



Modern Composite Dentistry 2026

David Clark DDS Tacoma WA

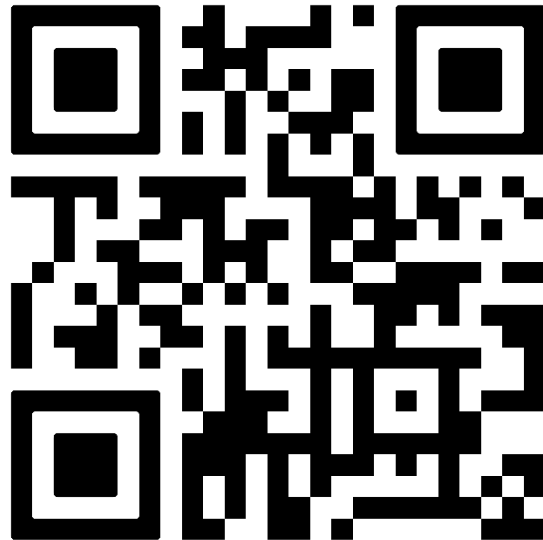
featuring

 **BIOCLEAR**

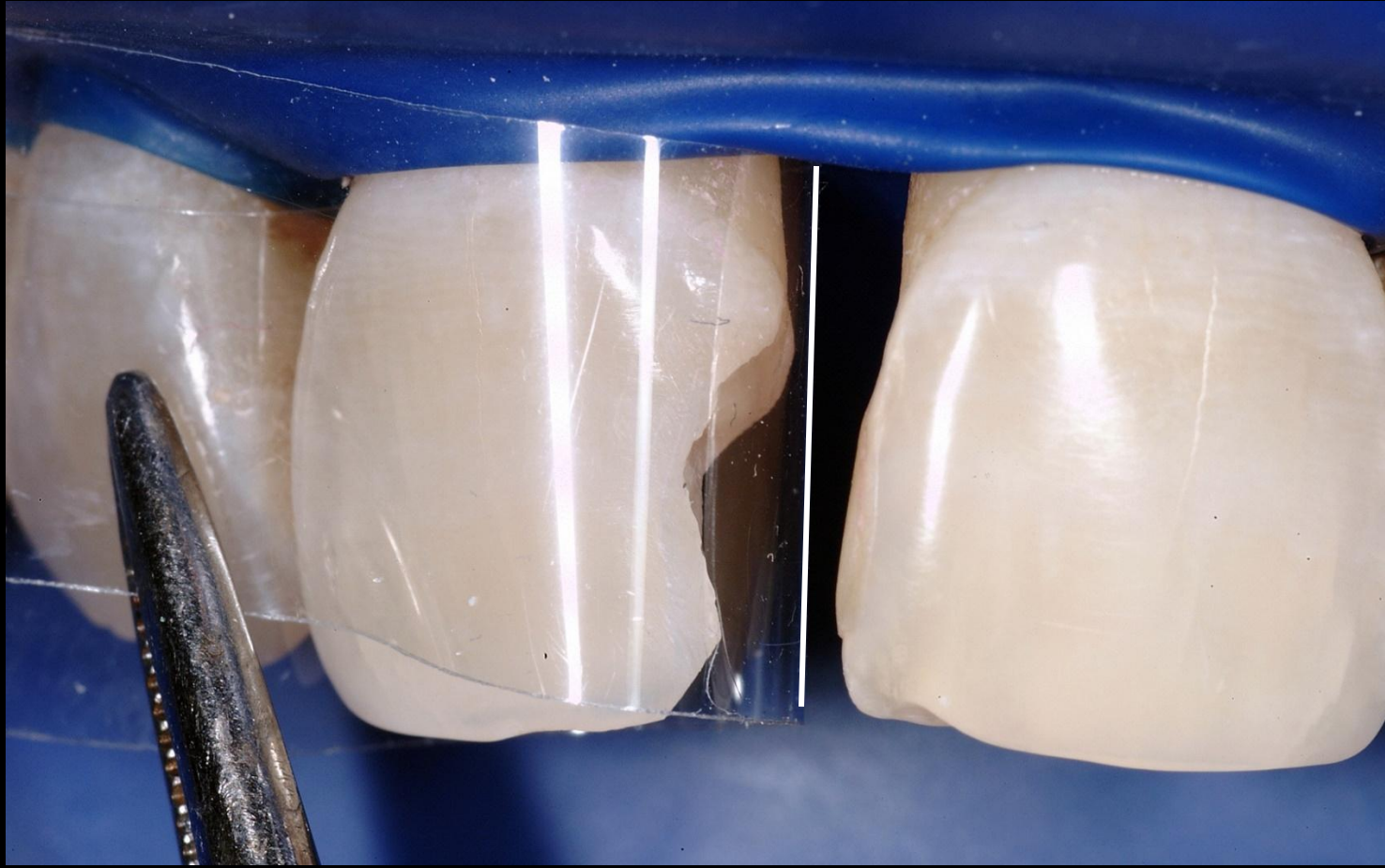
For a copy of today's presentation,
Learning Center info or the essential
Learning Center Library, email us at:

lectures@bioclearmatrix.com

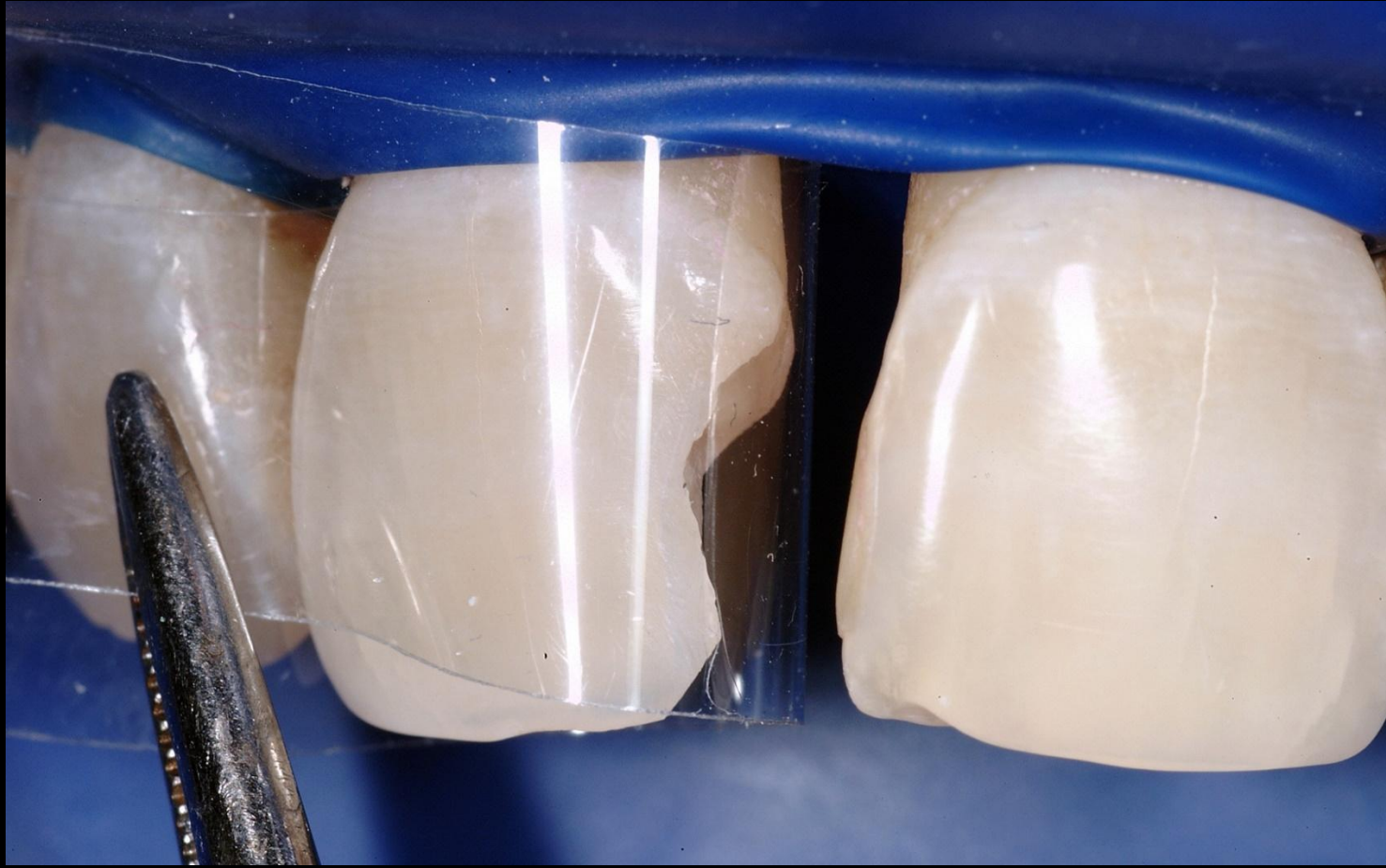
For a copy of today's presentation,
Learning Center info or the essential
Learning Center Library



Traditional composite technique



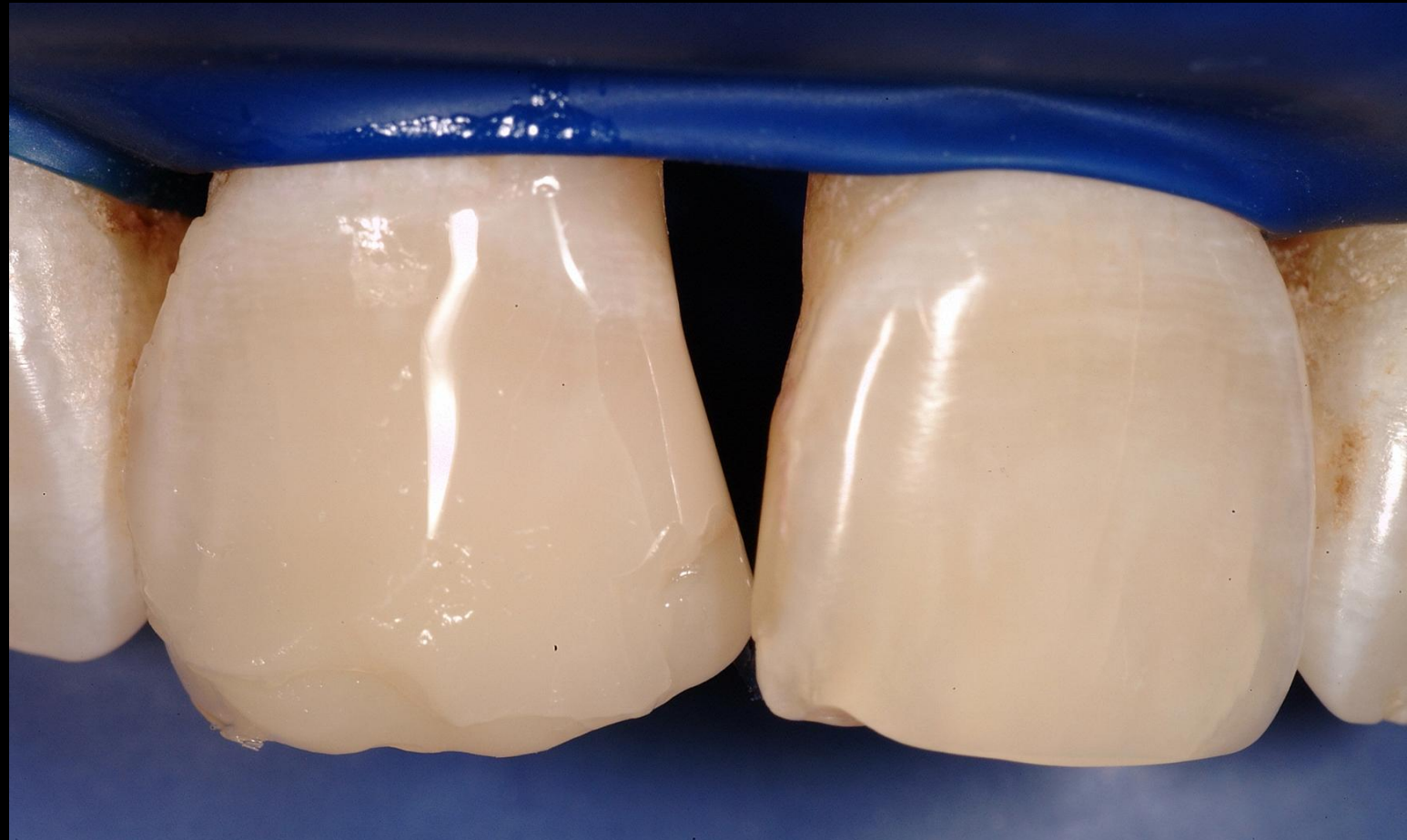
Traditional composite technique



Traditional composite technique



Traditional composite technique



Traditional composite technique



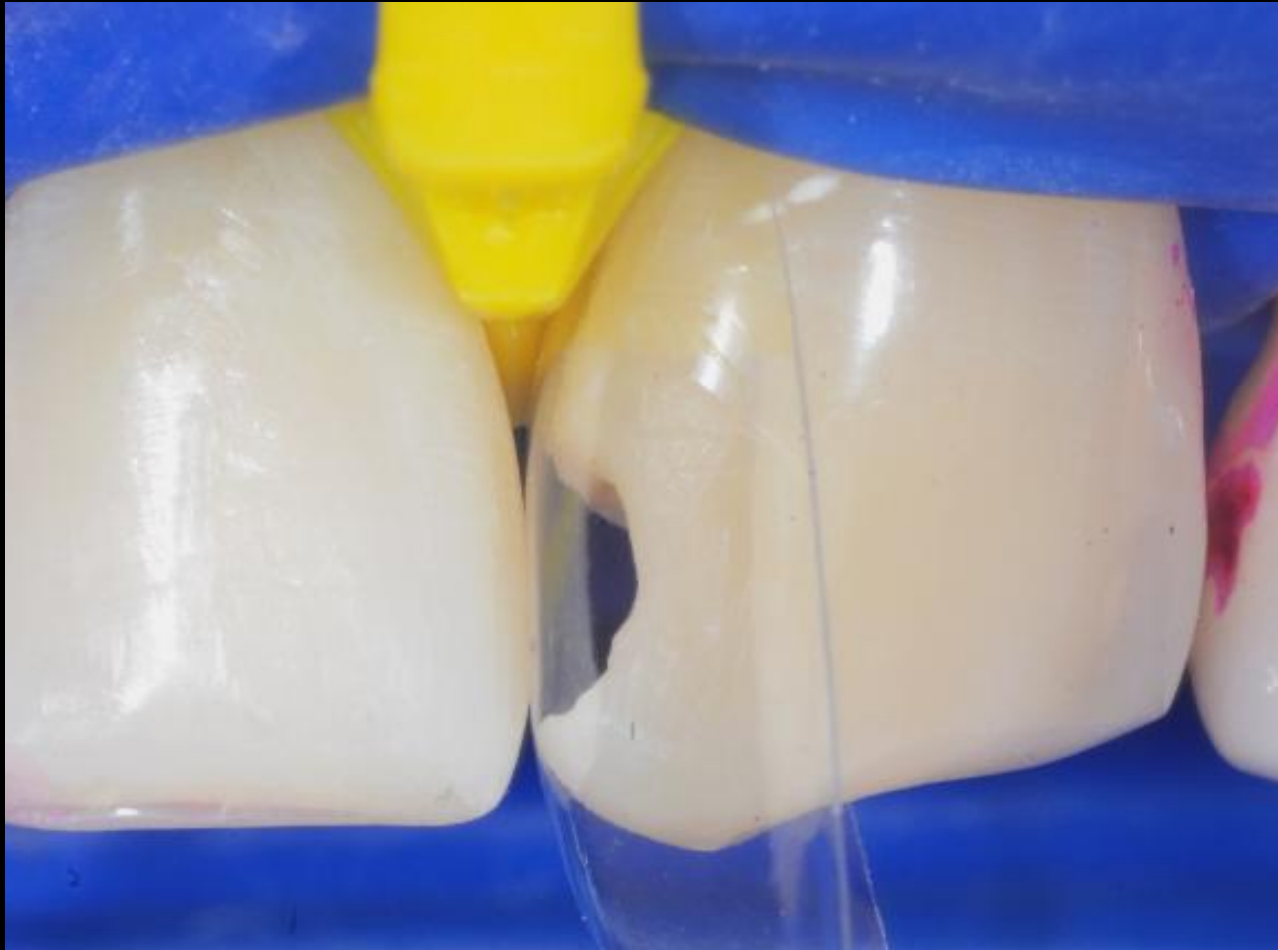
flat matrix + flat wedge = flat tooth

It's 2025. Why are we
still using flat Mylar and
flat wedges?

Teeth are not flat

Teeth are not flat!

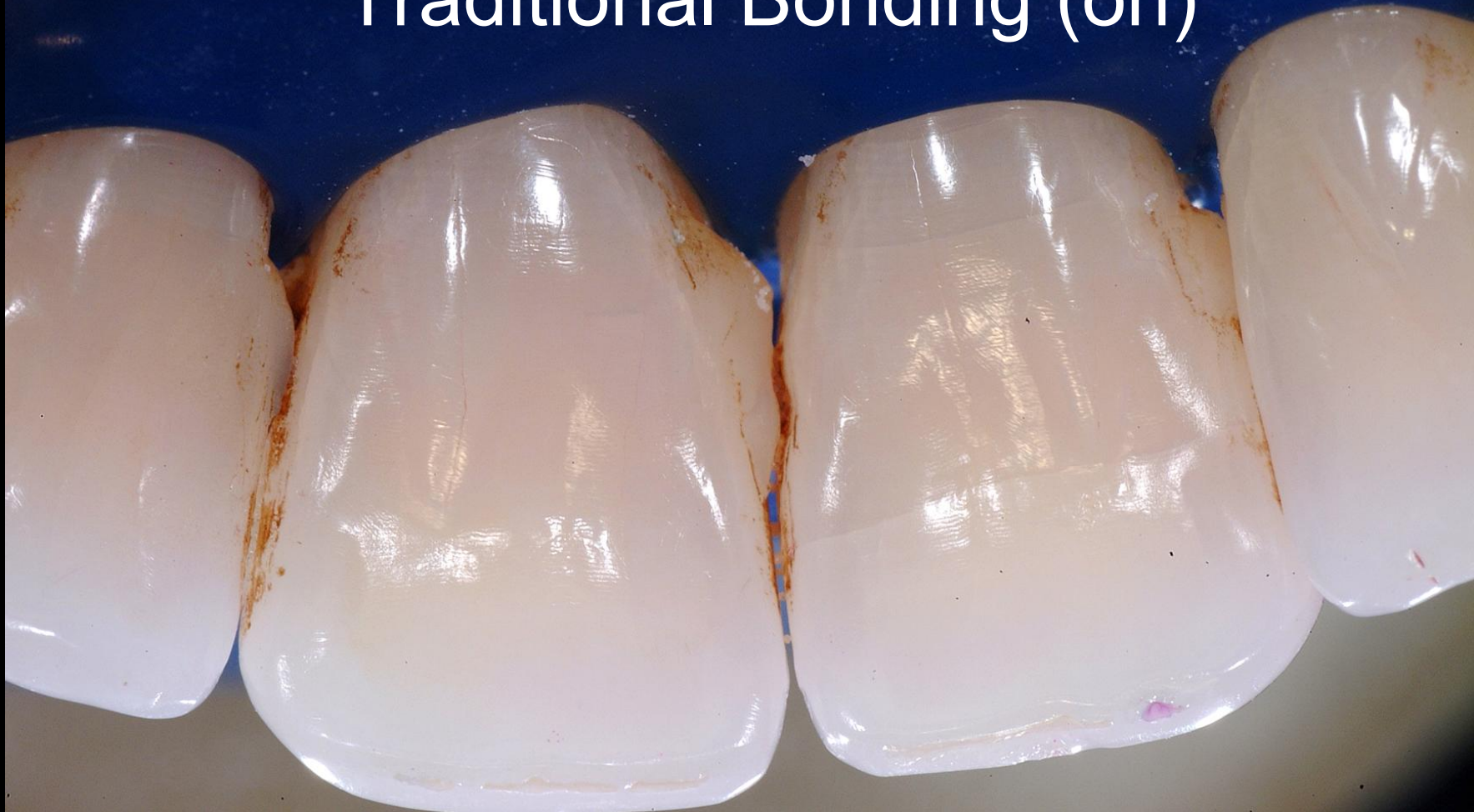




Anatomic
Bioclear Anterior
Matrix plus
Bioclear
Diamond Wedge
(yellow-large)

“On” versus “Around”

Traditional Bonding (on)



Modern Method (around)



The Matrix and the Method Matter



Modern Method for Composite Restorations

Clear Anatomic Matrices, Powerful Separation

- Anterior & Posterior Matrices
- Designed to mimic nature

Preparation Design

- Designed for composite
- Minimizes stress concentration
- Maximizes enamel involvement

Biofilm Removal

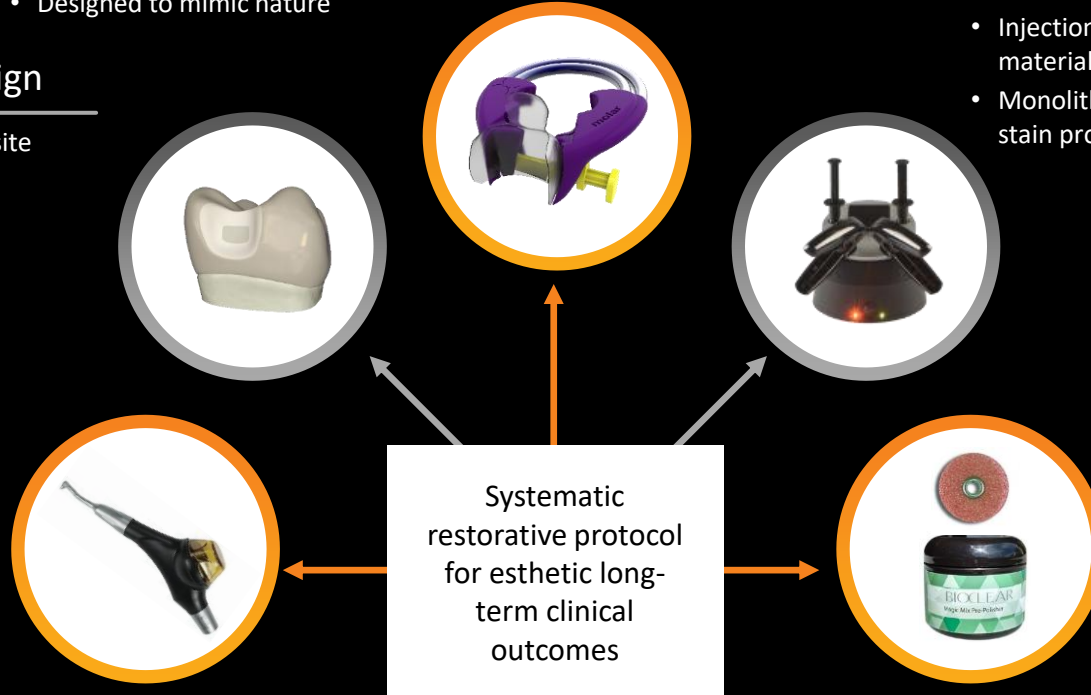
- Remove biofilm before bonding
- Allows bonding to uncut enamel
- Allows infinity edge margins

Injection Molded Composite

- Injection mold warmed Restorative materials
- Monolithic strength and Infinity Edge stain proof margins

Final Polish

- “Rock Star” polish with Bioclear Magic Mix & RS Polisher





∞ BIOCLEAR

Bioclear Black Triangle Restoration

with Kuraray Majesty ES-2 Flowable

Meet Erica: 35-year-old female
finishing her 2nd round of orthodontics



Erica just finished her ortho and she's not happy



What are Erica's chief complaints?



What were the options given when she complained to her orthodontist?



What was the TX Plan when she got back to her
General Dentist?



What were the TX Plans when she consulted with the periodontist?



➤ Bioclear can fix almost everything if you follow the method



- Take photos from a lateral view. The patient doesn't see this (but everyone else in the room does)





➤ Gauge the triangle space **before** the rubber dam









- “Aquarium” matrices and “Shield” matrices











Pre-Operative



1-Year Post-Operative



Pre-Operative



1-Year Post-Operative



Pre-Operative



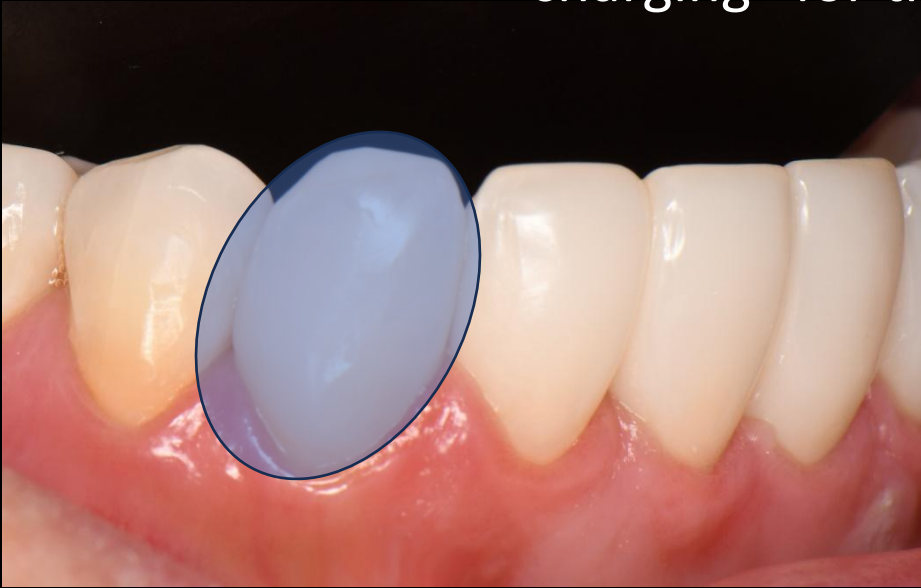
1-Year Post-Operative



If you are doing more than one BT, consider overmolding the entire tooth, even when we are not “charging” for that triangle area



If you are doing more than one BT, consider overmolding the entire tooth, even when we are not “charging” for that triangle area

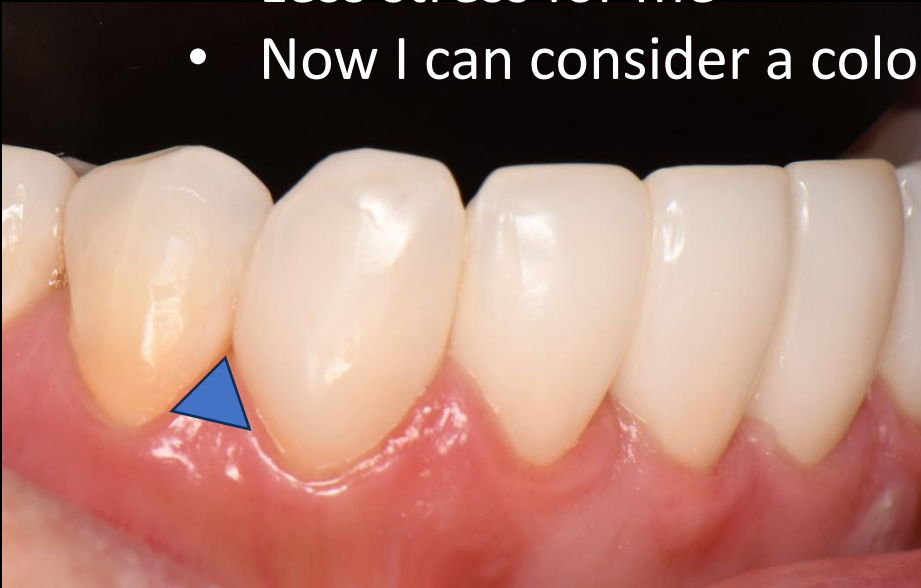


If you are doing more than one BT, consider overmolding the entire tooth, even when we are not “charging” for that triangle area



Why cover the WST (Whole Stinking Tooth)

- Easier than marginating
- Less stress for me
- Now I can consider a color upgrade



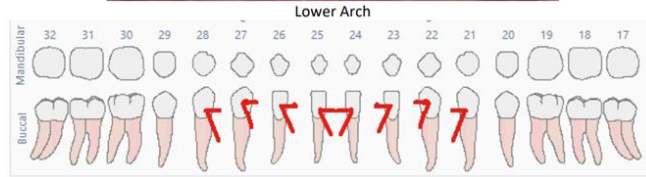


CLINIC

3402 South 38th Street, Tacoma, WA 98409
O: 253-474-7635 E: Patient@BioclearClinic.com

Date: 03-08-2021

Patient Name: Erica
Consultation Date: 03-08-2021
Treating Doctor: David Clark



Appointment time required to complete treatment One Day: 7am to 4pm with 10 day follow appointment.

- **Lunch and Breaks:** We provide a protein liquid drink for lunch. Be sure to eat breakfast prior to appointment. You will receive breaks to rest your jaw and use restroom.
- **Night Guard:** To protect your Bioclear restorations. Requirement for 5 yr. warranty of restoration. REFERRED: Night guard to be fabricated by your local dental provider.
- **Whitening Tray Options:** 1 Kit: (Kit include: custom upper and lower trays and bleach) Following Bioclear restoration placement for take home maintenance. Cost: \$250


Tooth #	Description	Fee
Comprehensive Evaluation: complete oral evaluation, color, size determination, photos.		
•	Bioclear Comprehensive Evaluation	\$289

Bioclear Black Triangle: To close negative space between teeth and rejuvenate tooth to youthful appearance.
Tooth # 21/22, 22/23, 23/24, 24/25, 25/26, 26/27 Bioclear Black Triangle Closure Multiple \$1,200 per Bioclear Black Triangle Closure.

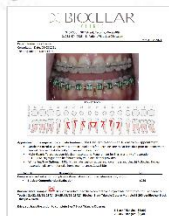
Erica, you have the option to complete 5 or 7 Black Triangle Closures.

5 Black Triangles \$6,000
7 Black Triangles \$8,400

- **Lunch and Breaks:** We provide a protein liquid drink for lunch. Be sure to eat breakfast prior to appointment. You will receive breaks to rest your jaw and use restroom.
- **Night Guard:** To protect your Bioclear restorations. Requirement for 5 yr. warranty of restoration. REFERRED: Night guard to be fabricated by your local dental provider.
- **Whitening Tray Options:** 1 Kit: (Kit include: custom upper and lower trays and bleach) Following Bioclear restoration placement for take home maintenance. Cost: **\$250**

Tooth #	Description	Fee
Comprehensive Evaluation: complete oral evaluation, color, size determination, photos.		
• Bioclear Comprehensive Evaluation		\$289
Bioclear Black Triangle:		To close negative space between teeth and rejuvenate tooth to youthful appearance.
Tooth # 21/22, 22/23, 23/24, 24/25, 25/26, 26/27 Bioclear Black Triangle Closure Multiple \$1,200 per Bioclear Black Triangle Closure.		

Erica, you have the option to complete 5 or 7 Black Triangle Closures.



5 Black Triangles \$6,000
7 Black Triangles \$8,400

Key Takeaways from Erica's case:

- Use a shield matrix or shield matrices when possible
- What's a shield matrix?
- What are aquarium matrices?
- Doing the whole tooth is easier than half a tooth
- The "flowable clamp" for anterior rubber dams
- Use very small hole punch on your rubber dam



Pre-Operative



1-Year Post-Operative



Key Takeaways from Erica's case:

- Remove the matrix/matrices after injection molding before you move on to achieve a tighter contact
- You don't want or need a shield matrix on a tooth once you have injection molded (same principal as above, to get tighter contacts)
- We will utilize this principal when we talk about quadrant strategy for Class II restorations later



Treating a Single Black Triangle























2-year follow up



2-year follow up

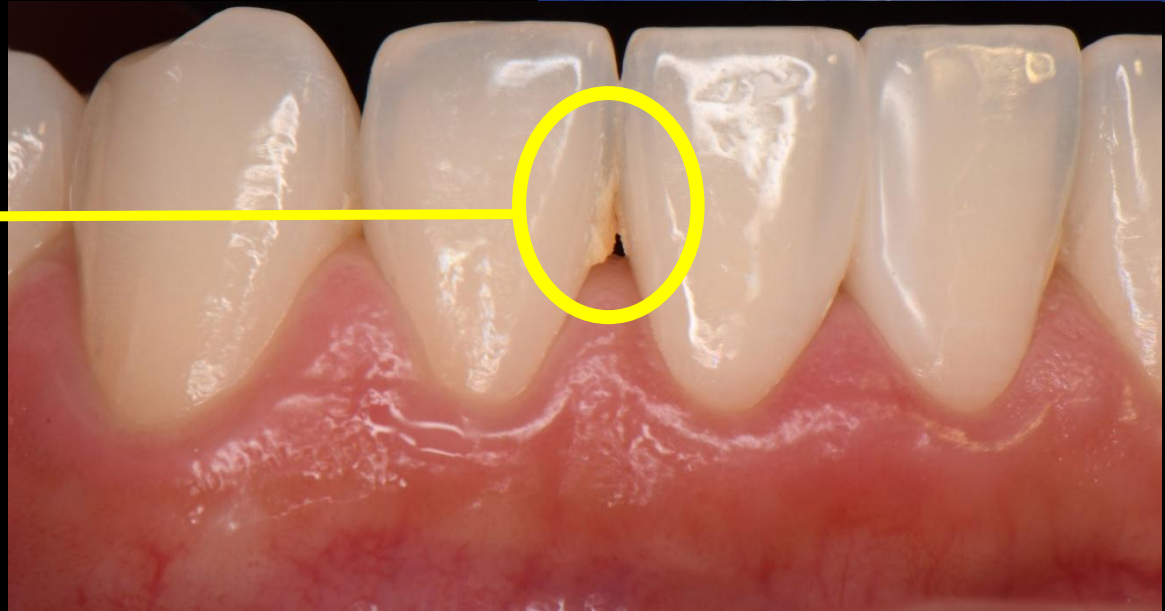


2-year follow up

➤ The new Bioclear BT matrices have a specific shape i.e. shoulder blades that deflect bacterial accumulation



unrestored



➤ The new Bioclear BT matrices have a specific shape i.e. shoulder blades that deflect bacterial accumulation



Injection over -
molded





The
BACHELOR  **RETTE**



The BACHELORETTE

The Bachelorette is a hugely popular American reality dating show where one woman dates about 25 men, eliminating them each week until she chooses a final partner—often ending in a proposal. It's a cultural staple in the U.S., famous for its romance, drama, and devoted fanbase.



The BACHELOR**ETTE**

The dentist will make several mistakes. Let's see if you can identify them. The case turned out ok though.





The
BACHELOR  **RETTE**

Season 21 averaged
2.39 million viewers
per episode.



A recent Black Triangle patient that flew from
Boston to Seattle for treatment

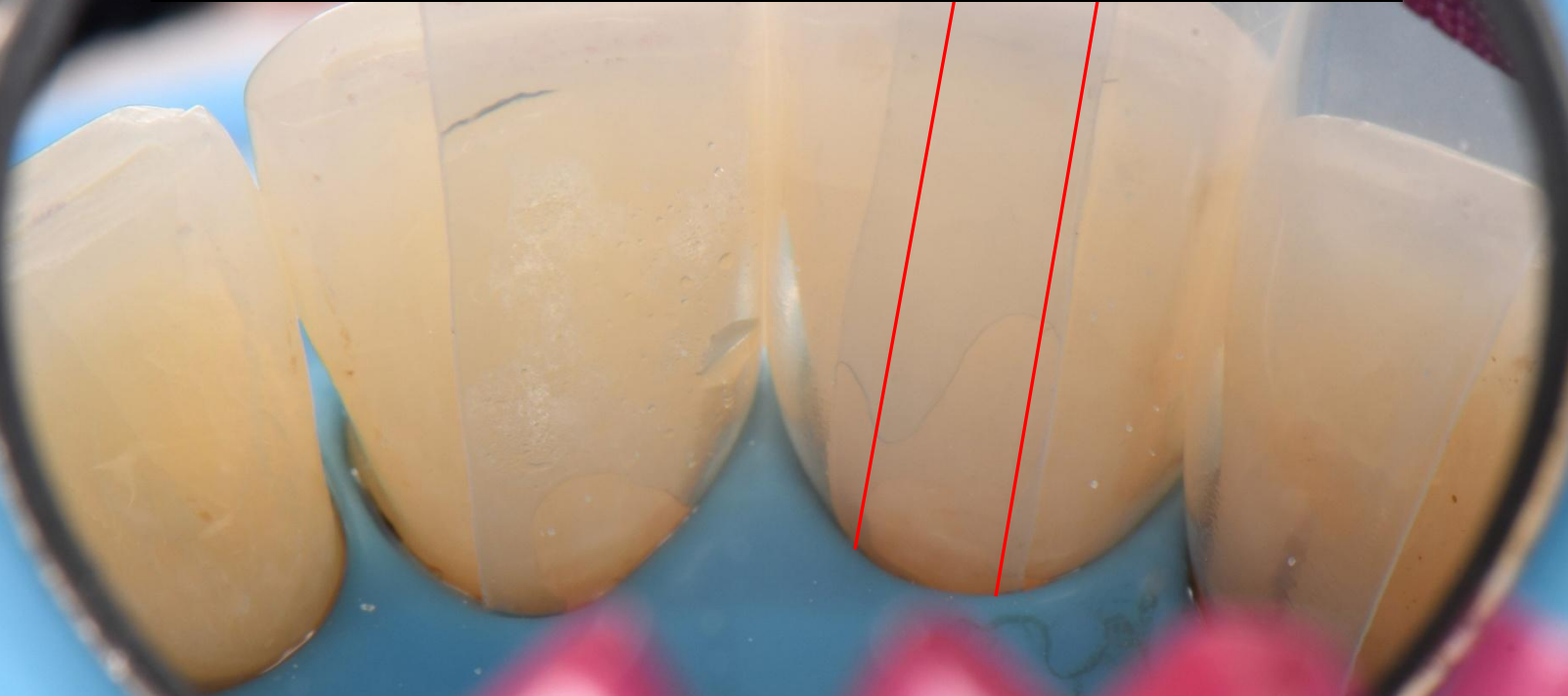
She wants more fullness and wants a color
upgrade







Ideally, we want 2-3 mm overlap of matrices on lingual and about 1 mm of overlap on the facial













Pre-op



Post-op

So which composites turn yellow over time, and which composites maintain their color better?

If you use A-1, B-1, W, or XW it matters... a lot

If you are using A-2 or darker, you don't see the change



Filtek™ EW Body 2020

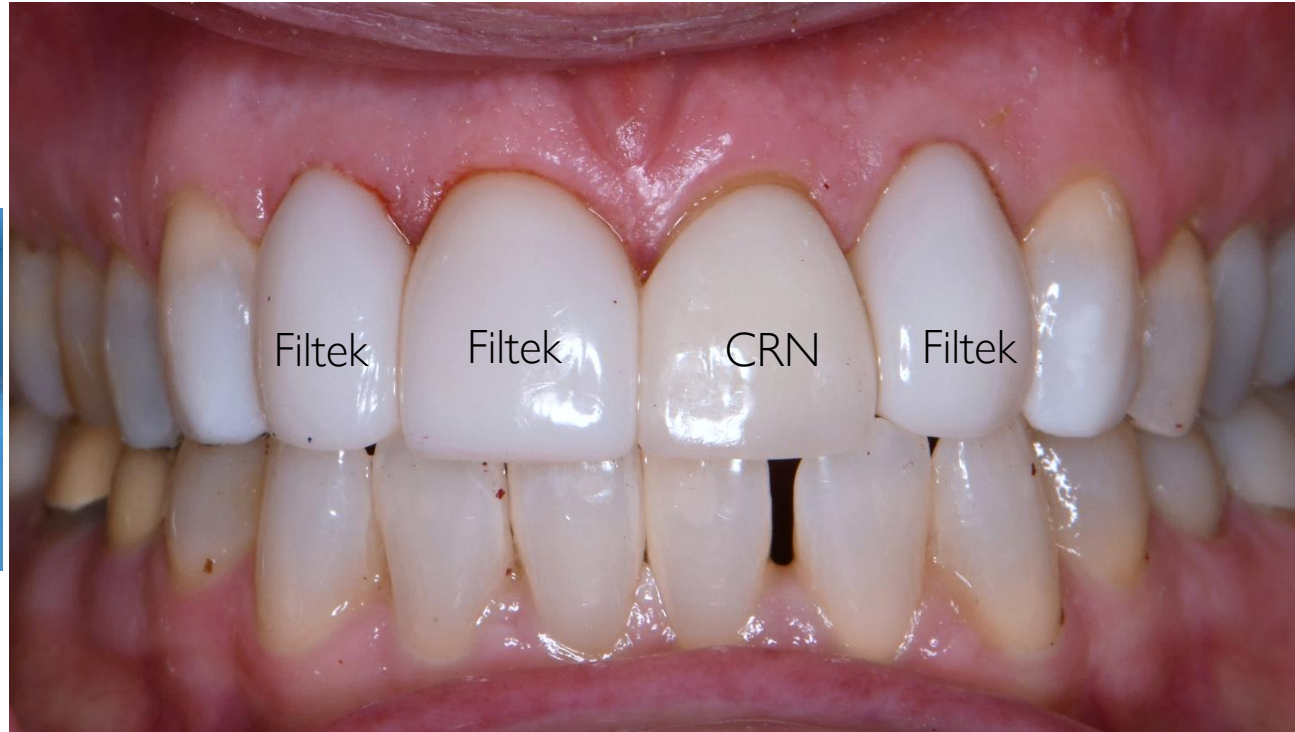


Filtek™ EW Body 2024

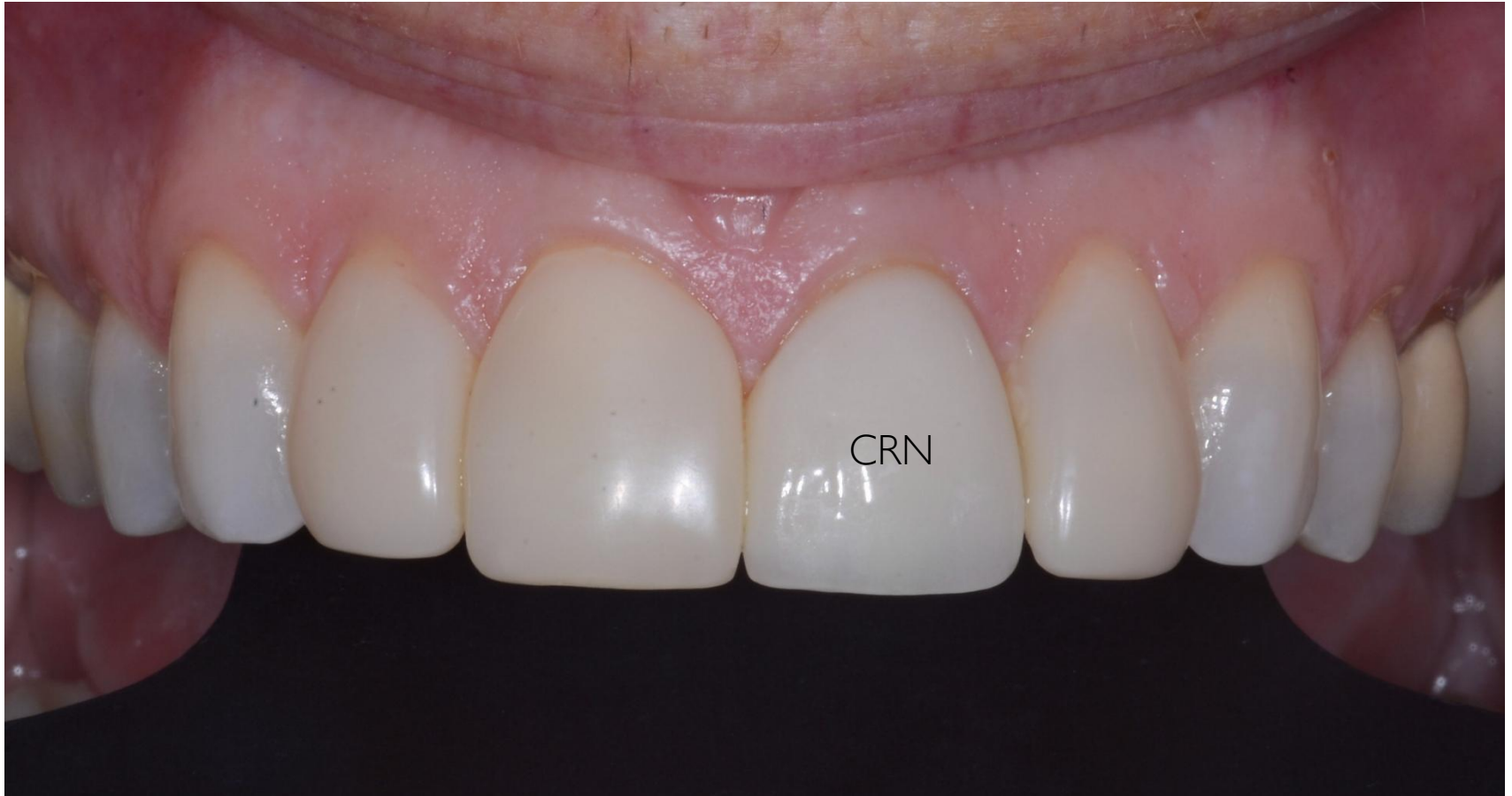
Immediate post-op with Filtek B-1



Pre-polish



2-year post-op, there is noticeable yellowing



Filtek 9-year post-op, there is catastrophic yellowing



Filtek™ B1
Body 2016

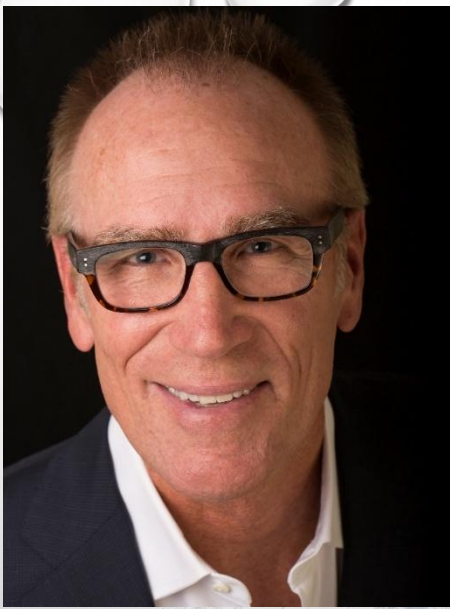


Filtek™ B-1
Body 2018



Filtek™ B-1
Body 2025





Dr. Richard
Young

Bioclear Cases 4 Year
Post-ops
Untouched-NO refresh
on either case
Majesty ES Classic and Flow



@dr.young.esthetics



@dr.young.esthetics





[@dr.young.esthetics](https://www.instagram.com/dr.young.esthetics)

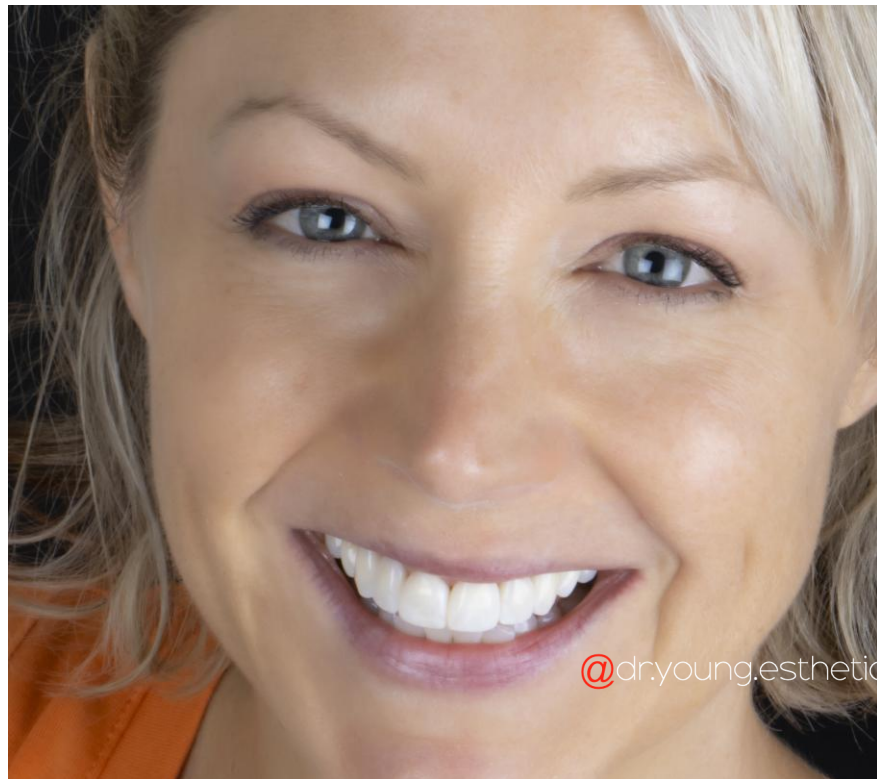


@dr.young.esthetics





@dr



@dr.young.esthetic



4 Years Post-Op

@dr.young.esthetics

Kuraray Majesty ES Classic (Paste) and Flow

CLEARFIL™

Injection Molded Composites



DENTAL BONDING AGENTS
CLEARFIL™ Universal Bond Quick 2



DENTAL LIGHT-CURED RESTORATIVE COMPOSITE
CLEARFIL MAJESTY™ ES Flow



DENTAL LIGHT-CURED RESTORATIVE COMPOSITE
CLEARFIL MAJESTY™ ES-2
Classic
(Body Shades)

Color stability and surface roughness of novel single-shade universal composite resins exposed to staining solutions: an in vitro study

Malin Janson¹, Anja Liebermann², Christoph Matthias Schoppmeier³

Received: 26 March 2025 / Accepted: 29 June 2025 / Published online: 15 July 2025
 © The Author(s) 2025

Abstract
 This study investigated the color stability and surface roughness of three novel single-shade universal composites after exposure to common staining solutions. A total of 120 specimens (n = 40 per composite) were fabricated from Transcend Universal Composite (TRA), Essie One (ECO), and Clearfil Majesty ES-2 Universal (CLA). Specimens were stored at 37 °C in four different staining solutions (artificial saliva, coffee, red wine, matcha tea). Color changes (ΔE_{*c}) were assessed at five time points using the e-LAB system, and surface roughness (Sa, Sr) was analyzed via 3D laser scanning microscopy. Statistical analysis was performed using a linear mixed model and post-hoc test (Tukey) ($p < 0.05$). Composite type, staining solution, and exposure duration significantly affected discoloration ($p < 0.001$). Red wine induced the most pronounced color change ($\text{ECO } \Delta E_{*c} = 38.9 \pm 1.56$), while coffee and matcha tea caused similar discoloration ($p = 0.164$). TRA showed the greatest surface roughness increase; no correlation with color change was observed. The color stability of single-shade composites is influenced by resin matrix composition and staining agent exposure. Tri-modal or multi-hybrid composites showed greater color stability than the micro by hybrid composite. Surface roughness did not impact discoloration susceptibility.

Keywords Single-shade universal composites · Color stability · e-LAB system · Staining solutions · Surface roughness

1 Introduction

The long-term color stability of restorative materials is a critical factor in esthetic reconstructive dentistry, as it significantly impacts both the durability and visual longevity of restorations (Parvina et al. 2015). Among the various restorative materials, resin-based composites must withstand continuous exposure to chromogenic substances found in foods, beverages, and saliva, which can compromise their optical and mechanical integrity over time (Cicchetti et al. 2024; Catalan et al. 2011; Kuchman et al. 2020). Multi-shade composites traditionally achieve esthetic outcomes through stratified layering and customized pigmentation techniques (Chen et al. 2024; Enobé et al. 2022). While effective, these procedures are time-consuming, technique-sensitive, and require a wide inventory of materials. Single-shade universal composites have been developed to overcome these limitations, offering simplified color selection while maintaining essential aesthetic and functional properties such as strength, durability, and adaptability (Lei et al. 2024). The primary advantage of these materials lies in their dynamic color adjustment. The chameleon effect enables a harmonious integration with the tooth structure by scattering and

Effects of different curing methods on the color stability of composite resins

Massimo Pisano¹, Alfredo Iandolo¹, Dina Abdelatif¹, Andrea Chiacchio¹, Marco Galdi¹, Stefano Martina¹

Department of Medicine, Surgery and Dentistry "Scuola Medica Salernitana", University of Salerno, Salerno, Italy

ABSTRACT

Objective: The aim of this study was to compare the effects of different polymerization strategies and the effectiveness of finishing and polishing procedures of composite resins on color stability.

Materials and Methods: The samples were divided into 4 main groups according to the polymerization strategy, and all groups except the control group received surface treatment. Each group was subsequently divided into 3 subgroups respectively: Kuraray Clearfil Majesty ES-2 Classic, Premium and Universal. Approximately 24 hours after preparation of the samples, they were immersed for 7 days in a coffee solution. A first color measurement was performed after the preparation of the samples, the second measurement was performed after 7 days in the coffee solution. All measurements were carried out using a dental spectrophotometer to assess the CIE L*, a*, b* color parameters.

Results: There was a statistically significant difference between ΔE values for different procedures ($p = 0.003$); in particular, the differences were found only between the groups that received surface treatment and the control group. In addition, a statistically significant difference was observed between the values of ΔE for different composites in the different procedure groups.

Conclusions: Spectrophotometric analysis showed that the additional photopolymerization and oxygen inhibition procedures did not yield better results in relation to color stability. In addition, finishing and polishing provided better color stability compared to not performing these procedures.

Keywords: Coffee, Color stability, Composite resin, Polishing, Surface treatment

Animal study

Discoloration of flowable and universal resin composites immersed in black tea for 30 days
 Ayaka Hori-Ishikawa, Yuka Ogawa, Ayako Okada, Nana Sakae, Daichi Aizawa, Masao Hanabasa, Kaoru Ohmori, Takatsugu Yamamoto

Department of Operative Dentistry, Tsurumi University School of Dental Medicine, Yokohama, Japan

Abstract
Purpose: This study evaluated the discoloration of current flowable and universal resin composites by immersing in black tea over 30 days.

Materials and Methods: Three flowable resin composites and three universal resin composites were evaluated. The composites were inserted into a disk-shaped stainless steel mold and properly cured. The surfaces of the composite disk were wet-ground and ultrasonically cleaned. Colors – L*, a*, and b* were measured at the center of disks on a gray background using a spectrophotometer. The disks were immersed in black tea at 37 °C for 30 days, and the colors were repeatedly measured at 1, 3, 5, and 30 days of immersion. Color differences ΔE^*ab were calculated from the L*, a*, and b* values. Water sorption and solubility of the composites were also measured as per ISO 4049. The results were statistically analyzed, and regression analyses were done between ΔE^*ab and ΔE^*a^* , ΔE^*b^* , or sorption/solubility.

Results: All the composites showed observable increases of ΔE^*ab within the first 5 days of immersion. Values of ΔE^*ab ranged from 0.6 to 4.97, and three composites exhibited values above the clinically acceptable value, 3.3. L* and ΔE^*b^* revealed strong correlations with ΔE^*ab . Both water sorption and solubility had positive correlations with ΔE^*ab at 30 days.

Conclusion: Tea immersion induced discoloration of the current resin composites. This discoloration was affected most by the change in brightness and difference in its blue-yellow chromaticity, and the level of discoloration was material-dependent.

(Asian Pac J Dent 2020; 20: 9-15)

Key Words: discoloration, flowable composite, solubility, tea, universal composite, water sorption

Introduction

Adhesive restoration is a conventional technique for the reconstruction of tooth structure lost to dental caries fracture

Among the adhesive restorative materials, resin composites have wide ranges of clinical applications including direct restorations, core build-ups, and lining of indirect restoratives. Light-cured resin composites, in particular, are essential for direct restorations for their adhesiveness, mechanical and esthetic properties [1]. Resin composites first began to be supplied in the form of pastes (hereinafter referred to as universal resin composite). Subsequent compositional alterations have produced less viscous resin composites, known as flowable resin composites since 1996 [2]. Flowable composites are dispersed by a syringe through a needle tip, achieving easy handling for filling relatively small cavities or cavities with large undercuts [3,4].

Initially, flowable composites contained hybrid-type fillers that were considerably larger than the current fillers [2]. The filler content was low with approximately 25 w/v% to attain sufficient flowability of the composites, making them mechanical properties inferior to those of universal resin composites. Hence, flowable composites were mainly used for small cavities or as cavity liners [2,5]. Subsequent developments in filler technology, i.e., surface treatments and the dispersion techniques produced much smaller fillers [6], which improved the mechanical properties of composites. In addition, viscosity of composites became controllable due to filler/nanomer technology. The flowable composite became applicable in occlusal load bearing areas and allowed for contouring the anatomical forms under the direct syringe application. With such improvements, clinical usage of flowable composites has increased in present day [7].

As described earlier, low viscosity is an advantage of the flowable composites. Flowability is controlled by the comonomer – resin. The major comonomer is bisphenol A-glycidyl methacrylate (Bis-GMA) for current composite

resins to use alone in composite in terms of manipulation

The Effects of Fresh Detox Juices on Color Stability and Roughness of Resin-Based Composites

İhsan Yıkılmaz, DDS, PhD,¹ Sinem Akgül, DDS, PhD,² Ahmet Hazer, DDS, PhD,² Cemille Kedici Altı, DDS, PhD,³ Serdar Başlamir, DDS, PhD,³ & Oya Balta, DDS, PhD,³

¹Department of Restorative Dentistry, Faculty of Dentistry, Gazi University, Ankara, Turkey
²Department of Restorative Dentistry, Faculty of Dentistry, Balıkesir Egeci University, Zonguldak, Turkey
³Department of Restorative Dentistry, Faculty of Dentistry, Ankara University, Ankara, Turkey

Keywords

Color stability, Resin-based composites, Resin-based composites, Surface roughness.

Correspondence

İhsan Yıkılmaz, Faculty of Dentistry, Department of Restorative Dentistry, Gazi University, 06510 Eskişehir, Ankara, Turkey.
 Email: ihsanyilmaz@gazi.edu.tr

The author declares no conflict of interest related to this study.

Accepted November 18, 2017

doi: 10.1111/jopr.12798

Abstract

Purpose: To evaluate the effects of three fresh detox juices, including an orange juice, and red beverage, on the color stability and surface roughness of three aesthetic resin-based composites (RBCs).

Materials and Methods: Disk-shaped specimens were prepared with three different color RBCs (Amaris, G-aerial Aesthetic, Clearfil Majesty ES-2) according to the manufacturers' instructions. Forty specimens were prepared for each RBC, and all specimens were stored in artificial saliva at 37°C for 24 hours. The initial color values and surface roughness measurements of the specimens were taken using a spectrophotometer and a profilometer. The specimens were then divided into 4 subgroups (n = 10). All specimens except the control specimens were immersed in their designated fresh detox juices (green, red, or orange) for 10 minutes twice a day. Color and surface roughness measurements were taken on day 15 and day 30, and the results were analyzed by one-way ANOVA and Tukey HSD test. The association between color change and surface roughness was evaluated by Spearman's Rank Correlation analysis.

Results: Color changes and surface roughness increased upon exposure to fresh detox juices for 15 and 30 days for all of the RBCs. All of the G-aerial and Amaris groups displayed color changes above the threshold of acceptability, whereas Clearfil Majesty ES-2 displayed a color change above the threshold of acceptability only after exposure to the red beverage for 30 days ($L^*a^* > 3.7$). With regard to surface roughness, Clearfil Majesty ES-2 outperformed the other RBCs ($p < 0.001$). According to Spearman's Rank Correlation analysis, there was no correlation between color change and surface roughness ($p > 0.001$).

Conclusions: Exposure to the fresh detox juices used in this study led to similar color changes in the RBCs used in this study.

Resin-based composites (RBC) are highly popular in restorative dentistry, but, as for the use of any restorative material, clinical failures are unavoidable. It has been reported that the reasons for replacing composite restorations include secondary/recurrent caries, marginal discoloration, bulk discoloration, marginal/bulk factor of the restorations, fracture of tooth and pain or sensitivity. Unacceptable color change is the primary reason for replacing RBC restorations in anterior teeth.^{1,2} Color change certainly occurs in restorative materials, but it is the degree of the color change that is important. Because small color changes in restorative materials are largely undetectable by the human eye, restoration replacement is not required for materials that display small color changes, but for materials that display large color changes, such as anterior teeth, when the color harmony between the restoration

and the dental tissues deteriorates, replacement of the restorations is inevitable.

Different factors affect discoloration of RBCs by three basic mechanisms: intrinsic discoloration, surface/subsurface degradation, and extrinsic discoloration. Intrinsic discoloration is defined as the discoloration of materials independent of external factors. The chemical structure of the material, including the type of monomer, the filler size, and the distribution, as well as the degree of conversion and the physicochemical reactions of the material in the body affect intrinsic discoloration.³ Surface/subsurface degradation occurs when staining agents react with superficial composite layers. A rough restoration surface, bad finishing, and poor curing by contaminating colored foods and beverage may cause extrinsic discoloration.^{4,5}

4 CLEARFIL MAJESTY ES Composites Tested in 4 Papers



Color Stability Results for Flowables:

ΔE_{ab} (Value & Chroma Changes)

Hori-Ishikawa et al. Asian Pac J Dent 2020; 20: 9-15

Original article
Discoloration of flowable and universal resin composites immersed in black tea for 30 days

Ayaka Hori-Ishikawa, Yuka Ogawa, Ayako Okada, Nana Sakacada, Daichi Aizawa, Masao Hanabusu, Kaoru Ohmori, Takatsugu Yamamoto

Department of Operative Dentistry, Tsurumi University School of Dental Medicine, Yokohama, Japan

Abstract
Purpose: This study evaluated the discoloration of current flowable and universal resin composites by immersing in black tea over 30 days.

Materials and Methods: Three flowable resin composites and three universal resin composites were evaluated. The composites were inserted into a disk-shaped stainless steel mold and properly cured. The surfaces of the composite disks were wet-ground and ultrasonically cleaned. Colors (L^* , a^* , and b^*) were measured at the center of disks on a gray background using a spectrophotometer. The disks were immersed in black tea at 37°C for 30 days, and the colors were repeatedly measured at 1, 3, 5, and 30 days of immersion. Color differences ΔE^*ab were calculated from the L^* , a^* , and b^* values. Water sorption and solubility of the composites were also measured as per ISO 4049. The results were statistically analyzed, and regression analyses were done between ΔE^*ab and ΔL^* , Δa^* , Δb^* or sorption/solubility.

Results: All the composites showed observable increases of ΔE^*ab within the first 5 days of immersion. Values of ΔE^*ab ranged from 0.64 to 4.97, and three composites exhibited values above the clinically acceptable value, 3.3. ΔL^* and Δb^* revealed strong correlations with ΔE^*ab . Both water sorption and solubility had positive correlations with ΔE^*ab at 30 days.

Conclusion: Tea immersion induced discoloration of the current resin composites. This discoloration was affected most by the change in brightness and difference in its blue-yellow chromaticity, and the level of discoloration was material dependent.

(Asian Pac J Dent 2020; 20: 9-15.)

Key Words: discoloration, flowable composite, solubility, tea, universal composite, water sorption

Introduction

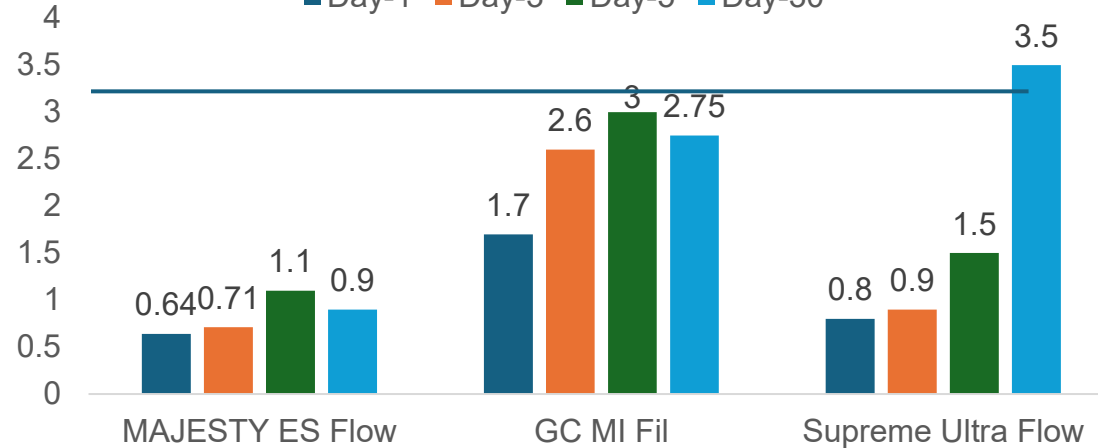
Adhesive restoration is a conventional technique for the reconstruction of tooth structure lost to dental caries/fracture. Among the adhesive restorative materials, resin composites have wide ranges of clinical applications including direct restorations, core build-ups, and lining of indirect restoratives. Light-cured resin composites, in particular, are essential for direct restorations for their adhesiveness, mechanical and esthetic properties [1]. Resin composites first began to be supplied in the form of pastes (hereinafter referred to as universal resin composite). Subsequent compositional alterations have produced less viscous resin composites, known as flowable resin composites since 1996 [2]. Flowable composites are dispensed by a syringe through a needle tip, achieving easy handling for filling relatively small cavities or cavities with large undercuts [3,4].

Initially, flowable composites contained hybrid-type fillers that were considerably larger than the current fillers [2]. The filler content was low with approximately 25 wt% to attain sufficient flowability of the composites, making their mechanical properties inferior to those of universal resin composites. Hence, flowable composites were mainly used for small cavities or as cavity liners [2,5]. Subsequent developments in filler technology, i.e., surface treatments and the dispersion techniques produced much smaller fillers [6], which improved the mechanical properties of composites. In addition, viscosity of composites became controllable due to filler/nanofiller technology. The flowable composites became applicable in occlusal load bearing areas and allowed for contouring the anatomical forms under the direct syringe application. With such improvements, clinical usage of flowable composites have increased in present day [7].

As described earlier, low viscosity is an advantage of the flowable composites. Flowability is controlled by the compounding base resins. The major monomer is bisphenol A-glycidyl methacrylate (Bis-GMA) for current composites due to its mechanical strengths. However, as Bis-GMA is too viscous to use alone in composite in terms of manipulation, other monomers such as urethane dimethacrylate (UDMA) and methylene glycol dimethacrylate (TEGDMA), and certain fillers are compounded to adjust the viscosity [6,8]. Different base resins are frequently utilized in flowable and universal resin composites. Several studies have investigated discoloration of resin composites [7,9-11]. Universal resin composites [10-13].

3.3 & Below Acceptable

■ Day-1 ■ Day-3 ■ Day-5 ■ Day-30



Re: Discoloration: **“CLEARFIL MAJESTY ES Flow showed the lowest means at every interval of measurement”**

Color Stability Results for Packable Universal Shades:

ΔE ab (Value & Chroma Changes)

Hori-Ishikawa et al. Asian Pac J Dent 2020; 20: 9-15
 Original article
Discoloration of flowable and universal resin composites immersed in black tea for 30 days
 Ayaka Hori-Ishikawa, Yuika Ogawa, Ayako Okada, Nana Sakaeda, Daichi Aizawa, Masao Hanabusa, Kiyori Ohmori, Takatsugu Yamamoto
 Department of Operative Dentistry, Tsurumi University School of Dental Medicine, Yokohama, Japan

Abstract
Purpose: This study evaluated the discoloration of current flowable and universal resin composites by immersing in black tea over 30 days.
Materials and Methods: Three flowable resin composites and three universal resin composites were evaluated. The composites were inserted into a disk-shaped stainless steel mold and properly cured. The surfaces of the composite disks were wet-ground and ultrasonically cleaned. Colors (L*, a*, and b*) were measured at the center of disks on a gray background using a spectrophotometer. The disks were immersed in black tea at 37°C for 30 days, and the colors were repeatedly measured at 1, 3, 5, and 30 days of immersion. Color differences (ΔE^*ab) were calculated from the L*, a*, and b* values. Water sorption and solubility of the composites were also measured as per ISO 4049. The results were statistically analyzed, and regression analyses were done between ΔE^*ab and ΔL^* , Δa^* , Δb^* or sorption/solubility.
Results: All the composites showed observable increases of ΔE^*ab within the first 5 days of immersion. Values of ΔE^*ab ranged from 0.64 to 4.97, and three composites exhibited values above the clinically acceptable value, 3.3. ΔL^* and Δb^* revealed strong correlations with ΔE^*ab . Both water sorption and solubility had positive correlations with ΔE^*ab at 30 days.
Conclusion: Tea immersion induced discoloration of the current resin composites. This discoloration was affected most by the change in brightness and difference in its blue-yellow chromaticity, and the level of discoloration was material dependent.

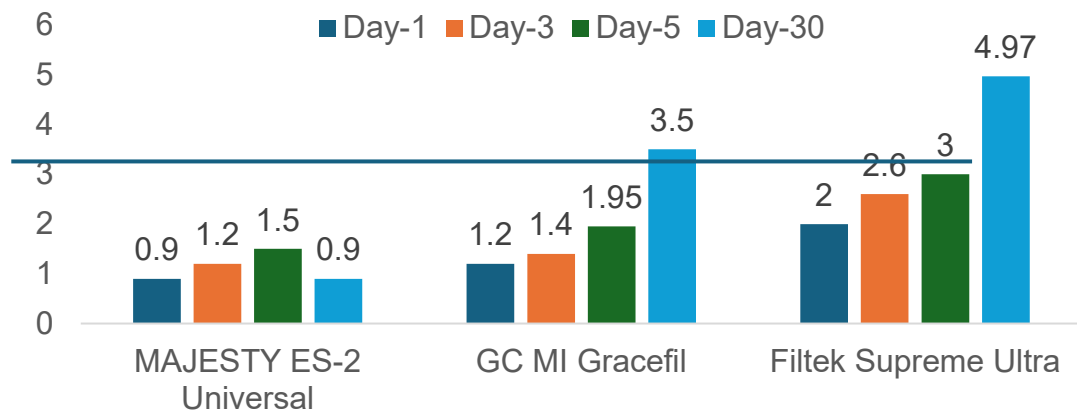
(Asian Pac J Dent 2020; 20: 9-15)
Key Words: discoloration, flowable composite, solubility, tea, universal composite, water sorption

Introduction
 Adhesive restoration is a conventional technique for the reconstruction of tooth structure lost to dental caries/fracture. Among the adhesive restorative materials, resin composites have wide ranges of clinical applications including direct restorations, core build-ups, and lining of indirect restorations. Light-cured resin composites, in particular, are essential for direct restorations for their adhesiveness, mechanical and esthetic properties [1]. Resin composites first began to be supplied in the form of pastes (hereinafter referred to as universal resin composite). Subsequent compositional alterations have produced less viscous resin composites, known as flowable resin composites since 1996 [2]. Flowable composites are dispensed by a syringe through a needle tip, achieving easy handling for filling relatively small cavities or cavities with large undercuts [3,4].

Initially, flowable composites contained hybrid-type fillers that were considerably larger than the current fillers [2]. The filler content was low with approximately 25 wt% to attain sufficient flowability of the composites, making their mechanical properties inferior to those of universal resin composites. Hence, flowable composites were mainly used for small cavities or as cavity liners [2,5]. Subsequent developments in filler technology, i.e., surface treatments and the dispersion techniques produced much smaller fillers [6], which improved the mechanical properties of composites. In addition, viscosity of composites became controllable due to filler/anomomer technology. The flowable composites became applicable in occlusal load bearing areas and allowed for contouring the anatomical forms under the direct syringe application. With such improvements, clinical usage of flowable composites have increased in present day [7].

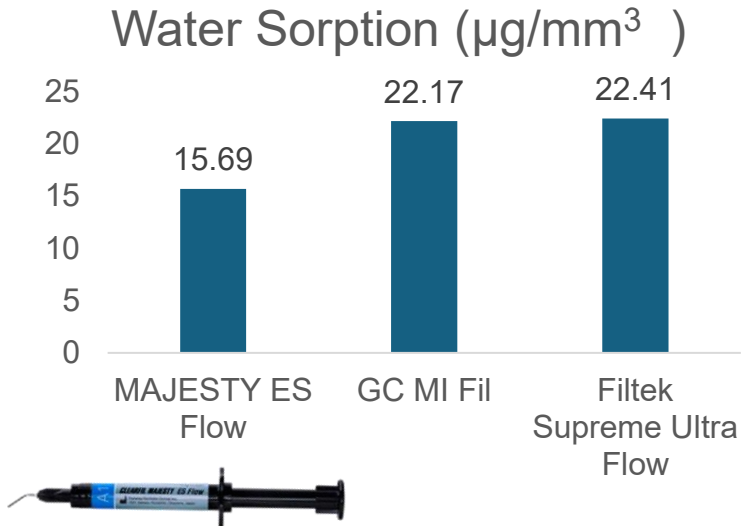
As described earlier, low viscosity is an advantage of the flowable composites. Flowability is controlled by the compounding base resins. The major monomer is bisphenol A-glycidyl methacrylate (Bis-GMA) for current composites due to its mechanical strength. However, as Bis-GMA is too viscous to use alone in composite in terms of manipulation, other monomers such as urethane dimethacrylate (UDMA) and trimethylene glycol dimethacrylate (TEGDMA), and certain α -methyl methacrylates are compounded to adjust the viscosity [6,8]. Different base resins are frequently utilized in flowable and universal resin composites. Previous studies have investigated discoloration of resin composites [7,9-13].

3.3 & Below Acceptable

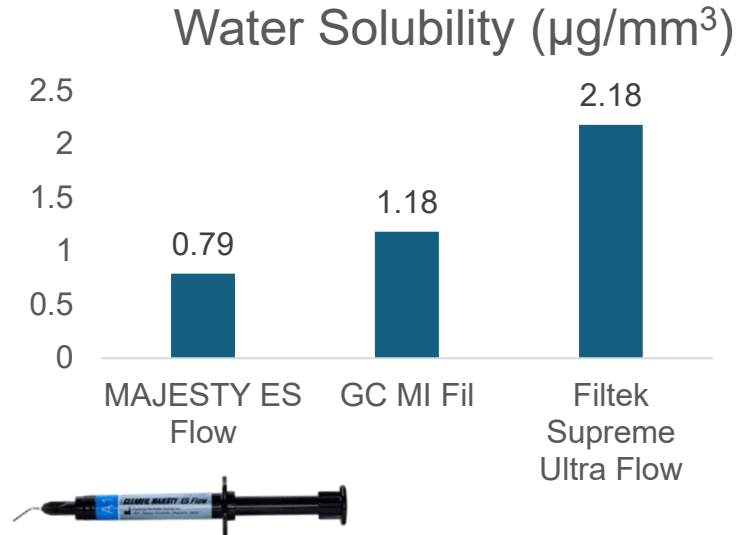


Water Sorption & Solubility:

Water Sorption W_{sp} (Flowables)



Water Solubility W_{sl} (Flowables)



As I see it: The race is on!

We will see porcelain performance
from composite (color and polish
retention)

As I see it: The race is on!

We are moving away from hand manipulated paste composite and toward injectable “Super flowables” (Kuraray) or “Injectables” (GC).

Transform the way you work

Start injecting with our strongest
direct restorative ever*

**G-ænial™ Universal
Injectable**



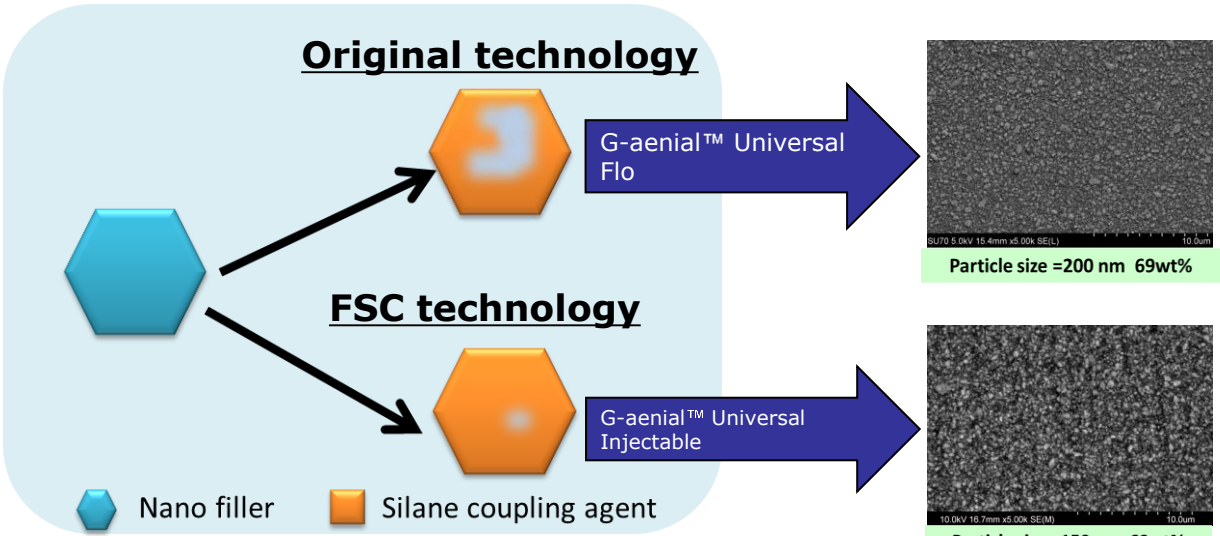
What is G-aenial™ Universal Injectable?

“G-aenial™ Universal Injectable (“GUI”) is an injectable high-strength ultra-fine particle composite with ideal viscosity, handling, and adaptation characteristics that may be used for long lasting esthetic restorations.”

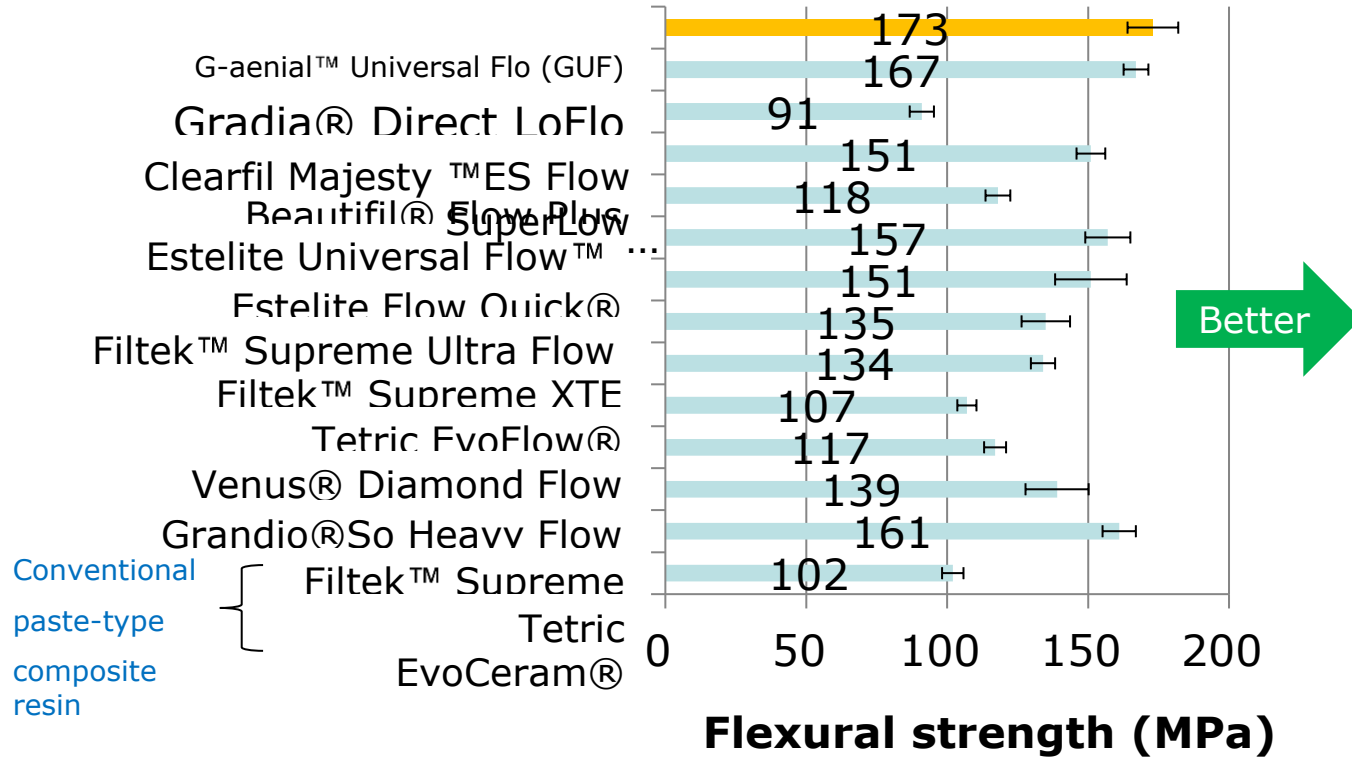
New Technology – Full Coverage Silane Coating

High Density Resin with Full Coverage Silane Coating (HDR with FSC Technology)

- Full silane coating of ultra-fine particles allows particles to disperse homogeneously and in higher density within resin matrix
- This, along with finer ultra-fine filler, delivers **high physical strength, wear resistance** and **improved handling**



High Flexural Strength



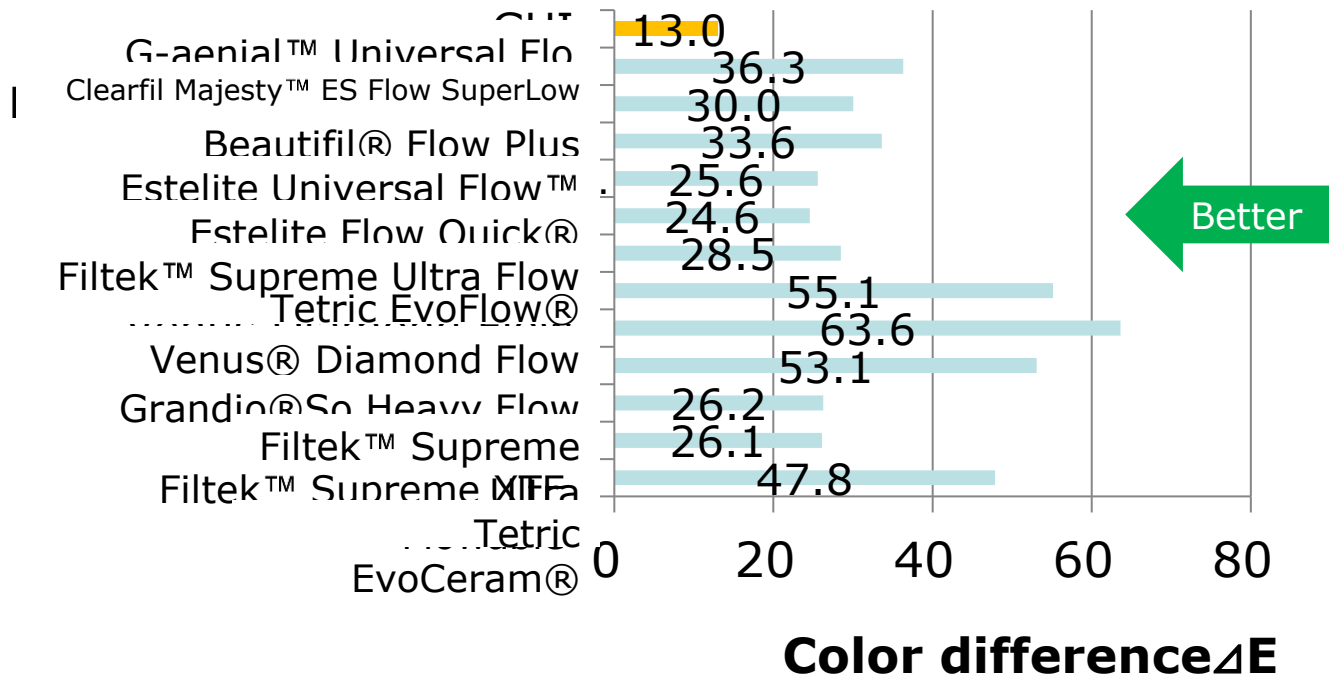
► GUI has the highest flexural strength among all the competitive products in the market. → **Low risk of chipping or fracture.**

High Resistance to Discoloration



Discoloration after 1 week of immersion in 2% curry extract

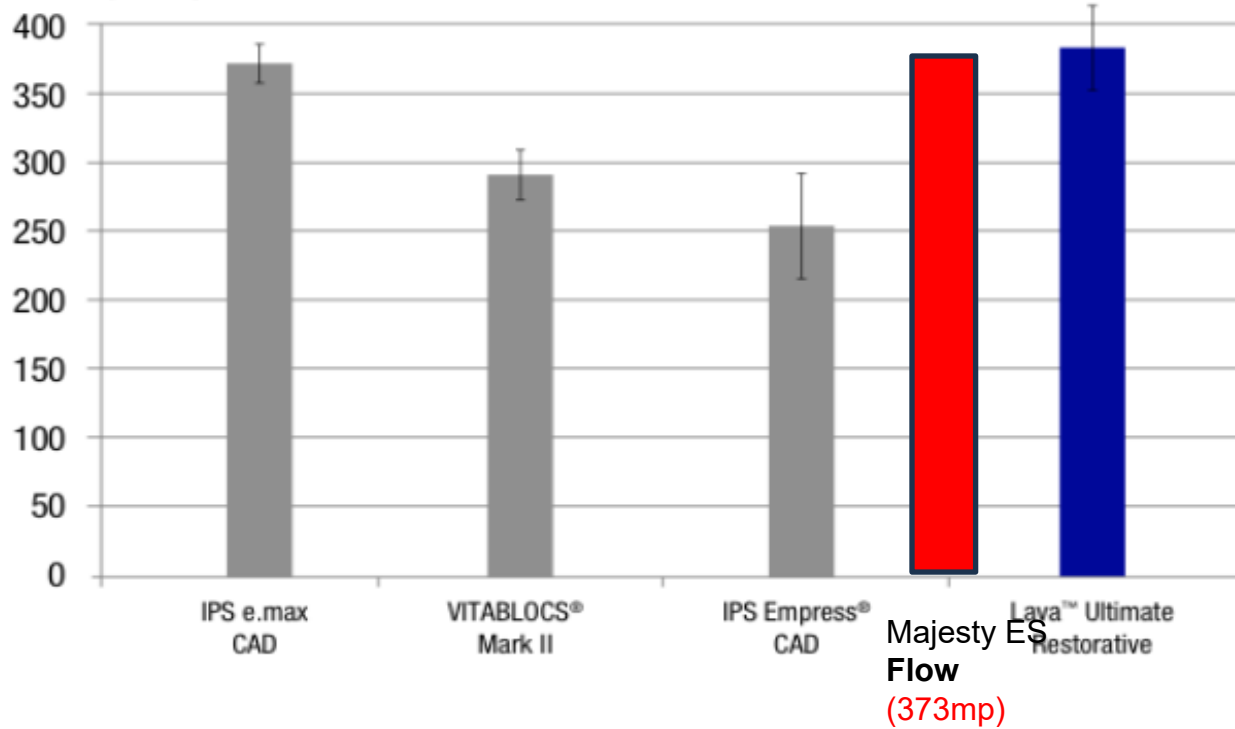
Discoloration



The GUI restoration retains its natural color better than all other products in the competitive set

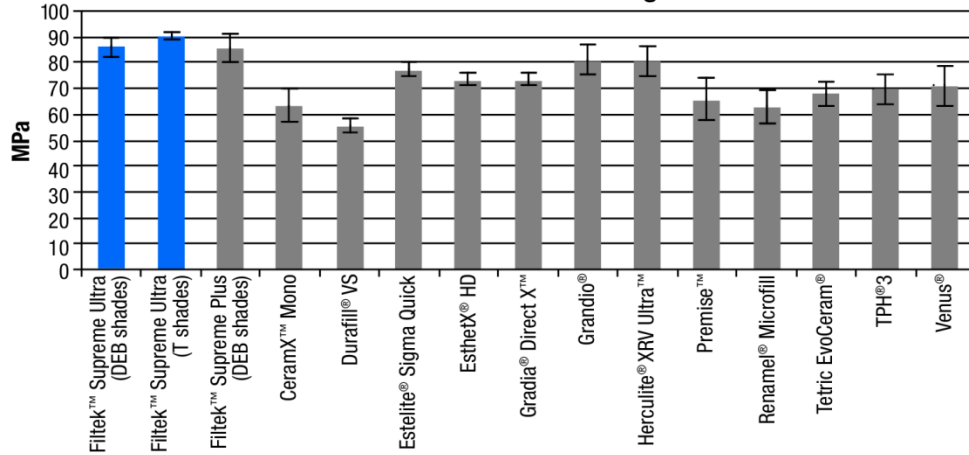


High Compressive Strength (MPa)



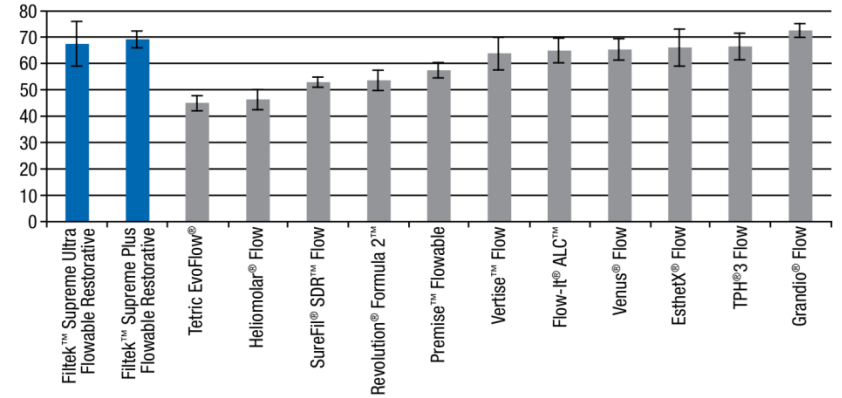
Composites

Diametral Tensile Strength

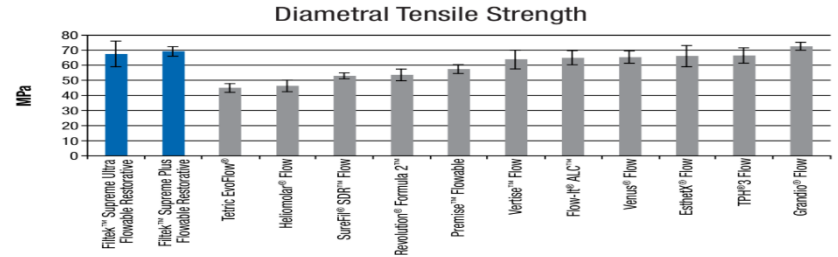
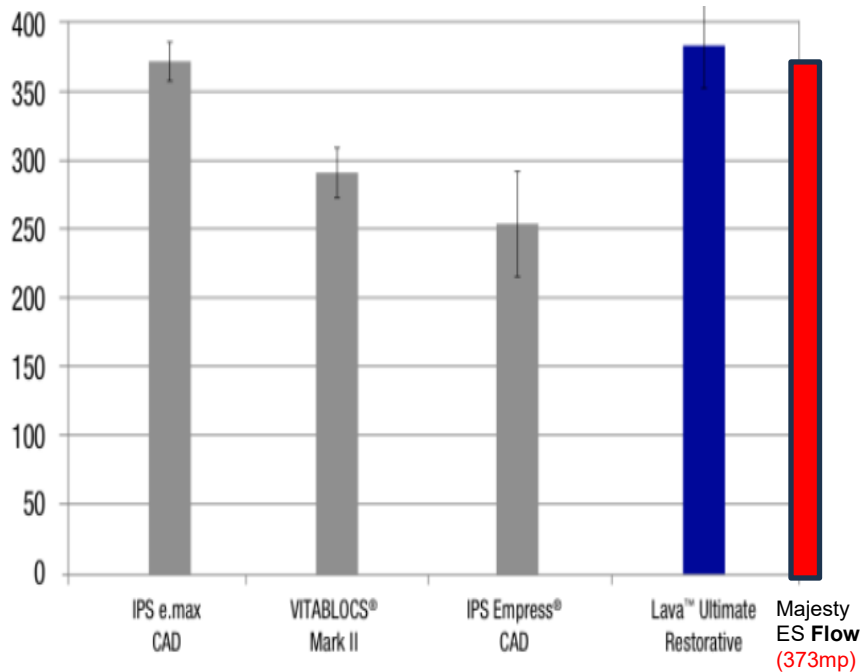


Flowables

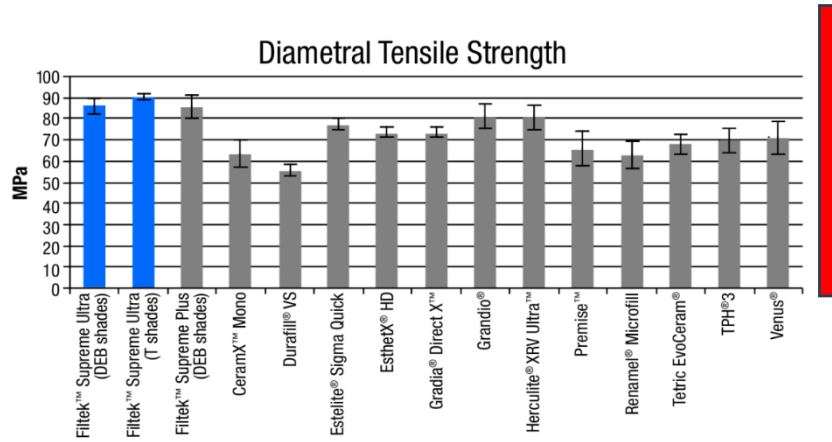
Diametral Tensile Strength



In general composites are 3 to 4 times stronger in compression than in tension

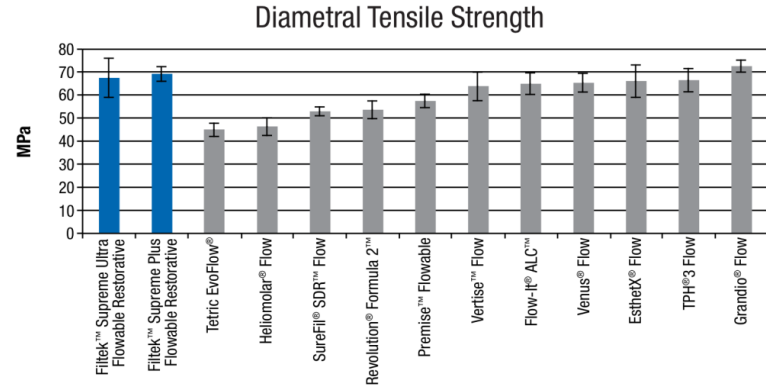


Composites



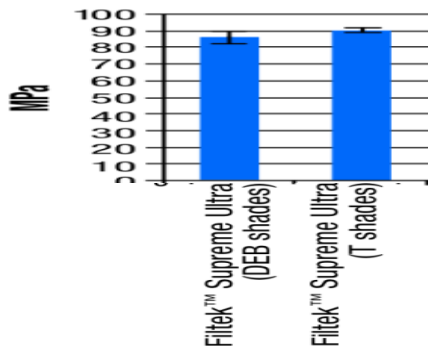
Majesty
ES Flow
(148mp)

Flowables

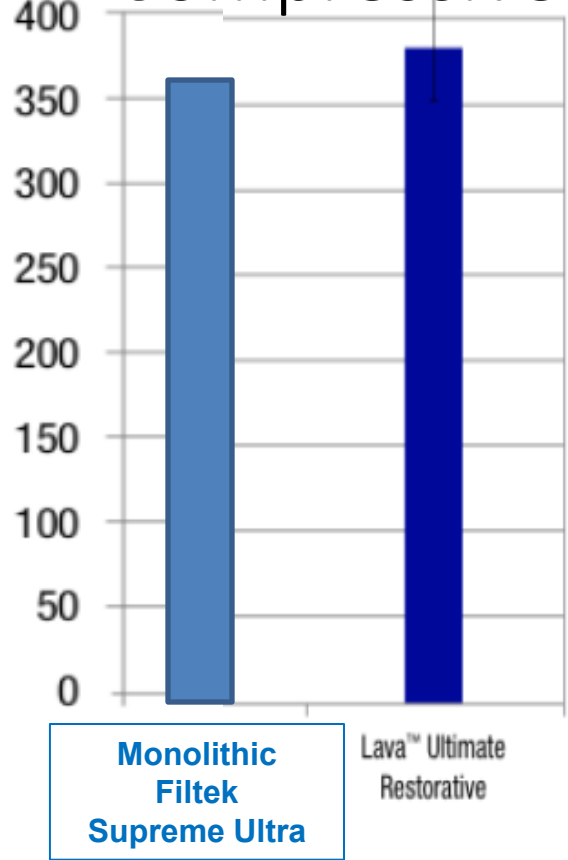


The compressive strength of composite is generally 3x to 4x higher than tensile strength

Tensile



Compressive



Before



After



Dr. John Yun
Toronto, ON





Dr. David Carroll,
Prosthodontist,
Aventura FL





Dr. Scott Kollen
Vancouver, BC



Dr. Scott Kollen
D.M.D.





Dr. Antonio
Mendoza,
Barcelona
Spain





 vnsdentistry

Bioclear Matrix System

8 HOURS AGO



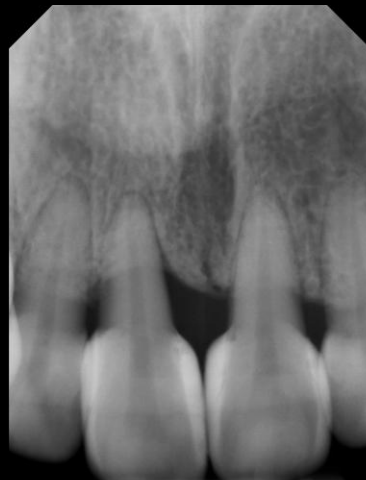
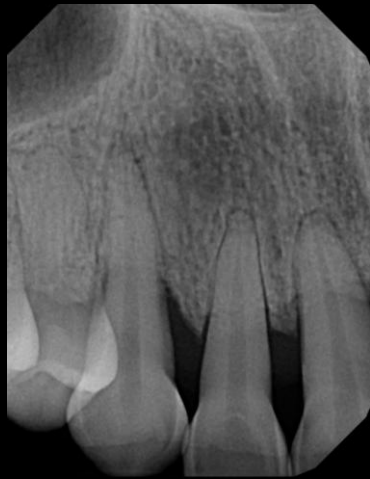
Courtesy Dr. Charles Regalado

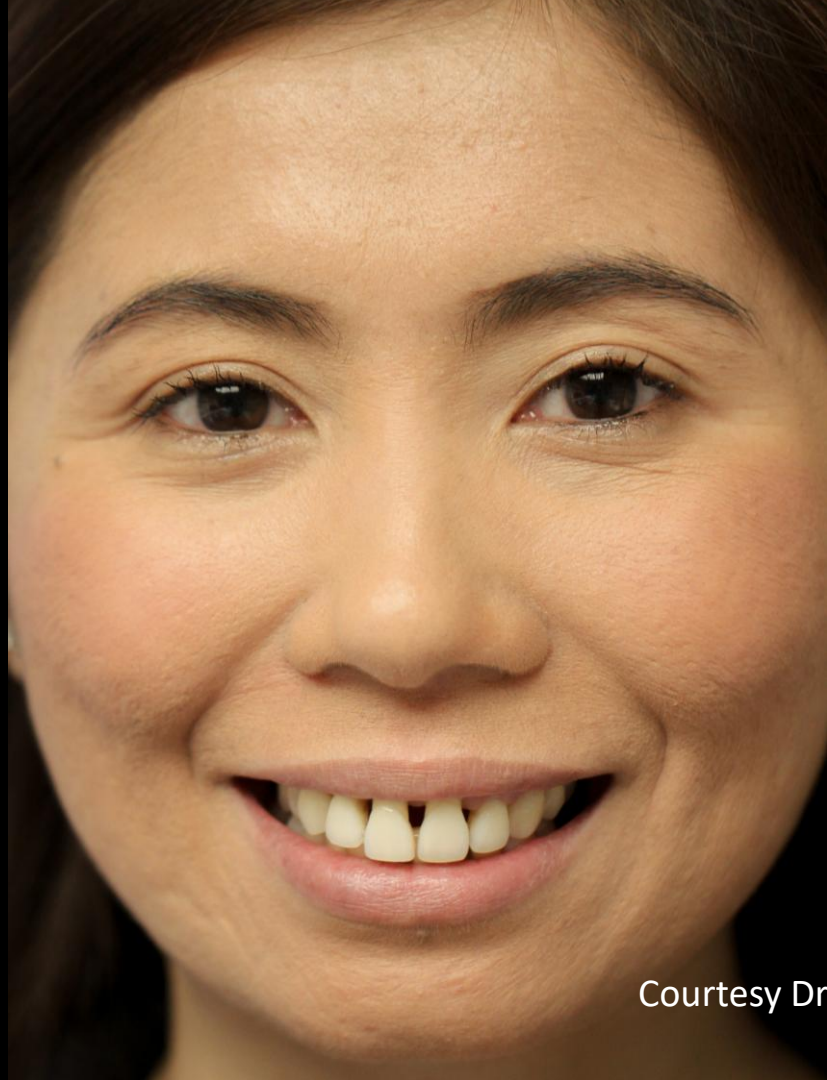


Courtesy Dr. Charles Regalado









Courtesy Dr. Charles Regalado



Injection Overmolding: Possibilities and Long-Term Outcomes

Finishing Ortho Cases

A young orthodontist with beautiful teeth...



She HATED Her Black Triangles



Immediate post-operative



6 months post-operative



6 years post-operative





Pre-op



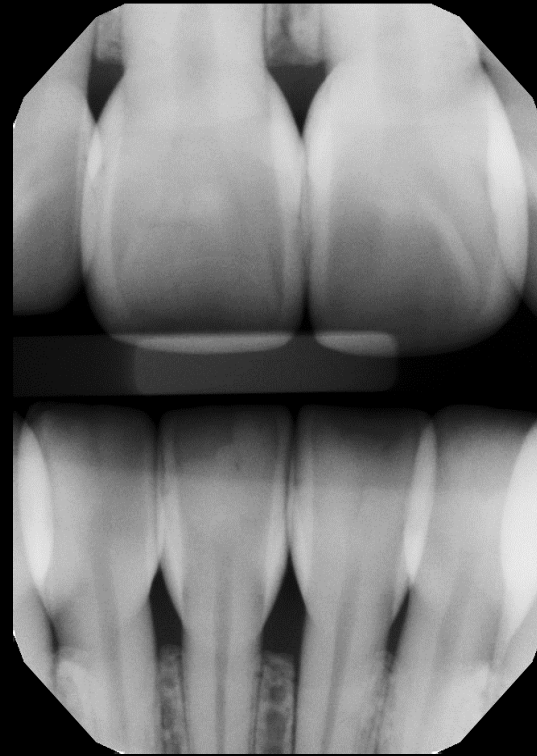
Post-Op



6 Years Post-Op



Pre-op



6 Years Post-Op



Journal of the California Dental Association






ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/ucda20

Minimally Invasive Cosmetic Restoration of Teeth Associated with Open Gingival Embrasures. Descriptive Case Series

Álvaro Ferrando Cascales, Rubén Agustín Panadero, José Amengual Lorenzo, Salvatore Sauro, Antonio Mendoza Rodríguez, Raúl Ferrando Cascales, Ronaldo Hirata & David Clark

To cite this article: Álvaro Ferrando Cascales, Rubén Agustín Panadero, José Amengual Lorenzo, Salvatore Sauro, Antonio Mendoza Rodríguez, Raúl Ferrando Cascales, Ronaldo Hirata & David Clark (2024) Minimally Invasive Cosmetic Restoration of Teeth Associated with Open Gingival Embrasures. Descriptive Case Series, Journal of the California Dental Association, 52:1, 2313244, DOI: [10.1080/19424396.2024.2313244](https://doi.org/10.1080/19424396.2024.2313244)

To link to this article: <https://doi.org/10.1080/19424396.2024.2313244>

Salvatore Sauro, PhD ^{c,d}, Antonio Mendoza Rodríguez, DDS, MSc^e, Raúl Ferrando Cascales, DDS, PhD ^a,
Ronaldo Hirata, DDS, MSc, PhD ^f, and David Clark, DDS^g

^aDepartment of Biomaterials Engineering, Faculty of Medicine, UCAM. Universidad Católica de Murcia, Murcia, Spain; ^bProsthodontic and Occlusion Unit, Department of Stomatology, Faculty of Medicine and Dentistry, Universitat de València, Valencia, Spain; ^cDepartment of Therapeutic Dentistry, I. M. Sechenov First Moscow State Medical University, Moscow, Russia; ^dDental Biomaterials and Minimally Invasive Dentistry, Department of Dentistry, University CEU Cardenal Herrera, Valencia, Spain; ^eArconclinic odontòlegs, Barcelona, Spain; ^fDepartment of Biomaterials and Biomimetics, New York University College of Dentistry, New York, New York, USA; ^gAcademy of Microscope Enhanced Dentistry, Newport Coast Oral Facial Institute, Newport Beach, California, USA

ABSTRACT

The aim of this study is to evaluate the performance of the restorations and soft tissues at 2 years using direct composite resin with injection molding technique to solve open gingival embrasures, also known as black triangles.

Materials and Method: An observational study of a case series was conducted for the treatment of black triangles. The criteria evaluated in each of the restorations were: color stability, polishing, maintenance of surface gloss, staining in the tooth/restoration margins, secondary caries, radiographic appearance of the restored emergence profile, probing depth and bleeding on probing (of the restored proximal surface), presence of plaque (of the restored proximal surface), detachment, delamination, and fracture of the restoration. The following patient satisfaction criteria were evaluated using the visual analog scale (VAS): aesthetic, functional and overall satisfaction.

Results: A total of 36 restorations were performed in the anterior aesthetic area between canines (24 upper and 12 lower). The mechanical and biological survival rate of restorations were both 100% (95%CI: 90.3–100%). Regarding mechanical complications, there were no restorations showing secondary caries, alteration of color, staining in the tooth/restoration interface, detachment, delimitation or fracture during the entire follow-up (0%; 95%CI: 0–9.7%). Regarding biological complications, there were no restorations measuring probing depth higher than 3 mm or showing an unusual radiographic appearance during the entire follow up (0%; 95%CI: 0–9.7%).

Conclusions: The composite injection technique using anatomical matrices is a cost-effective, minimally traumatic, predictable, and reproducible approach to achieve anterior black triangles closure and creation of pseudopapillas.

ARTICLE HISTORY

Received 7 September 2023

Revised 3 January 2024

Accepted 29 January 2024

KEYWORDS

Composite resin; dental marginal adaptation; cosmetic dentistry; gingival recession; matrix band; dental papilla

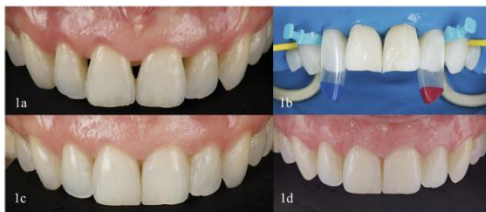


Figure 1. Clinical case I. (a) Initial intraoral front view. (b) Detail of the isolated teeth. Anterior HD diastema closure upper mesial-distal. Bioclear matrix systems. Bioclear was used to treat the central black triangle. The specific matrices for black triangles installed on the sides (black triangle kit, Bioclear matrix systems, Bioclear) can be seen, they are color coded and the red one has a lower profile than the blue one, which allows us to close a larger area of the anterosuperior sector in which the black triangles can be seen. (c) Two weeks review. (d) Two years review, highlighting the periodontal health and restorations integrity.

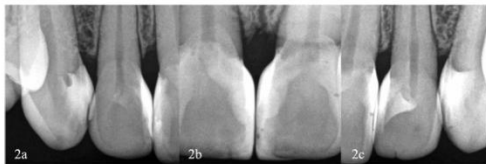


Figure 2. Clinical case I. Two weeks radiographic control composition to check the adaptation and the absence of retentive areas, the radiopacity of the composite allows us to observe the new artificial amelocementary junctions proximally. (a) Adaptation of composite in the papilla area from right mesial upper canine to distal upper right central incisor. (b) Good composite adaptation between centrals incisors drawing the new natural emergence profiles. (c) Adaptation of composite in the papilla area from left distal upper central incisor to mesial upper left canine.



Figure 3. Clinical case II. (a) Initial intraoral front view. (b) It was performed a back triangles closure from canine to canine. Anterior HD an DC diastema closure upper mesial-distal. Bioclear matrix systems. Bioclear was used. (c) Two weeks review. (d) Two years review, highlighting gingivitis due to plaque accumulation and loss of polish because the patient never returned to maintenance.

tion) and the status of the restoration (color stability, polishing, maintenance of surface gloss, detachment, delamination and/or fracture of the restoration if present by visual inspection).

McNemar's test was used to assess changes in the presence of complications between 1-year and 2-years. Chi-squared independence and Fisher's exact test was used to assess the relationship between the different complications

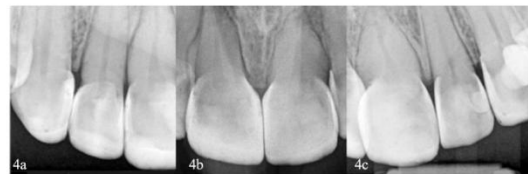


Figure 4. Clinical case II. Two weeks radiographic control composition to check the subgingival marginal composite integrity and the absence of gaps and retentive areas, the radiopacity of the composite allows us to notice the pores absence and the continuity of the restoration without undercuts. (a) Adaptation of composite in the papilla area from right mesial upper canine to distal upper right central incisor. (b) Excellent adaptation of the composite between the central incisors drawing the new natural and progressive emergence profiles. (c) Adaptation of composite in the papilla area from left distal upper central incisor to mesial upper left canine.



Figure 5. Clinical case III. (a) Initial lower intraoral front view. (b) Detail of the isolated teeth. The small yellow specific matrices for black triangles installed on the central black triangle (black triangle kit, Bioclear matrix systems, Bioclear) can be seen. (c) Immediate result just after removed the rubber dam. (d) Two weeks radiographic control. (e) Two years review, highlighting the periodontal health and good polish of the restorations.



Figure 6. Clinical case IV. (a) Initial intraoral lateral view. (b) Detail of the isolated teeth. The largest yellow and green specific matrices for black triangles were selected (black triangle kit, Bioclear matrix systems, Bioclear). (c) Two weeks clinical control. (d) Radiographic control at two weeks. (e) Two years review, highlighting the restoration integrity.

Table 3. Incidence of complications (mechanical and biological) and survival after one and two years of clinical behavior.

6 A. FERRANDO CASCALES ET AL.

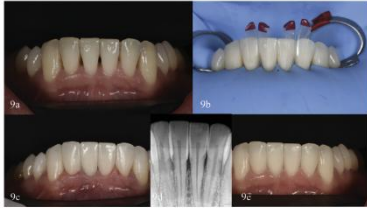


Figure 9. Clinical case VII. (a) Initial lower intraoral front view. (b) Detail of the isolated teeth, the small red specific markers for black triangles installed can be seen, to do the injection molding procedure at the same time fibra triangle kit. (c) Two weeks clinical review. (d) Two weeks radiograph control. (e) Two years review, highlighting the stability of periodontal health and good polish.

Table 1. Restoration survival and outcomes (restorative parameters).

Location	N	Color stability	Polishing	Maintenance surface gloss	Secondary caries	Staining tooth/restoration interface	Detachment, delimitation, fracture
Maxilla (case 1) 1 year	6	Yes	Not necessary	Yes	No	No	No
Maxilla (case 1) 2 years	6	Yes	Not necessary	Yes	No	No	No
Maxilla (case 2) 1 year	6	Yes	At one year	No (small insignificant loss)	No	No	No
Maxilla (case 2) 2 years	6	Yes	At two years	No (loss of surface gloss)	No	No	No
Maxilla (case 3) 1 year	6	Yes	Not necessary	Yes	No	No	No
Maxilla (case 3) 2 years	6	Yes	Not necessary	Yes	No	No	No
Maxilla (case 4) 1 year	5	Yes	At one year	No (small insignificant loss)	No	No	No
Maxilla (case 4) 2 years	5	Yes	At one year	No (small insignificant loss)	No	Yes (one tooth of 5)	No
Maxilla (case 5) 1 year	1	Yes	Not necessary	Yes	No	No	No
Maxilla (case 5) 2 years	1	Yes	At two years	No (small insignificant loss)	No	No	No
Mandible (case 6) 1 year	6	Yes	At one year	No (small insignificant loss)	No	No	No
Mandible (case 6) 2 years	6	Yes	At two years	No (small insignificant loss)	No	No	No
Mandible (case 7) 1 year	6	Yes	Not necessary	Yes	No	No	No
Mandible (case 7) 2 years	6	Yes	Not necessary	Yes	No	No	No

Table 2. Restoration survival and outcomes (periodontal and radiographic parameters).

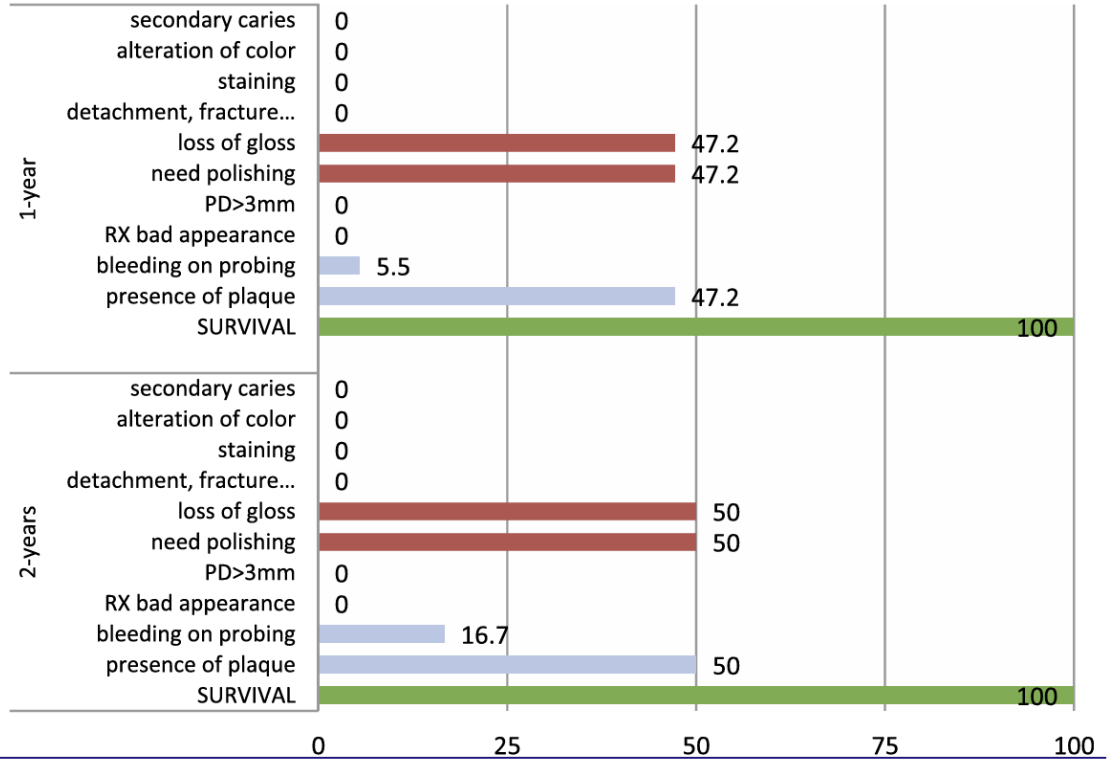
Location	N	Probing depth	Bleeding on probing	Presence of plaque	Radiographic appearance
Maxilla (case 1) 1 year	6	1-3 mm	No	No	Correct emergence profile
Maxilla (case 1) 2 years	6	1-3 mm	No	No	Correct emergence profile
Maxilla (case 2) 1 year	6	1-3 mm	No	Little on proximal surfaces	Correct emergence profile
Maxilla (case 2) 2 years	6	1-3 mm	Yes (2 tooth of 6)	Little on proximal surfaces	Correct emergence profile
Maxilla (case 3) 1 year	6	1-3 mm	No	No	Correct emergence profile
Maxilla (case 3) 2 years	6	1-3 mm	No	Little on proximal surfaces	Correct emergence profile
Maxilla (case 4) 1 year	5	1-3 mm	No	Yes (1 tooth of 5)	Correct emergence profile
Maxilla (case 4) 2 years	5	1-3 mm	Yes (1 tooth of 1)	Little on proximal surfaces	Correct emergence profile
Maxilla (case 5) 1 year	1	1-3 mm	No	No	Correct emergence profile
Maxilla (case 5) 2 years	1	1-3 mm	Yes (2 tooth of 6)	Little on proximal surfaces	Correct emergence profile
Mandible (case 6) 1 year	6	1-3 mm	Yes (2 tooth of 6)	Little on proximal surfaces	Correct emergence profile
Mandible (case 6) 2 years	6	1-3 mm	Yes (2 tooth of 6)	Little on proximal surfaces	Correct emergence profile
Mandible (case 7) 1 year	6	1-3 mm	No	No	Correct emergence profile
Mandible (case 7) 2 years	6	1-3 mm	No	No	Correct emergence profile

(47.2%; 95%CI: 30.9-63.5%) showed plaque at 1 year, increasing to 18 (50%; 95%CI: 33.7-66.3%) at 2 years. All complication rates did not change statistically from 1 year to 2 years. The most relevant increase was bleeding ($p = .125$) (Table 2).

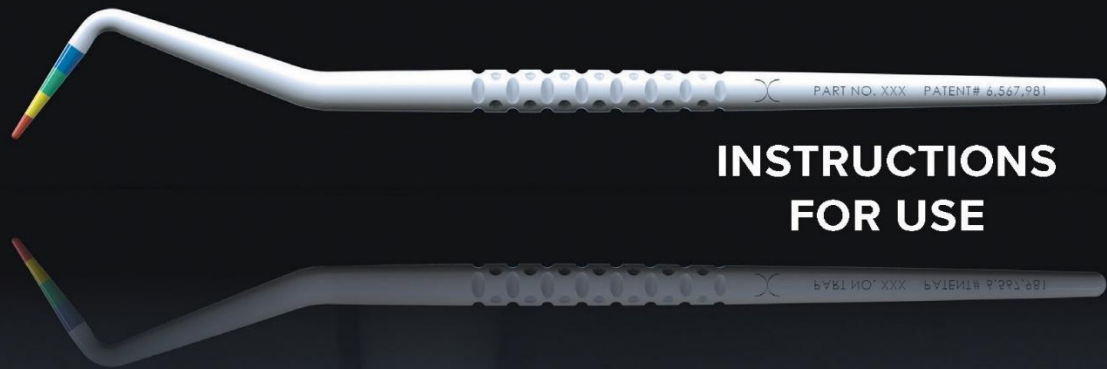
At 1 year, no association was found between bleeding and other complications: loss of gloss ($p = .216$), need for polishing

($p = .216$) or presence of plaque ($p = .216$). Loss of gloss and polishing were always observed in the presence of plaque ($p < .001$). At 2 years, loss of gloss and polishing were significantly more frequent when bleeding ($p = .019$) or plaque ($p < .001$) were present. In addition, bleeding rate was 50% in teeth with plaque and absent in teeth without plaque ($p = .019$) (Table 3).

Complications and Survival rate



BT MATRIX

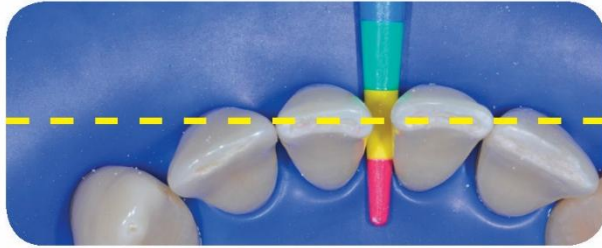


INSTRUCTIONS FOR USE

 BIOCLEAR

BLACK TRIANGLE SYSTEM INSTRUCTIONS FOR USE

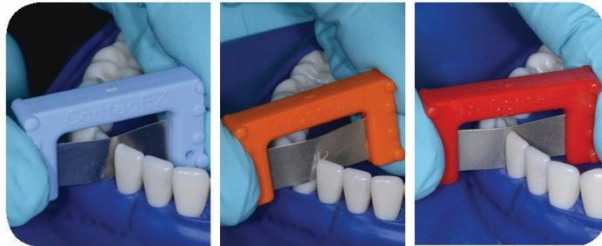
1
GAP
SIZING



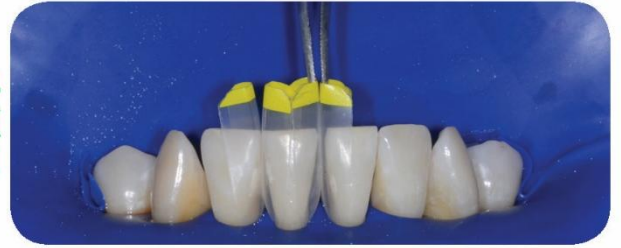
2
DISCLOSE
AND CLEAN



3
CONTACT
OPTIMIZATION



4
MATRIX
INSERTION



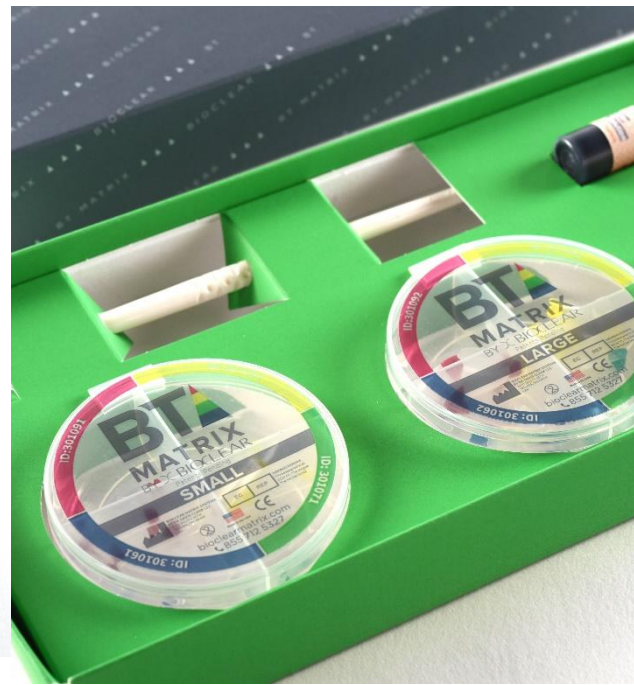
5
ETCH
AND RINSE



6
ADHESION,
INJECTION MOLD,
LIGHT CURE,
RELEASE MATRIX,
FINISH



BT
MATRIX
BY ∞ BIOCLEAR



BT



MATRIX

BY  BIOCLEAR



Rock Star Polish

1



2



The Art and Science of Perfect Contacts: How do we best temporarily displace the teeth so that when the matrix comes out, the teeth “bounce” back together?

1. If the contact is intact, we gently sand the contact until it is friendly, then the matrix itself plus gentle prying of the teeth will displace the teeth
2. Use a wedge
3. Use a powerful separator
4. Spot Weld/Push Pull Technique

The Art and Science of Perfect Contacts: How do we best temporarily displace the teeth so that when the matrix comes out, the teeth “bounce” back together?

5 The Direct Contact Strut



The Bioclear Direct Contact Strut

Creating Contacts for Diastemas, Peg Laterals, and Bioclear 360° Veneers

- Abbreviated Version -



**TOOTH & SURFACE SPECIFIC
MATRIX SYSTEM**
BY  **BIOCLEAR**



140 Anterior Matrices

#6 through #11 in Mesial & Distal
Small & Medium Lower Incisor

75 Wedges

25 Small Wedges
50 Medium Wedges

**The next generation
of anterior matrices:**

We're taking the
guesswork out of to
matrix selection

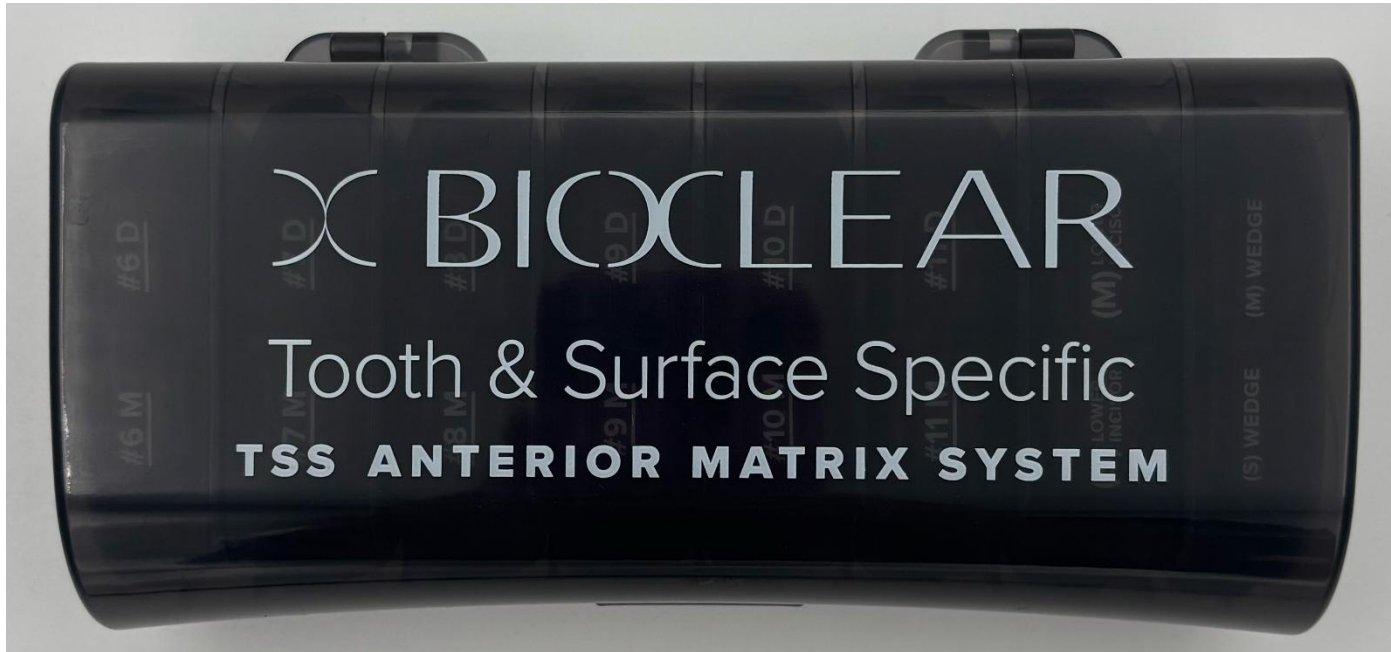


Contact your *Bioclear Sales Rep to Pre-Order*

WWW.BIOCLEARMATRIX.COM

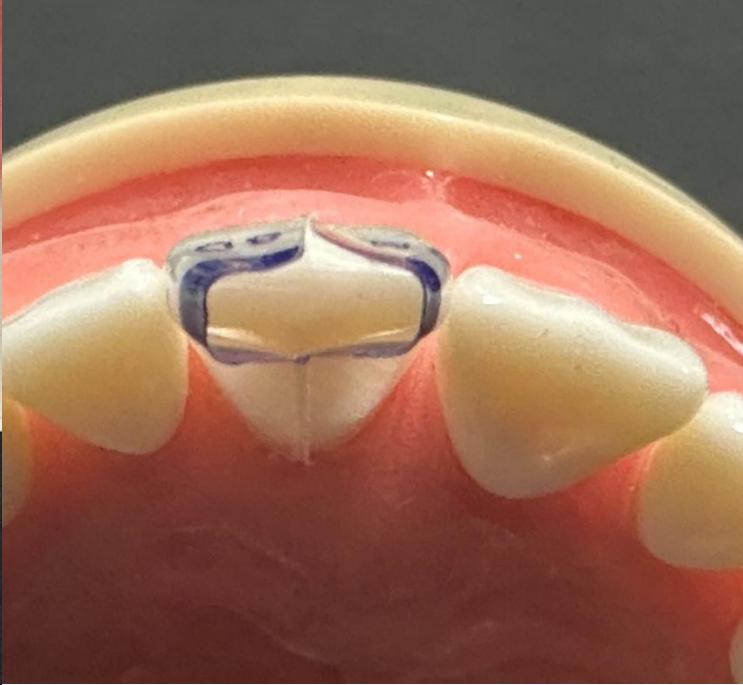
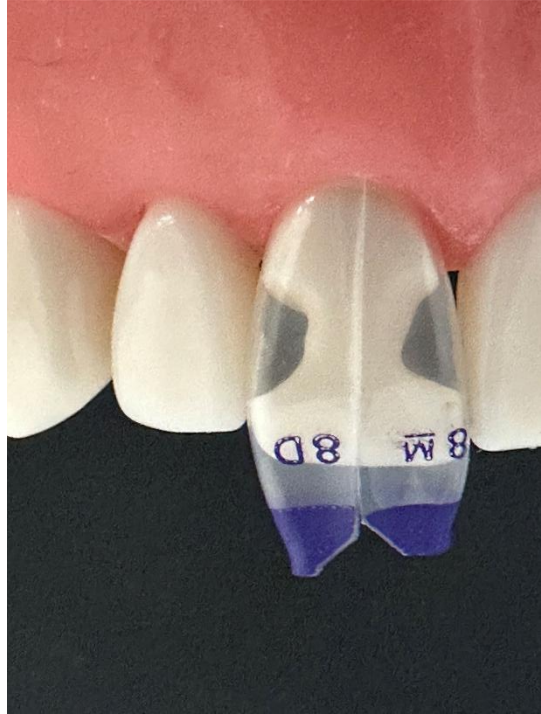
1.855.712.5327

The TSS system is for small and large anterior restorations, broken teeth and anterior esthetic veneering when you DO NOT have a black triangle or diastema









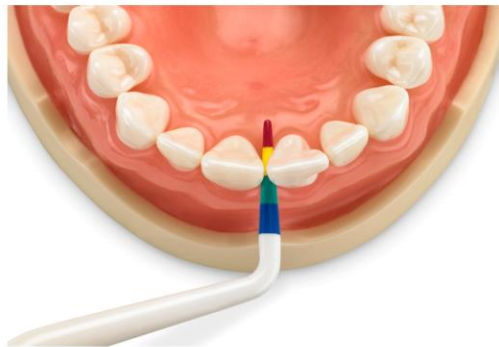


BLACK TRIANGLE

CERTIFICATION COURSE

18 CE CREDITS

This three-part live hands-on certification course will teach you how to treat black triangles, gingival recession, root abrasions, and perform confident restorations. In becoming a certified Bioclear black triangle doctor, you'll increase your overall skill and knowledge of Bioclear and learn to market your new skills to patients.



Toronto
February 27th 2026

Washington DC
May 8th 2026

Orange Beach
April 24th 2026

LIMITED SPOTS AVAILABLE!



BIOCLEAR
CERTIFIED

BLACK TRIANGLES

Scan to learn more
& sign up for your
local BT Course!



www.bioclearmatrix.com/live-courses/



BEFORE



AFTER



BEFORE



AFTER

∞ BIOCLEAR

Stop by convention

booth #1916

to...

- ✓ Hear more about Bioclear courses
- ✓ Meet our team of Bioclear nuts
- ✓ Order products
- ✓ Register for courses
- ✓ Learn why Bioclear is a BIG DEAL!







Dan placed a Direct Contact Strut which made his life way easier and the case much better.



Dan placed a Direct Contact Strut which made his life way easier and the case much better.

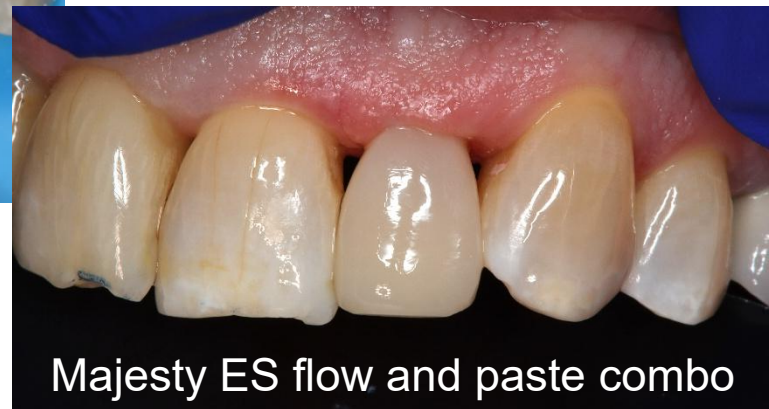








Courtesy of Dr.
Dan
Henricksen



Majesty ES flow and paste combo

Is monolithic injection molded composite a viable alternative to full ceramic crowns in some cases?

You be the judge of that



The patient is a 35-year-old male. His original chief complaint was a discolored filling on the distal of tooth #8. The patient was given two treatment plans, one to simply replace a few defective restorations and remove caries with traditional fillings or in patient terms we said, “We can patch the holes, or I can rejuvenate your smile. The patchwork plan will be healthy but will not make a significant esthetic change. In addition, the severe wear and acid erosion present on the palatal surfaces could eventually lead to catastrophic problems later i.e. root canals, infection, and tooth loss.” The patient opted for Bioclear rejuvenation versus simple fillings because he wanted a beautiful smile. He chose Bioclear in lieu of crowns because he understood that Bioclear is a more conservative and healthier approach to achieving his goals than traditional crowns.

Phase one of the treatment plan was to restore the anterior six teeth, simultaneously opening the vertical dimension to reduce the need for aggressive tooth reduction for material thickness. In addition, because the patient needed to have the teeth lengthened by 2 mm, opening the vertical dimension by 2 mm allowed the overbite to be more ideal. Because the patient could only commit to the cost of the six Bioclear restorations (\$11,600) we placed transitional occlusal flowable composites (thick sealants) on the four maxillary premolar teeth, and we will allow the molars to settle into occlusion utilizing the well-researched Dahl Technique.

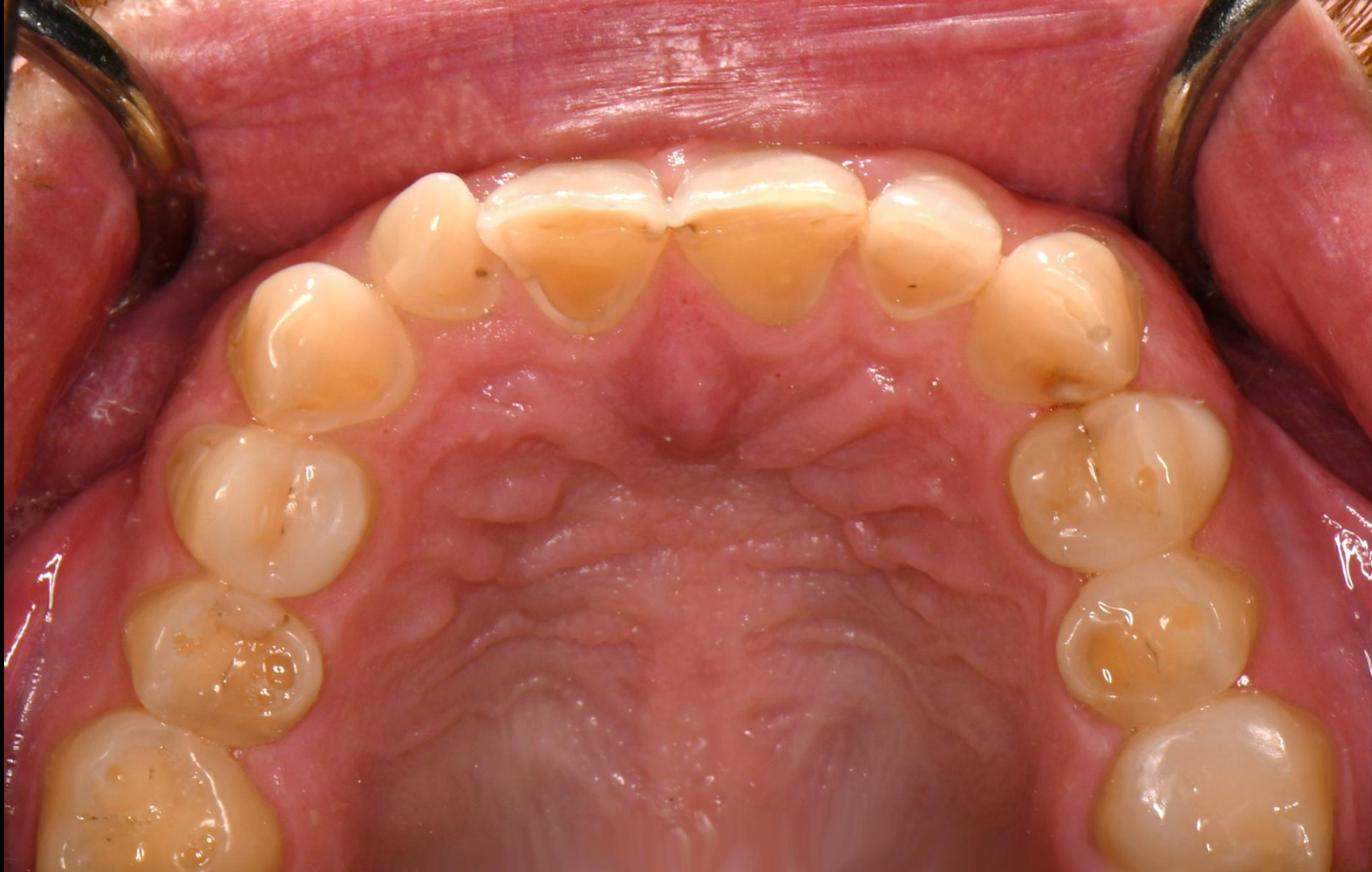
Phase two will be to restore the remaining teeth with Bioclear when the patient has his finances ready.

Treatment Summary Short Version:

Treatment was finished in a single 4-hour session. (Less experienced clinicians should plan to give one hour per tooth). Bioclear TSS Matrices were utilized on all the teeth except tooth #10. #10 required the Bioclear BT matrix system to create “instant ortho” and because a diastema was present there. Bioclear Diamond wedges were used as needed in areas where the contact was lost during caries removal or removal of old composites. Bioclear RSP X-course discs (Black) were used to shape the incisal edges and smooth the small seams present where the matrices meet on the facial and palatal. Final polish was achieved with Bioclear Magic Mix and then Rock Star Polish cups and cones.

One-week postoperative visit revealed healthy teeth and gingiva. The patient was ecstatic about his new smile, had zero post-operative pain or sensitivity, and expressed that his new bite with the increase in VDO felt more comfortable than before.





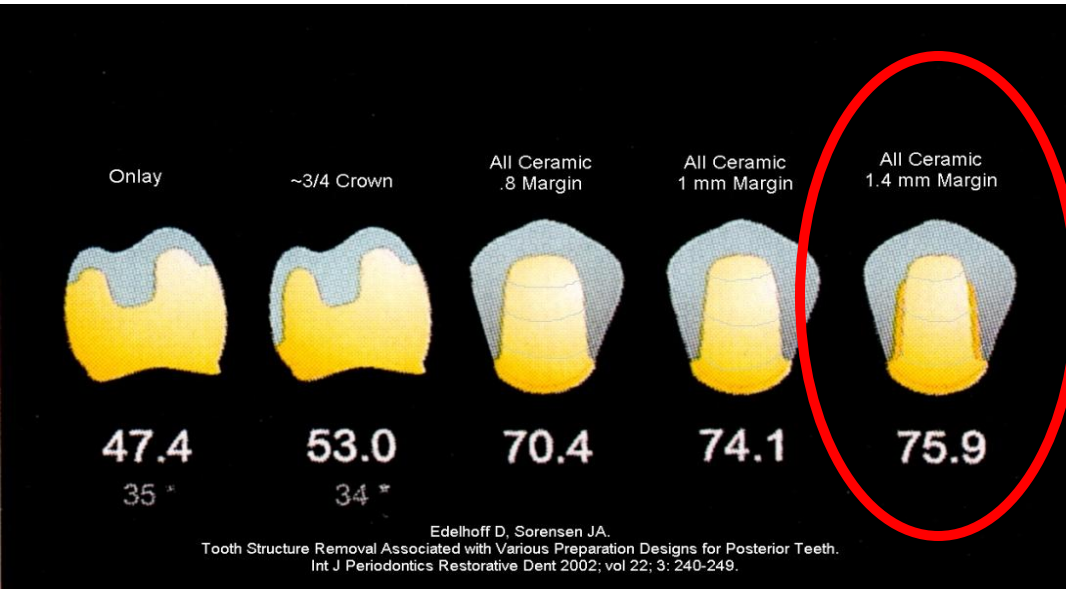


What percentage of the tooth is removed for a conservative crown prep?



Source: Google Images

What percentage of the tooth is removed for a conservative crown prep?





5
10
15
20

Central Width
7.0mm

7.5mm

8.0mm

8.5mm

9.0mm

9.5mm

10mm

 **Panadent**
Esthetic Proportion
Gauge

Central Width | Central Height

8.0mm | 10.0mm

8.5mm | 10.6mm

9.0mm | 11.2mm

9.5mm | 11.8mm

10.0mm | 12.5mm













TSS

TOOTH & SURFACE SPECIFIC
MATRIX SYSTEM
BY BIOCLEAR



140 Anterior Matrices

20 Standard Anterior Matrix

Small & Medium Upper Incisors

76 Bridges

20 Small Bridges

20 Medium Bridges

**The next generation
of anterior matrices:**

We're taking the
guesswork out of
to matrix selection



Contact your local distributor for more information

www.bioclearmatrix.com

1-800-702-3327



TSS

TOOTH & SURFACE SPECIFIC
MATRIX SYSTEM
BY DEXTEAR



100 Anterior Matrices
100 Anterior 1/2" (25mm) & 1/4" (12mm)
Single & Multiple Layer Options

25 Matrices
25 Anterior 1/2" (25mm)
25 Anterior 1/4" (12mm)

**The next generation
of anterior matrices:**

We're taking the
guesswork out of
matrix selection



Contact your DEXTEAR Sales Rep or Fax Order
www.dextear.com/usa/usa/usa
1.888.752.5227





TSS

TOOTH & SURFACE SPECIFIC
MATRIX SYSTEM
BY BOLLER



80 Single-Block
Matrix and Wax System
www.boller.com

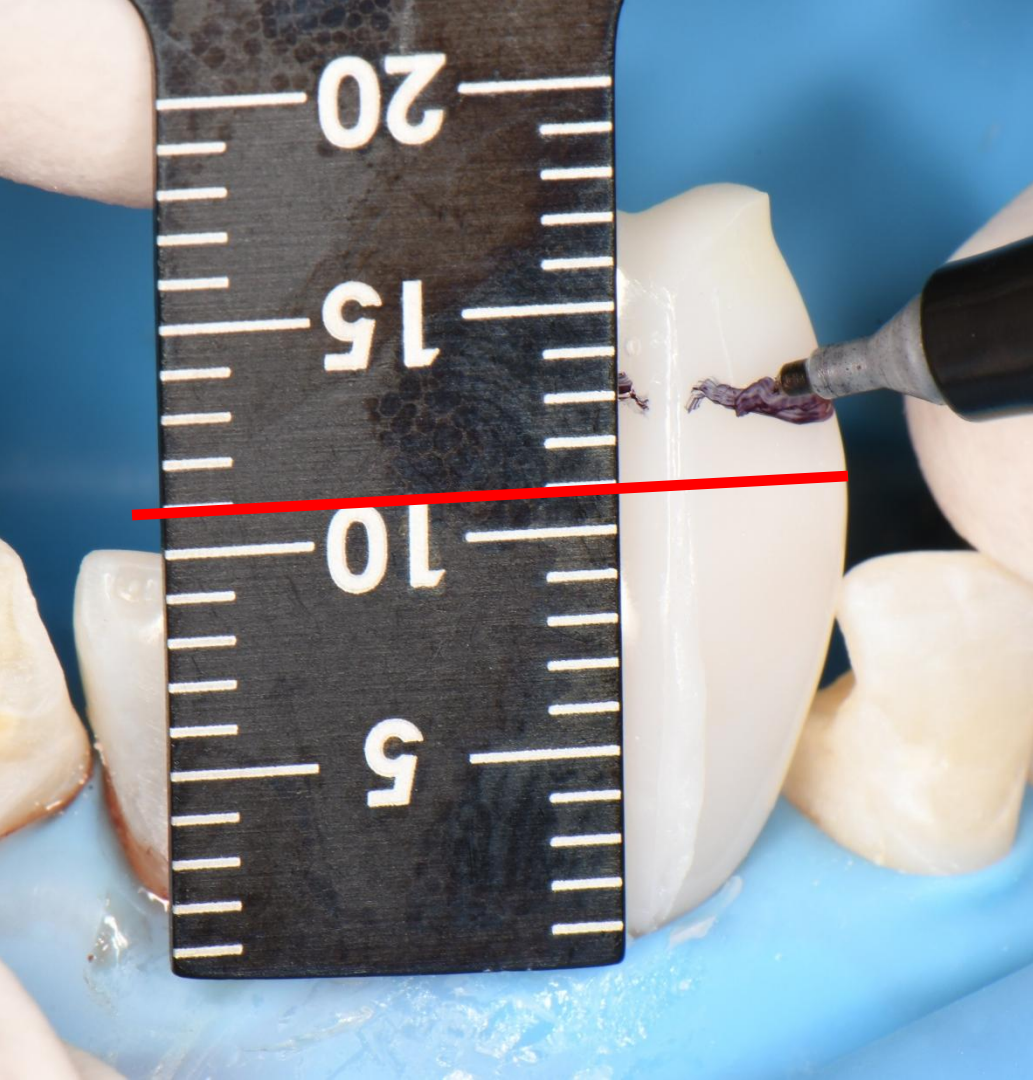
25 Single-Block
Matrix and Wax System
www.boller.com

**The next generation
of anterior matrices:**
We're taking the
guesswork out of
matrix selection



Contact your Boller Sales Rep or Pin-Order
www.boller.com
1 800 765 5247



































Pre-operative



Immediate Post-Operative



One Week Post-Operative









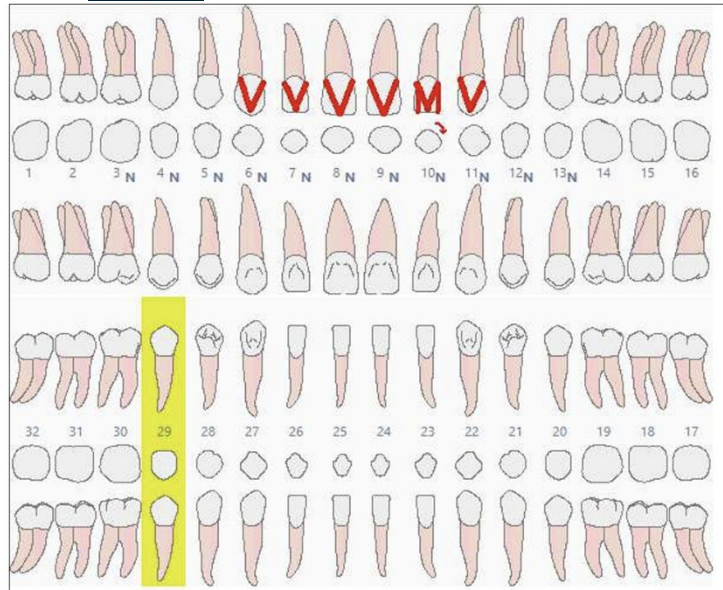
Last week...the
day of treatment



This
week...
1-week
post-op

Patient Chart

Patient Name
Patient ID



Date	Description	Provider	Th	Surf	Status	Fee
1/15/2026	2993A - BIOCLEAR 360 REJUVENATION COMPLEX	David J. Clark, D.D.S.	6		Proposed	\$1,840.00
1/15/2026	2993A - BIOCLEAR 360 REJUVENATION COMPLEX	David J. Clark, D.D.S.	7		Proposed	\$1,840.00
1/15/2026	2993A - BIOCLEAR 360 REJUVENATION COMPLEX	David J. Clark, D.D.S.	8		Proposed	\$1,840.00
1/15/2026	2993A - BIOCLEAR 360 REJUVENATION COMPLEX	David J. Clark, D.D.S.	9		Proposed	\$1,840.00
1/15/2026	2993A - BIOCLEAR 360 REJUVENATION COMPLEX	David J. Clark, D.D.S.	10		Proposed	\$1,840.00
1/15/2026	2993A - BIOCLEAR 360 REJUVENATION COMPLEX	David J. Clark, D.D.S.	11		Proposed	\$1,840.00
1/15/2026	199.2 - BIOCLEAR ORTHO CORRECTION PER TOOTH	David J. Clark, D.D.S.	10		Proposed	\$306.00
1/15/2026	299.5 - BIOCLEAR DIASTEMA CLOSURE	David J. Clark, D.D.S.	10	MD	Proposed	\$285.00

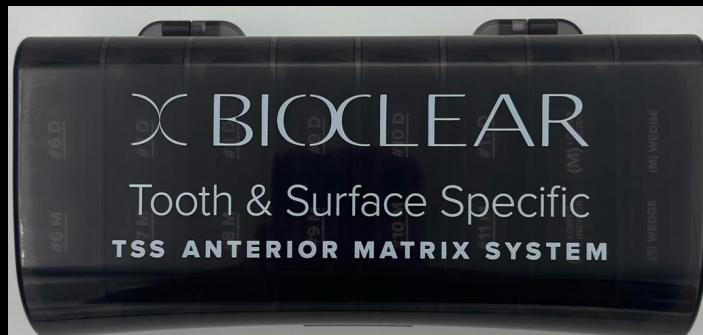


Total Bioclear Case Fee?

\$11,631

Let's quickly review several types of anterior cases
and best matrix system for the case:

Anatomic or **BT/DC?** (Black Triangle/Diastema Closure)







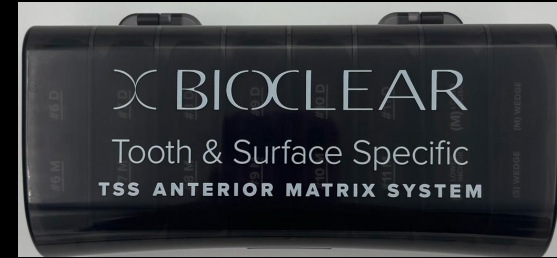
The monolithic restoration can create adequate non-layered polychromaticity with **Body** shade



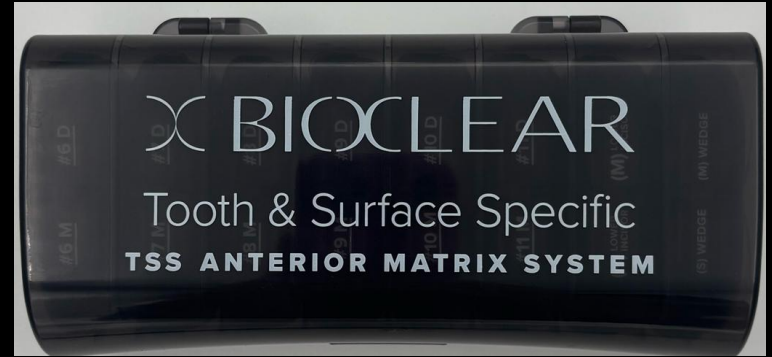
17 year old male. Had emotional Issues and had ortho brackets on for many years without returning to complete orthodontic care. Left with rampant decay. Injection molded A2 **BODY** composite



Which Matrix Type?



Which Bioclear kit?





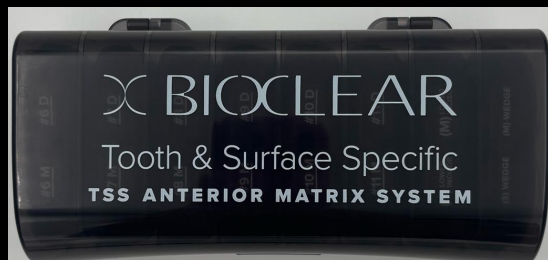
- If you think you will lose your contacts, you need to prep and then take each to 80% shape before you move to the next tooth.
- Bioclear method benefits from leverage and landmarks
- Creation of 3 facial planes is key
- Monolithic composite in the body shade is generally beautiful to the patient. Why?



Case by recent
attendee of
Learning Center 4-
day Certification
Course



Which Bioclear Kit?



Which Bioclear Kit?





Courtesy Dr.
Les Miller

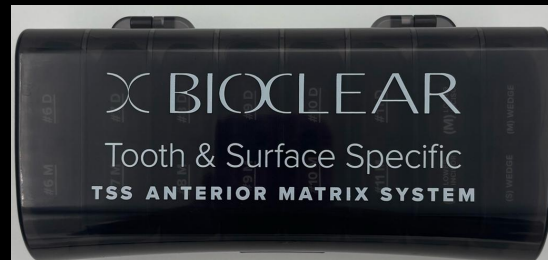


Which Bioclear kit or kits?





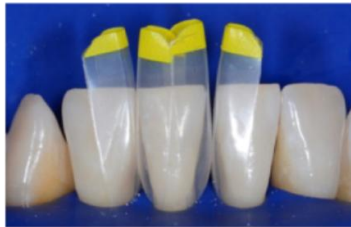
Both



Getting paid to be conservative

BIOCLEAR VS. CROWNS AND VENEERS

Bioclear is an alternative to traditional methods for enhancing a smile. Rather than preparing for a crown or veneer, the Bioclear Method—expanding the possibilities of dentistry—conserves the natural tooth structure, tooth enamel and tooth durability.



BIOCLEAR PREPARATION
Bioclear allows dentists to **conserve** healthy tooth structure



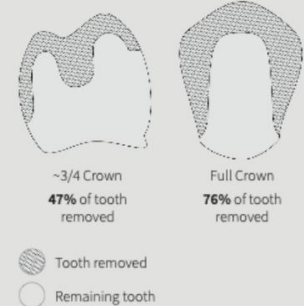
CROWN PREPARATION
Crowns require dentists to **remove an average of 76%** of the tooth structure prior to the procedure



VENEER PREPARATION
Veneers require dentists to **remove an average of 47%** of the tooth structure prior to the procedure

AN HONEST LOOK AT CROWN PREPARATIONS

As illustrated below, crowns, veneers, and onlays require the removal of a significant amount of healthy tooth structure. Bioclear dentists can leave most or all of the tooth structure. Bioclear is a very attractive option to patients.





BIOCLEAR

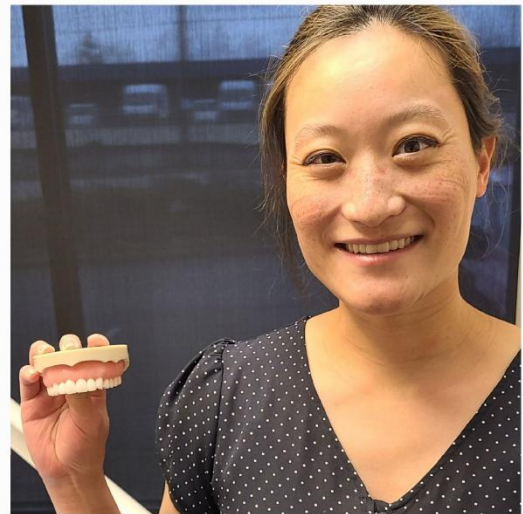
LEARNING CENTER

Tacoma USA · Solihull UK
Varberg Sweden · Cairo Egypt
Syracuse Italy









Last week's attendees at the certification course



BIOCLEAR
LEARNING CENTER

Welcome

Dr. John Servinis
Toronto, ON
Dr. Leo Sonnler
Austin, TX
Dr. Randal Valenta
Marion, WI
Dr. Whitney Wolff
Lexington, TX

WiFi: BioclearLearn
Password: bikt120

BIOCLEAR
LEARNING CENTER

Welcome

Advanced Posterior Solutions

Registration and Continental Breakfast
Introduction to Advanced Posterior Solutions

Lecture: Opportunistic Class II & Bioclear Overlay

Dinner and Reception
(Guests: Dr. Randal Valenta, Dr. Leo Sonnler, Dr. John Servinis, Dr. Whitney Wolff)

Lunch

Lecture: Modified Hall & Dugg Margin Techniques

Dr. John Servinis
Dr. Leo Sonnler
Dr. Randal Valenta
Dr. Whitney Wolff

Champagne Toast

BIOCLEAR
LEARNING CENTER

Dr. Lakshmi Rao
Houston, TX

BIOCLEAR
LEARNING CENTER



Learning Center Lexicon

- The Direct Contact Strut
- The Infinity Edge Margin or Tooth Restoration Interface (TRI)
- Progressive Wedging
- Deep Margin Acquisition (Temporarily deepening the sulcus)
- Angle of Incidence (Matrix to tooth)
- Angle of Incidence (composite to enamel rods)
- Driving the matrix to partly displace the gingival attachment to achieve a perfect seal
- Pressurizing the *System*
- The power and importance of a resin surfactant
- Optimizing the neighboring contacts (creating parallel guide planes)
- The dimple contact
- The Clark Pocket in a Class II restoration
- Regional C-Factor
- Maximizing the enamel/dentin surface area ratio
- Creating Compression at the Primary strike point
- Aquarium matrices vs. shield matrices
- Anatomic vs. volume matrices
- Class I lever vs. a Class II lever
- Prescriptive Selective Caries Removal (SCR)
- Taking the tooth shape to 80% in multi tooth cases
- Double Direct Contact Struts (midline diastems)
- Patient centered vs. doctor centered outcomes

Dr Jose Moura 5/2025 Taubate Brazil




















The Great Tooth Killer: Epidemic of Cracked Teeth, the Science of Strong Teeth

THE SCIENCE OF STRONG RESTORED TEETH



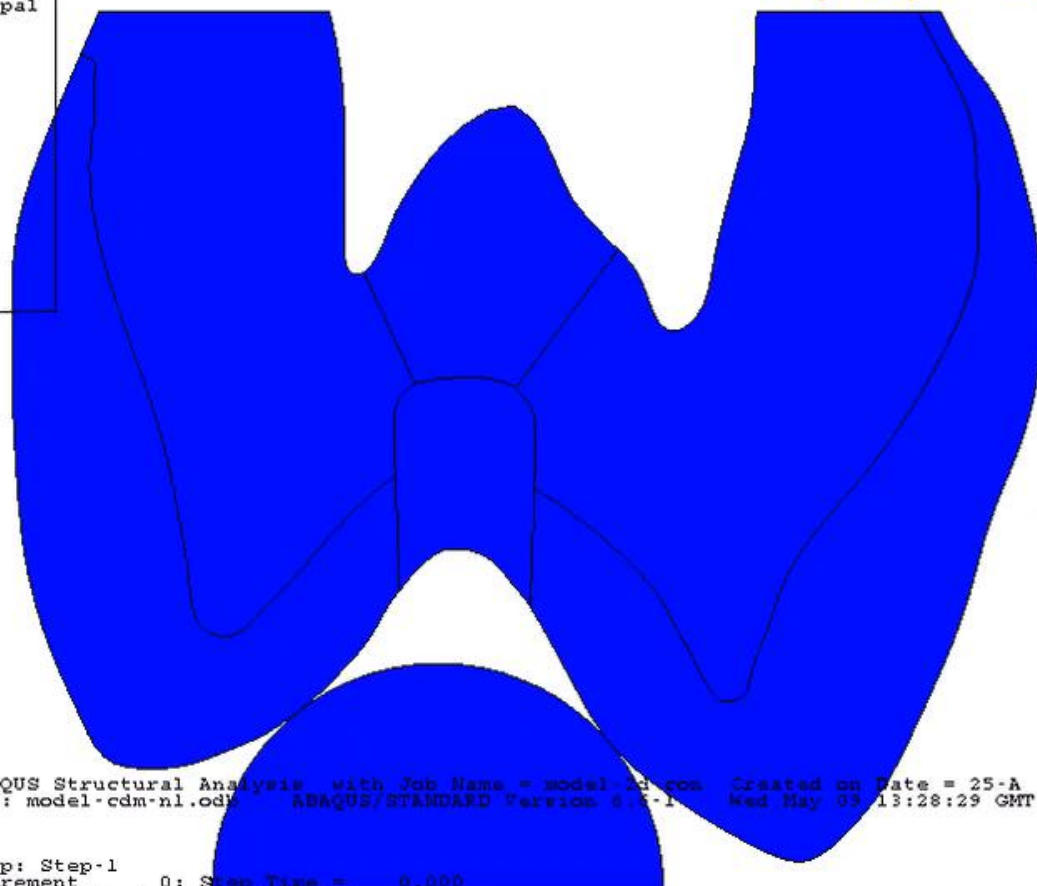
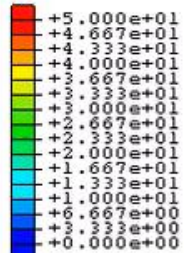
DR. DAVID CLARK



DR. ALEX FOK

Step: Step-1 Frame: 0

S, Max. Principal
(Avg: 75%)



2
3
1

ABAQUS Structural Analysis with Job Name = model-nl.odb Created on Date = 25-A
ODB: model-cdm-nl.odb ABAQUS/STANDARD Version 6.6-1 Wed May 03 13:28:29 GMT Daylight

Step: Step-1
Increment 0: Span Time = 0.000
Primary Var: S, Max. Principal
Deformed Var: U Deformation Scale Factor: +1.000e+01



Modern Method for Composite Restorations

Bioclear Anatomic Matrices

- Anterior & Posterior Matrices designed to mimic or improve nature



Preparation Design

- I.C.E. Infinity edge, Compression based, Enamel driven
- Maximizes enamel involvement by going "around the tooth"

Biofilm Removal

- Bioclear Blaster removes biofilm before bonding
- Allows bonding to uncut enamel
- Allows infinity edge margins

Injection Mold Composite

- Injection mold warmed Solventum Restorative materials
- Industry leading polish, esthetic, strength & wear

Rock Star Polish

- 3M™ Sof-Lex™ XT coarse discs for reduction
- "Rock Star" polish with Bioclear Magic Mix & RS Polisher

1st Pillar of Modern Composite

Disclosing of Biofilm, then
Blasting to remove Biofilm plus
remove Protein Pellicle

Part 1 | Biofilm Removal

If you were going to paint a wall that looked like this....



...you'd prepare the surface to receive the paint and have it stay long-term.

We need to do the same with teeth...



Clean teeth surfaces allow for

- Better adhesion
- Difference between “Flash” and an infinity edge at the Tooth Restoration Interface

Does 37% phosphoric acid
(gel etchant)
remove biofilm?

Composite
Heating: Trend
or the future of
placing the
material?

Composite Heater pre-set
to 155° F



Conclusions

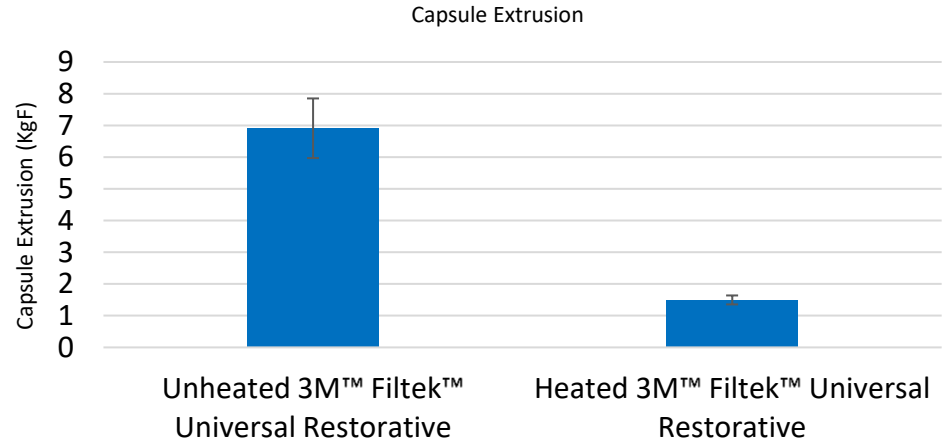
- Preheating a syringe of Filtek™ Bulk Fill Posterior to 60 °C for twenty 1 hour increments does
 - NOT harm mechanical properties such as
 - Diametral tensile strength
 - Flexural strength
 - NOT harm cure properties such as
 - Depth of cure
 - Cusp deflection (polymerization shrinkage stress)
 - NOT harm esthetic properties such as
 - Color and opacity
 - Polish retention

From: Does Preheating a Dental Composite Degrade its Post-Cure Properties?
T.D. Dunbar et al., *J Dent Res* 95 (Spec Iss A):952, 2016 (www.iadr.org).

Composite warming

Why warm?

- Handling preference
- Lowers capsule extrusion force by 75-80%



3M internal data

14% of dentists survey stated they use some type of device to warm their composite prior to placement.

3M Market Research, January, 2018 N=304 Dentists (US, Russia, UK, Brazil, Germany)

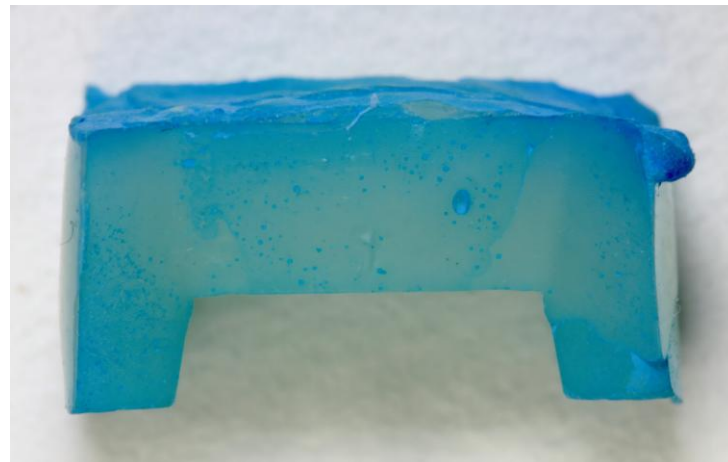
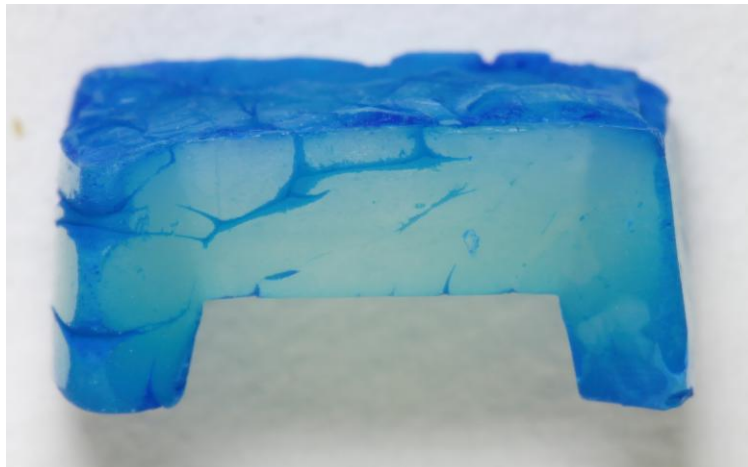
Let's go back to 2007...

“Dr. Clark, aren't we supposed to layer everything?”

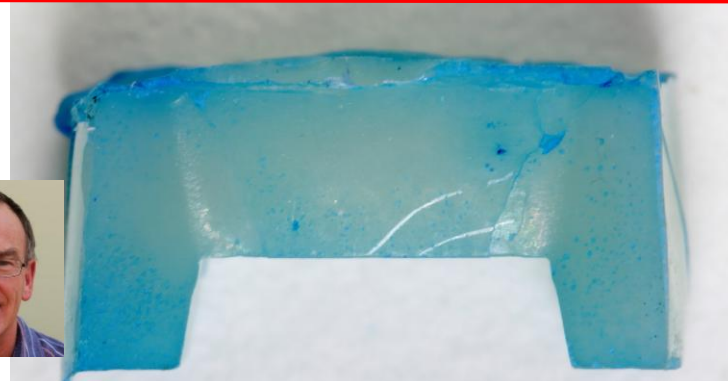
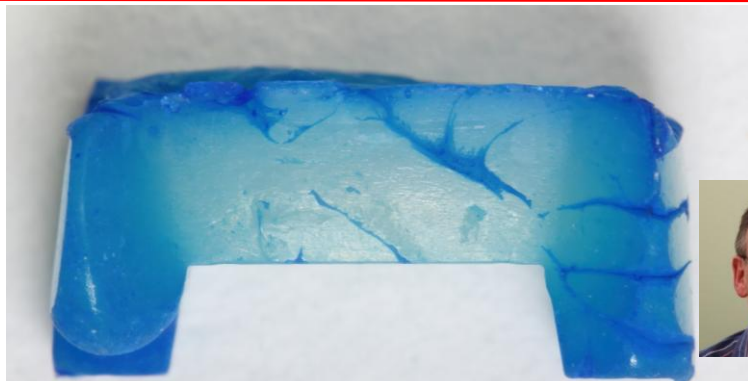
Hand-Packed and Layered

Monolithic and Injection-Molded

Dr. #1



Dr. #2



Courtesy Dr. Richard Price

A microscopic image of a tooth with a filling. A dark spot is visible at the interface between the filling and the tooth, indicating microleakage. The text is overlaid on a dark blue rectangular background.

Is layering a good thing or a bad thing?

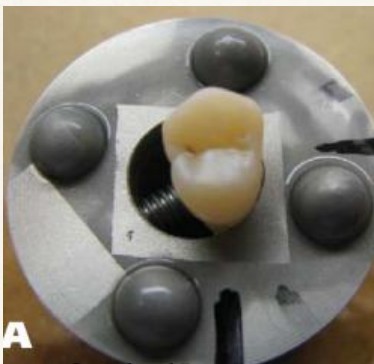
Does layering relieve stress and reduce microleakage? **NO**

Studies do not support layering to mitigate polymerization stress

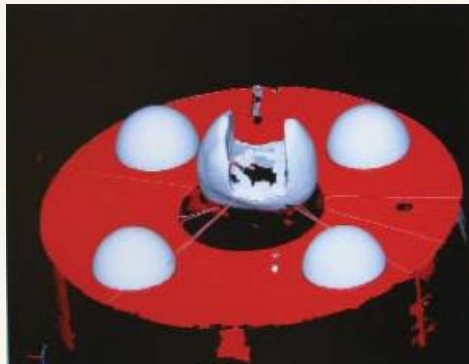
- ◆ Does Incremental Filling Technique Reduce Polymerization Shrinkage Stresses?
Versluis A, et.al., J Dent Res March 1996; 75(3): 871-878
- ◆ An In Vitro Study of the Effect of Restorative Technique on Marginal Leakage in Posterior Composites
Neiva IF, et.al.; Oper Dent 1998, 23:282-289
- ◆ Microleakage and adaptation of Class II packable resin-based composites using incremental or bulk filling techniques
Gallo JR, et.al., Am J Dent 2000; 13: 205-208
- ◆ The Effects of Adhesive Thickness on Polymerization Contraction Stress of Composite
Choi KK, et.al., J Dent Res 2000; 79(3): 812-817
- ◆ Microleakage of Posterior Packable Resin Composites with and without flowable liners
Leevailoj C, et.al., Oper Dent 2001; 26: 302-307
- ◆ Marginal adaptation of Class II resin composite restorations using incremental and bulk placement techniques: and ESEM study
Idriss S, et.al., J Oral Rehab 2003; 30: 1000-1007
- ◆ A reappraisal of the incremental packing technique for light cured composite resins
Rees JS, et.al., J Oral Rehab 2004; 31: 81-94
- ◆ Cuspal deflection and depth of cure in resin-based composite restorations filled by using bulk, incremental and transtooth-illumination techniques
Carlos E. Campodonic, DDS 2011, October 2011 JADA

October 2011 JADA

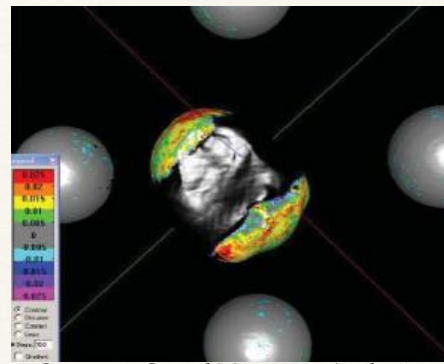
Cuspal deflection and depth of cure in resin-based composite restorations filled by using bulk, incremental and transtooth-illumination techniques



Completed Restoration



COS Scan



Computer Cuspal Movement Analysis

"Conclusions: Cuspal deflection was not affected by filling techniques."

"Filtek Supreme Plus had lower curing values below a depth of 2 mm."

"Clinical Implications. When using resin-based composite restorative materials, clinicians should be more concerned about the effect of filling techniques on curing depth than about how these techniques affect shrinkage stresses."

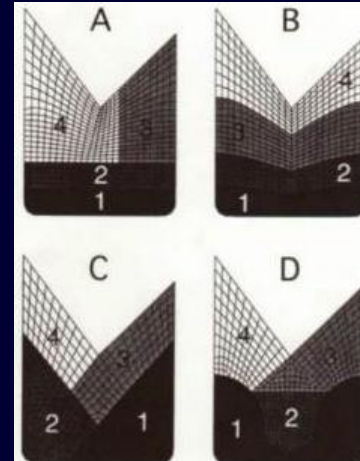
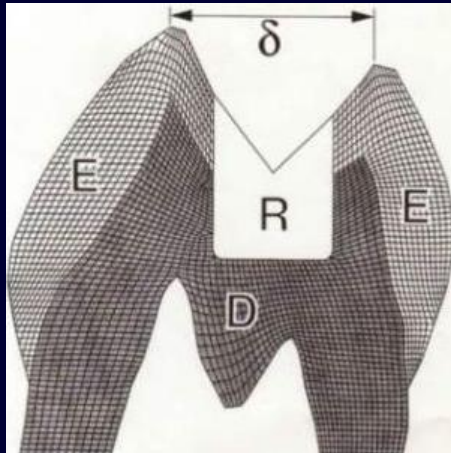
Does an incremental filling technique reduce polymerization shrinkage stresses?

Versluis A, Douglas WH, Cross M, Sakaguchi RL.

Minnesota Dental Research Center for Biomaterials and Biomechanics, University of Minnesota, Minneapolis 55455, USA.

Abstract

It is widely accepted that volumetric contraction and solidification during the polymerization process of restorative composites in combination with bonding to the hard tissue result in stress transfer and inward deformation of the cavity walls of the restored tooth. Deformation of the walls decreases the size of the cavity during the filling process. This fact has a profound influence on the assumption—raised and discussed in this paper—that an incremental filling technique reduces the stress effect of composite shrinkage on the tooth. Developing stress fields for different incremental filling techniques are simulated in a numerical analysis. The analysis shows that, in a restoration with a well-established bond to the tooth—as is generally desired—incremental filling techniques increase the deformation of the restored tooth. The increase is caused by the incremental deformation of the preparation, which effectively decreases the total amount of composite needed to fill the cavity. This leads to a higher-stressed tooth-composite structure. The study also shows that the assessment of intercuspal distance measurements as well as simplifications based on generalization of the shrinkage stress state cannot be sufficient to characterize the effect of polymerization shrinkage in a tooth-restoration complex. Incremental filling methods may need to be retained for reasons such as densification, adaptation, thoroughness of cure, and bond formation. However, it is very difficult to prove that incrementalization needs to be retained because of the abatement of shrinkage effects.



Epidemic of Failing Composites

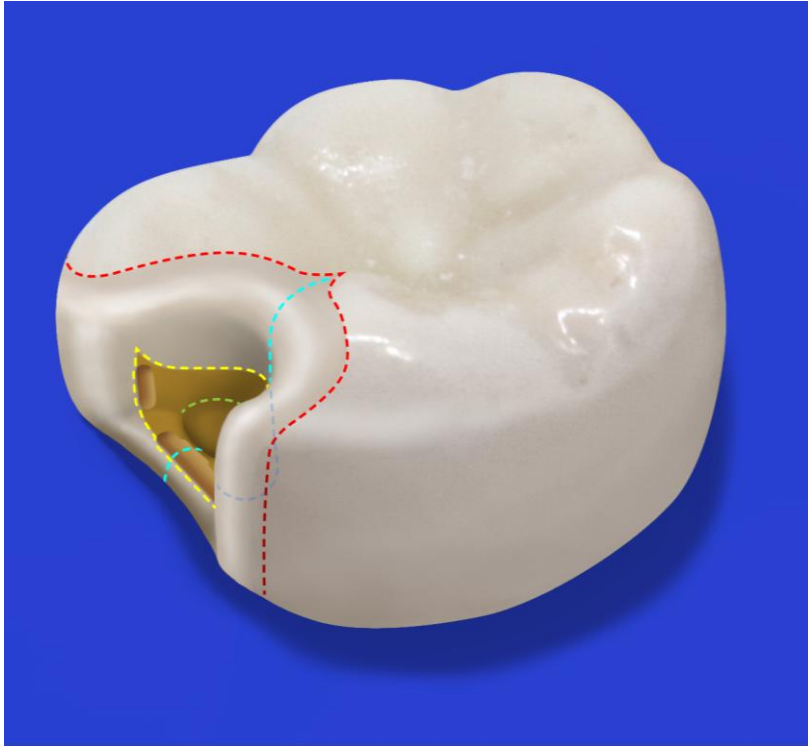


Modern Class II Cavity Preparation Design

The Prep?



Final views of completed Bioclear Class II Preparation.





before

The Bioclear method





Infinity edge
of the T.R.I.

The Bioclear Injection Molding Approach



Failing composite;
traditional preparation



Re-Restored using the
Bioclear Evolve System and Method

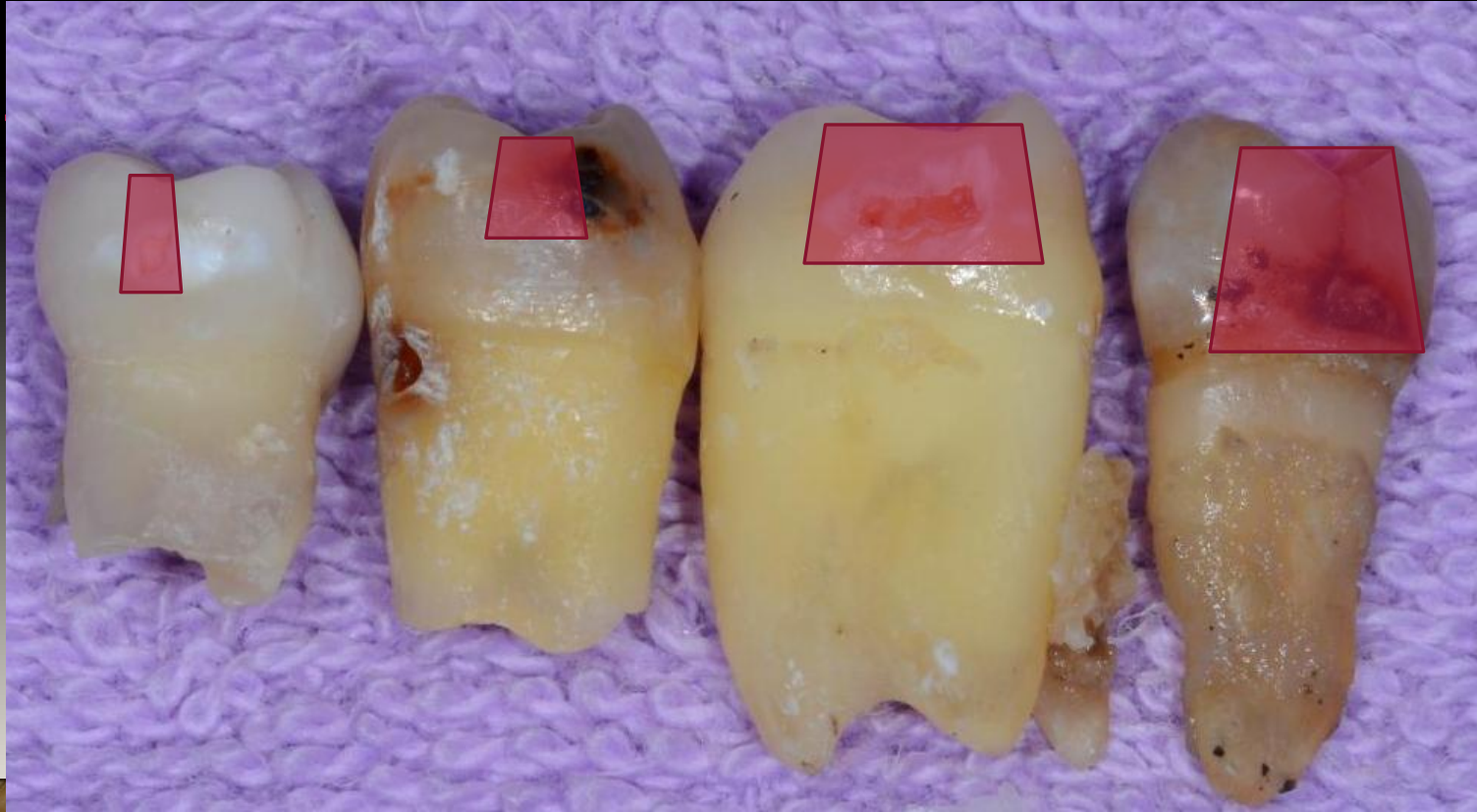
CAVITATION VS APRISMATIC ENAMEL



WHY WOULD WE PUT A MARGIN IN THE *DISEASE ZONE*?



FOUR WAYS TO CUT A TRAGIC SLOT PREP



LET'S PUT IT ALL TOGETHER WITH EVOLVE



The Bioclear Evolve All In One Kit





One of the many
problems with a Slot
Prep



One of the many
problems with a Slot
Prep

















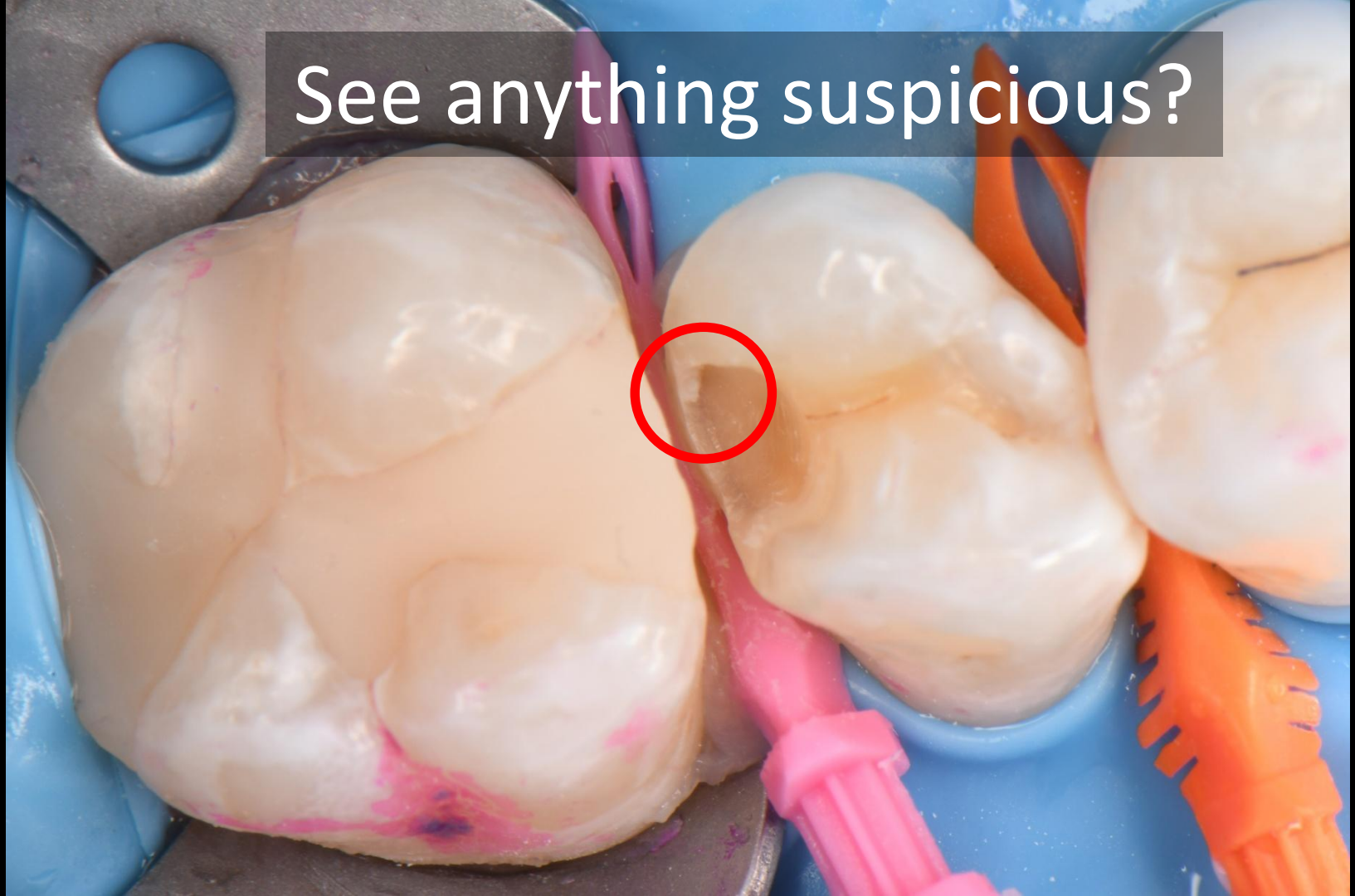








See anything suspicious?















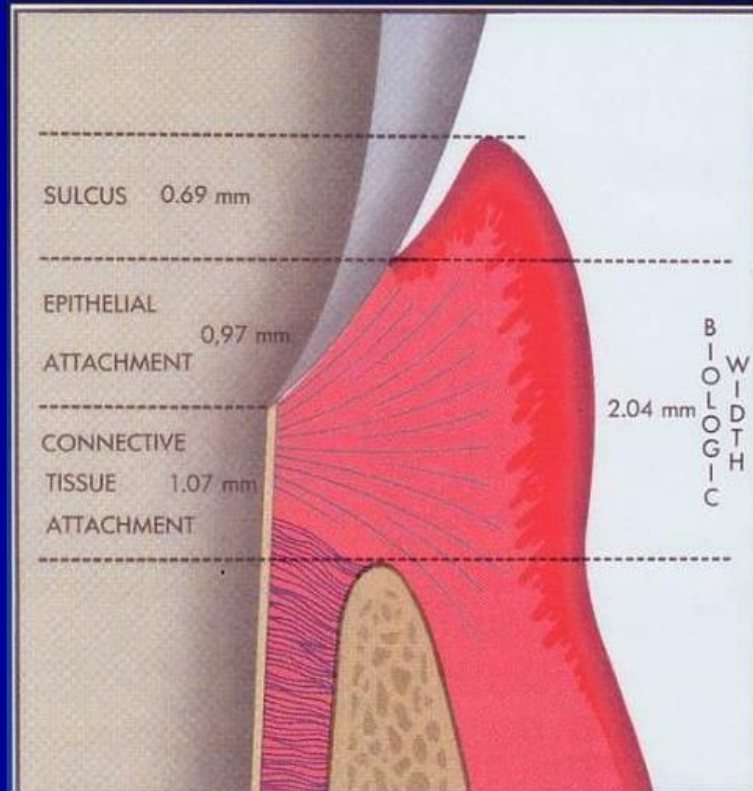
What's my
reference?

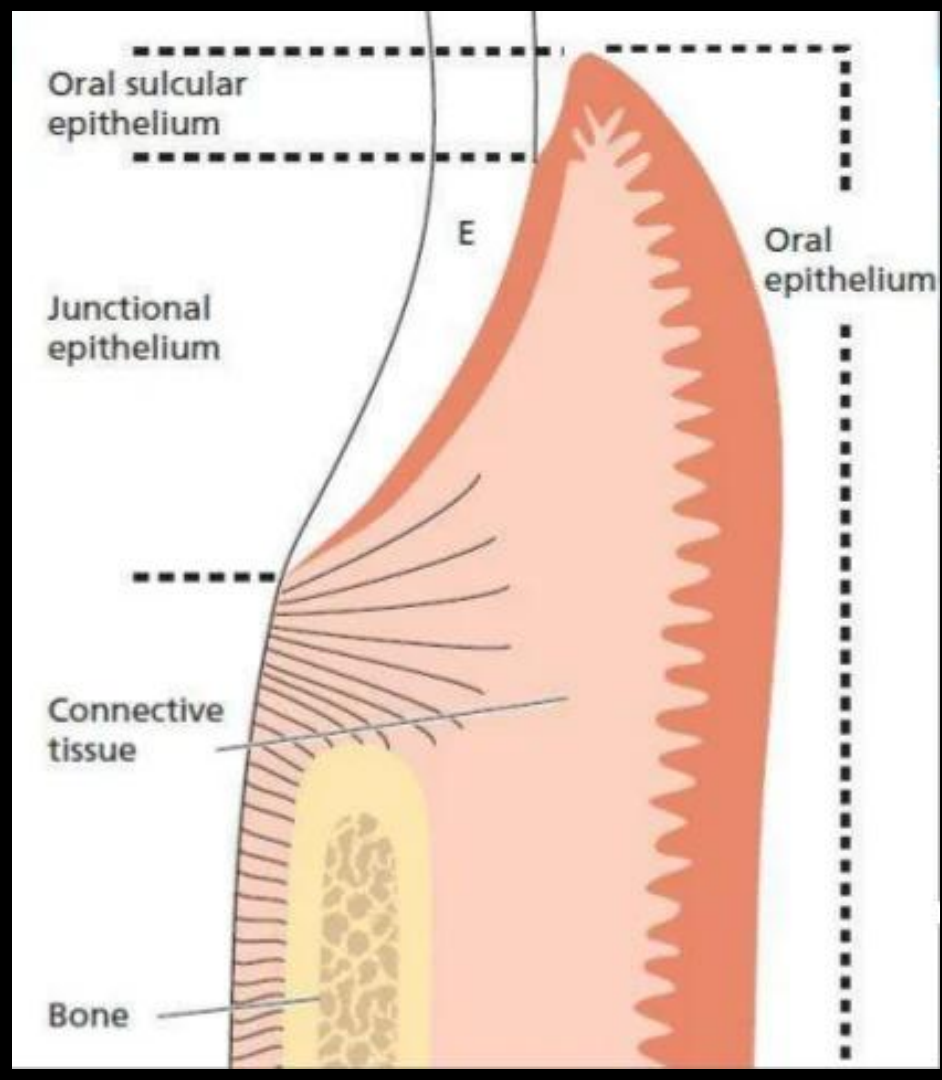
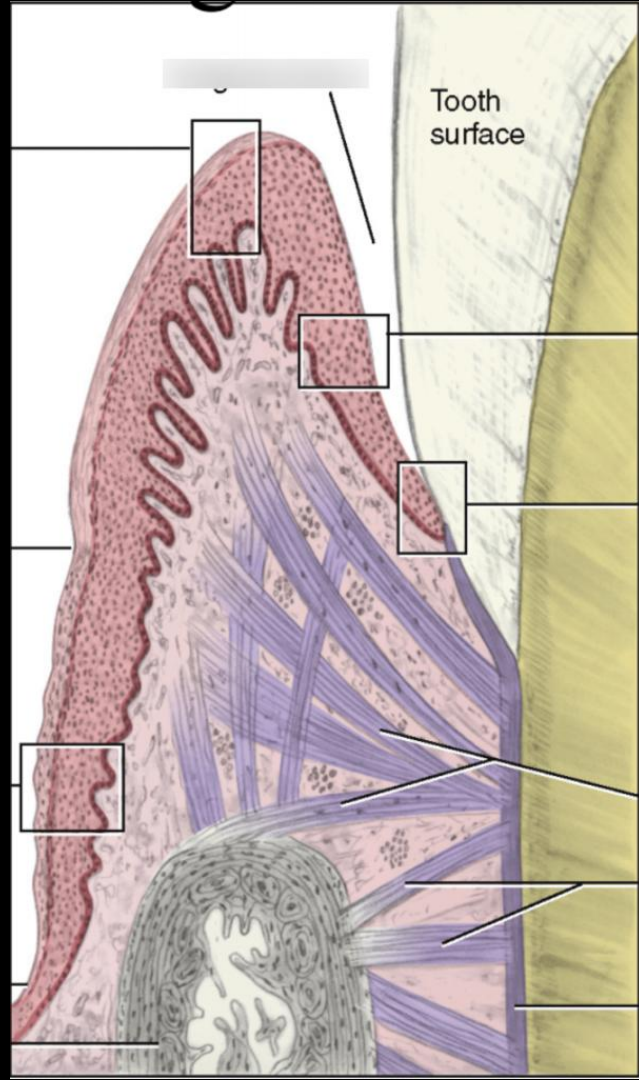


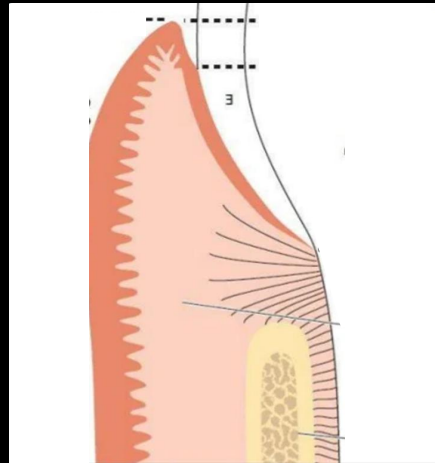
What's my
reference?

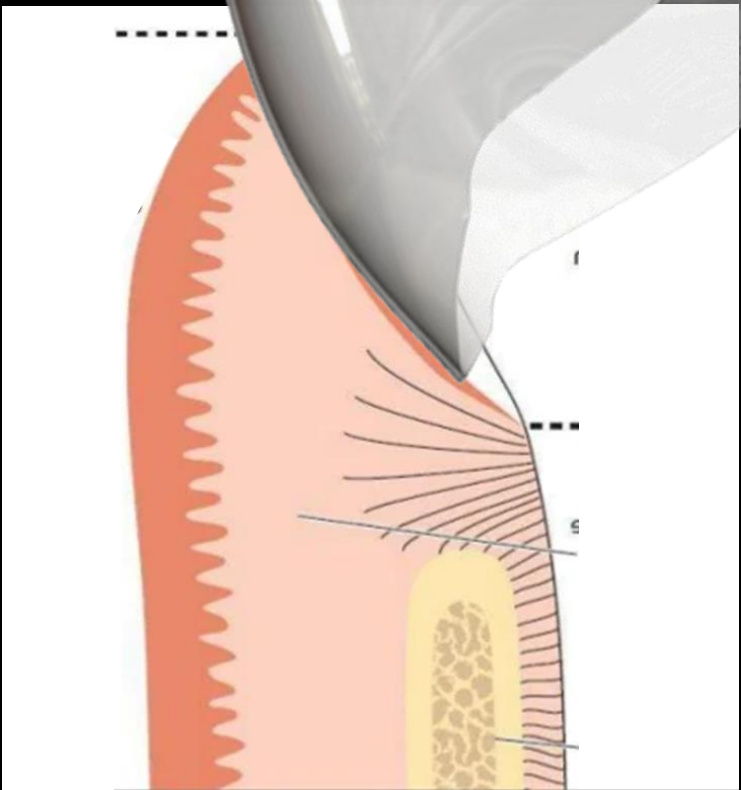


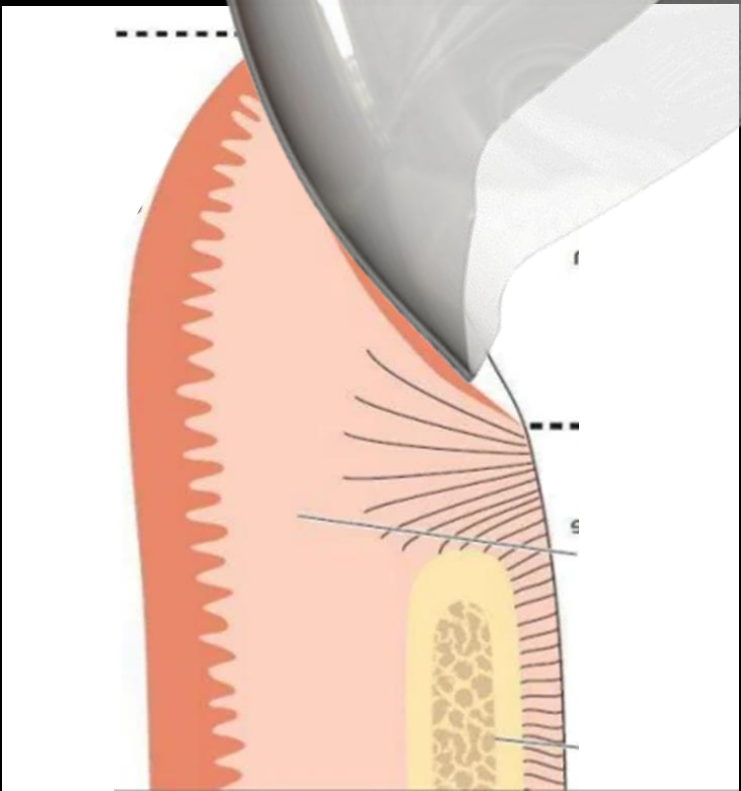


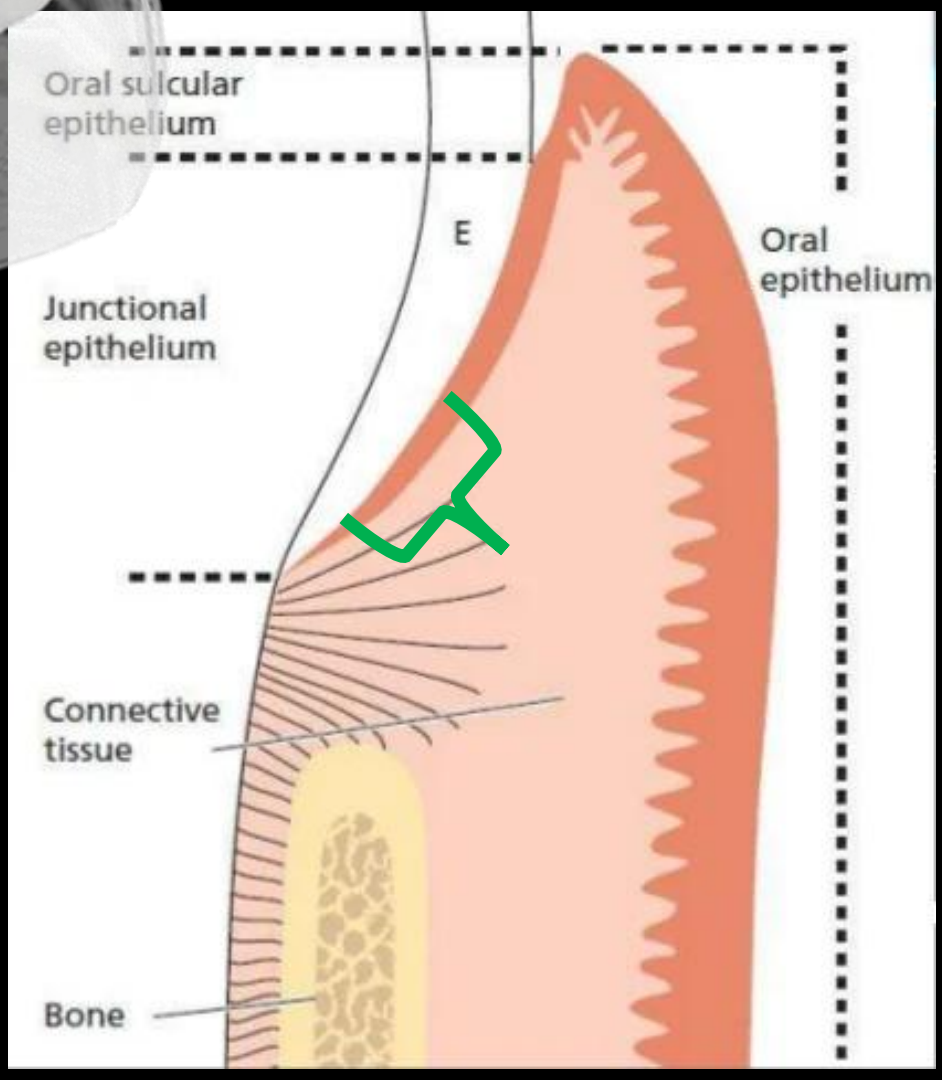
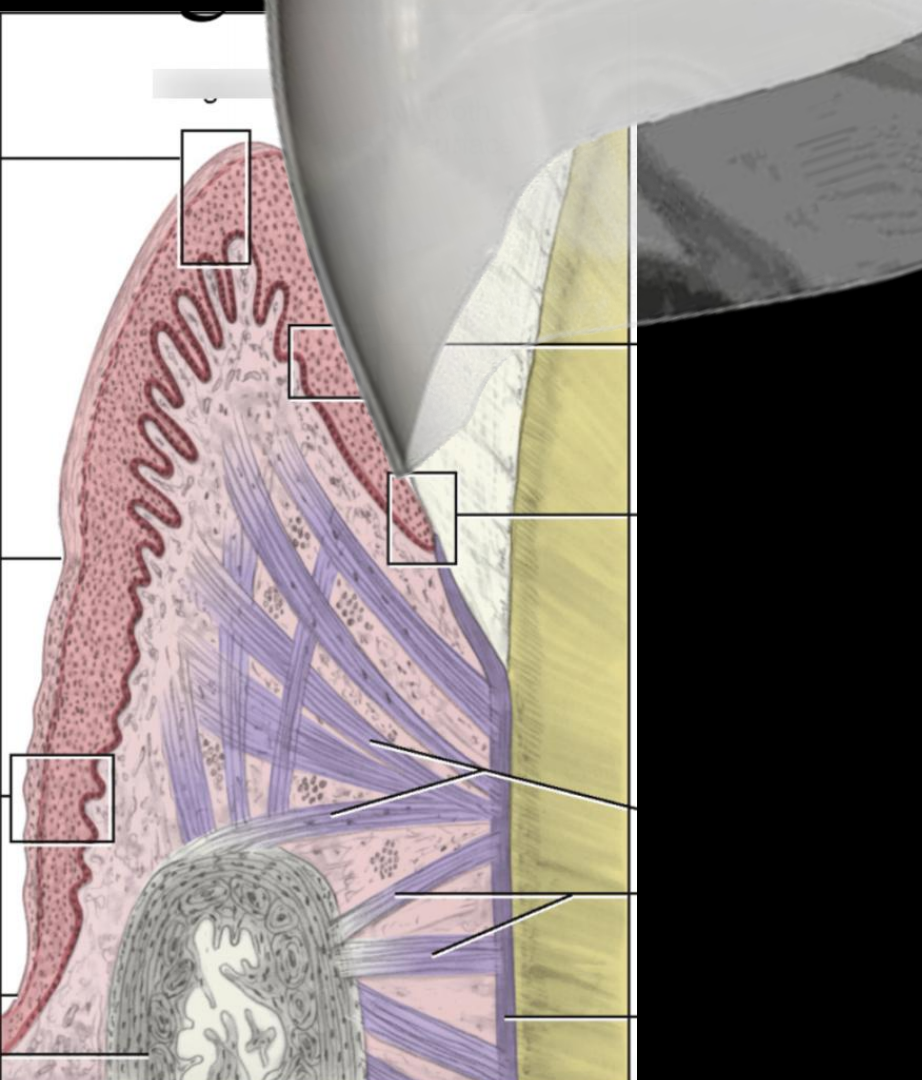












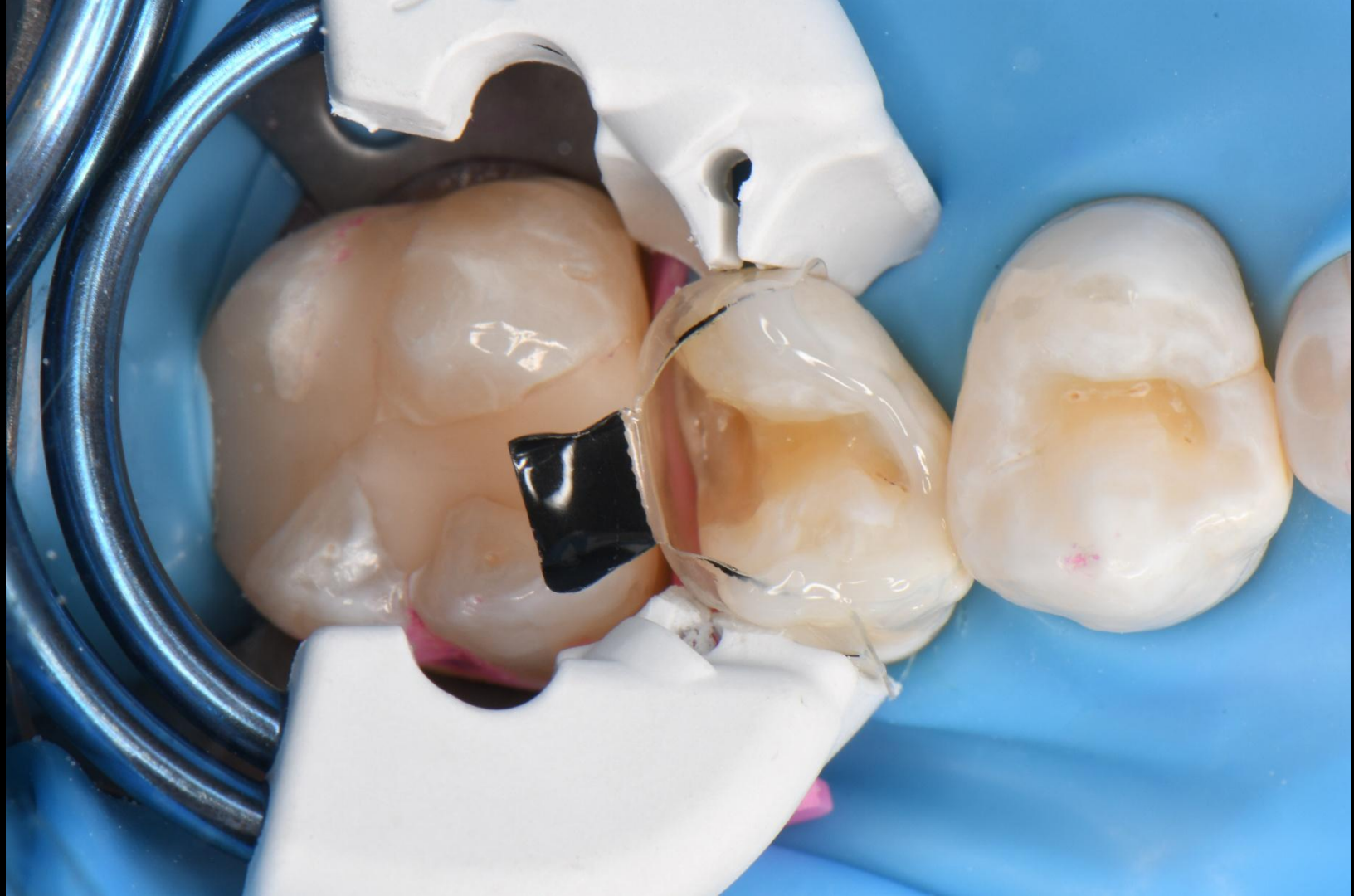


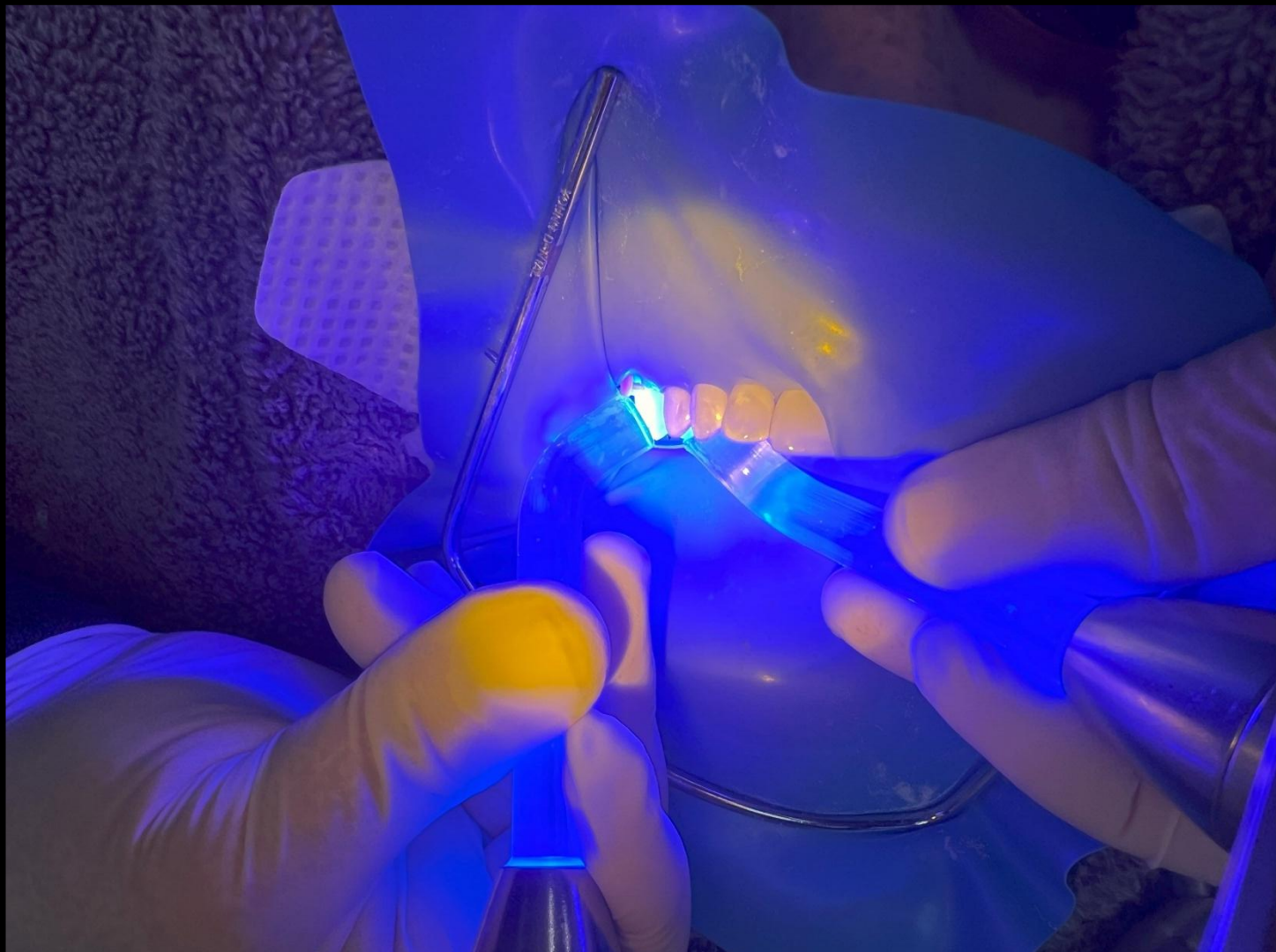






















Similar Case: Pre-op, post op, and 3 year follow up





Step by Step Guide for Injection Molded Class II

Are all
Separators
Equal?

NO!



Stretched to 20mm ONCE!!!





And now most of the power is permanently lost

Once the yield of the metal/shape is reached, the metal undergoes plastic deformation

Stretched to 20mm Twenty Times

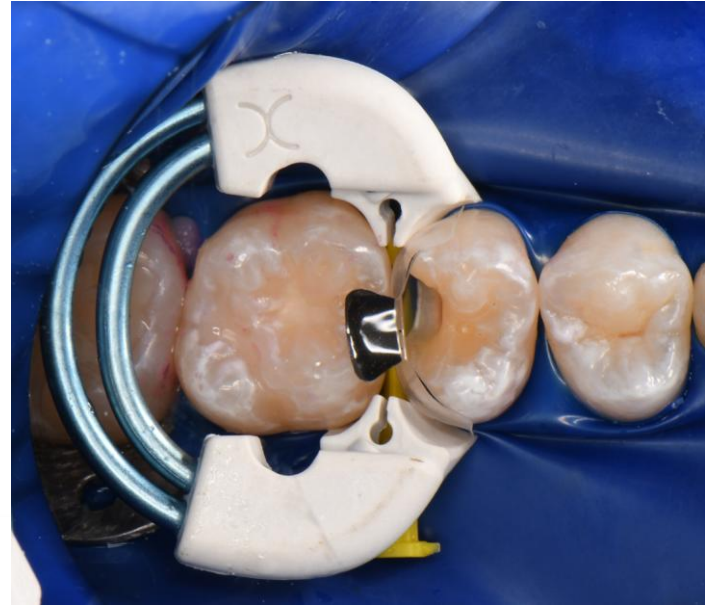
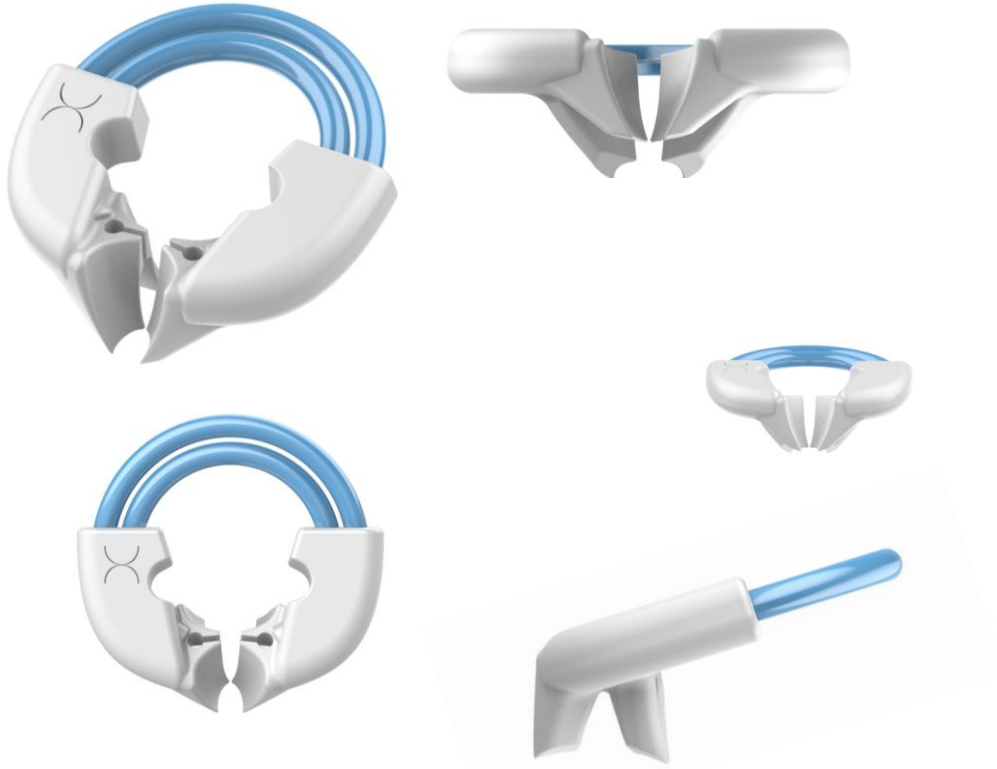


Stretched to 20mm Twenty Times



TwinRing Universal

∞ BIOCLEAR





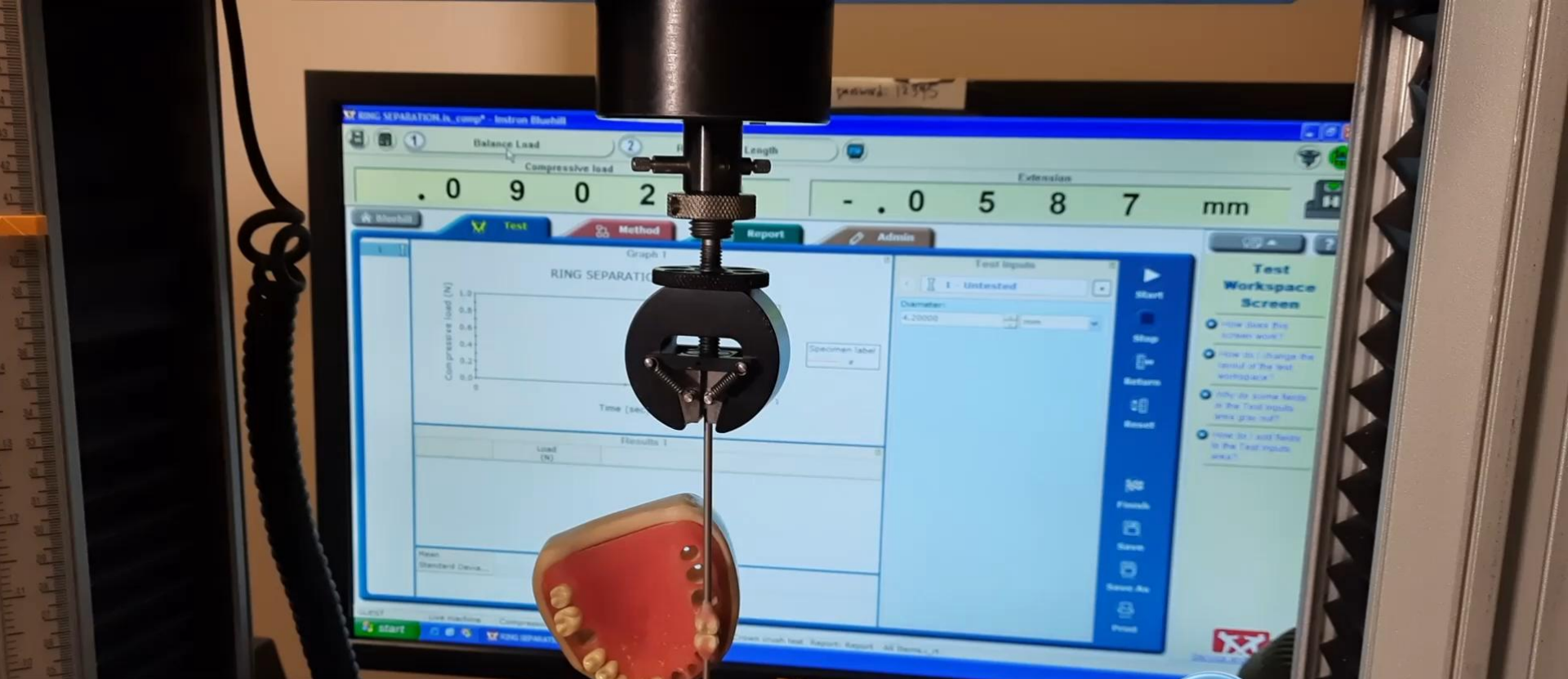
How do we win the *Snug Contact Game?*

- Power
- Strategy
- Technique



How do we win the *Snug Contact Game?*

- Power
- Strategy
- Technique



Nate Lawson DMD PhD

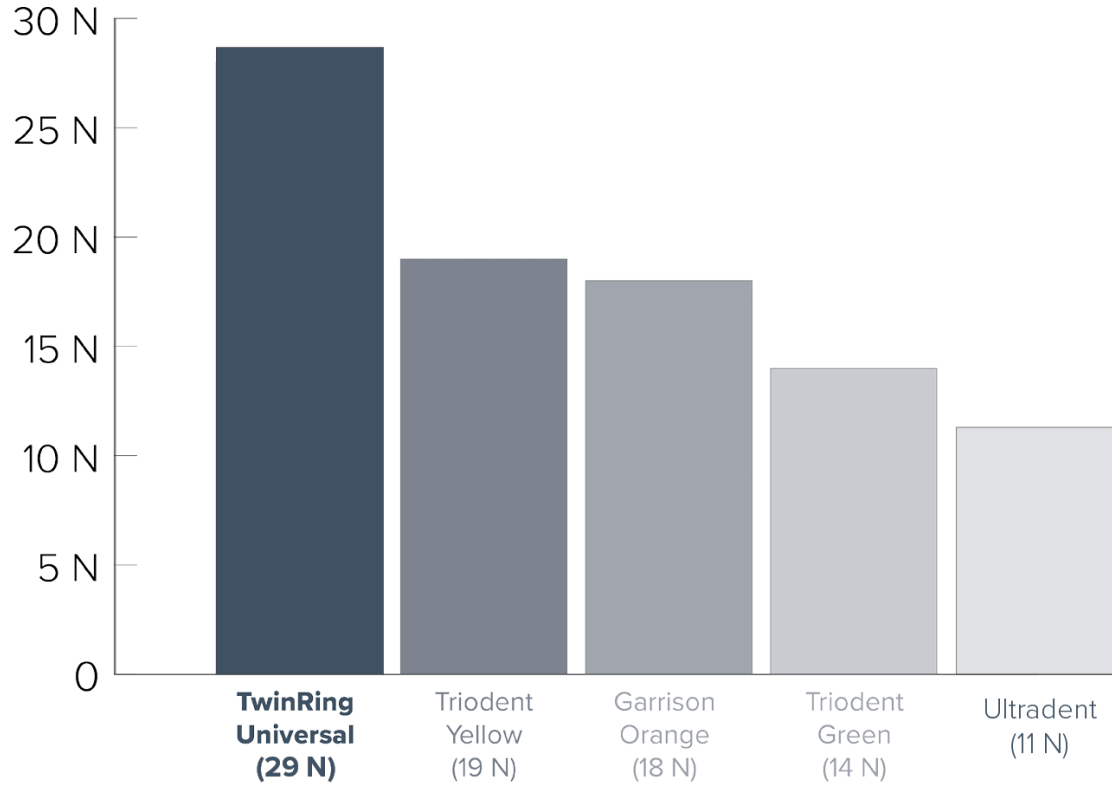
Director of the Division of Biomaterials and Pranit Bora. BDS, MDS.

Resident, Division of Biomaterials UAB School of Dentistry



TwinRing Universal
28 N

TwinRing Universal Instron Comparison



Note: Rings tested are not new and some rings stretch out quickly and lose up to half of their power after multiple uses. 1N = 1kg (m/s/s)

∞ BIOCLEAR

Bioclear Matrices - Posterior





EVOLVE --- MATRIX

Premolar



Molar



EVOLVE
MATRIX

Premolar Evolve: Width & Profile

- Evolve premolar matrices come in one width and profile – Black – to fit a variety of premolar tooth shapes

BLACK EVOLVE

Designed with an aggressively rounded emergence profile. Shaped specifically for premolar teeth, these matrices can be used anywhere you would typically use a Biofit matrix or BT matrices on premolars.

Tip: Rotate the matrix into place.



Premolar Normal
Width

Black Premolar Evolve

∞ BIOCLEAR



5 Sizes

5mm

6mm

7mm

8mm

10mm

- Curved profile
- Normal width for a premolar



5 Sizes

5mm
6mm
7mm
8mm
9mm

- Curved profile
- Normal width

Molar Evolve: Width & Profile

- Evolve matrices come in three widths and profiles – Blue, Orange, and Pink – to fit a variety of posterior tooth shapes

BLUE EVOLVE

Designed with an aggressively rounded emergence profile and an average width. Blue Evolve is suitable for the majority of posterior cases.

Tip: Rotate the matrix into place.



Normal width

ORANGE EVOLVE

Features a flatter emergence profile than the Blue Evolve. Orange Evolve is perfect for patients with average-sized molars where the tooth is too flat for the Blue Evolve

Tip: Use the Orange Evolve if the Blue Evolve inverts



Wide Molar



3 Sizes

6mm

7mm

9mm

- Curved/straight profile
- Wider width

∞ BIOCLEAR

The Adjustable Push-Pull Instrument

for Ideal Contacts

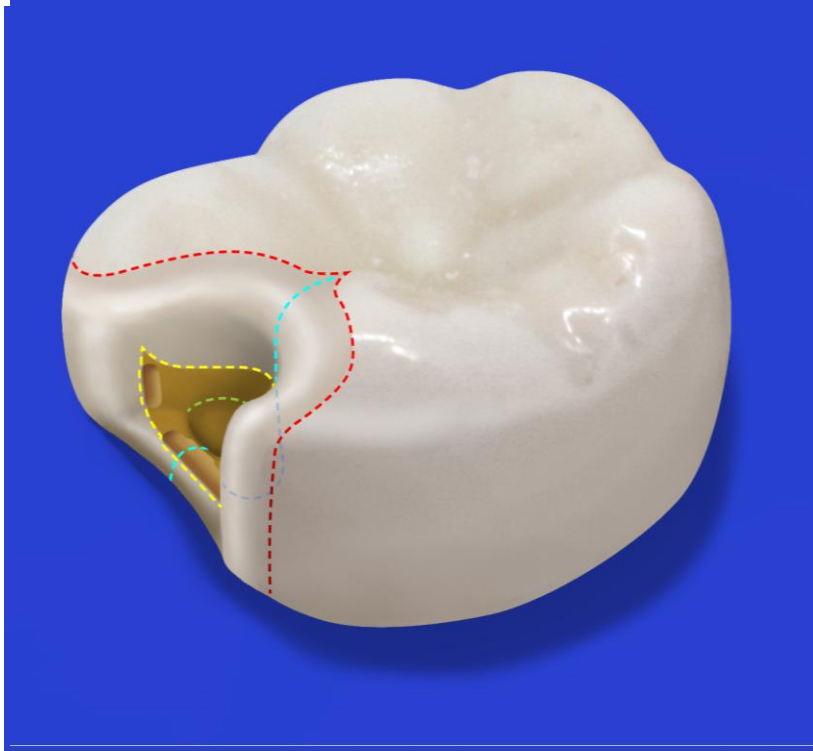


EVOLVE MATRIX SYSTEM

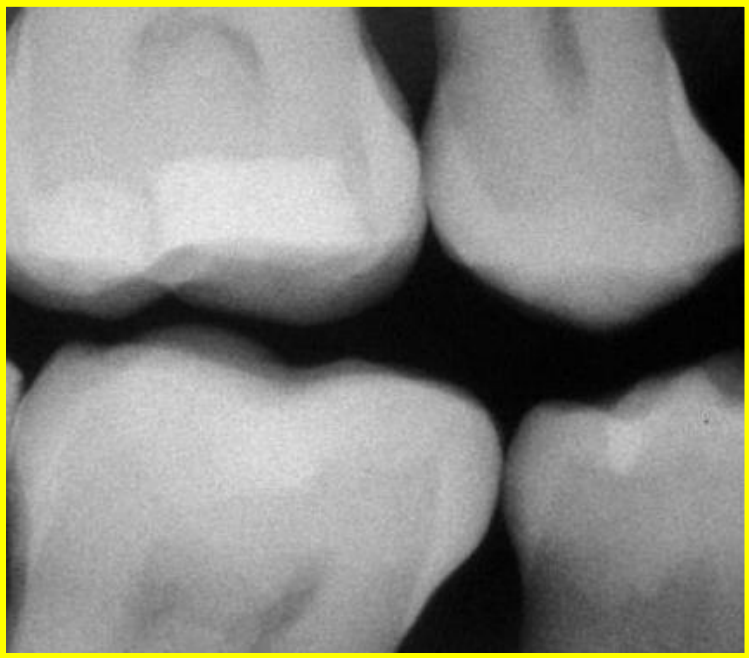
The slip-off test



Final views of completed Bioclear Class II Preparation.



Natural Contacts



Traditional Composite Contacts

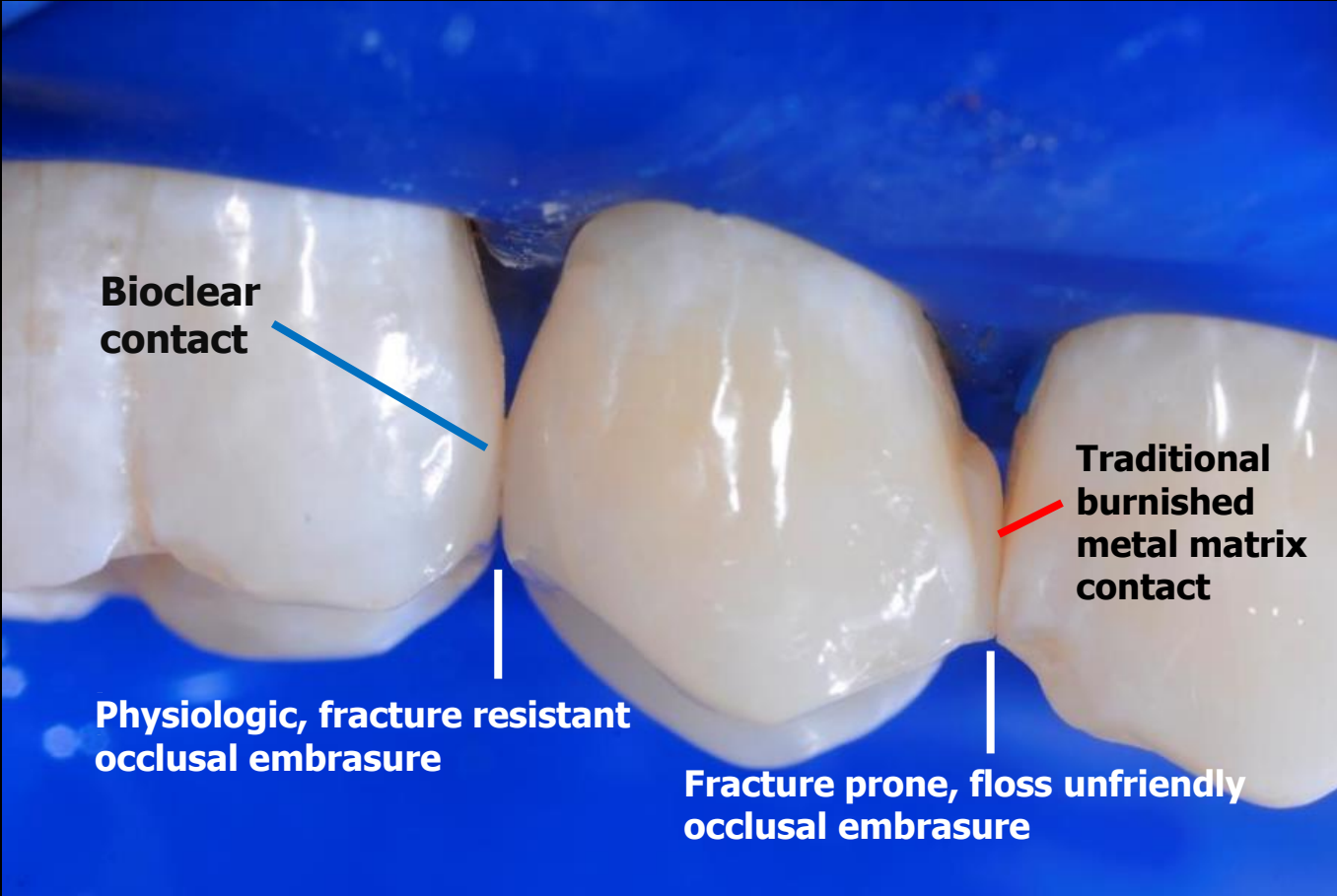


Let's compare old vs. new

Traditional box prep restoration with staining margins and burnished mediocre shape.



Bioclear restoration with Evolve Matrix, Twin Ring Universal, and Diamond Wedge combined with an infinity edge.



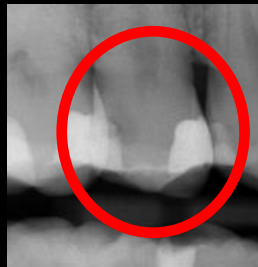
**Bioclear
contact**

**Physiologic, fracture resistant
occlusal embrasure**

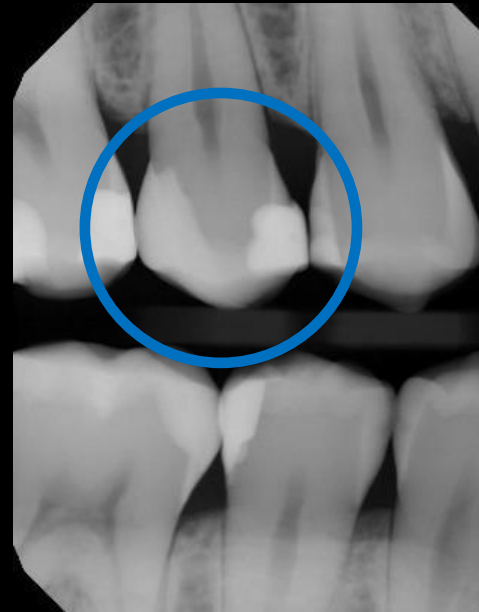
**Fracture prone, floss unfriendly
occlusal embrasure**

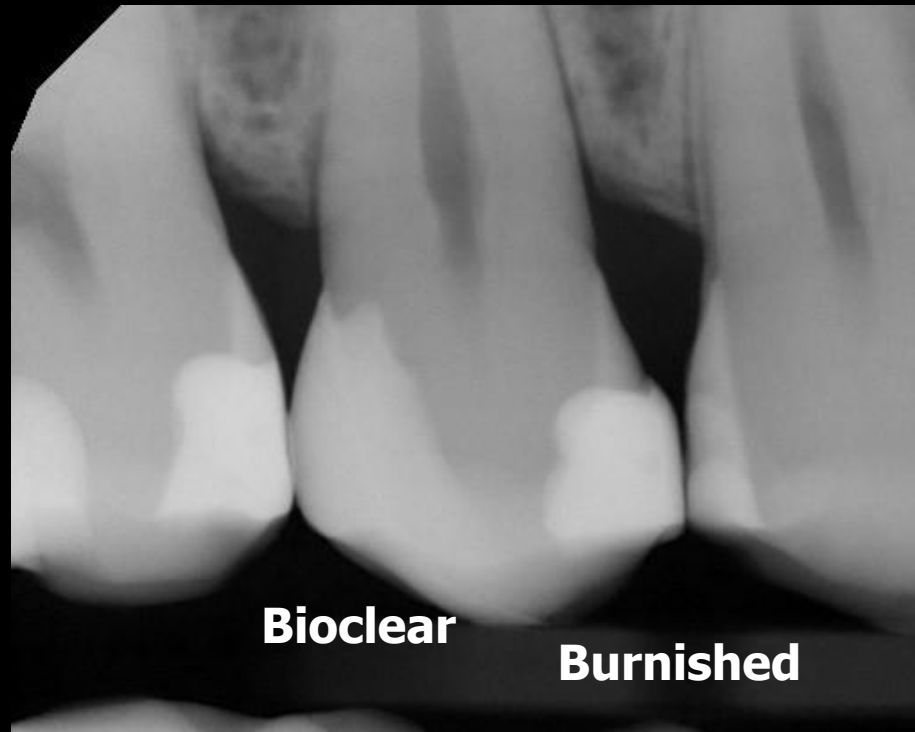
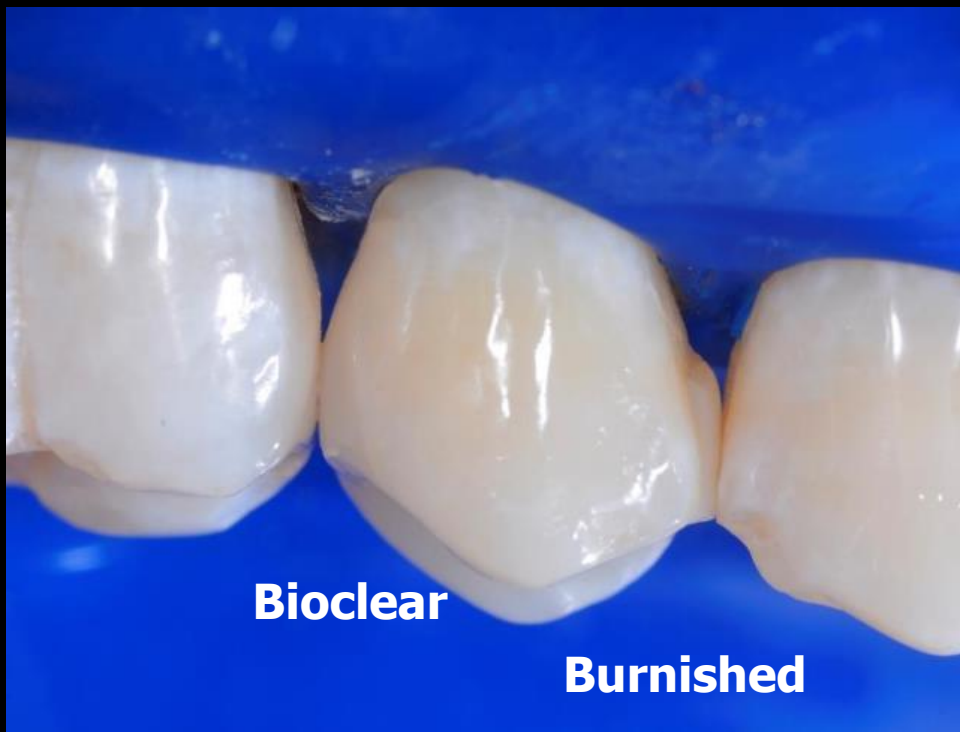
**Traditional
burnished
metal matrix
contact**

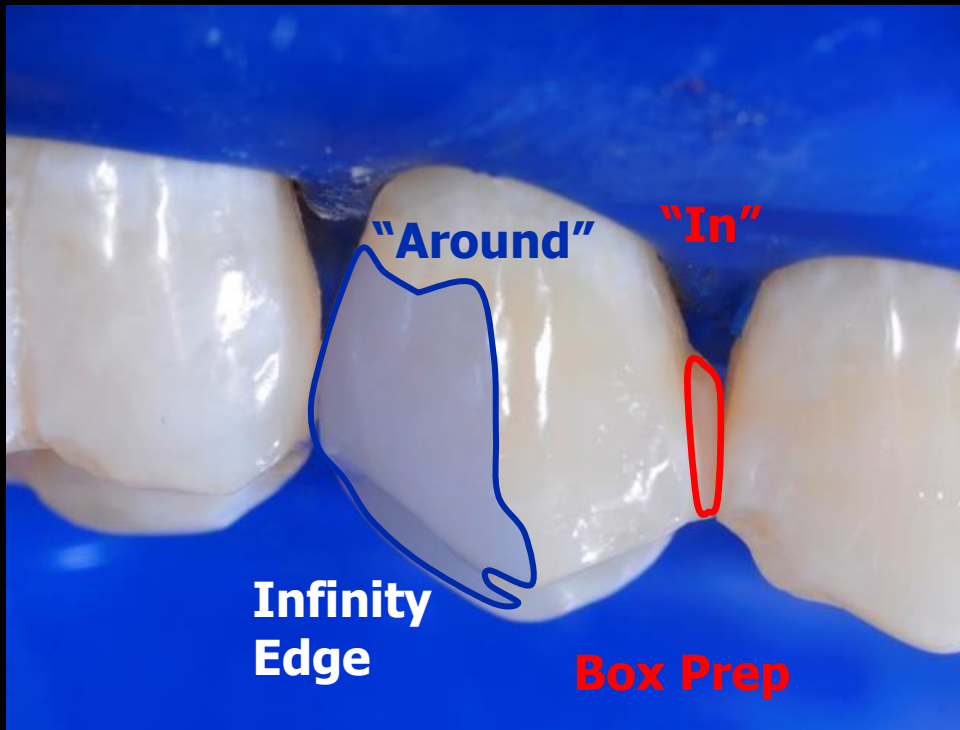
Pre-Operative Radiographs

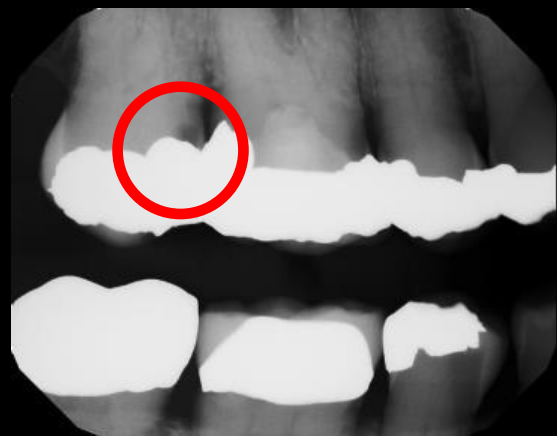


1 Year Post-Operative









Deep Margin Acquisition (DMA)



Inside the prep to our reference = 6mm

- What Evolve matrix color should you choose and what height?
- What's my reference?









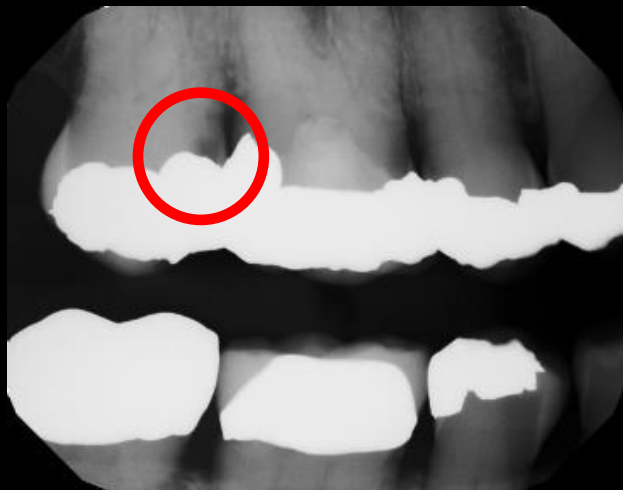




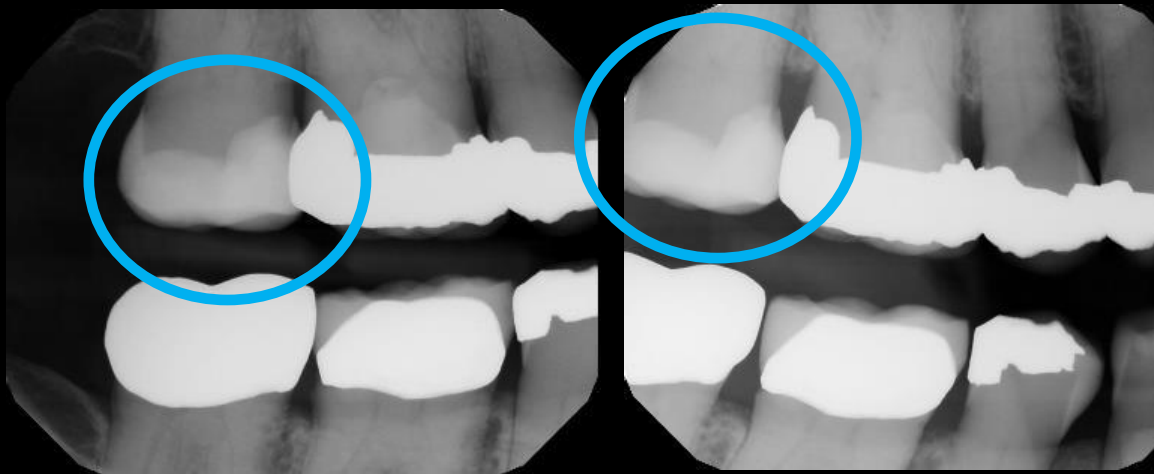




Pre-op



Post-op (two views)

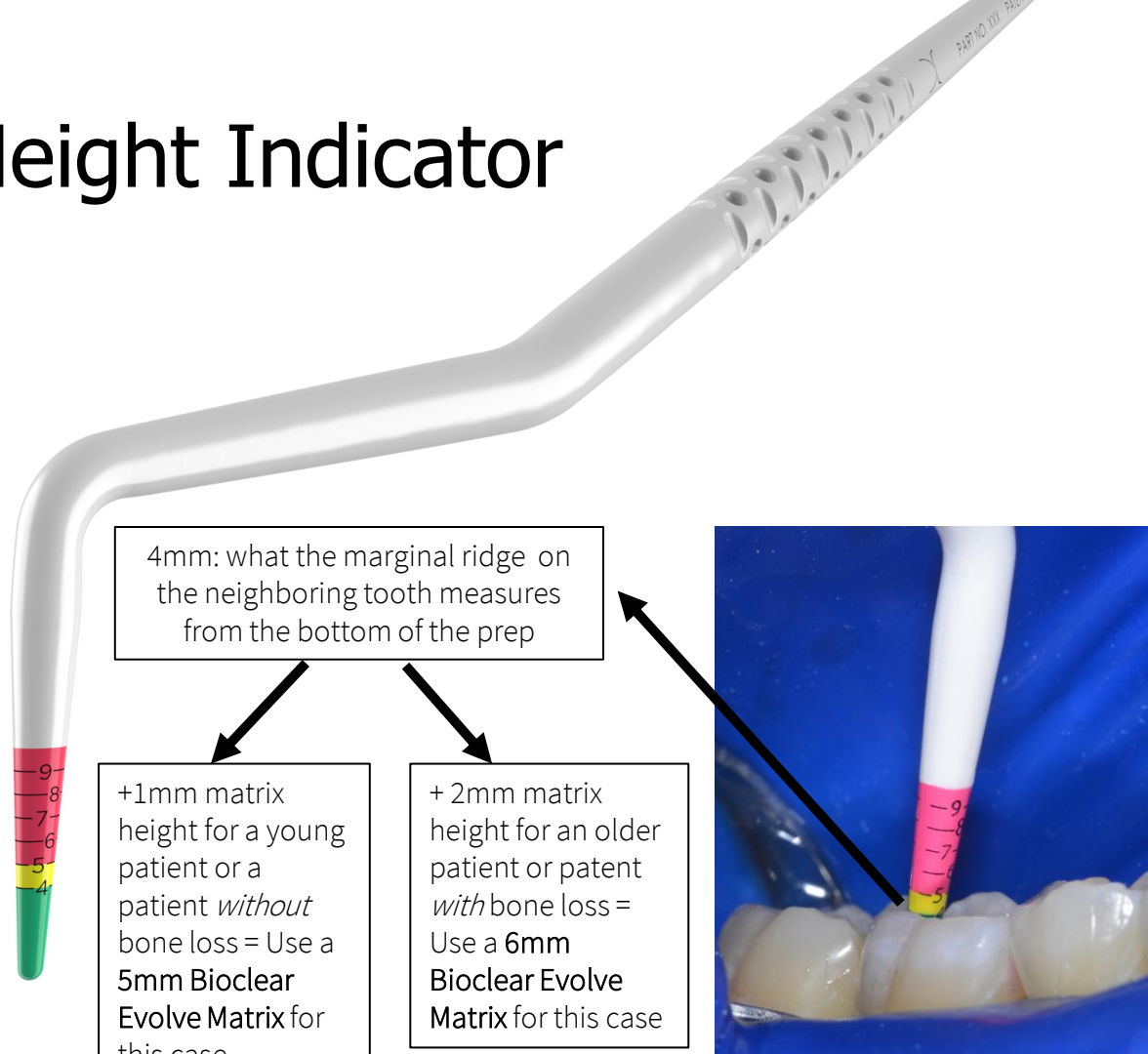


Evolve Matrix Height Indicator

Matrix Height Indicator:

Numbers are printed on the indicator so the correct Evolve matrix for a restoration is chosen the first time. This helps reduce waste when incorrect matrices are chosen.

Once you have measured the depth of the cavity in relation to the marginal ridge of the neighboring tooth, you will generally need to add 1-2mm from that reading.



4mm: what the marginal ridge on the neighboring tooth measures from the bottom of the prep

+1mm matrix height for a young patient or a patient *without* bone loss = Use a 5mm Bioclear Evolve Matrix for this case

+ 2mm matrix height for an older patient or patient *with* bone loss = Use a 6mm Bioclear Evolve Matrix for this case

Evolve Matrix Height Indicator

Go/No-Go:

The colored tip indicates if a cavity prep can be cured in one layer or if more must be used.

Red: NO-GO the composite will be deeper than 5mm

Yellow: GO WITH CONDITIONS

Green: GO



Tip: The best reference point is the marginal ridge of the neighboring tooth. If you are doing a back-to-back restoration and no marginal ridge is available, then use the gauge to estimate the height the composite should be when you are finished injection molding but before curing.





 **DIAMOND**
WEDGE

The modern composite procedure

- Adhesion versus mechanical retention
- Preparation design based on engineering
- Compression Joints vs Tension Joints
- Biofilm Removal and the Infinity EdgeTooth Restoration Interface
- **Selective Caries Removal**
- Monolithic injection molding
- Rock Star Polish

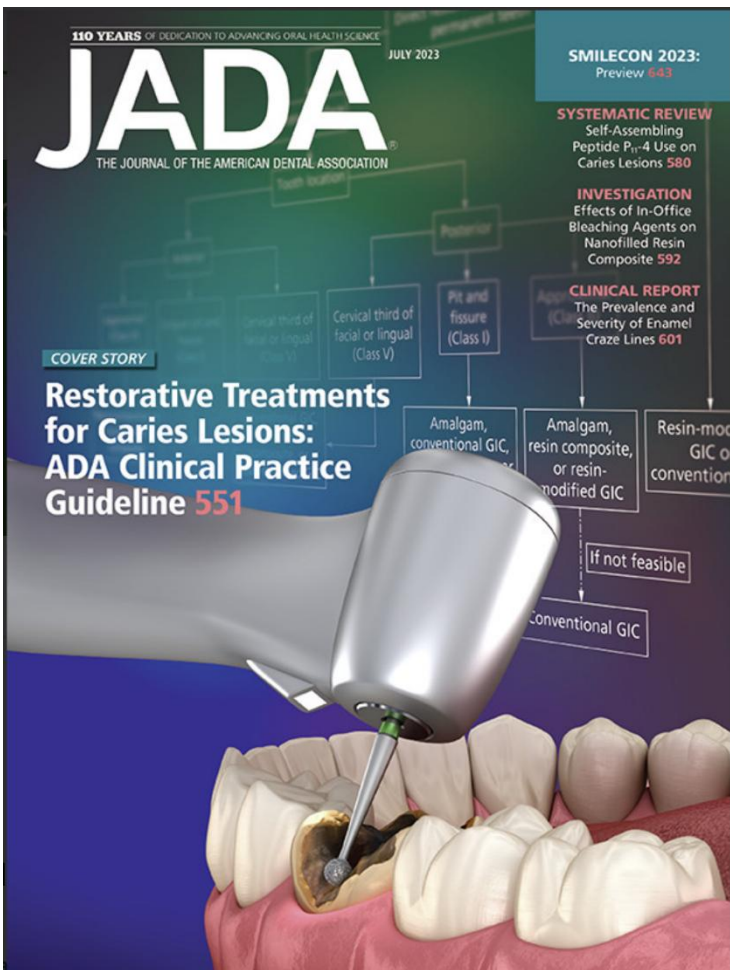


Table 1. Definitions of carious tissue removal approaches and clinical presentation of caries lesion.

CARIOUS TISSUE REMOVAL APPROACHES (THAT IS, THE EXTENT OF CARIOUS TISSUE REMOVED)

Nonselective Caries Removal	Carious tissue is removed until hard dentin is reached. Also known as complete caries removal.
Selective Caries Removal	Carious tissue is removed until soft or firm dentin is reached. Also known as partial or incomplete caries removal.
Stepwise Caries Removal	Carious tissue is first removed until soft dentin is reached and then a temporary restoration is placed. Months later, the restoration and carious tissue are removed until firm dentin is reached and a permanent restoration is then placed. Also known as 2-step caries removal.
No Carious Tissue Removal	No carious tissue is removed prior to the placement of a definitive restoration.

CLINICAL PRESENTATION OF CARIES LESIONS

Moderate Caries Lesion	International Caries Detection and Assessment System codes 3 and 4
Advanced Caries Lesion	International Caries Detection and Assessment System codes 5 and 6

Clinical Practice Guideline

Cover Story

Evidence-based clinical practice guideline on restorative treatments for caries lesions

A report from the American Dental Association

Vineet Dhar, BDS, MDS, PhD; Lauren Plicher, MSPH; Margherita Fontana, DDS, PhD; Carlos Gonzalez-Cabezas, DDS, MSD, PhD; Martha Ann Keele, DDS, PhD; Ana Karina Mascarenhas, BDS, MPH, DPH; Marcelle Nascimento, DDS, MS, PhD; Jeffrey A. Platt, DDS, MS, Gregory J. Sabino, DDS, PhD; Rebecca Stavitt, DDS, PhD; Norman Trautloff, DDS, MS; Douglas A. Young, DDS, EdD, MBA, MS; Domènec T. Zoro, DDS, MS; Sarah Parke, MS; Olivia Longhart, MPH; Kelly K. O'Brien, MD; Alonso Carrasco-Labra, DDS, MSc, PhD

ABSTRACT

Background. An expert panel convened by the American Dental Association (ADA) Council on Scientific Affairs together with the ADA Science and Research Institute's program for Clinical and Translational Research conducted a systematic review and developed recommendations for the treatment of moderate and advanced cavitated caries lesions in patients with vital, non-endodontically treated primary and permanent teeth.

Types of Studies Reviewed. The authors searched for systematic reviews comparing carious tissue removal (CTR) approaches in Ovid MEDLINE, Embase, Cochrane Database of Systematic Reviews, and Trip Medical Database. The authors also conducted a systematic search for randomized controlled trials comparing direct restorative materials in Ovid MEDLINE, Embase, Cochrane Central Register of Controlled Trials, ClinicalTrials.gov, and the World Health Organization International Clinical Trials Registry Platform. The authors used the Grading of Recommendations Assessment, Development, and Evaluation approach to assess the certainty of the evidence and formulate recommendations.

Results. The panel formulated 16 recommendations and good practice statements: 4 on CTR approaches specific to lesion depth and 12 on direct restorative materials specific to tooth location and surfaces involved. The panel conditionally recommended for the use of conservative CTR approaches, especially for advanced lesions. Although the panel conditionally recommended for the use of all direct restorative materials, they prioritized some materials over the use of others for certain clinical scenarios.

Practical implications. The evidence suggests that more conservative CTR approaches may decrease the risk of adverse effects. All included direct restorative materials may be effective in treating moderate and advanced caries lesions on vital, nonendodontically treated primary and permanent teeth.

Key Words. Evidence-based dentistry; clinical practice guideline; direct restorative materials; caries; general dentistry; pediatric dentistry; American Dental Association.

JADA 2023;154(7):551-566
<https://doi.org/10.1016/j.jada.2023.04.011>

Restorative dentistry is integral to managing caries.¹ The decisions involved in restoring teeth are complex and based on the balance of several factors such as prognosis, caries risk and activity assessment, and clinical or radiographic signs of caries.^{2,3} When indicated, various carious tissue removal (CTR) approaches (that is, the extent of carious tissue removed) and direct restorative materials are available to restore moderate and advanced (Table 1) caries lesions on vital, nonendodontically treated primary and permanent teeth.

Copyright © 2023 American Dental Association. All rights reserved.

JADA 154(7) • <http://jada.ada.org> • July 2023

551

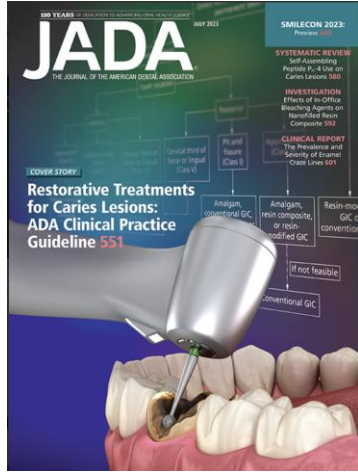
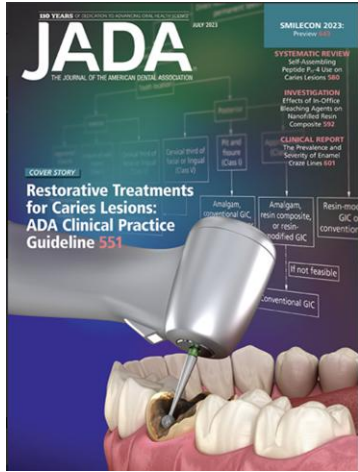


Table 1. Definitions of carious tissue removal approaches and clinical presentation of caries lesion.

CARIOUS TISSUE REMOVAL APPROACHES (THAT IS, THE EXTENT OF CARIOUS TISSUE REMOVED)	
Nonselective Caries Removal	Carious tissue is removed until hard dentin is reached. Also known as complete caries removal.
Selective Caries Removal	Carious tissue is removed until soft or firm dentin is reached. Also known as partial or incomplete caries removal.
Stepwise Caries Removal	Carious tissue is first removed until soft dentin is reached and then a temporary restoration is placed. Months later, the restoration and carious tissue are removed until firm dentin is reached and a permanent restoration is then placed. Also known as 2-step caries removal.
No Carious Tissue Removal	No carious tissue is removed prior to the placement of a definitive restoration.
CLINICAL PRESENTATION OF CARIES LESIONS	
Moderate Caries Lesion	International Caries Detection and Assessment System codes 3 and 4
Advanced Caries Lesion	International Caries Detection and Assessment System codes 5 and 6

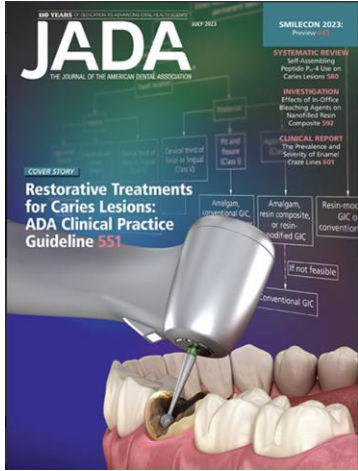
“To treat **moderate caries lesions** of vital permanent teeth, the panel suggests prioritizing the use of SCR over nonselective i.e., complete caries removal.”

Evidence to Decisions: 1) Desirable and **undesirable effects**, 2) Values and preferences, 3) Cost, 4) Acceptability, 5) Feasibility



“Undesirable effects of traditional caries removal: Patient discomfort during treatment, pulp exposure, pulp necrosis, pulpal complications due to infection, and tooth loss.”

July 2023



Selective Caries Removal (SCR) is the new standard of care

BOOM!*

*Just one hundred and thirty-three years later

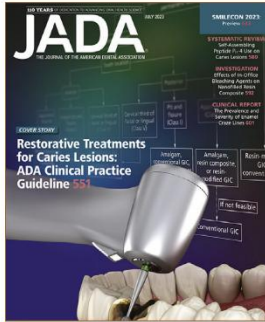
JCDA article the next month (August 2023)

ADA Publishes Guideline on Restorative Treatments for Caries Lesions

A new American Dental Association (ADA) clinical practice guideline suggests conservative methods to treat tooth decay in primary and permanent teeth could lead to better outcomes when used with common restorative materials. An expert panel of dentists developed guidelines on this topic after extensive review of approximately 300 published studies.

The guideline, published in the July 2023 issue of *The Journal of the American Dental Association*, contains 16 recommendations regarding treatment of moderate and advanced tooth decay in primary and permanent teeth that have not received orthodontic treatment. It suggests that conservative carious tissue removal (CTR) is less likely to result in adverse outcomes like nerve exposure or a failed filling. The recommendations also identify selective CTR as an effective treatment option in most cases of moderate or advanced decay in primary and permanent teeth.

This is the ADA's second clinical practice guideline in a series on caries treatment. The new restoration guideline, and existing recommendations on non-restorative treatment for tooth decay, are available at: ada.org/cariesguidelines *



“An expert panel developed guidelines after an extensive review of 300 published studies.”

“(SCR) is less likely to result in adverse outcomes...”

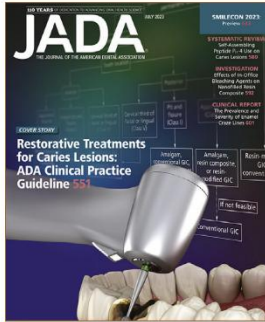
JCDA article the next month (August 2023)

ADA Publishes Guideline on Restorative Treatments for Caries Lesions

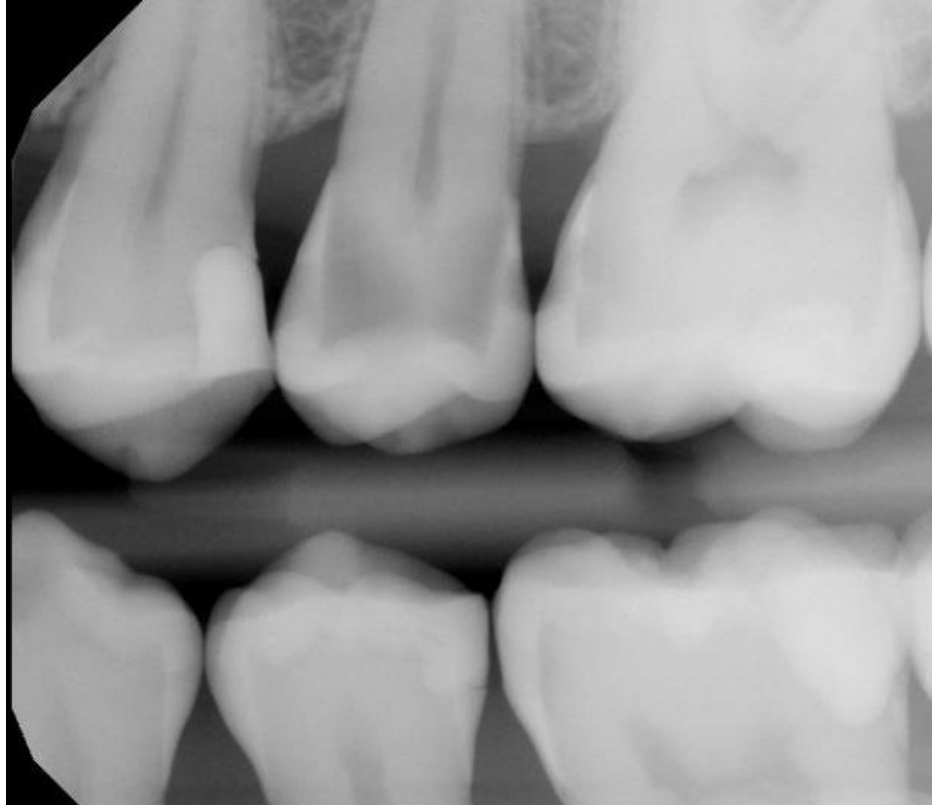
A new American Dental Association (ADA) clinical practice guideline suggests conservative methods to treat tooth decay in primary and permanent teeth could lead to better outcomes when used with common restorative materials. An expert panel of dentists developed guidelines on this topic after extensive review of approximately 300 published studies.

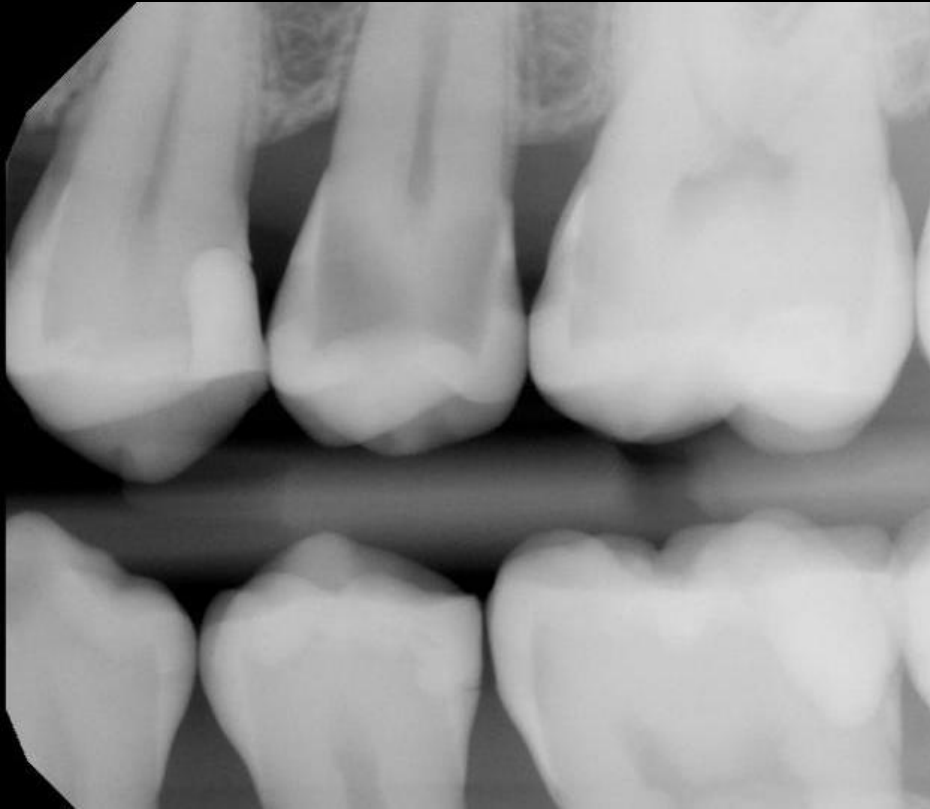
The guideline, published in the July 2023 issue of *The Journal of the American Dental Association*, contains 16 recommendations regarding treatment of moderate and advanced tooth decay in primary and permanent teeth that have not received orthodontic treatment. It suggests that conservative carious tissue removal (CTR) is less likely to result in adverse outcomes like nerve exposure or a failed filling. The recommendations also identify selective CTR as an effective treatment option in most cases of moderate or advanced decay in primary and permanent teeth.

This is the ADA's second clinical practice guideline in a series on caries treatment. The new restoration guideline, and existing recommendations on non-restorative treatment for tooth decay, are available at: ada.org/cariesguidelines *



“(SCR) Could lead to better outcomes with **ordinary restorative materials** (i.e. no more liners or bases)”





“Your website says you are a Certified Bioclear Provider offer the Selective Caries Technique (Modified Hall) as an alternative to root canals”

“My current office recommends endo, post, buildup & crown, but I have no pain”



11/10/20	BIO	2999A	Selective Caries Removal	13	\$175.00	\$0.00	\$175.00
----------	-----	-------	--------------------------	----	----------	--------	----------

Subtotal for This Phase:					\$175.00	\$0.00	\$175.00
---------------------------------	--	--	--	--	----------	--------	----------

11/10/20	BIO	299.8	BIOCLEAR POSTERIOR OVERLA	13	\$1,032.00	\$0.00	\$1,032.00
----------	-----	-------	---------------------------	----	------------	--------	------------

Subtotal for This Phase:					\$1,032.00	\$0.00	\$1,032.00
---------------------------------	--	--	--	--	------------	--------	------------

\$1,207.00



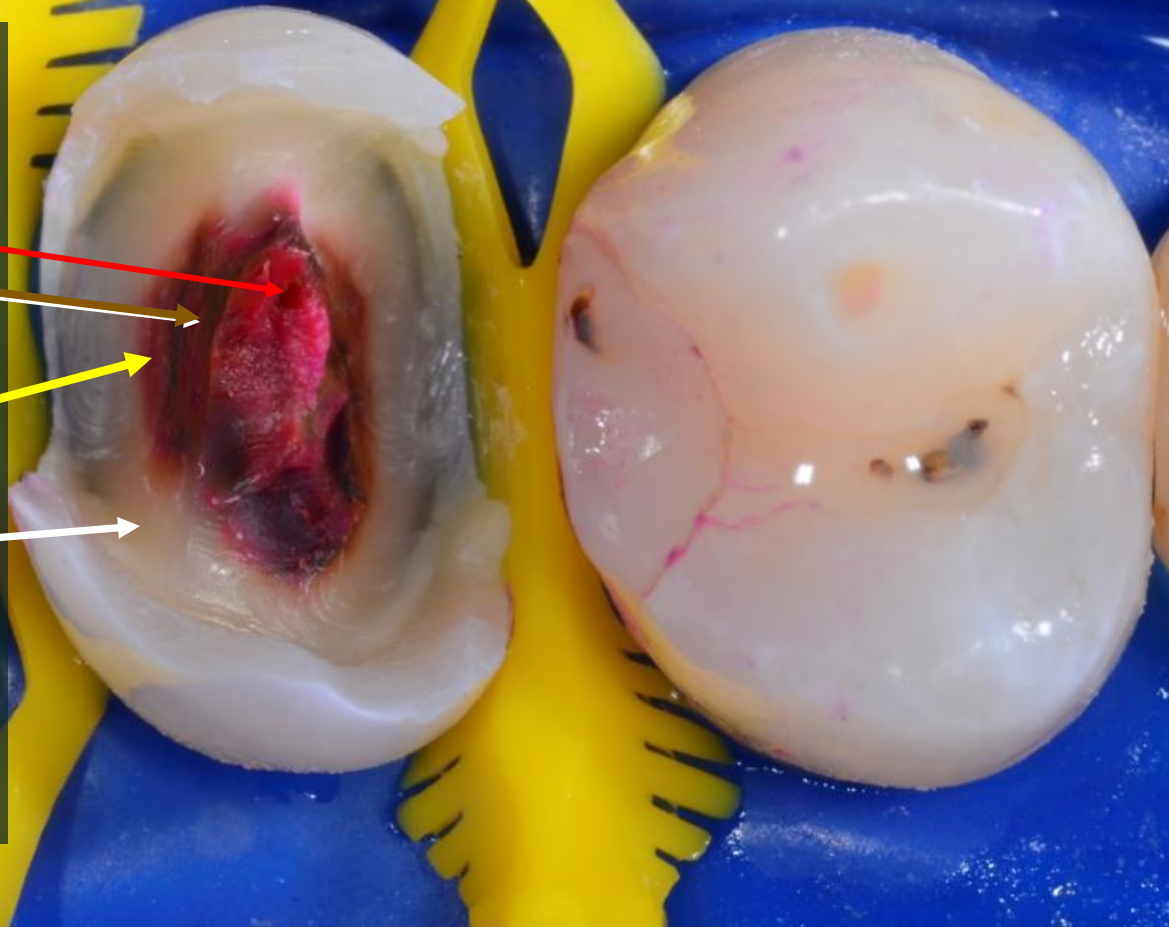






Simplification of dentin zones for restorative dentist:

- 1) **Loose Dentin**
- 2) **Smooth Soft Dentin**
- 3) **Affected Dentin:
hard-ish and funny color**
- 4) **Sound Dentin**



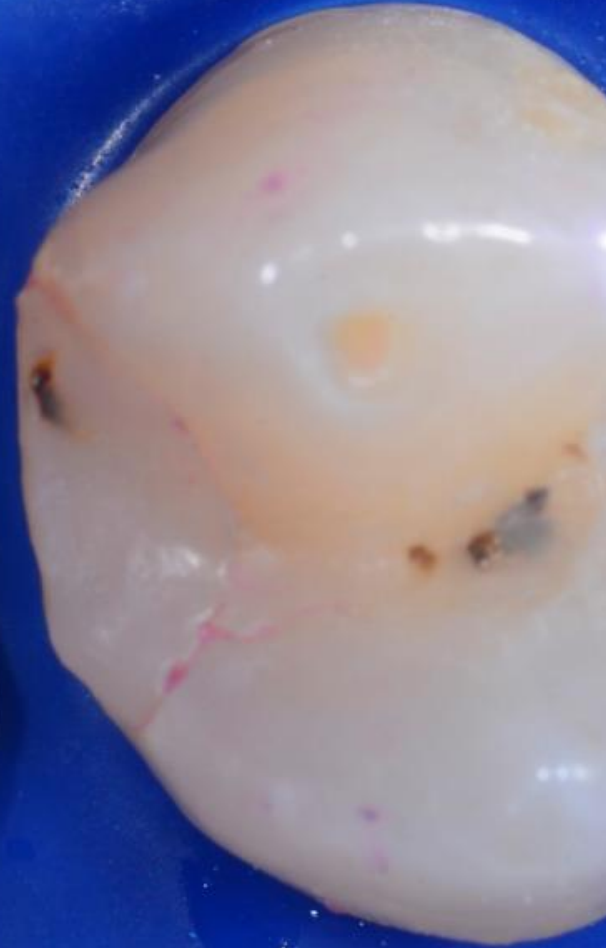
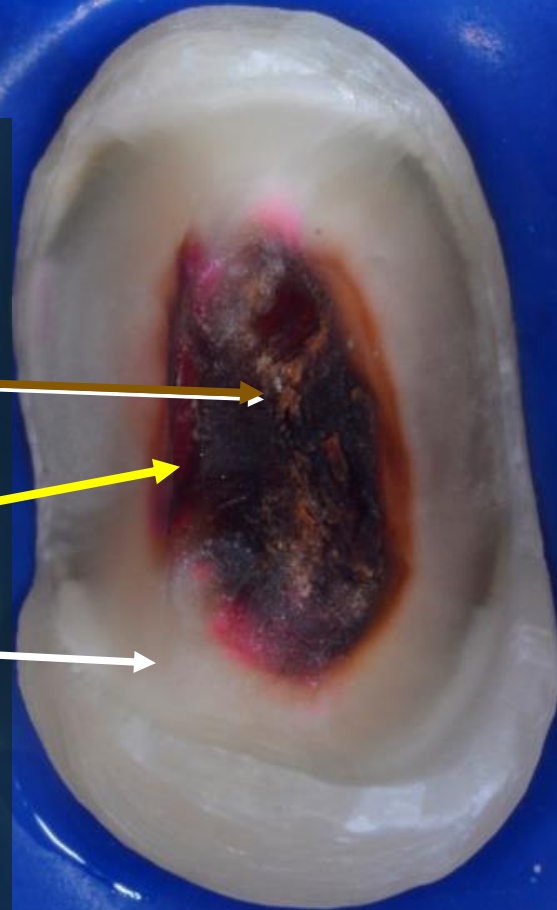
Simplification of dentin zones for restorative dentist:

1) **Loose Dentin**

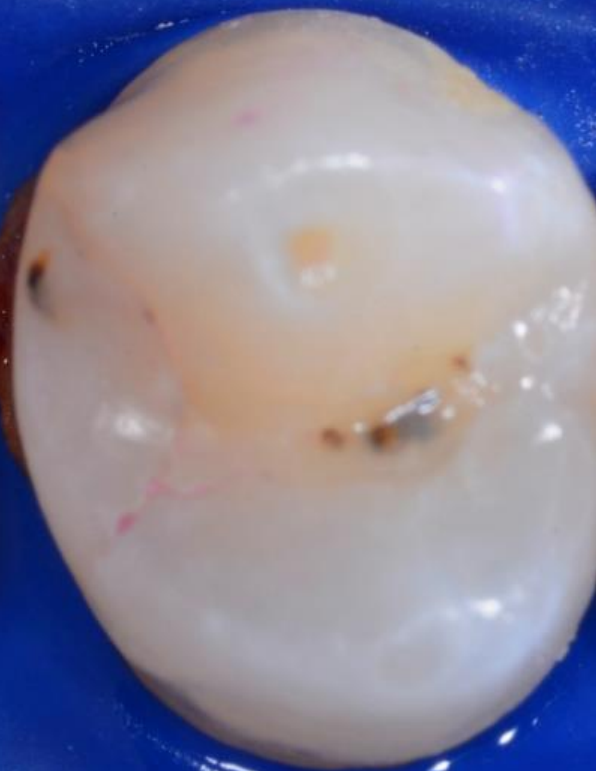
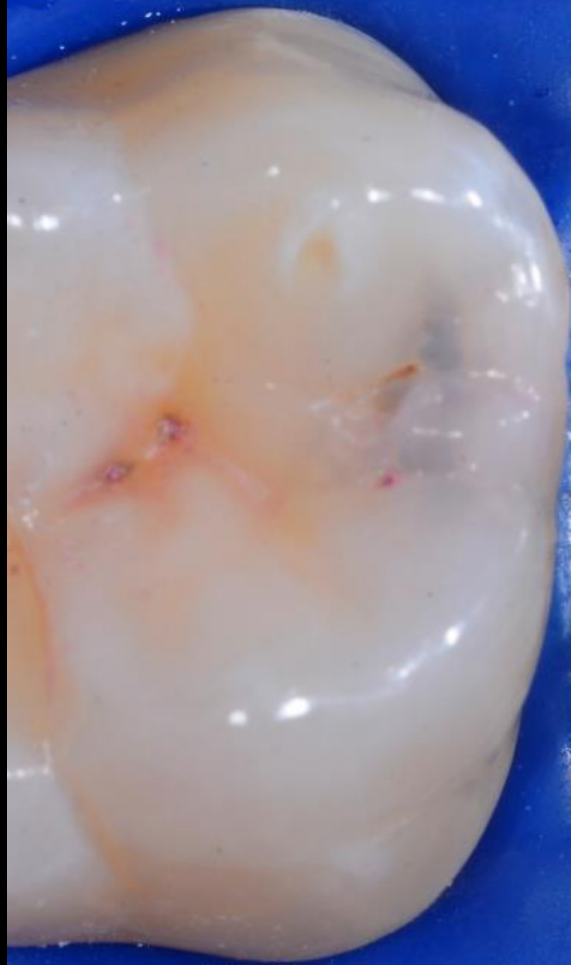
2) **Smooth Soft Dentin**

3) **Affected Dentin:
hard-ish and funny color**

4) **Sound Dentin**

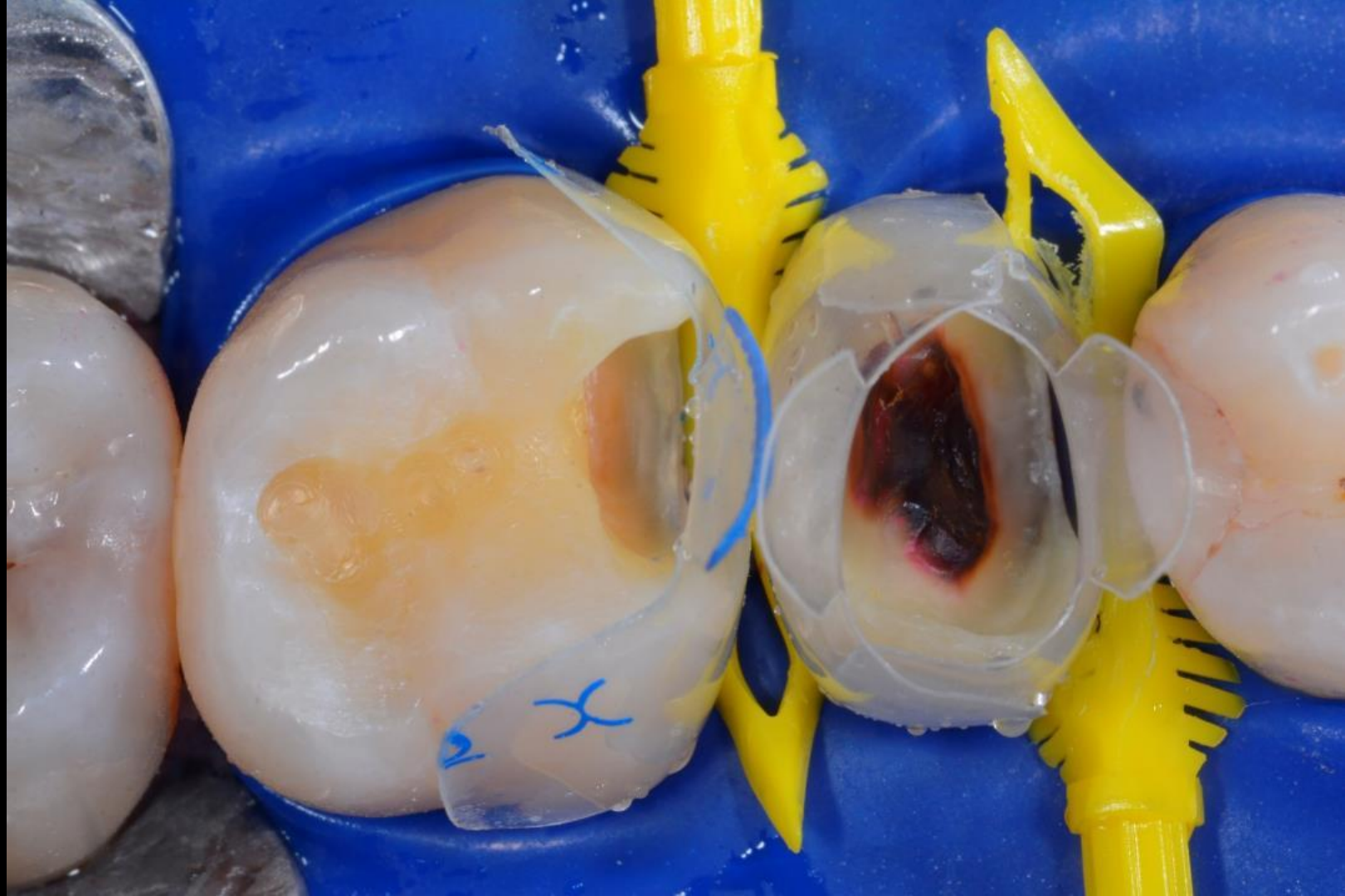










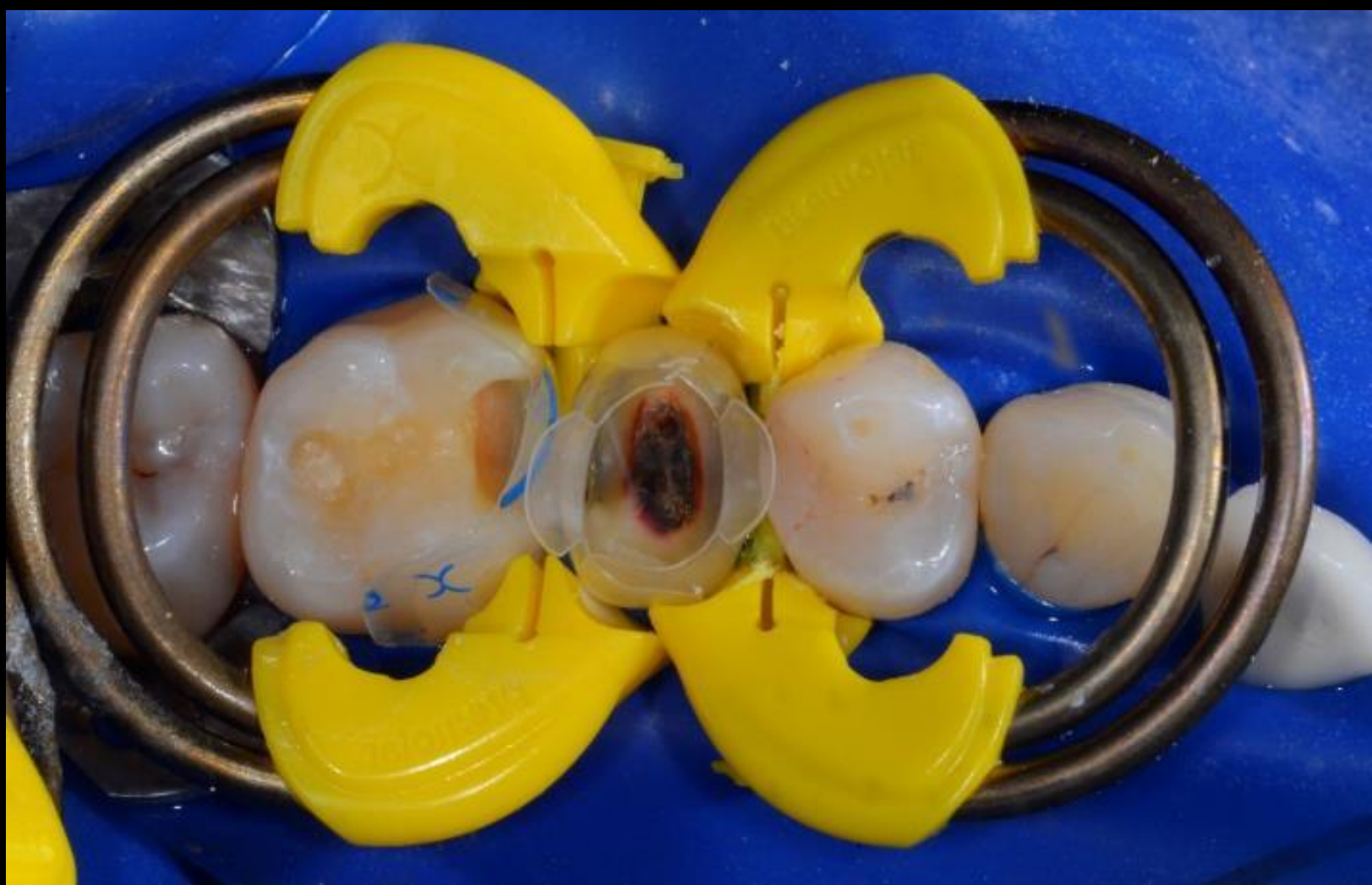






8 keys to ideal contacts with Injection Molding

- ✓ Change the Prep
- ✓ Pre-wedging
- ✓ Choose the correct matrix height
- ✓ Optimize the neighboring contact
- ✓ Progressive wedging
- ✓ Place separator like a rubber dam clamp
- ✓ Spot Weld Push/Pull.. Rehearse first★
- ✓ Quadrant Strategy Do the unilateral contact last













2018



2020



2020 post op



hopeless



hopeful

2 week follow up



3-year follow up



Mid treatment



post-op



3-year follow up





BIOCLEAR LEARNING CENTER

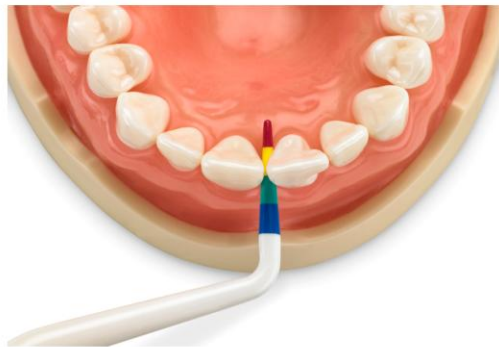
Tacoma USA · Solihull UK
Varberg Sweden · Cairo Egypt
Syracuse Italy · Taubate Brazil
Livermore CA (Bioclear pediatrics)
Seoul Korea · Madrid/Barcelona
Sydney Australia · Provence France

BLACK TRIANGLE

CERTIFICATION COURSE

18 CE CREDITS

This three-part live hands-on certification course will teach you how to treat black triangles, gingival recession, root abrasions, and perform confident restorations. In becoming a certified Bioclear black triangle doctor, you'll increase your overall skill and knowledge of Bioclear and learn to market your new skills to patients.



Toronto
February 27th 2026

Washington DC
May 8th 2026

Orange Beach
April 24th 2026

LIMITED SPOTS AVAILABLE!



**BIOCLEAR
CERTIFIED**

BLACK TRIANGLES

Scan to learn more
& sign up for your
local BT Course!



www.bioclearmatrix.com/live-courses/



BEFORE



AFTER



BEFORE



AFTER

∞ BIOCLEAR

Stop by convention

booth #1916

to...

- ✓ Hear more about Bioclear courses
- ✓ Meet our team of Bioclear nuts
- ✓ Order products
- ✓ Register for courses
- ✓ Learn why Bioclear is a BIG DEAL!



Caries Progression and Selective Caries Removal (SCR) or Modified Hall Technique

Max Planck *Nobel Prize, 1918*



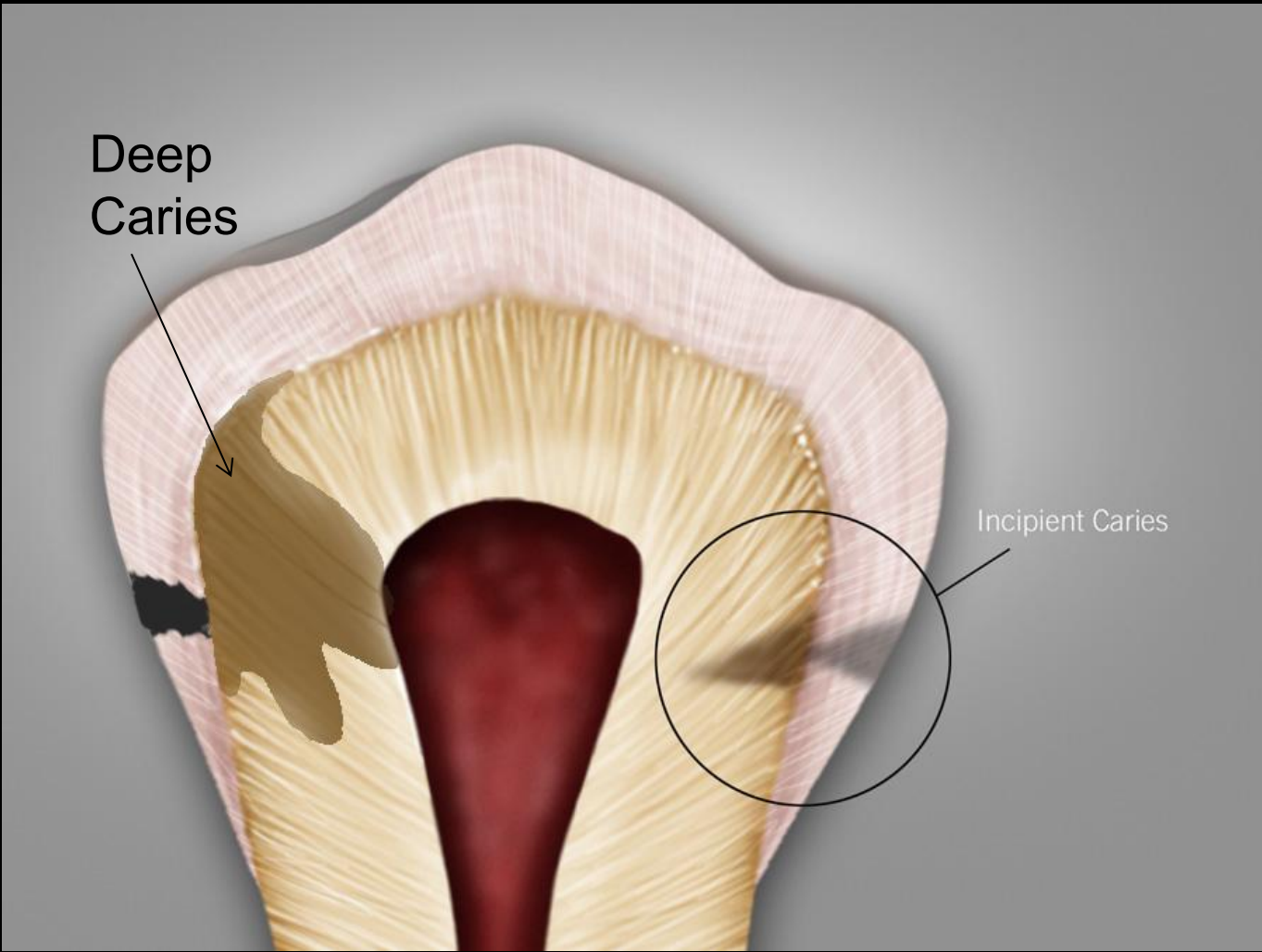
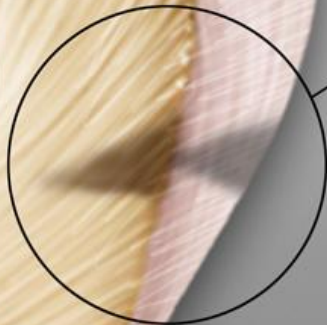
“A new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar with it.”



Deep
Caries



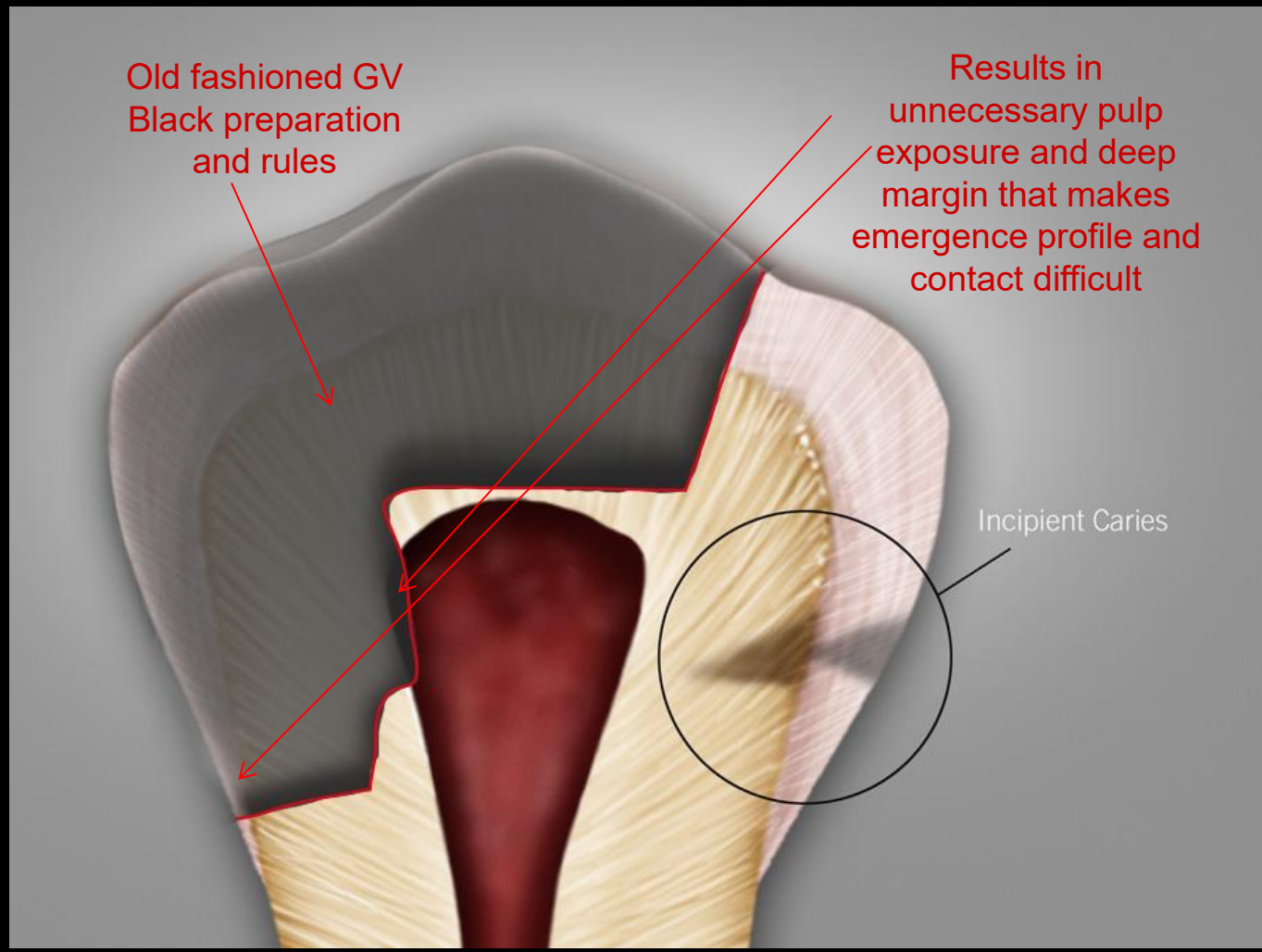
Incipient Caries



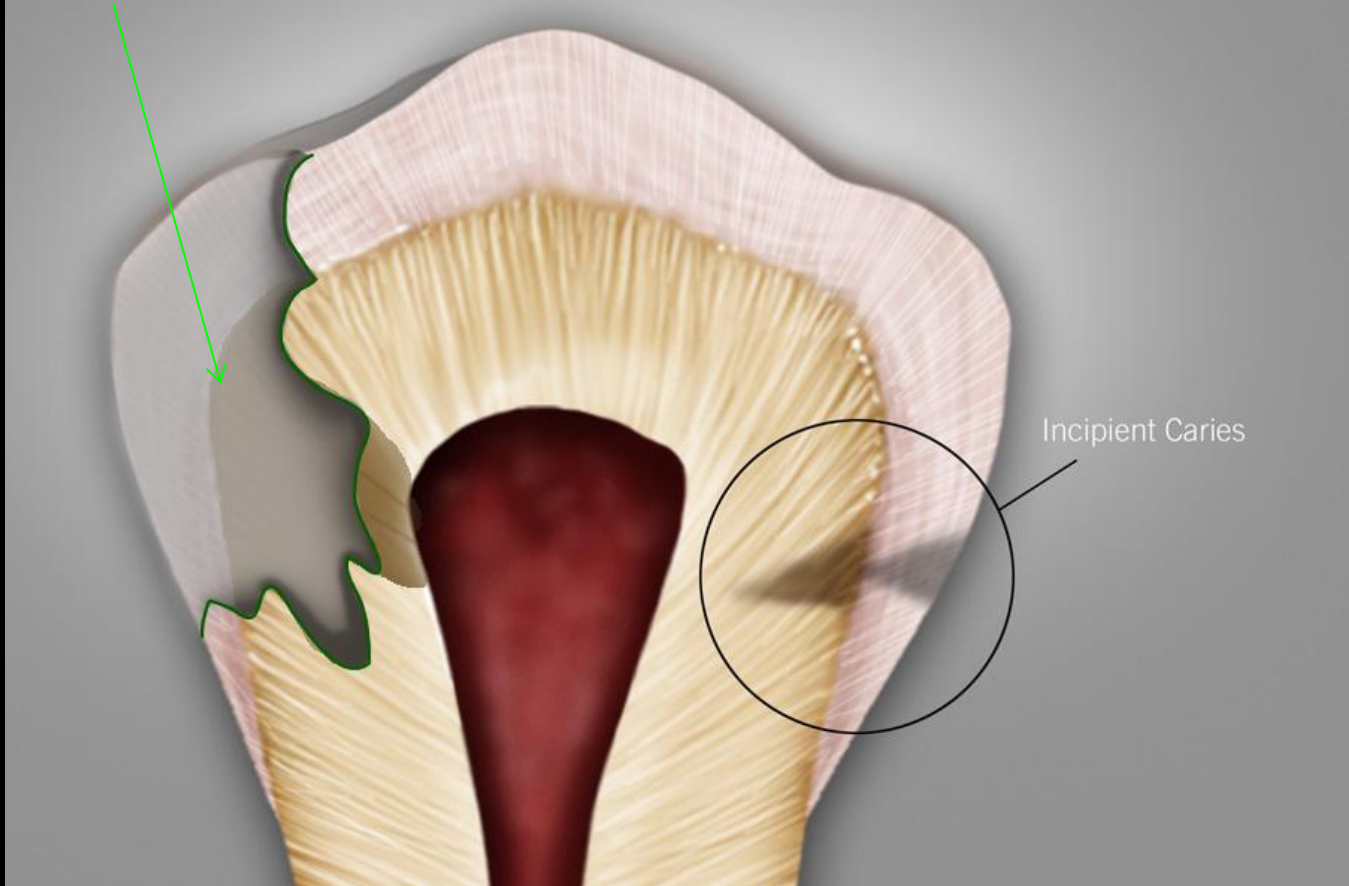
Old fashioned GV
Black preparation
and rules

Results in
unnecessary pulp
exposure and deep
margin that makes
emergence profile and
contact difficult

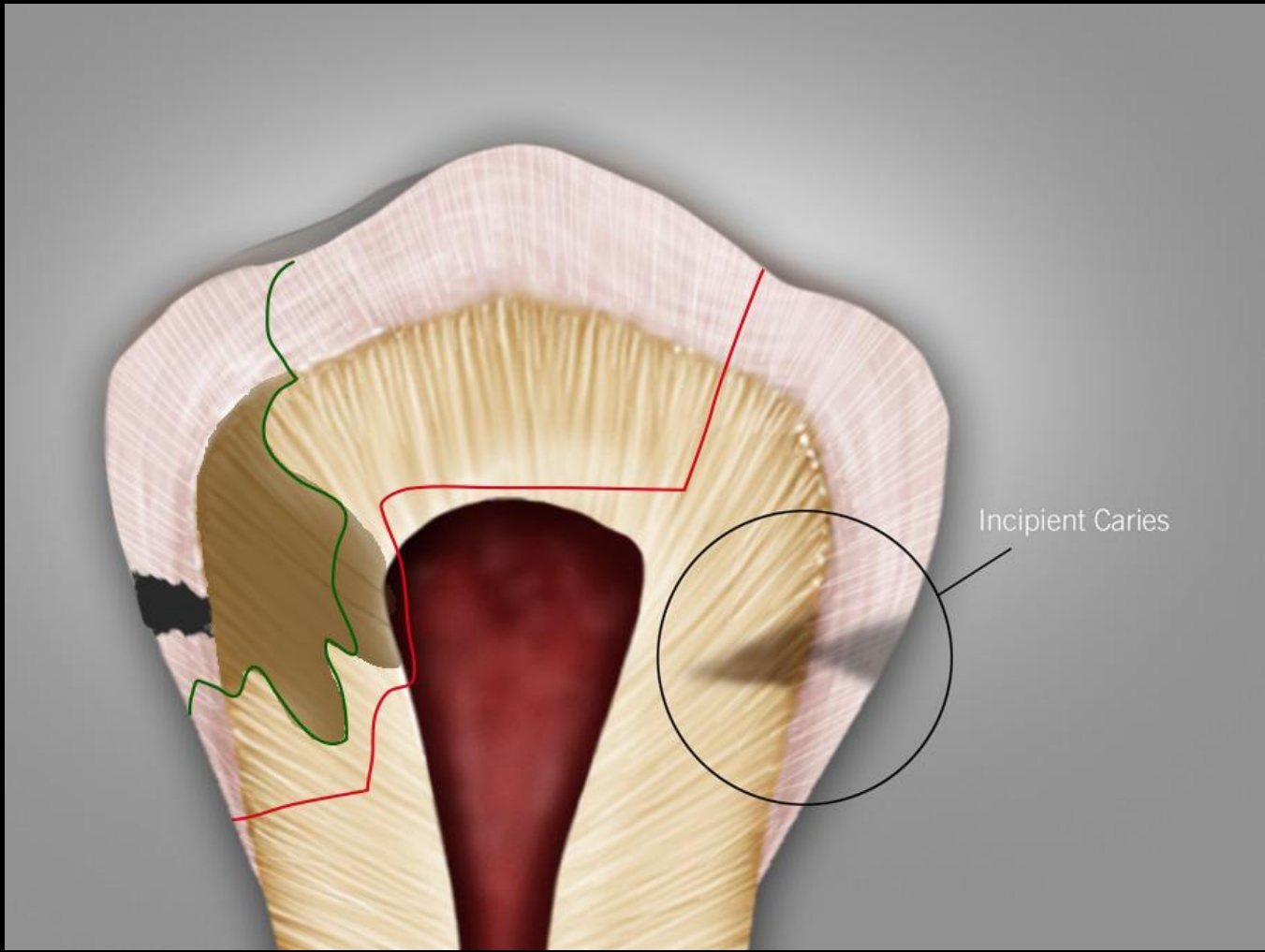
Incipient Caries



Modern "Clark Class II"



Incipient Caries



Incipient Caries

What is the ultimate pulp capping agent?

- DyCal?
- RMGI?(Vitrebond/Fuji IX)
- MTA?
- Dentin in a Capsule? (Septodont)
- Caulk Snuggly stuff?
- Bonded resin?
- None of the above?

What is the ultimate pulp capping agent?

- A well sealed TRI and a **beret of soft smooth dentin**
(Past al dente dentin)

What are the 3 rules of pulp capping?

1. Don't expose the pulp
2. Don't expose the pulp
3. Don't expose the pulp

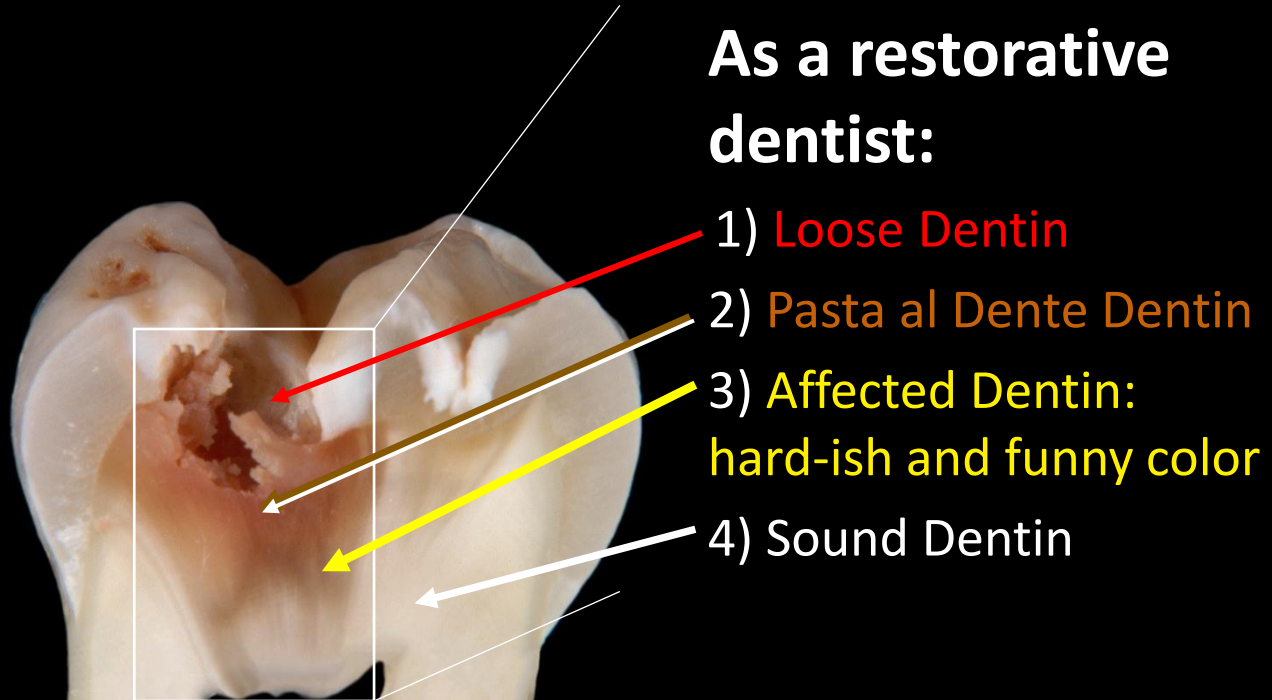
Hundreds of Selective Caries Removal (SCR) studies show remarkably and consistently high success rates. SCR is preferred by most patients over RCT or pulpotomy.

Qualitative and Quantitative Radiographic Assessment of Sealed Carious Dentin: A 10-Year Prospective Study	Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2010	Objective: the objective of this study was to assess radiographic outcomes after partial carious dentin removal performed in deep caries lesions over a 10-year period.	10-year survival rate of the pulp: 100% in 13 teeth	Sealing of carious dentin arrested the caries process, promoted deposition of tertiary dentin, and induced mineral gain in the radiolucent zone.
The Monitoring of Deep Caries Lesions After Incomplete Dentine Caries Removal: Results After 14-18 Months	Clin Oral Investig 2006	Objective: this paper aims to assess radiographic changes after incomplete carious dentine removal and tooth sealing.	Survival rate of the pulp: 97% in 31 teeth	Complete dentine caries removal is not essential to control caries progression.
The Hall Technique: a randomized controlled clinical trial of a novel method of managing carious primary molars in general dental practice: acceptability of the technique and outcomes at 23 months	BMC Oral Health 2007	Objective: Study the simplified method of managing carious primary molars using preformed metal crowns cemented with no local anesthetic, caries removal, or tooth preparation, and compare to traditional pulpotomy and metal crown.	2-year survival rate was 89%, outperforming traditional treatment by 11%	The Hall technique was preferred to conventional restorations by the majority of children, carers and GDP's.
Long-Term Survival of Indirect Pulp Treatment Performed in Primary and Permanent Teeth with Clinically Diagnosed Deep Carious Lesions	Journal of Endodontics 2010	Objective: Examine clinically and radiographically the 3-year survival of teeth treated with Indirect Pulp Treatment	3-year survival rate was 96% for 125 primary molars and 93% for 45 permanent teeth.	IPT performed in primary and permanent teeth of young patients may result in a high 3-year survival rate Note: Frank decay was retained.
Outcomes of Partial and Complete Caries Excavation in Permanent Teeth: A 18-Month Clinical Study	Contemp Clin Dent 2018	Objective: Clinical and radiographic outcomes of partial caries removal vs. complete caries removal in permanent teeth with deep carious lesions.	Survival rate of the pulp: 92.5%	Leaving a layer of soft, wet dentin adjacent to the pulpal wall could be an elective treatment option for mature permanent teeth with deep carious lesions.
Clinical Performance of Sealed Composite Restorations Placed Over Caries Compared with Sealed and Unsealed Amalgam Restorations	JADA 1987	Objective: To identify differences in the clinical outcomes of carious lesions sealed with composite vs. amalgams placed over caries-free preparations.	Survival rate of the pulp: 100%	There was no significant clinical difference between occlusal caries sealed with composite vs caries-free occlusal preps restored with amalgams over 2 years.
Sealing vs Partial caries Removal in Primary Molars: a RCT.	BMC Oral Health 2014	Objective: To assess the efficacy of arresting dentinal caries either with sealants or partial caries removal and composite restorations	18-month survival rate of the pulp: 100% for 17 teeth	Composite sealing of caries can arrest their progression therefore its complete removal is not necessary.
Conventional Caries Removal and Sealed Caries in Permanent Teeth: A Microbiological Evaluation	J Dent 2012	Objective: To compare bacterial load after conventional carious dentine removal with incomplete carious dentine removal and	Survival rate: 100%	It is not necessary to remove all carious dentin before a restoration is placed.

Partial Caries Removal in Deep Caries Lesions: A 5-Year Multicenter Randomized Controlled Trial	Clin Oral Investig 2018	Objective: To evaluate the effects of partial caries removal on pulp vitality five years after the procedure was performed.	Five-year survival rate: 80% of 121 teeth	Partial caries removal reduced the occurrence of pulp necrosis.
Effect of Different Liners on Pulpal Outcome After Partial Caries Removal: A preliminary 12 Months Randomized Controlled Trial	Caries Res 2019	Objective: To compare the effects of liners on pulp health outcomes 12 months after partial caries removal and restoration with composite.	12-month survival rate of the pulp: 94.6%	Partial removal of carious dentin does not interfere with pulp vitality or restoration survival, and liners are not necessary for the success of the procedure.
The Hall Technique 10 Years on: Questions and Answers	Br Dent J 2017	Objective: To review the success rate of sealing carious lesions.	5-year survival rate of the pulp: 97%	Sealing carious lesion is successful and this method is now regarded as a viable management options for carious primary molars
Sealing caries in primary molars: Randomized control trials, 5-year results	J Dent Res 2011	Objective: To compare clinical and radiographic failures of sealing carious lesions vs complete caries removal	5-year survival rate of the pulp: 95% of 264 teeth	Sealing caries outperformed conventional caries removal methods in preserving tooth vitality.
Ultrastructural and Microbiological Analysis of the Dentin Layers Affected by Caries Lesions in Primary Molars Treated by Minimal Intervention	Pediatr Dent 2007	Objective: To understand the effects that sealing carious lesions has on bacteria left in carious dentin.	60-day survival rate of pulp: 96%	Bacterial population decreased by 96% and carious dentine showed better tissue organization following sealing of the lesion.

Selective Caries Removal or the Modified Hall Technique

Don't expose the pulp, establish a clean TRI and maintain frank caries where possible.



Caries zones – Image courtesy of Prof. Leandro Hilgert and Prof. Soraya Leal, University of Brasilia (UnB), Brazil

Saving Natural Tooth Substance – With Confidence

Preparation guidelines have changed considerably over time. Over 100 years ago, G.V. Black promoted “extension for prevention”, today, the philosophy is “prevention of extension” (F.J.T. Burke, Dent. Update 2003, 30, 492-502), supported by guidelines for minimally invasive dentistry.

Minimally invasive preparations have meaningful benefits for patients:

- Increased tooth longevity
- Lower risk of pulpal exposure
- Reduced need for painful root canal treatments



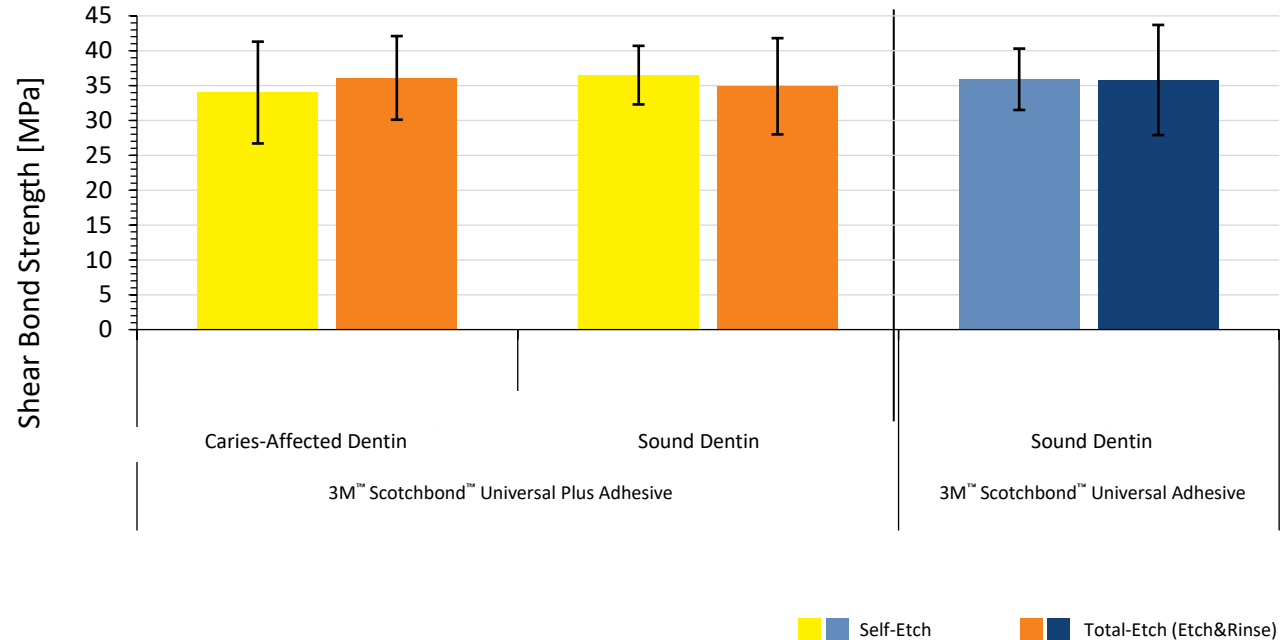
Long term survival of restorations depends on a stable bond to enamel and dentin. With minimally invasive dentistry, caries-affected dentin is preserved during excavation.

3M™ Scotchbond™ Universal Plus Adhesive bonds to firm caries-affected dentin with similar strength as to sound dentin, so you can have confidence in your minimally invasive preparations.

Strong Bonding to Caries-Affected Dentin

Strong bonding to caries-affected dentin helps preserve tooth structure

Cariou human molars were prepared with a polymer bur (SmartBur™ II, SS White) to expose caries-affected dentin. In both etching modes, 3M™ Scotchbond™ Universal Plus Adhesive achieved similar shear bond strength to caries-affected dentin and sound dentin as the control 3M™ Scotchbond™ Universal Adhesive. This high bond strength makes it well suited for MID procedures.



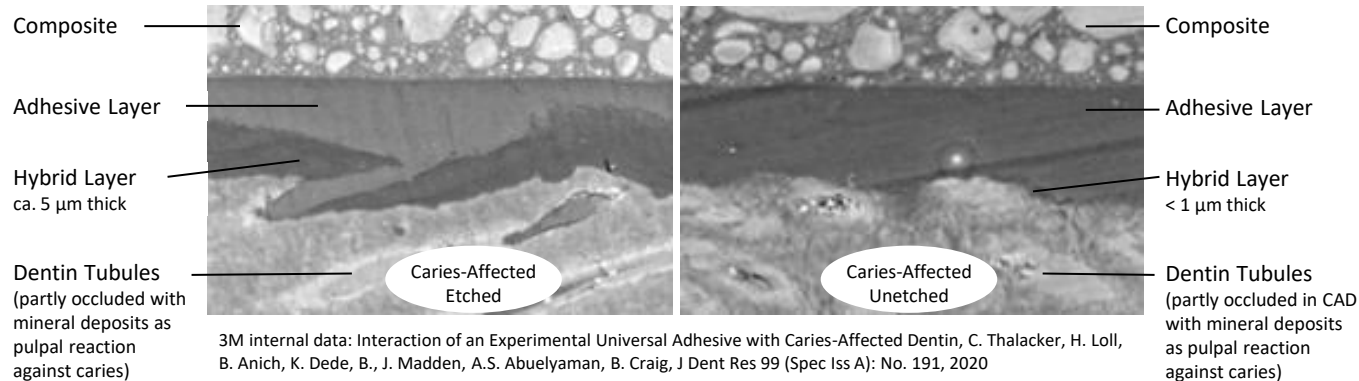
3M internal data: Interaction of an Experimental Universal Adhesive with Caries-Affected Dentin, C. Thalacker, H. Loll, B. Anich, K. Dede, B., J. Madden, A.S. Abuelyaman, B. Craig, J Dent Res 99 (Spec Iss A): No. 191, 2020

Well-Defined Hybrid Layer on Caries-Affected Dentin

Supports minimally invasive dentistry to preserve natural tooth substance

3M™ Scotchbond™ Universal Plus Adhesive helps preserve natural tooth structure in MID procedures and when preparing near the pulp by forming a continuous hybrid layer without voids or gaps on both caries-affected and sound dentin. A well-defined hybrid layer effectively seals caries-affected dentin areas.

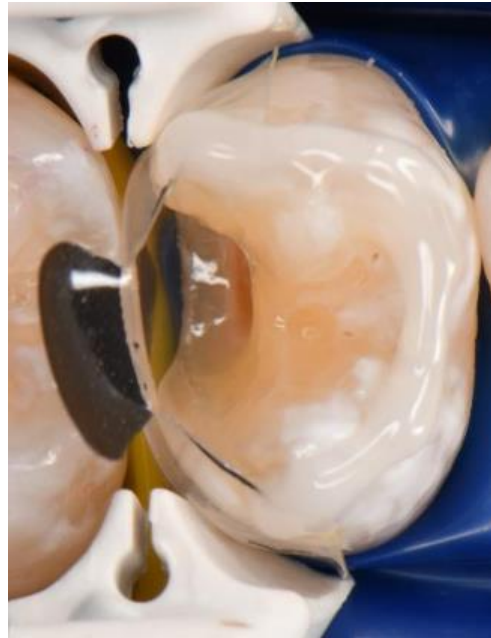
SEM study – hybrid layer on caries-affected dentin (etched and unetched)



SCR: We have a lot to talk about...

- 1) How much clean dentin do I need on the periphery to seal in decay?
- 2) Better question: How much clean dentin can I afford?

Core Posterior Solutions



Diastema Closure with the Bioclear BT matrix kit



Traditional composite is thought of as
a “patching” material.

Why a method?

There reaches a **tipping point**...with a tooth, a smile,
an occlusal scheme where it is time to rethink
composite... as the best vehicle to **rejuvenate** without
the need to **amputate**.



BIOCLEAR LEARNING CENTER

Tacoma USA · Solihull UK

Varberg Sweden · Cairo Egypt

Syracuse Italy · Taubate Brazil

Livermore CA (Bioclear pediatrics)

Seoul Korea

Madrid/Barcelona · Sydney Australia

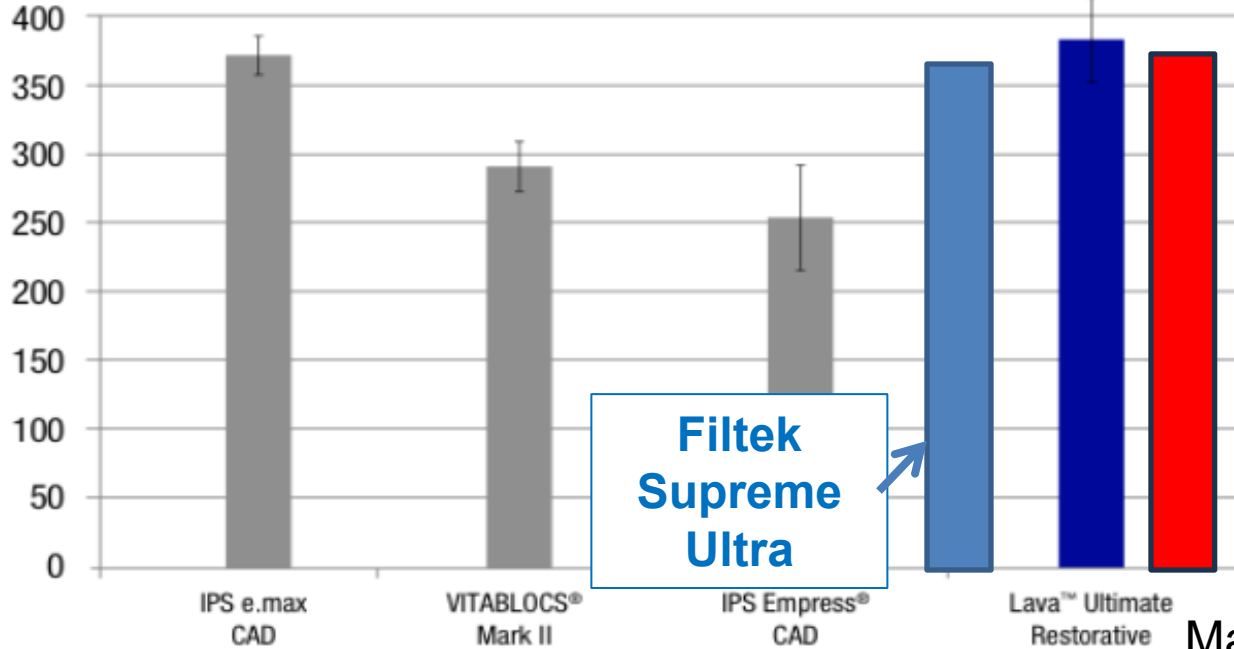


BIOCLEAR LEARNING CENTER

Tacoma USA · Solihull UK ·
Varberg Sweden · Cairo Egypt



High Compressive Strength (MPa)

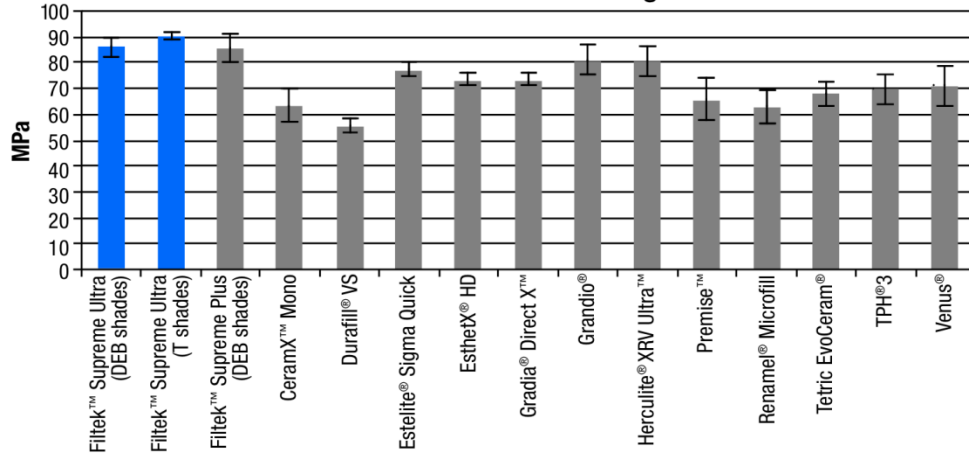


Lava™ Ultimate Restorative has similar or higher compressive strength than leading chairside materials.
3M ESPE internal data.

**Majesty
ES
Flow
(373mp)**

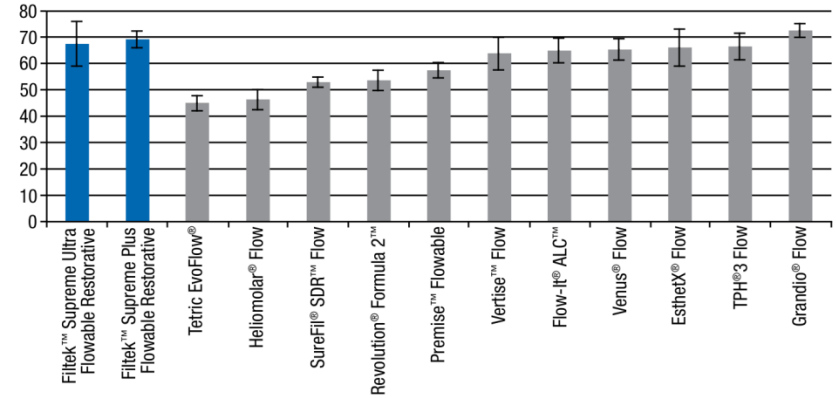
Composites

Diametral Tensile Strength

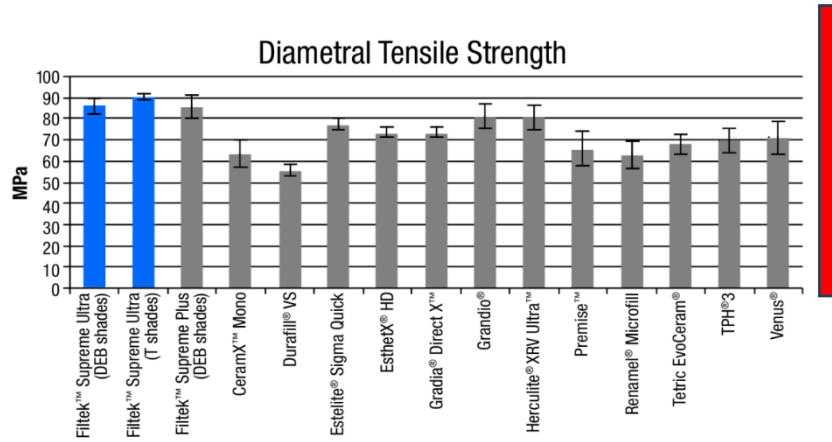


Flowables

Diametral Tensile Strength

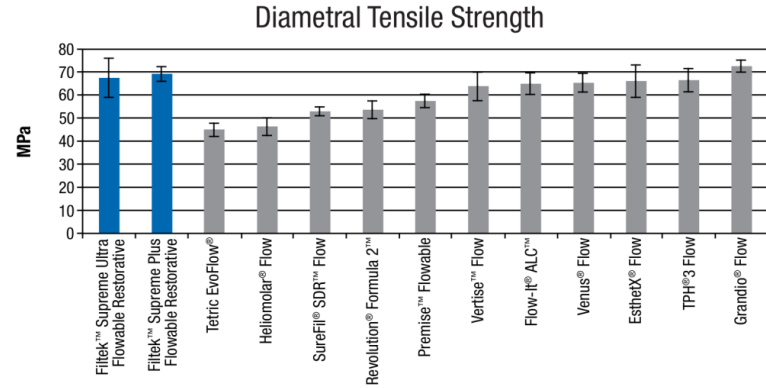


Composites



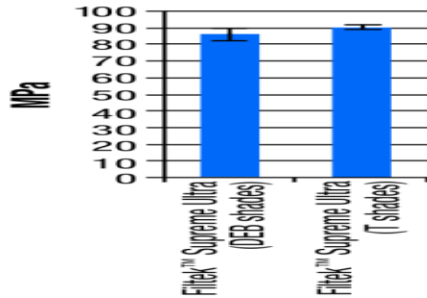
Majesty
ES Flow
(148mp)

Flowables

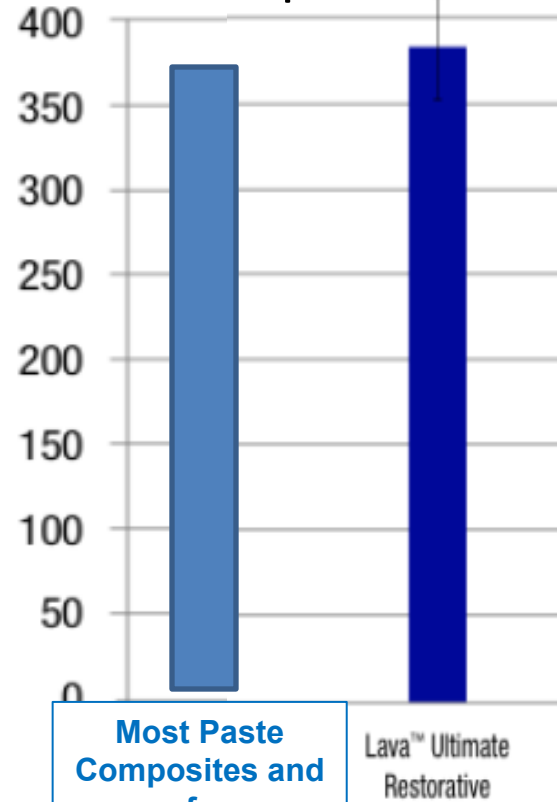


Composite strength...

Tensile



Compressive





BIOCLEAR LEARNING CENTER

Tacoma USA · Solihull UK
Varberg Sweden · Cairo Egypt
Syracuse Italy · Taubate Brazil
Livermore CA (Bioclear pediatrics)
Seoul Korea · Madrid/Barcelona
Sydney Australia · Provence France

Dental schools/GPR integrating the Bioclear Method

