRODUCTION

Review Article

Mineral Trioxide Aggregate: A Comprehensive Literature Review—Part III: Clinical Applications, Drawbacks, and Mechanism of Action

Masoud Parirokh, DMD, MS, and Mahmoud Torabinejad, DMD, MSD, PhD[†]*

Drawbacks

The main drawbacks of MTA include a discoloration potential, presence of toxic elements in the material composition, difficult handling characteristics, long setting time, high material cost, an absence of a known solvent for this material, and the difficulty of its removal after curing (71, 74, 76, 87, 157, 160, 169, 206, 210, 214–220).

Because of potential discoloration of teeth treated with GMTA, the manufacturer introduced a new formula of MTA with an off-white color

MTA has been considered as an alternative material to gutta-percha for root canal obturation. The drawbacks of using MTA as a root canal filling material include difficulty in obturation of curved root canals, discoloration potential, and long setting time (206).

Parirokh M, Torabinejad M. Mineral trioxide aggregate: a comprehensive literature review

Part III: clinical applications, drawbacks, and mechanisms of action. Journal of endodontics. 2010;36(1):400-13.

NEW MATERIALS

To improve MTA drawbacks

MATERIALS & METHODS

~~GMTA~~ → WMTA

Major compounds:

$3\,CaO\text{-}SiO_2$	Tricalcium silicate
Bi_2O_3	Bismuth oxide
$2\,CaO\text{-}SiO_2$	Dicalcium silicate
$3\,CaO\text{-}Al_2O_3$	Tricalcium aluminate
$CaSO_4\text{-}2H_2O$	Calcium sulfate dihydrate or Gypsum

Powder	Liquid
Tricalcium silicate ($3CaO.SiO_2$) Dicalcium silicate ($2CaO.SiO_2$) Calcium carbonate ($CaCO_3$) Zirconium dioxide (ZrO_2) Iron oxide	Calcium chloride ($CaCl_2.2H_2O$) Water reducing agent Water

MM-MTA	Tricalcium silicate, dicalcium silicate, tricalcium aluminate, bismuth oxide, calcium sulphate dehydrate and magnesium oxide

MATERIALS & METHODS

MATERIALS & METHODS

MATERIALS & METHODS

CRITERIA

1. Extracted by periodontal reasons
2. No carious lesion
3. Single Rooted Teeth
4. Fully developed apexes
5. One Straight Root Canal


117 TEETH

MATERIALS & METHODS

OBJECTIVE

Standardization of root sample sizes

1000 rpm

Water cooled diamond saw

Progression: 0.5mm per second

BIOMECHANICAL PREPARATION

STEP BY STEP

WORKING LENGHT – 15 MM

BIOMECHANICAL PREPARATION

STEP BY STEP

WORKING LENGHT - 15 MM

MATERIALS & METHODS

GROUP 1
ProRoot® MTA

n = 39

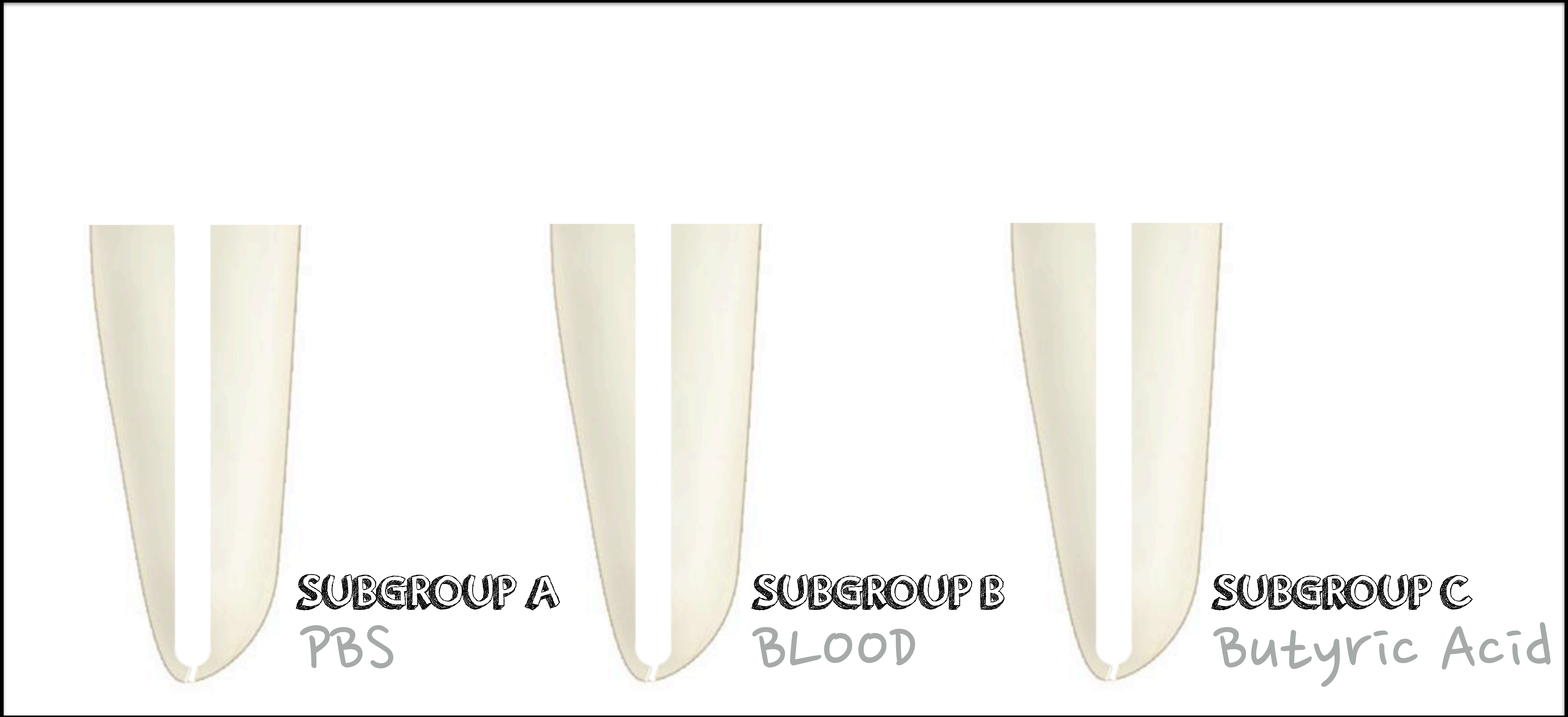
GROUP 2
Biodentine™

n = 39

GROUP 3
MM-MTA™

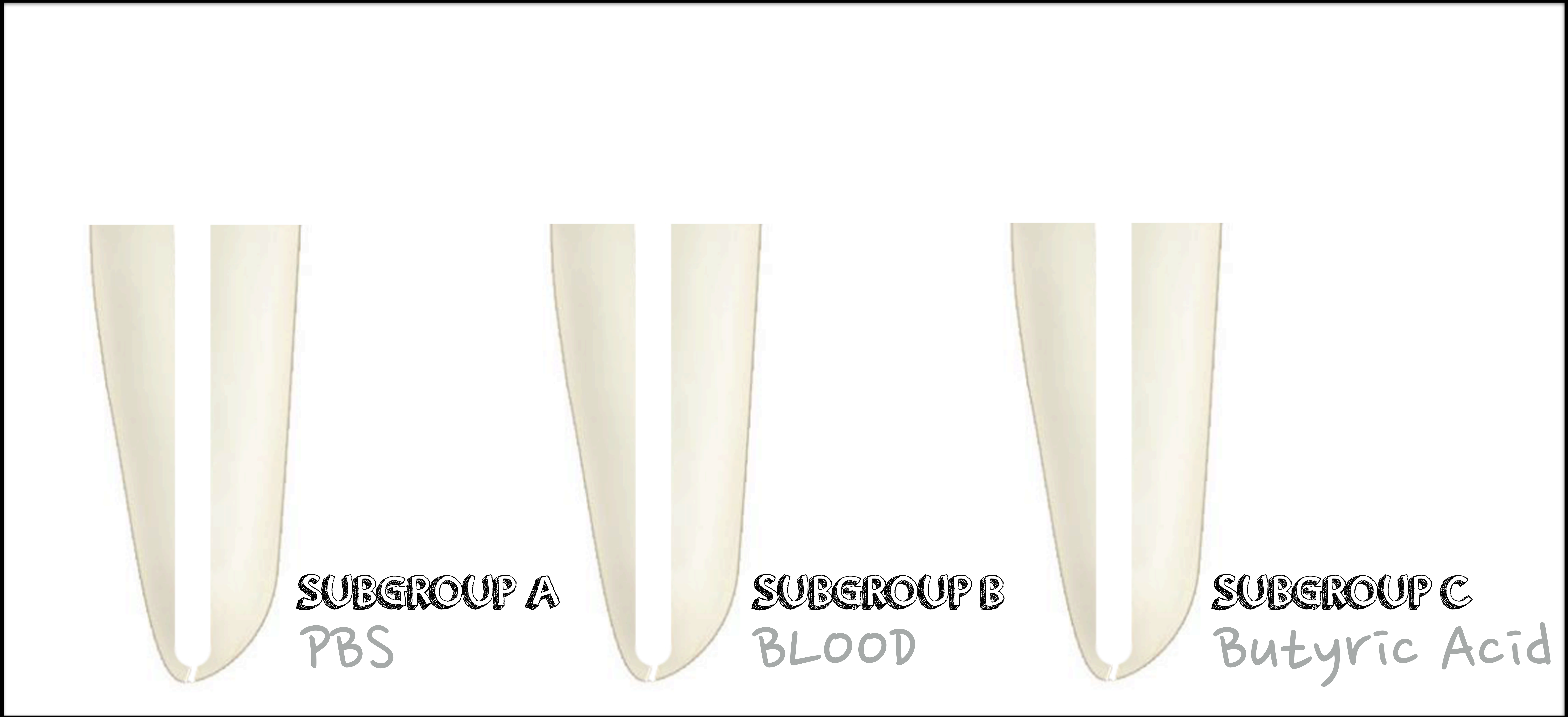
n = 39

FINAL IRRIGATION PROTOCOL



3mL of NaOCl - 2.5%

FINAL IRRIGATION PROTOCOL



3mL of Butyric Acid - pH = 5

ARMAMENTARIUM

FOR ROOT FILLING

ARMAMENTARIUM

FOR ROOT FILLING

MTA GUN

Placement of material

Pluggers

Condensation and
MTA Placement

MicroBrush

Condensation and Wall Cleaning

Paper Points

Condensation and Wall Cleaning
Dry of root canal system

ARMAMENTARIUM

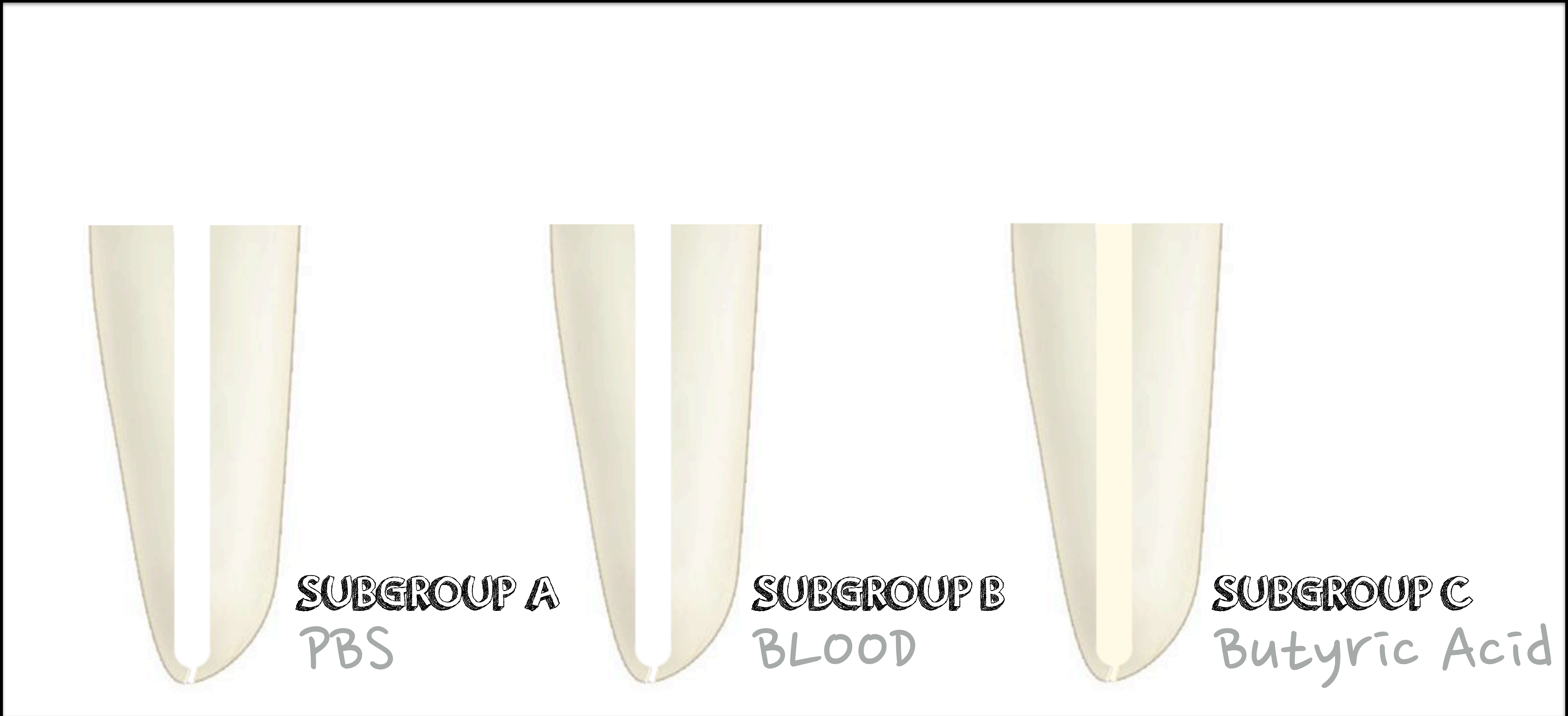
FOR ROOT FILLING

Paper Points
Condensation and Wall Cleaning
Dry of root canal system

Surgical Microscope
Improve your vision

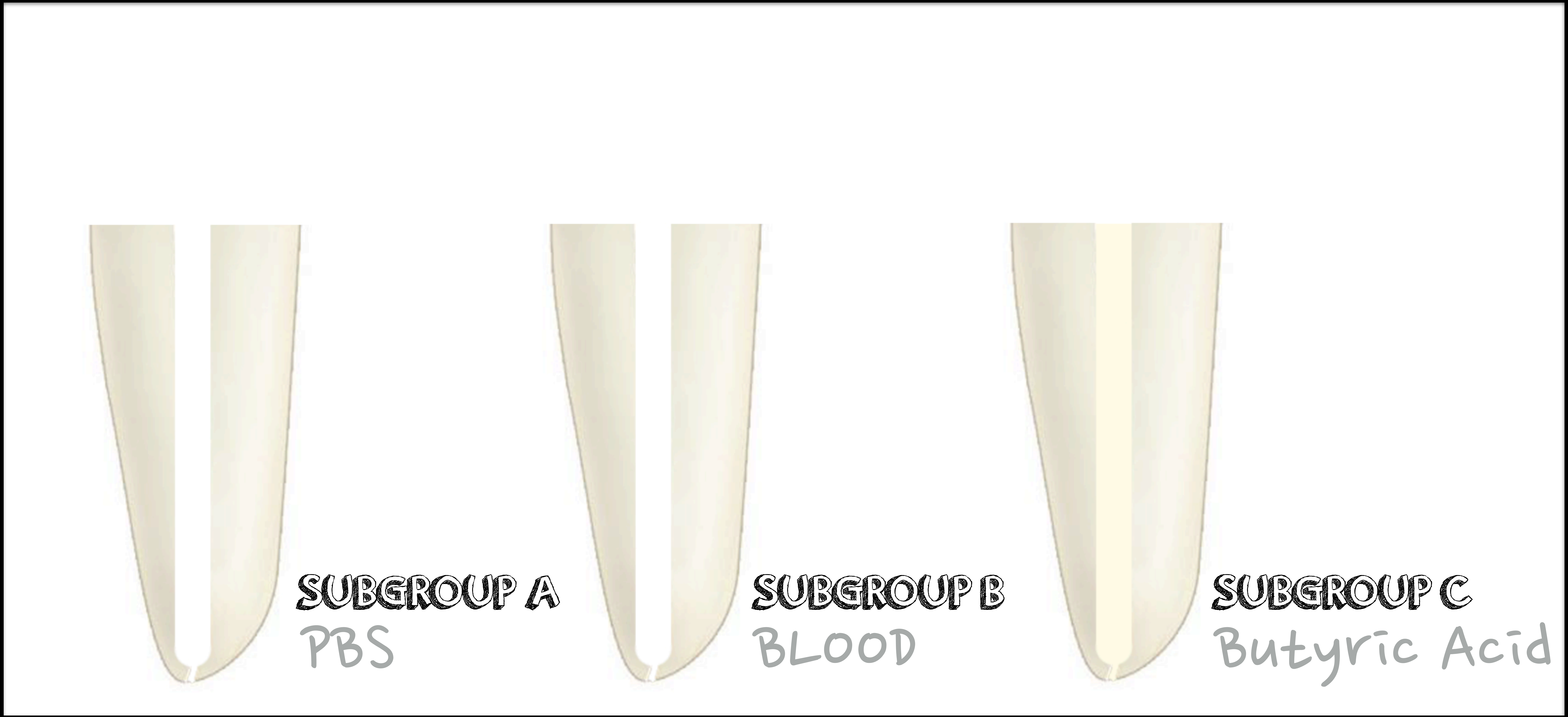
Mixer and Spatula
Preparation of material

MATERIALS & METHODS



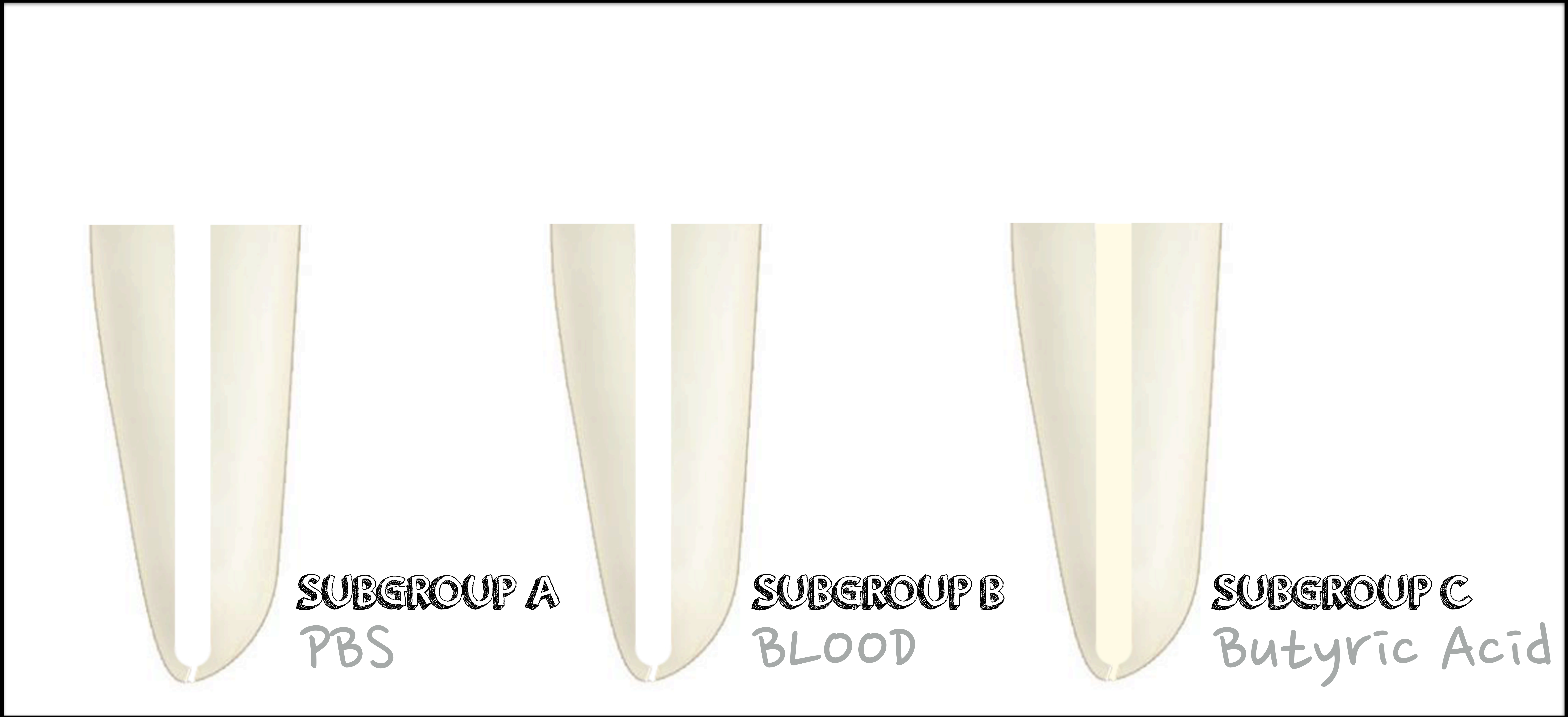
Placement of blood in root canal

MATERIALS & METHODS



Placement of root canal sealers

MATERIALS & METHODS



Condensation with a plugger

MATERIALS & METHODS

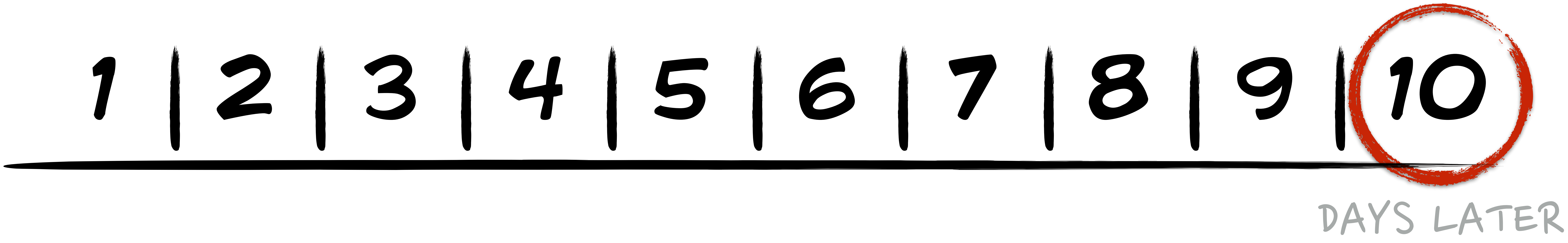
Subgroups A and B

15 mL of PBS

Subgroup C

15 mL of Butyric acid

MATERIALS & METHODS



37 °C

100% OF RELATIVE HUMIDITY

MATERIALS & METHODS

351 ROOT SLICES

Average size 2,003 ± 0,157

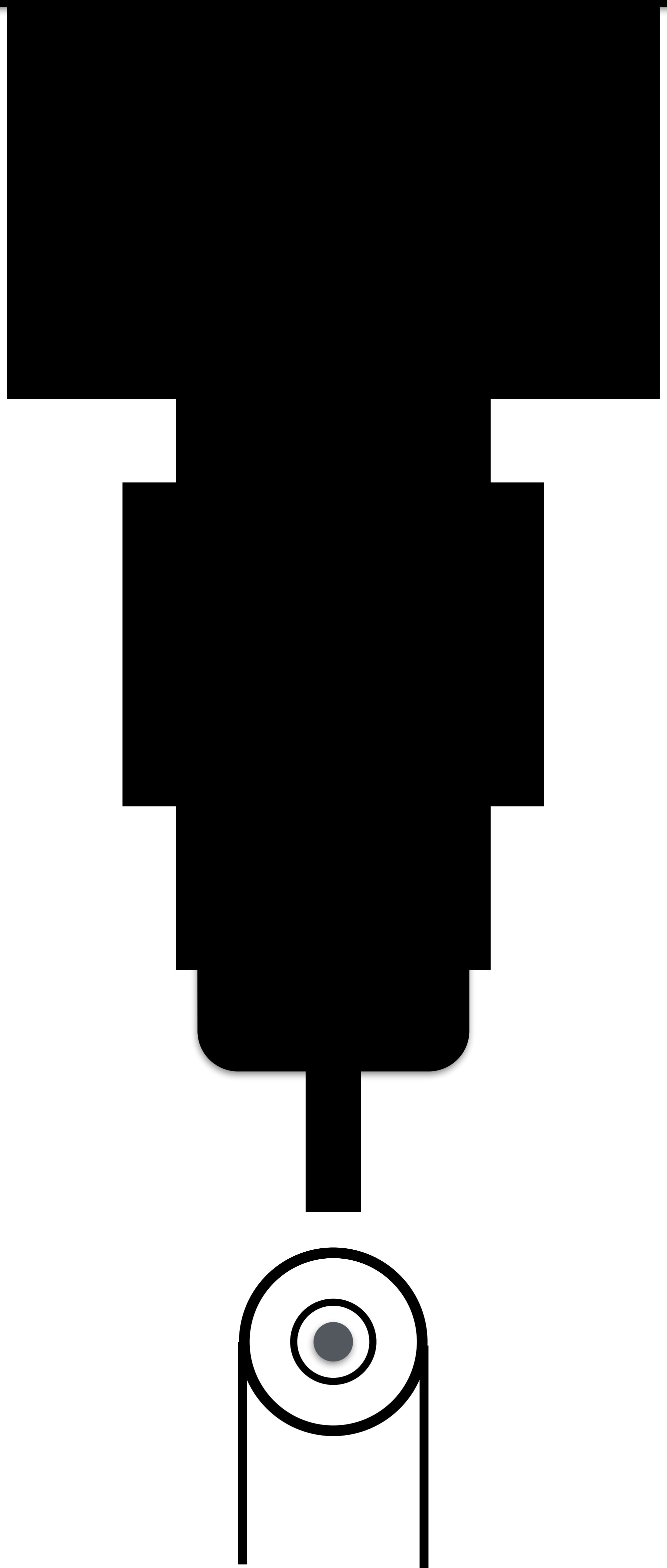
LET'S RESUME

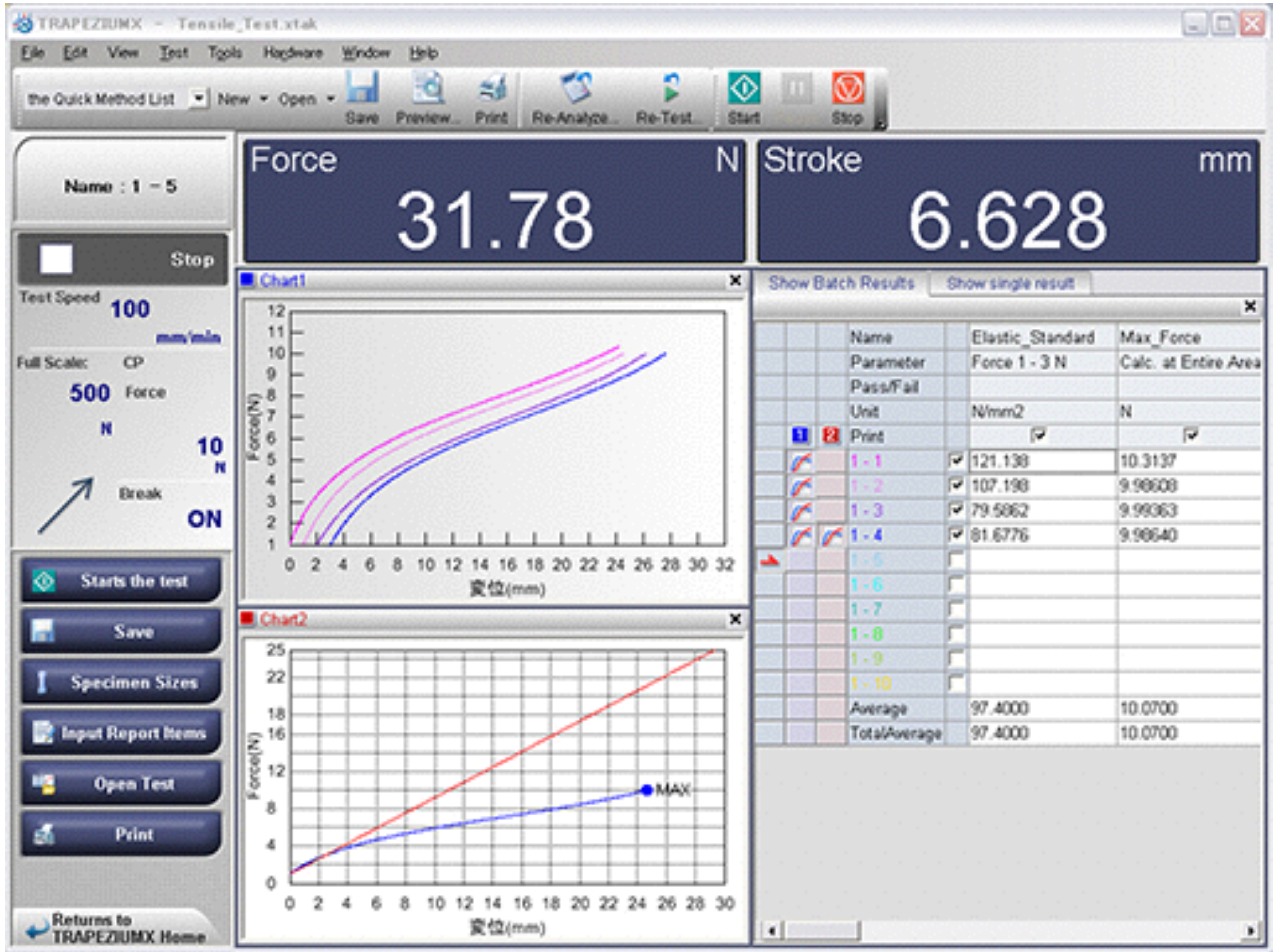
117 TEETH

GROUP 1	GROUP 2	GROUP 3	
ProRoot® MTA	Biodentine™	MM-MTA™	n = 39 teeth
1A. PBS 1B. Blood 1C. Butyric acid	2A. PBS 2B. Blood 2C. Butyric acid	3A. PBS 3B. Blood 3C. Butyric acid	n = 351 root slices

MATERIALS & METHODS

CROSSHEAD SPEED: 0.5MM PER MINUTE





Chen WP, Chen YY, Huang SH, Lin CP. Limitations of push-out test in bond strength measurement. Journal of endodontics. 2013;39(2):283-7.

RESULTS
By Material

Two-way analysis of variance (ANOVA)

Statistically significant difference was found between the 3 groups ($F=155.972$, **$p<0.001$**)

RESULTS
By Material

Mann-Withney test followed by Tukey's Test for pairwise comparisons

Statistically significant difference was found between all groups when analyzed two by two (**$p < 0.001$**)

RESULTS
Setting Environment

Bond Strenght Values [MPa]

PBS Blood Butyric Acid

Two-way analysis of variance (ANOVA)

Statistically significant differences
(F=3.512, p=0.031)

Mann-Withney test with correction for pairwise comparisons - Tukey's Test

Butyric Acid VS Blood ✔

❌ PBS VS Blood

❌ PBS VS Butyric Acid

RESULTS

Material and Setting Environment

Bond Strenght Values [MPa]

PBS Blood Butyric Acid

RESULTS

Material and Setting Environment

Bond Strenght Values [MPa]

PBS

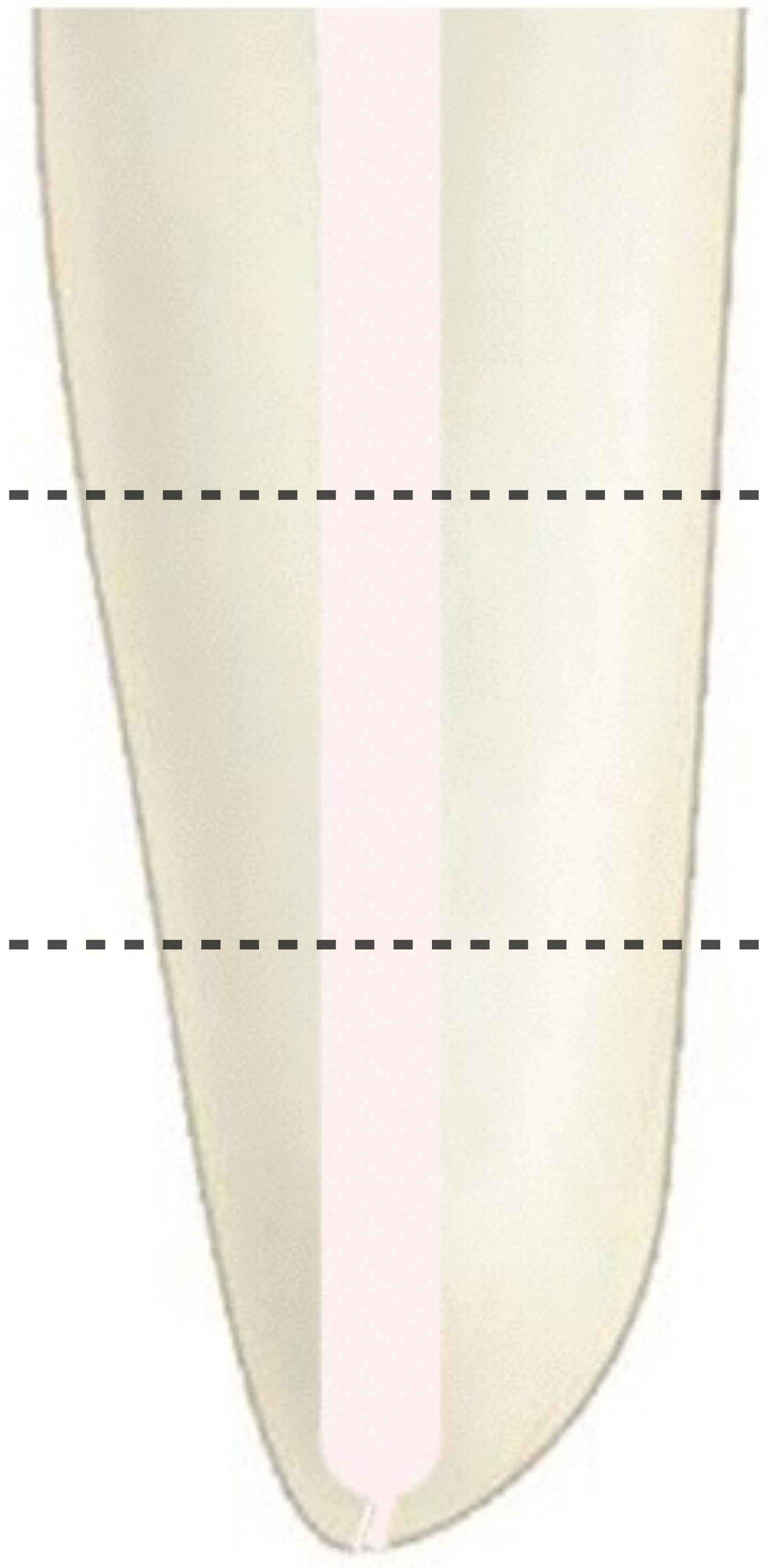
Blood

Butyric Acid

RESULTS
Sample Location

Root canal thirds | **Mean values**

Coronal Third



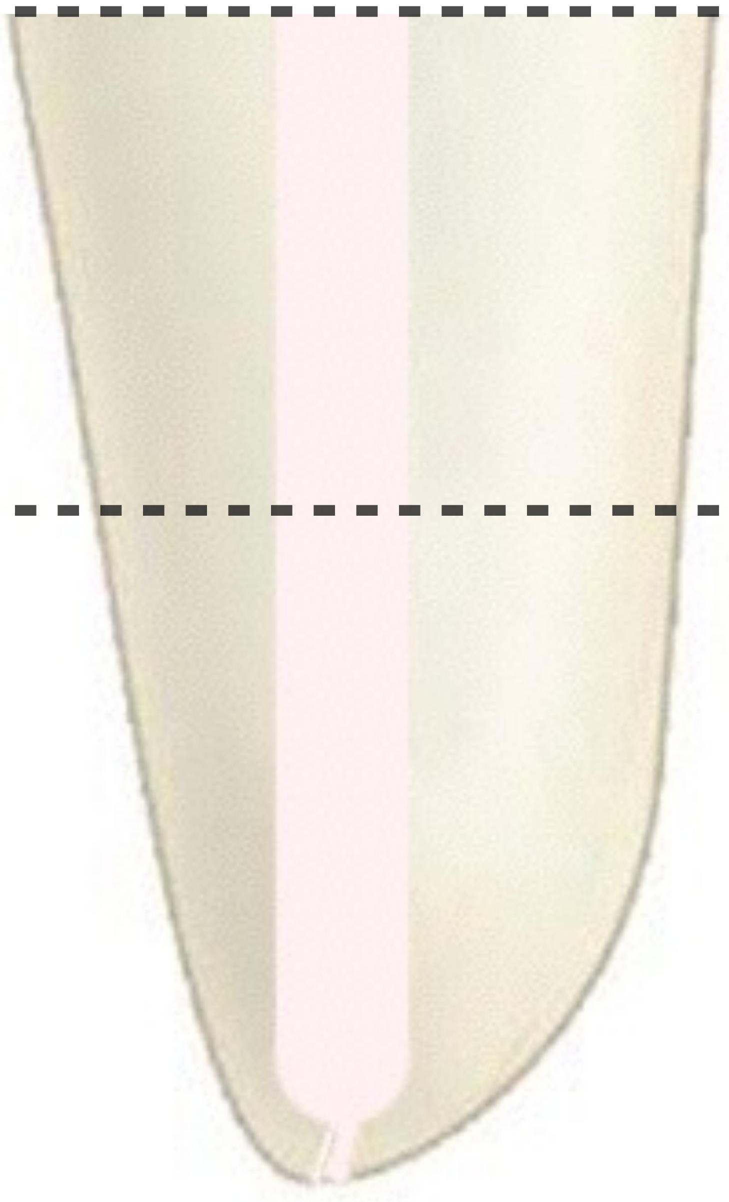
Middle Third

Apical Third

Only statistically significant differences were found between apical and coronal third

RESULTS
Sample Location

Root canal thirds	Mean values
Coronal Third	
Middle Third	
Apical Third	



Only statistically significant differences were found between apical and coronal third

RESULTS

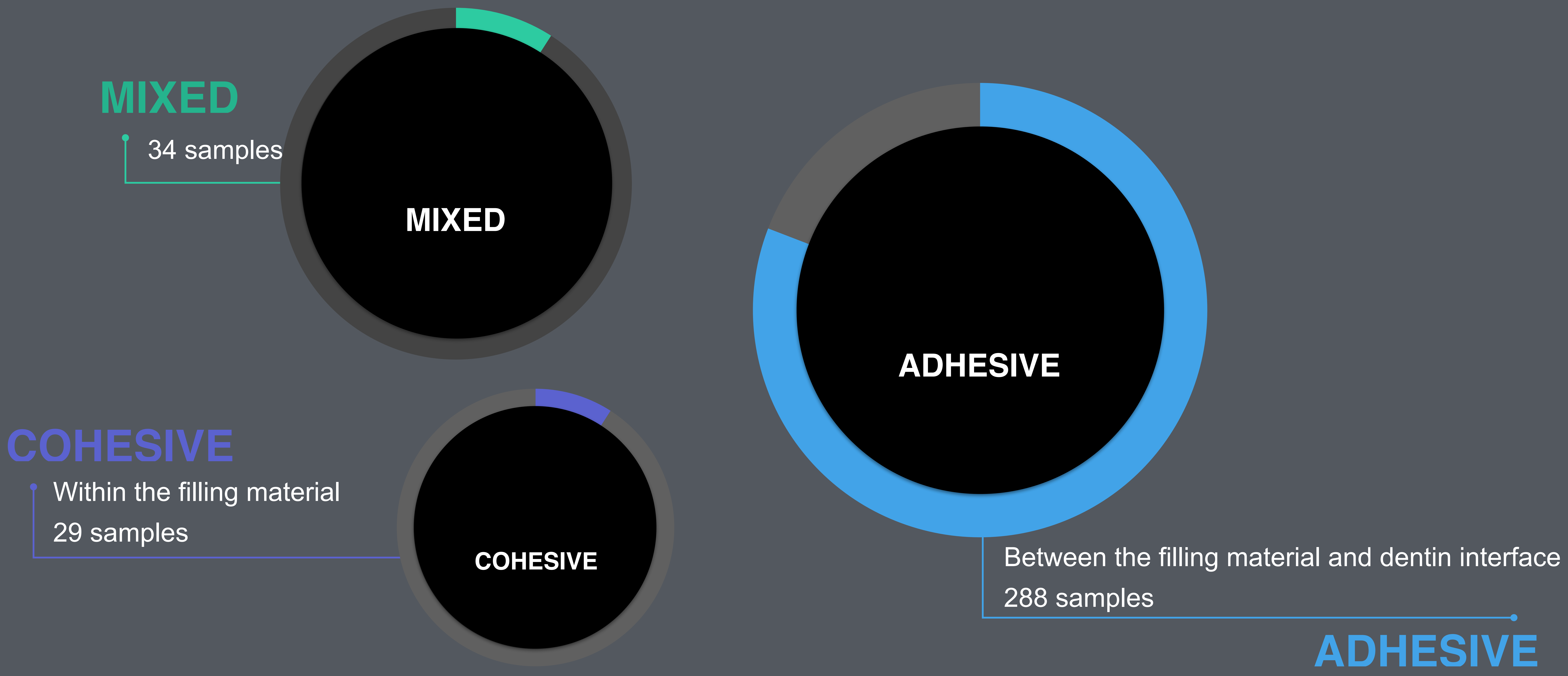
Sample Location

Root canal thirds	Mean values
Coronal Third	
Middle Third	
Apical Third	

Only statistically significant differences were found between apical and coronal third

FAILURE MODES

ALL SAMPLES



RESULTS FAILURE MODES

MIXED　　COHESIVE　　ADHESIVE

❌ Material **VS** Type of failure

❌ Setting environment **VS** Type of failure

DISCUSSION

Basic Research—Technology

Effect of Acidic Environment on the Push-out Bond Strength of Mineral Trioxide Aggregate

Noushin Shokouhinejad, DDS, MSc,[*†] *Mohammad Hossein Nekoofar, DDS, MSc,*[*‡] *Azita Iravani, DDS,*[*] *Mohammad Javad Kharrazifard, DDS, MPH,*[§] *and Paul M.H. Dummer, BDS, MScD, PhD, DDSc, FDSRCS*[‡]

Basic Research—Technology

Push-out Bond Strength of Mineral Trioxide Aggregate in the Presence of Alkaline pH

Mohammad Ali Saghiri, BSc, MSc,[*] *Noushin Shokouhinejad, DDS, MSc,*[†] *Mehrdad Lotfi, DMD, MSc,*[‡] *Mohsen Aminsobhani, DMD, MSc,*[†] *and Ali Mohammad Saghiri, BSc, MSc*[§]

Basic Research—Technology

Influence of Acidic Environment on Properties of Biodentine and White Mineral Trioxide Aggregate: A Comparative Study

Amr M. Elnagby, BDS, MSc, PhD

Clin Oral Invest
DOI 10.1007/s00784-013-1082-4

ORIGINAL ARTICLE

Push-out bond strength of three calcium silicate cements to root canal dentine after two different irrigation regimes

Davut Çelik · Kürşat Er · Ahmet Serper · Tamer Taşdemir · Kadir Tolga Ceyhanlı

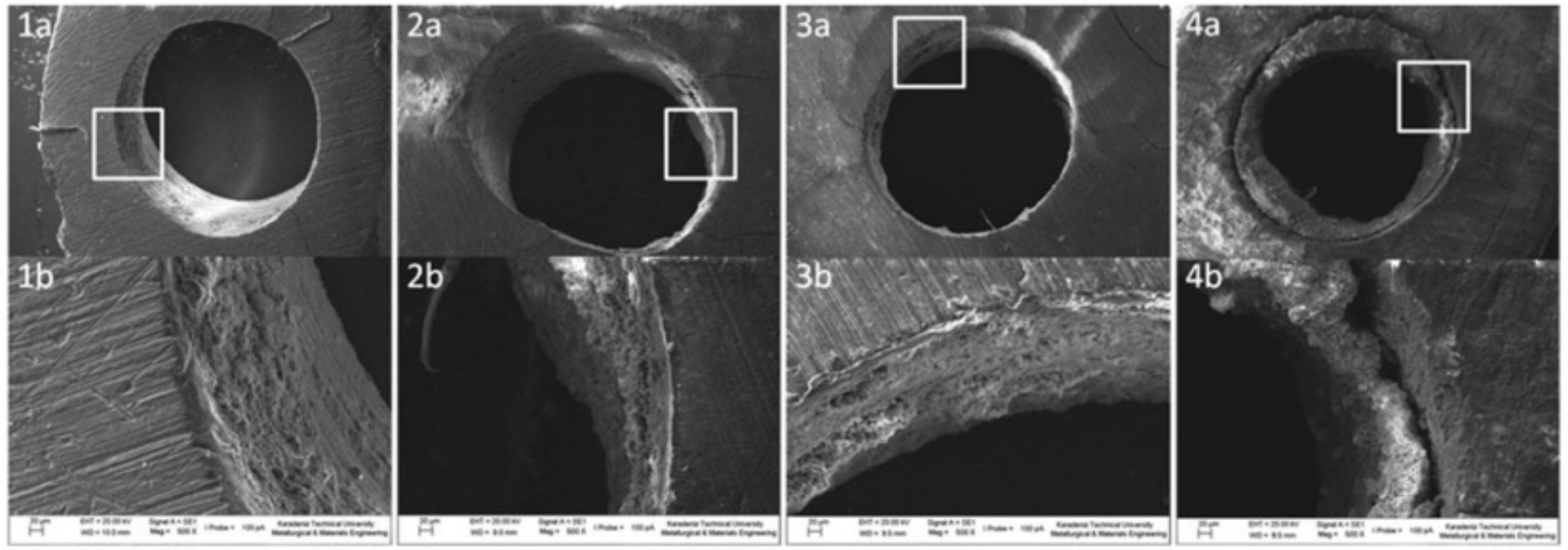


Fig. 1 SEM images of the samples. Bond failure was of the adhesive type in the majority of samples; however, some samples exhibited cohesive and mixed failure patterns. *1* Subgroup C2, *2* subgroup B4, *3* subgroup B3, *4* subgroup A1, *a* ×100, *b* ×500

Inspection of the samples revealed that the bond failure was of the adhesive type in the majority of the samples; however, some samples exhibited cohesive and mixed failure patterns (Fig. 1).

DISCUSSION

J Contemp Dent Pract. 2014 May 1;15(3):336-40.

Comparative Evaluation of Push-out Bond Strength of ProRoot MTA, Bioaggregate and Biodentine.

Alsubait SA[1], Hashem Q[2], AlHargan N[2], AlMohimeed K[2], Alkahtani A[3].

⊕ Author information

Abstract

OBJECTIVE: To evaluate the push-out bond strength of Biodentine (BD) in comparison with two available calcium silicate based materials, bioaggregate (BA) and ProRoot MTA (WMTA).

MATERIALS AND METHODS: One hundred and twenty-three Root dentin slices of freshly extracted single Rooted human teeth were randomly divided into three groups (n = 41) according to the used test material: WMTA, BA, BD. After canal space preparation, the filling materials were placed inside the lumen of the slices. After 72 hours, the maximum force applied to materials at the time of dislodgement was recorded and slices were then examined under a stereomicroscope at ×40 magnification to determine the nature of bond failure. Analysis of variance (ANOVA) test was used to compare means of push-out bond strength. Post-hoc test was then accomplished for multiple comparisons. Chi-square test was used to determine if there is significant association between the type of material and type of failure.

RESULTS: The mean push-out bond strength ± standard deviation in MPa values of WMTA, BA and BD were 23.26 ± 5.49, 9.57 ± 3.45, 21.86 ± 6.9, respectively. There was no significant difference between the means of WMTA and BD ($p = 0.566$), but the mean of BA was significantly lower than those of WMTA and BD ($p = 0.000$). Under stereomicroscope, WMTA and BA showed a majority of mixed type of failure than cohesive failure, while BD showed the opposite. No adhesive failure was observed in any specimen.

CONCLUSION: The findings of the present study imply that the force needed for BD displacement is similar to WMTA and significantly higher than the force required to displace BA.

???

DISCUSSION

International Endodontic Journal
doi:10.1111/iej.12168

Influence of the exposure of MTA with and without calcium chloride to phosphate-buffered saline on the push-out bond strength to dentine

J. de Almeida, M. C. S Felippe, E. A. Bortoluzzi, C. S. Teixeira & W. T. Felippe
School of Dentistry, Federal University of Santa Catarina, Florianópolis, Brazil

	Group 1		Group 2	
Period	Mean	SD	Mean	SD
3 days	3.83[Aa]	0.46	4.21[Aa]	0.43
28 days	3.55[Aa]	0.95	4.44[Aa]	0.76
60 days	4.07[Aa]	1.1	5.12[Ab]	1.03

Statistically significant differences

The interaction of MTA/dentine with PBS positively influenced the bond strength of MTA

So, why not place PBS on contact with MTA instead of a moisted cotton pellet?

DISCUSSION

Dental Traumatology

Dental Traumatology 2013; doi: 10.1111/edt.12070

Bond strength of mineral trioxide aggregate to root dentin after exposure to different irrigation solutions

Emre Nagas[1], Zafer C. Cehreli[2], Mehmet Ozgur Uyanik[1], Veli Durmaz[1], Pekka K. Vallittu[3], Lippo V.J. Lassila[3]

[1]Department of Endodontics, Faculty of Dentistry, Hacettepe University; [2]Department of Pediatric Dentistry, Faculty of Dentistry, Hacettepe University, Ankara, Turkey; [3]Department of Prosthetic Dentistry and Biomaterials Research, Institute of Dentistry, University of Turku, Turku, Finland

Table 1. The push-out bond strength (MPa) of MTA in the coronal, middle, and apical thirds of radicular dentin. The values are expressed as mean ± SD

Irrigation solutions	Coronal	Middle	Apical
5.25% NaOCl	8.25 ± 1.28	8.51 ± 1.28	8 ± 0.9
17% EDTA	7.8 ± 1.1	7.66 ± 0.91	7.67 ± 1.1
1% PAA	8.14 ± 0.94	7.68 ± 1.1	7.87 ± 1
Control	8.76 ± 1.14	8.53 ± 1.28	8.19 ± 1.24

Within the methodological limitations of the present study, it can be concluded that there was no significant difference in the push-out bond strengths of MTA in dentin cavities exposed to NaOCl, EDTA, and PAA. Further, location of simulated MTA-repaired defects did not affect the push-out strength. Provided that

In our study

WHY? Perhaps

- Variations of tubules density along root canal
- Removal of smear layer
- Placement of materials in apical third is more difficult

DISCUSSION

JOURNAL OF ENDODONTICS
Printed in U.S.A.
VOL. 25, NO. 3, MARCH 1999

Clinical Applications of Mineral Trioxide Aggregate

Mahmoud Torabinejad, DMD, MSD, PhD, and Noah Chivian, DDS, FICD, FAC

preparation. When MTA is placed in perforations with a high degree of inflammation, the material remains soft when checked at the second appointment. This is due to the presence of low pH, which prevents proper setting of MTA. In these cases, rinse out the MTA and repeat the procedure. Assess the healing in 3 to 6 months

Low **PH**

↓

Affects hydration of silicate based materials

↓

Surface alterations

Effects of physiological environments on the hydration behavior of mineral trioxide aggregate

Yuan-Ling Lee[a], Bor-Shiunn Lee[a], Feng-Huei Lin[b], Ava Yun Lin[a], Wan-Hong Lan[a], Chun-Pin Lin[a,*]

[a] School of Dentistry, College of Medicine, National Taiwan University & National Taiwan University Hospital, No. 1, Chang Te Street, Taipei 10016, Taiwan, ROC
[b] Institute of Biomedical Engineering, National Taiwan University, Taipei 10016, Taiwan, ROC

Received 17 February 2003; accepted 14 July 2003

ments. Specimens hydrated in distilled water, normal saline, and pH 7 indicated that the microstructure of hydrated MTA consists of cubic and needle-like crystals. While the cubic crystals formed the principal structure of MTA, the needle-like crystals formed between the cubic crystals and were less prominent. In addition, XRD indicated a peak corresponding to Portlandite, a hydration product of MTA. In the pH 5 hydrated specimens, however, not only were needle-like crystals observed, but erosion of the cubic crystal surfaces was noted as well. Moreover, the Portlandite peak decreased noticeably in the pH 5 group, and the microhardness of

DISCUSSION

doi:10.1111/j.1365-2591.2007.01325.x

The effect of pH on surface hardness and microstructure of mineral trioxide aggregate

M. S. Namazikhah[1], M. H. Nekoofar[2,3], M. S. Sheykhrezae[2], S. Salariyeh[4], S. J. Hayes[3], S. T. Bryant[3], M. M. Mohammadi[4] & P. M. H. Dummer[3]

[1]Private Practice, Beverly Hills, CA, USA; [2]Department of Endodontics, Faculty of Dentistry, Medical Sciences, University of Tehran, Tehran, Iran; [3]Endodontology Research Group, School of Dentistry, Cardiff University, Cardiff, UK; and [4]Private practice, Tehran, Iran

Basic Research—Technology

Influence of Acidic Environment on Properties of Biodentine and White Mineral Trioxide Aggregate: A Comparative Study

Amr M. Elnagby, BDS, MSc, PhD

Material	Micro-push-out (MPa) pH 7.4	6.4	5.4	4.4
BD	9.1 ± 1.8[A,a]	7.2 ± 1.1[B,a]	5.3 ± 0.9[C,a]	4.3 ± 0.7[C,a]
WMTA	7.0 ± 1.2[A,b]	5.2 ± 0.7[B,b]	3.4 ± 0.6[C,b]	2.5 ± 0.4[C,b]

J Endod. 2010 May;36(5):871-4. doi: 10.1016/j.joen.2009.12.025. Epub 2010 Feb 21.

Effect of acidic environment on the push-out bond strength of mineral trioxide aggregate.

Shokouhinejad N[1], Nekoofar MH, Iravani A, Kharrazifard MJ, Dummer PM.

The Effect of **Acidic** pH on Microleakage of Mineral Trioxide Aggregate and Calcium-Enriched Mixture Apical Plugs.
Mirhadi H, Moazzami F, Safarzade S.
Iran Endod J. 2014 Fall;9(4):257-60. Epub 2014 Oct 7.
PMID: 25386205 [PubMed] **Free PMC Article**
Related citations

Effect of **acidic environment** on dislocation resistance of endosequence root repair material and mineral trioxide aggregate.
Shokouhinejad N, Yazdi KA, Nekoofar MH, Matmir S, Khoshkhounejad M.
J Dent (Tehran). 2014 Mar;11(2):161-6. Epub 2014 Mar 31.
PMID: 24910691 [PubMed] **Free PMC Article**
Related citations

Acidic pH weakens the microhardness and microstructure of three tricalcium silicate materials.
Wang Z, Ma J, Shen Y, Haapasalo M.
Int Endod J. 2014 May 28. doi: 10.1111/iej.12318. [Epub ahead of print]
PMID: 24871586 [PubMed - as supplied by publisher]
Related citations

Acid and microhardness of mineral trioxide aggregate and mineral trioxide aggregate-like materials.
Bolhari B, Nekoofar MH, Sharifian M, Ghabrai S, Meraji N, Dummer PM.
J Endod. 2014 Mar;40(3):432-5. doi: 10.1016/j.joen.2013.10.014. Epub 2013 Dec 31.
PMID: 24565666 [PubMed - in process]
Related citations

Lower pH values have effect on MTA

DISCUSSION

Int Endod J. 2014 May 28. doi: 10.1111/iej.12318. [Epub ahead of print]

Acidic pH weakens the microhardness and microstructure of three tricalcium silicate materials.

Wang Z[1], Ma J, Shen Y, Haapasalo M.

Author information

[1]Division of Endodontics, Department of Oral Biological & Medical Sciences, Faculty of Dentistry, University of British Columbia, Vancouver, BC, Canada; The State Key Laboratory Breeding Base of Basic Science of Stomatology (Hubei-MOST) & Key Laboratory of Oral Biomedicine Ministry of Education, School & Hospital of Stomatology, Wuhan University, Wuhan, China.

Abstract

AIM: To investigate the microhardness and microstructural features of three tricalcium silicate materials: mineral trioxide aggregate (MTA), Endosequence Root Repair Material Putty (ERRM Putty) and Endosequence Root Repair Material Paste (ERRM Paste), after exposure to a range of acidic environments in comparison with intermediate restorative material (IRM).

METHODOLOGY: Endosequence Root Repair Material Putty (Brasseler, Savannah, GA, USA), ERRM Paste (Brasseler, Savannah, GA, USA), MTA (ProRoot; Dentsply Tulsa Dental, Johnson City, TN, USA) and IRM (Dentsply Caulk, Milford, DE, USA) were set in cylindrical rubber moulds as four groups containing twenty specimens each. Fifteen specimens per each material were randomly distributed into three groups ($n = 5$) to be exposed to butyric acid buffered at three different pH levels (5.4, 6.4 and 7.4) for 7 days. The remaining five specimens were exposed to distilled water as a control group. The surface microhardness after exposure either to acid or to water was measured after 7-days at 37 °C. The morphology of the internal microstructure was observed using a scanning electron microscope (SEM). Two-way univariate analysis of variance (anova) was applied to evaluate the Vickers microhardness value (VHN).

RESULTS: The microhardness values of the materials were significantly higher in the neutral environment of butyric acid at pH 7.4 compared to those in the acidic condition of pH 5.4 for all groups ($P < 0.001$). MTA, ERRM Putty and ERRM Paste had higher microhardness values than IRM at all pH levels ($P < 0.001$). Specimens exposed to distilled water displayed significantly higher microhardness values than those values obtained in the presence of butyric acid buffered to all pH levels ($P < 0.001$). A more porous microstructure was observed following exposure to butyric acid at pH 5.4 than at pH 7.4. Several types of crystalline structures were formed by recrystallization, especially at pH 7.4 in all groups except for IRM.

CONCLUSIONS: The microhardness values of ERRM Putty, ERRM Paste and MTA were reduced in an acidic environment, which resulted in these materials having more porous and less crystalline microstructures. MTA seems the most suitable material for application to an area of inflammation where a low pH value may exist.

DISCUSSION

J Endod. 2014 Jul;40(7):953-7. doi: 10.1016/j.joen.2013.11.007. Epub 2013 Dec 17.

Influence of acidic environment on properties of biodentine and white mineral trioxide aggregate: a comparative study.

Elnaghy AM.

Author information

Abstract

INTRODUCTION: The purpose of this study was to evaluate the surface microhardness, compressive strength, bond strength, and morphologic microstructures of Biodentine (BD; Septodont, Saint Maur des Fossés, France) and white mineral trioxide aggregate (WMTA) after exposure to a range of acidic pH levels.

METHODS: For each test, 4 groups of each material were exposed to pH values of 7.4, 6.4, 5.4, and 4.4, respectively, for 7 days. The surface hardness was determined using Vickers microhardness. The compressive strength and micro-push-out bond strength were determined using the universal testing machine at a crosshead speed of 0.5 mm/min. The morphologic microstructures of specimens were evaluated using scanning electron microscopy.

RESULTS: BD showed higher surface hardness, compressive strength, and bond strength to root dentin compared with WMTA after exposure to different pH values. A substantial change in the microstructure of BD and WMTA occurred after exposure to different pH values. WMTA appeared to be more sensitive to acidic pH environments than BD.

CONCLUSIONS: BD material seems more appropriate for use when exposed to an acidic environment compared with WMTA.

DISCUSSION

Basic Research—Technology

Influence of Acidic Environment on Properties of Biodentine and White Mineral Trioxide Aggregate: A Comparative Study

Amr M. Elnagby, BDS, MSc, PhD

	Micro-push-out (MPa)			
	pH			
Material	7.4	6.4	5.4	4.4
BD	$9.1 \pm 1.8^{A,a}$	$7.2 \pm 1.1^{B,a}$	$5.3 \pm 0.9^{C,a}$	$4.3 \pm 0.7^{C,a}$
WMTA	$7.0 \pm 1.2^{A,b}$	$5.2 \pm 0.7^{B,b}$	$3.4 \pm 0.6^{C,b}$	$2.5 \pm 0.4^{C,b}$

→ Higher bond strength of BD

Differences between the composition of two materials

DISCUSSION

Basic Research—Technology

Tricalcium Silicate Cements with Resins and Alternative Radiopacifiers

Josette Camilleri, BChD, MPhil, PhD, FADM, FIMMM

Conclusions

The resin type and composition of the radiopacifier affect the calcium-releasing ability and bioactivity of tricalcium silicate cements. Barium was leached in solution with barium zirconate radiopacified variants. Light-cured Bis-GMA–based resins did not exhibit cement hydration; however, they encouraged leaching of calcium ions in solution and promoted surface deposition of calcium phosphate.

Radiopacifier influences material bond strenght

DISCUSSION

Basic Research—Technology

Effect of Blood Contamination on the Retention Characteristics of Two Endodontic Biomaterials in Simulated Furcation Perforations

Saeed Rahimi, DDS, MSc, Negin Ghasemi, MSc,† Shahriar Shahi, DDS, MSc,* Mehrdad Lotfi, DDS, MSc,‡ Mohammad Froughreyhani, DDS, MSc,* Amin Salem Milani, DDS, MSc,* and Mahmood Bahari, DDS, MSc§*

TABLE 1. Study Groups and the Mean ± Standard Deviation of Push-out in Experimental Groups

Group	Material	Blood contamination	Debonding interval	Bond strength (MPa)
1	MTA	+	24 hours	1.77 ± 0.53
2	MTA	–	24 hours	2.32 ± 0.31
3	MTA	+	72 hours	2.48 ± 0.65
4	MTA	–	72 hours	4.32 ± 1.20
5	MTA	+	7 days	4.02 ± 1.18
6	MTA	–	7 days	6.40 ± 1.98
7	CEM	+	24 hours	1.91 ± 0.71
8	CEM	–	24 hours	2.51 ± 0.62
9	CEM	+	72 hours	2.75 ± 0.97
10	CEM	–	72 hours	3.40 ± 1.10
11	CEM	+	7 days	4.90 ± 1.48
12	CEM	–	7 days	6.75 ± 1.51

+, blood contamination; –, no blood contamination.

Decrease bond strength

Basic Research—Technology

Effect of Blood Contamination on Retention Characteristics of MTA When Mixed With Different Liquids

Richard A. VanderWeele, DMD, Scott A. Schwartz, DDS,† and Thomas J. Beeson, DDS‡*

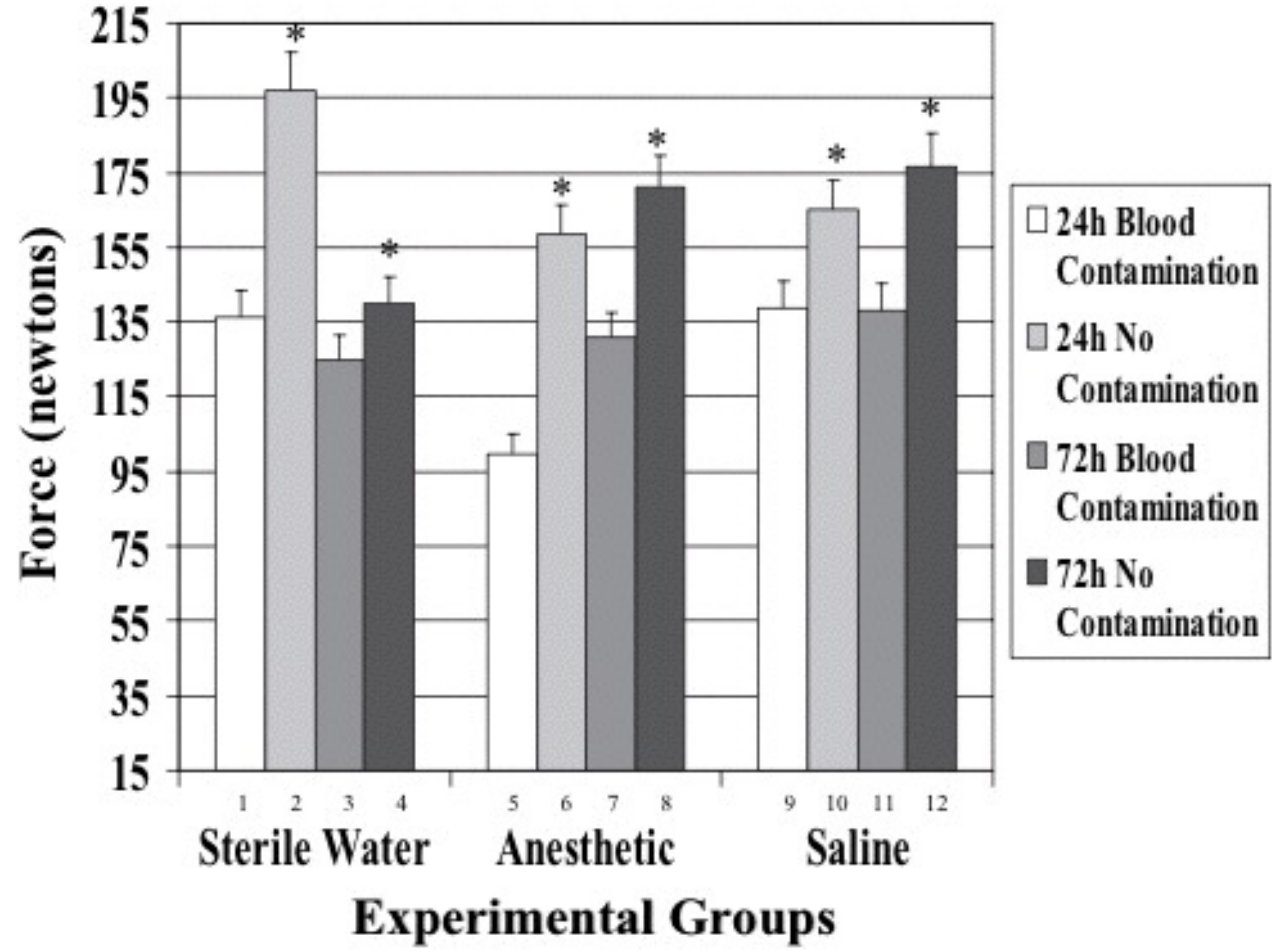


Figure 2. Average force required to push out samples at 7 days. Data represents mean values (±SD) of 10 samples per group. *Significant difference ($p < 0.05$) in displacement force between contaminated versus noncontaminated groups within same setting time.

DISCUSSION

Clin Oral Invest
DOI 10.1007/s00784-013-1082-4

ORIGINAL ARTICLE

Push-out bond strength of three calcium silicate cements to root canal dentine after two different irrigation regimes

Davut Çelik · Kürşat Er · Ahmet Serper · Tamer Taşdemir · Kadir Tolga Ceyhanlı

Received: 18 January 2013 / Accepted: 31 July 2013

Table 2 Mean and standard deviation (SD) of the push-out strength values (in megapascal) for the displacement of the endodontic material from the specimen in the middle thirds of each group

Groups	Subgroups	Mean	Median	SD
Group A (NaOCl)				
A1	DiaRoot BioAggregate	5.5520^{a}	5.3100	0.86589
A2	MTA-Angelus	5.5373^{a}	5.9000	0.89674
A3	Hand-mixed MM-MTA	$5.3180^{b,a}$	5.9600	0.91334
A4	Auto-mixed MM-MTA	5.7860^{a}	5.9500	0.79813
Group B (NaOCl+EDTA)				
B1	DiaRoot BioAggregate	5.9607^{a}	5.8500	0.80964
B2	MTA-Angelus	6.0340^{a}	6.0000	1.08634
B3	Hand-mixed MM-MTA	$5.4513^{b,a}$	5.4100	0.84667
B4	Auto-mixed MM-MTA	$6.4840^{c,a}$	6.4900	0.84129
Group C (Control, no irrigation)				
C1	DiaRoot BioAggregate	5.6510^{a}	5.0100	0.06964
C2	MTA-Angelus	5.6571^{a}	5.0000	0.06634
C3	Hand-mixed MM-MTA	$5.3055^{b,a}$	5.0500	0.06667
C4	Auto-mixed MM-MTA	5.9040^{a}	5.5000	0.04129

The same superscript letters indicate statistically no significant values. Mean with same letter is not significantly different at the $P = 0.05$ level.

The only study

That evaluate MM-MTA bond-strenght

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The only study

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Detailed evaluation of material components

More research is required

U C

INFLUENCE OF SETTING ENVIRONMENT ON THE BOND STRENGTH OF THREE CALCIUM SILICATE-BASED MATERIALS TO ROOT DENTIN

SPEMD
SOCIEDADE PORTUGUESA DE ESTOMATOLOGIA E MEDICINA DENTÁRIA

THANK YOU

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