

Creativity with Ceramics

David S. Hornbrook, DDS, FAACD

OCCUSION DEMYSTIFIED

Dr. David Hornbrook

March 3-5, 2017
3001 Lane Circle US

October 6-8, 2017
San Diego, CA

\$1495
(\$ 250 discount for new dentists)

TEST YOUR KNOWLEDGE

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WHAT YOU WILL LEARN

- The specific occlusal health concerns and health reporting
- The 3 ways to occlusal analysis with direct vision
- How to identify occlusal problems and how to document the case properly
- Challenges of the 2nd and 3rd molars in the lower arch and upper
- Changing the approximal contact
- How to adjust "high spots" and understand the benefits of a bite
- How to adjust "low spots" and understand when to make changes and why
- How to adjust occlusal contact and understand when to make changes and why
- Custom and decorative occlusal restorations: "You're making me!"

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BRING YOUR OWN PATIENT
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Six Day, Live Patient Course

The goal is to provide attendees with a unique hands-on, live patient educational experience and the opportunity to refine their smile designs. The combination of direct communication, modeling, and management skills addressed in this course will not only increase the retention of dentistry, but will also create a level of clinical success and confidence never before possible.

YOU WILL LEARN

- A complete understanding of dental identity, the natural and artificial dentition
- Analyzing occlusal and facial morphology and facial aesthetics
- Case planning, from aesthetics and functional of patient restorative demands
- Designing occlusal and facial morphology and functional aspects
- Understanding how to use wax, silicone, and other lab
- Through understanding of the new restorative materials and their properties
- How to communicate with patients, lab and technician
- How to manage the lab process
- How to manage the lab process
- How to manage the lab process
- How to manage the lab process
- How to manage the lab process

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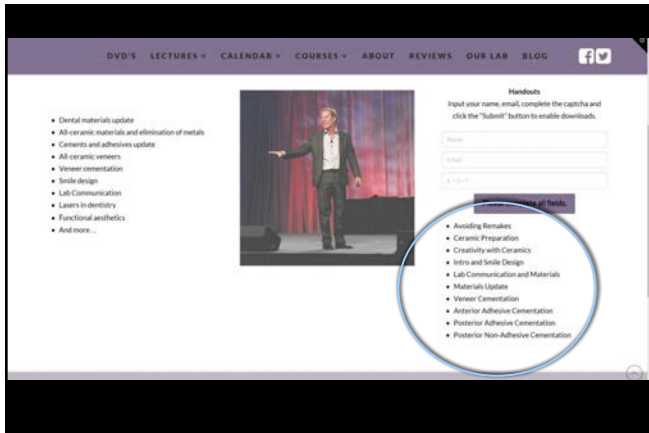
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Invite David to Speak
David's Highlights

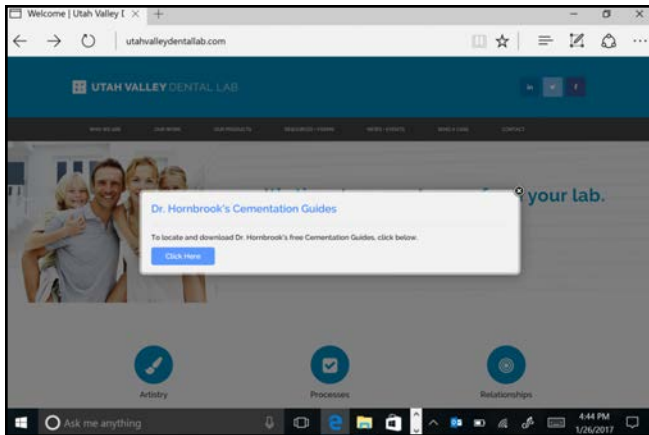
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Cementation Guides

- ❖ Anterior adhesive cementation
- ❖ Posterior adhesive cementation
- ❖ Posterior non-adhesive (Luting) cementation

www.uvdl.com

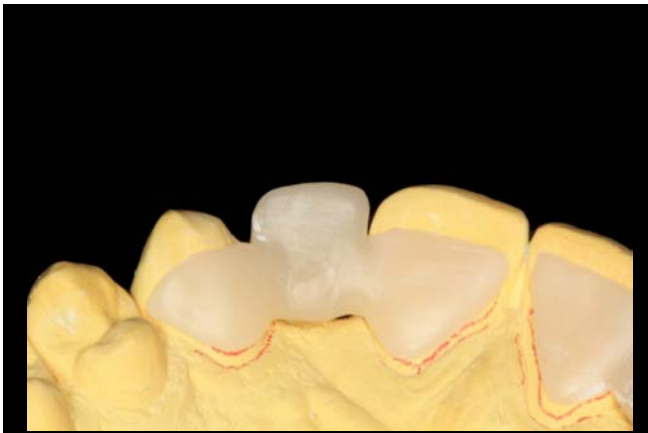
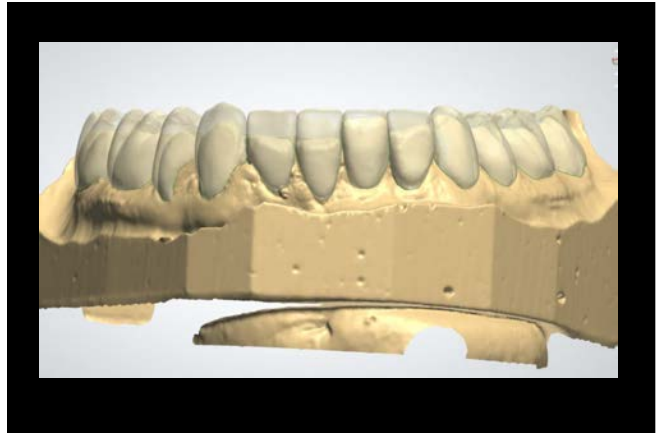
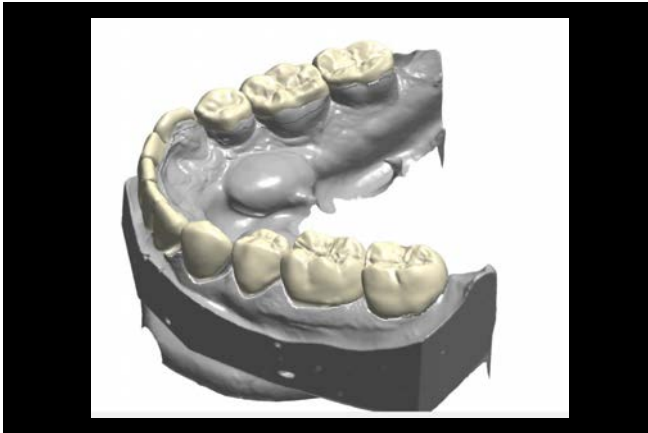


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EMMA Provisional over "H" Abutment

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Compendium

March 2015
 Volume 38, Issue 3

View Current Issue

Clinical Categories

- General Dentistry/Restorative
- Endodontics
- Implantology
- Oral Surgery
- Orthodontics
- Pediatric Dentistry
- Periodontics
- Prosthodontics
- Specialty Care

Additional Categories

- Business of Dentistry
- Infection Control
- Pain Management
- Office Only

Related Articles

Case Report Using the "H" Abutment: Achieving Esthetics, Strength, and Predictability for the Anterior Implant
 David Iversen, DDS

Abstract:
 Replacing an anterior tooth using a dental implant has long been a challenge for most clinicians. Implant abutment selection is a critical aspect of maximizing esthetics, strength, and predictability. The author has experienced significant success in this regard over a period of more than 7 years using a custom-designed "H" implant abutment. In this case presentation, a procedure is described for providing these highly esthetic abutment-supported restorations, which may offer significant advantages over traditional options.

With the introduction of new materials, the trend in dentistry over the past decade has been to promote the use of metal to achieve improved esthetics as well as restorative tooth structure. This search for the ideal restorative has also influenced the options available for anterior implant restoration. The replacement of an anterior tooth using an implant has been a challenging dilemma for most clinicians. While a metal abutment provides long-term predictability and strength, it can compromise the esthetic value of the final restoration and limit the restorative options. This is of particular concern if the implant crown is to be replaced by metal-free adjacent restorations such as ceramic veneers or all-ceramic crowns,^{1,2} which provide transparency that allows the underlying tooth structure to be seen through the restoration, thus providing a more realistic and natural appearance. When a metallic abutment is used on an implant, the restoration must provide the quality necessary

Modern Dentistry

INDUSTRY LEADING INTRACANAL HYDROPHILICITY & X-RAY STRENGTH

View Current Issue July 2017 Volume 13 Issue 4

Overcoming Obstacles to Provide an Esthetic Anterior Implant
A treatment plan for success
David Hornbrook, DDS

One of the most challenging restorative situations faced by dentists is replacing a missing anterior tooth with an implant while providing better esthetics and harmony with the surrounding natural dentition or adjacent all-ceramic restorations. The challenges involved include placing the correct implant, managing soft tissue contours before and after the implant is placed, utilizing previsualization that corrects gingival embrasure defects, choosing an implant abutment that provides a precise occlusal preparation, and selecting a restorative restoration. While a metal abutment (either stock or custom) provides long-term durability and strength, it can compromise the esthetic value of the final restoration and limit the restorative options available. This is especially true when the implant restoration is placed adjacent to natural teeth or additional all-ceramic restorations.^{1,2,3}

Case Presentation
A 35-year-old female presented for a clinical visit with the desire to replace her missing central incisor and improve the appearance of her smile. At the time of presentation, she was utilizing a filler to replace the missing tooth (Figure 1). She reported that she experienced bruising to the tooth after trauma as a teenager, which resulted in the fracture of her maxillary right central incisor and the need for orthodontic treatment as her maxillary left central and second incisors. The fractured right central was endodontically treated and retained with a metal post and a permanent resin crown/over crown. In her early 20s, a vertical fracture of the root was diagnosed, so her trauma dentist extracted the tooth and fabricated a maxillary flipper. She also reported that her mother was given tobacco while she was pregnant, which resulted in intrauterine bleeding and staining on her remaining teeth, and that her maxillary right canine suffered from baby impaction (Figure 2 and Figure 3). Periodontal and temporomandibular joint disorders remain acute within certain limits, and there were no other dental or health complications, corrected, that would



UCLA Abutment with pressed Lithium Disilicate

"H" Abutment

A photograph of a UCLA "H" abutment, which is a white, cylindrical dental component with a hexagonal base and a conical top. It is shown against a dark background.

Abutments, made your way
Universal Base

A photograph of two Universal Base abutments. One is a larger, silver-colored metal abutment with a hexagonal base and a conical top. The other is a smaller, white ceramic abutment with a similar shape. They are shown against a white background with red wavy lines.

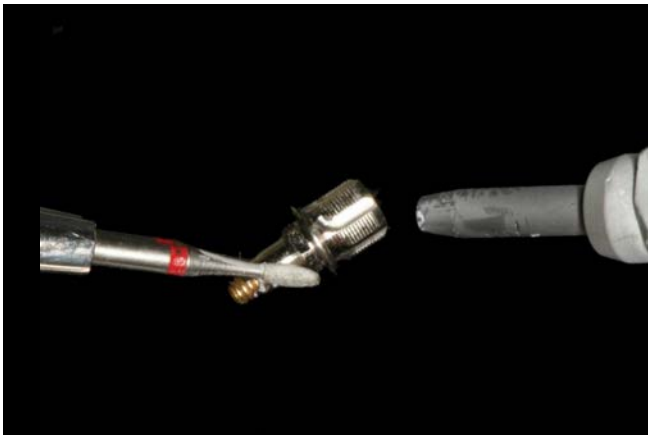
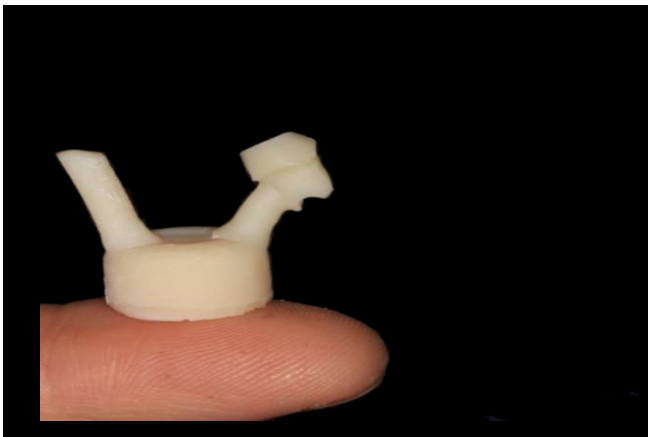
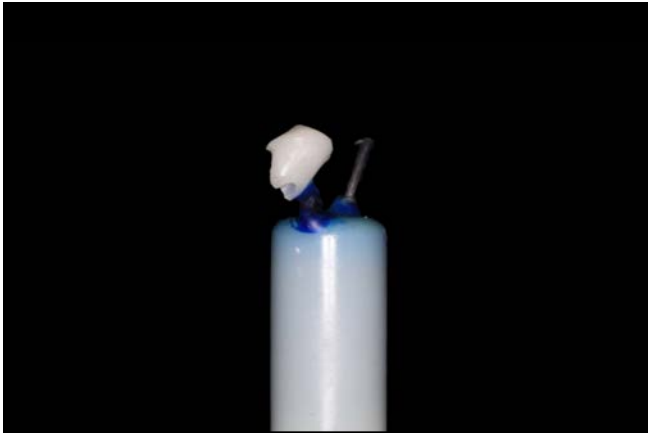
Universal Base (Nobel)

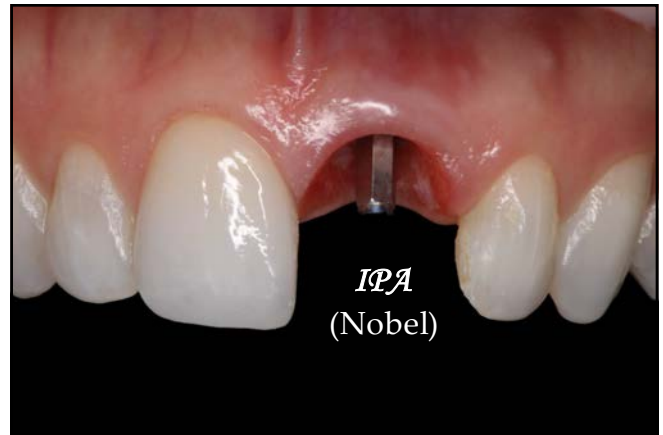
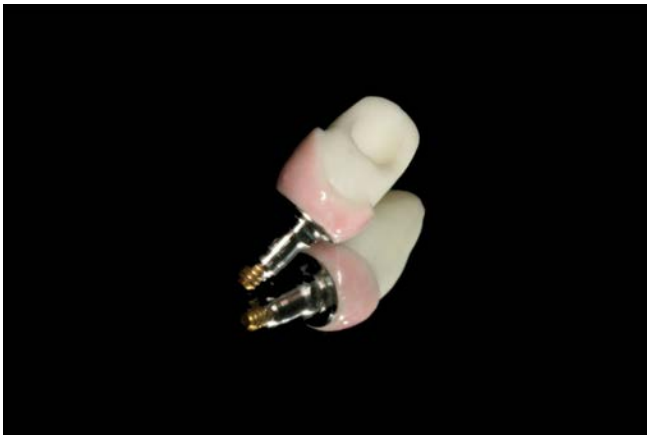
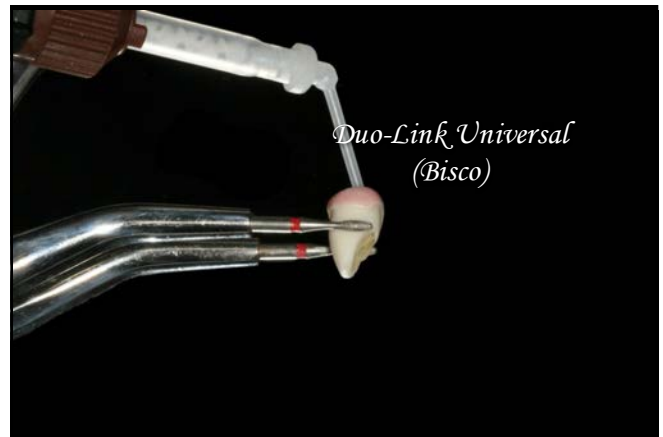
A diagram of a Viteo Base abutment, showing its various features and dimensions. The diagram includes callouts for:

- "Soft edge" design - suitable for press and CAD/CAM systems
- Adjustable diameter height - from 6 mm to 8 mm
- Increased retention protection - soft profiling and ideal support of the restorative material
- Preconditioned bonding surface - strong bond
- Tool and metal implant connection

Viteo Base (Ivoclar)







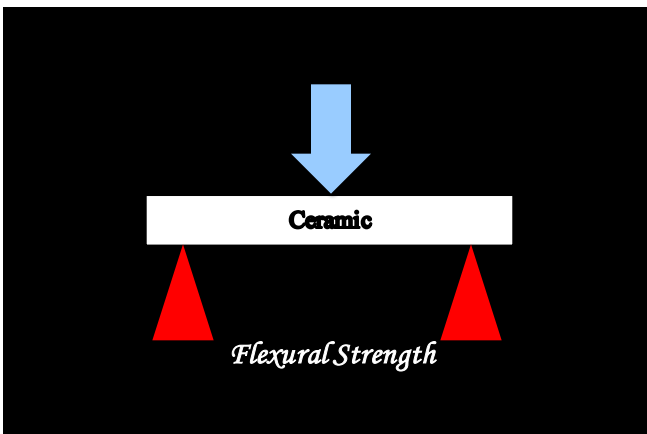


Full Contour Zirconium-oxide

Traditional ZrO₂

HT ZrO₂

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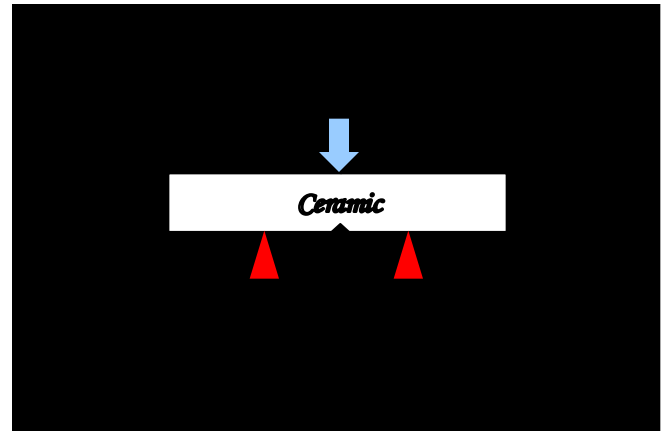


Flexural Strength

- ❖ Powder/liquid ceramic: 100 mPa
- ❖ IPS Empress: 200 mPa
- ❖ E.Max: 400 mPa
- ❖ ZrO₂: 650-1500 mPa

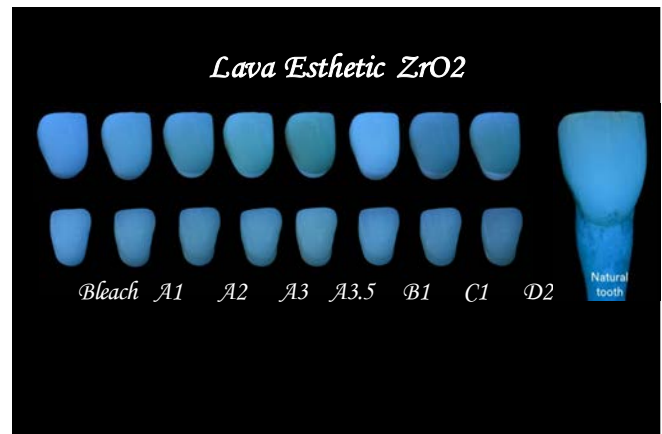
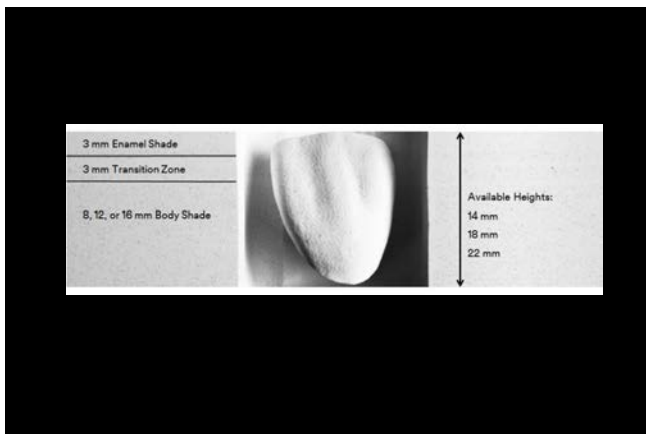
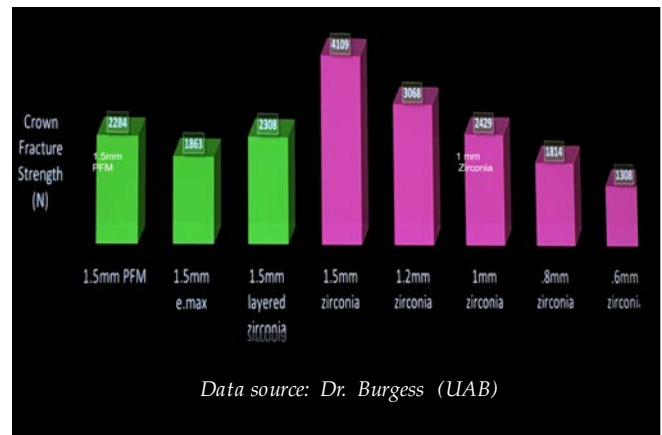
Fracture Toughness

In materials science, fracture toughness is a property which describes the ability of a material containing a crack to resist fracture, and is one of the most important properties of any material for many design applications



Fracture Toughness

- ❖ *IPS Empress*: 1 K1c
- ❖ *Composites/Hybrid ceramics*: 1.5 K1c
- ❖ *E.Max/Celtra Duo*: 2.0-3.0 K1c
- ❖ *Lava Esthetic*: 3.5-5.0 K1c
- ❖ *Tetragonal ZrO₂*: 5.0+ K1c (*Lava Plus, Katana STML, Bruxzir, etc*)





Where do I use the Lava Esthetic?

- ❖ Posterior single units
- ❖ Posterior 3 unit bridges
 (replacing premolars only: pontic width 9.0 mm)
- ❖ Anterior 3 unit bridges
 (replacing a single tooth: pontic width 11.0 mm)
- ❖ Anterior crowns on destroyers



*Cantilever
 Bridges*

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First 5 Lava Esthetic \$99 a unit!
(regularly \$ 135)

text **WEV** to Kennedy at
801-853-8757

Utah Valley Dental Lab

What do we cement them with?

*Depends upon prep design,
amount of retention, and
ability to isolate*

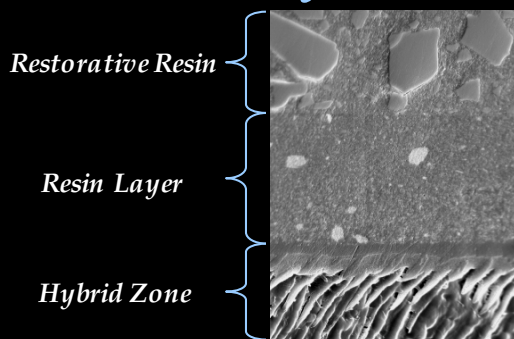
Two surfaces we bond (or attempt) to:

- ❖ *Tooth structure*
 - ❖ *Dentin*
 - ❖ *Enamel*

Adhesive cementation is always the most ideal

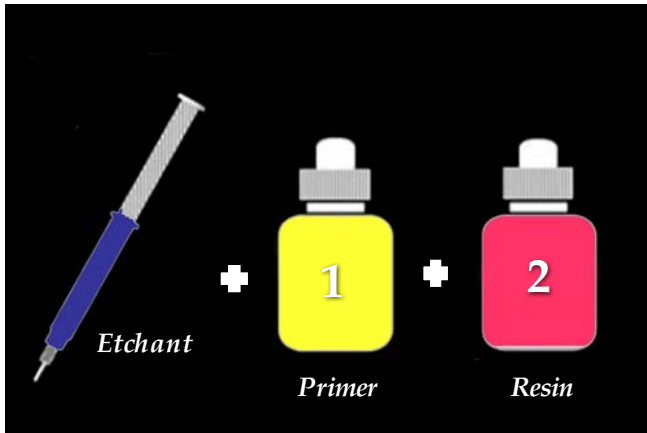
- ❖ *“total etch” followed by a 3-
step, 2-step, or Universal
adhesive system*
- ❖ *Resin Cement*

Dentinal Adhesion



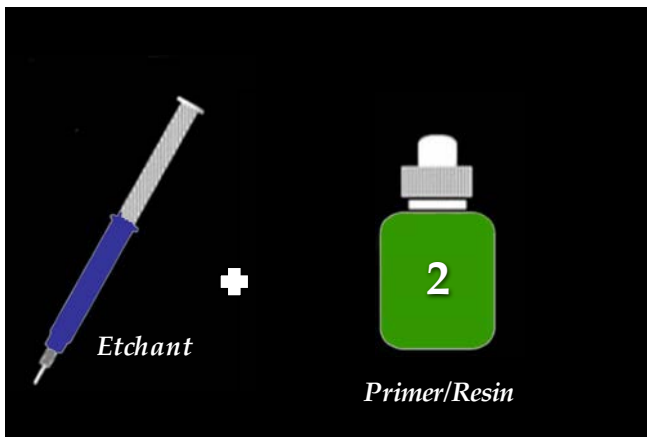
Dental Adhesive Systems

- ❖ *Total-Etch and rinse systems (Complete removal of smear layer)*
 - ❖ *3-Step*



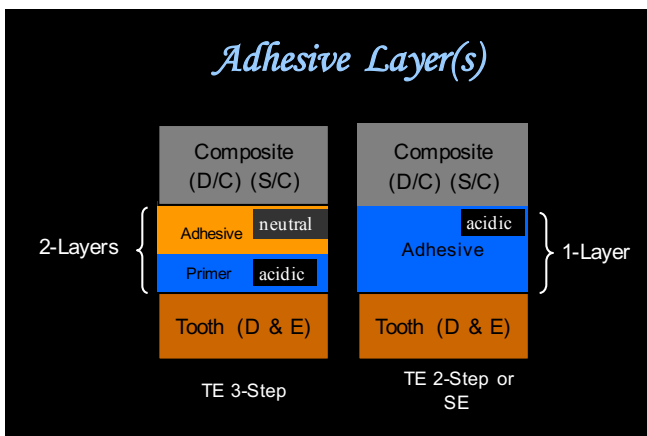
Dental Adhesive Systems

- ❖ Total-Etch and rinse systems (Complete removal of smear layer)
 - ❖ 3-Step
 - ❖ 2-Step



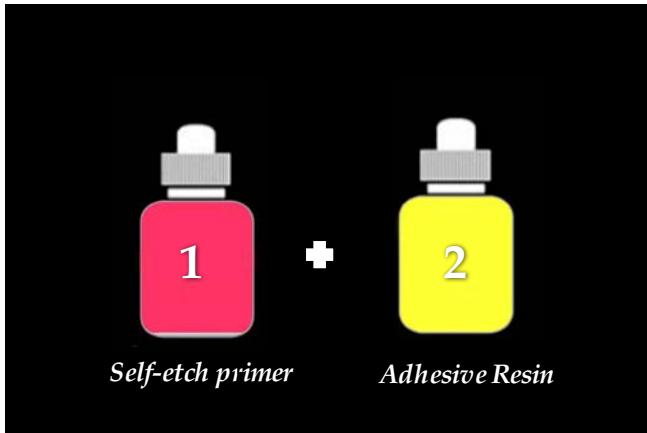
Limitations and applications of total-etch 2-step adhesive Systems

- ❖ Direct Restorations
- ❖ Indirect where it can be polymerized with light
 - ❖ Veneers
 - ❖ Anterior all-ceramic crowns
 - ❖ Ceramic inlays/onlays



Dental Adhesive Systems

- ❖ Total-Etch and rinse systems (Complete removal of smear layer)
 - ❖ 3-Step
 - ❖ 2-Step
- ❖ Self-etch Systems (Dissolution of smear layer and incorporation in adhesive)
 - ❖ 2-Step



Limitations and applications of Self-etch 2-step adhesive Systems

- ❖ *Direct Restorations*
- ❖ *Etch enamel with phosphoric acid, especially with Indirect*



MMPs

Matrix Metalloproteinases

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- ✦ *0.2 % Chlorahexadine*
- ✦ *Benzalkonium Chloride*

Inhibits degradation of Hybrid layer by MMPs

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- ❖ *Cavity Cleanser (Bisco)*
- ❖ *Consepsis (Ultradent)*

Dental Adhesive Systems

- ❖ *Total-Etch and rinse systems* (Complete removal of smear layer)
 - ❖ 3-Step
 - ❖ 2-Step
- ❖ *Self-etch Systems* (Dissolution of smear layer and incorporation in adhesive)
 - ❖ 2-Step
 - ❖ 1-Step

Hydrophilic



All-in-one

*There is a direct correlation
between hydrophilicity of the
resin and resin degradation*

Tay, et al.

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*Tay (et al) similarly concluded that 1-
layer Self-Etch adhesives are semi-
permeable membranes.*

(Tay, Suh, Pashley, Cavalho; J Dent 2002; 30:371-382)

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Limitations and applications of Self-etch 1-step adhesive Systems

- ❖ *Direct Restorations*
- ❖ *Etch enamel with phosphoric acid*



Dental Adhesive Systems

- ❖ *Total-Etch and rinse systems* (Complete removal of smear layer)
 - ❖ 3-Step
 - ❖ 2-Step
- ❖ *Self-etch Systems* (Dissolution of smear layer and incorporation in adhesive)
 - ❖ 2-Step
 - ❖ 1-Step
- ❖ *Select Etch, Universal Adhesive Systems*

Adhesive cementation using a resin cement is always the most ideal

- ❖ "total etch" followed by a 4th or 8 generation adhesive
- ❖ Dual Cure resin cement
 - ❖ Duolink (Bisco)
 - ❖ NX3 (Kerr)

Non-bonded posterior crown

(ZrO2 with Adequate Retention)

- ❖ Clean tooth with Chlorahexidine Pumice (Consepsis Scrub; Ultradent)
- ❖ Self-etching resin cement
 - ❖ BisCem (Bisco)
 - ❖ MaxCem Elite (Kerr)
 - ❖ Unicem Plus (3M)
- ❖ BioActive Cements
 - ❖ TheraCem (Bisco)
 - ❖ Activa cement (Pulpdent)
 - ❖ Ceramir (Doxa Dental)



Self-etching resin cement with alkaline pH



Potential advantages of alkaline pH:

- ❖ Promote apatite formation & healing of pulp tissue
- ❖ Inhibition of bacterial growth
- ❖ Neutralize acidic bacterial by-products, prevent secondary caries

	TheraCem	Ceramir
Shear Bond Strength to Dentin (gel-cap method)	5.7 MPa	4.0 MPa
Shear Bond Strength to Cut Enamel (ultradent jig method)	18.0 MPa	2.2 MPa
Shear Bond Strength to Zirconia (sandblasted, no primer applied, ultradent jig method)	26.8 MPa	0
Calcium Release after 7 days	66 µg/cm ²	70 µg/cm ²
Film Thickness	14 µm	14 µm
Flexural Strength	60 MPa	12 MPa
Compressive Strength	199 MPa	109 MPa
Radiopacity	2.4	2.4

Two surfaces we bond (or attempt) to:

- ❖ *Tooth structure*
 - ❖ *Dentin*
 - ❖ *Enamel*
- ❖ *Restorative material*

Clean the restoration with Ivoclean after try-in



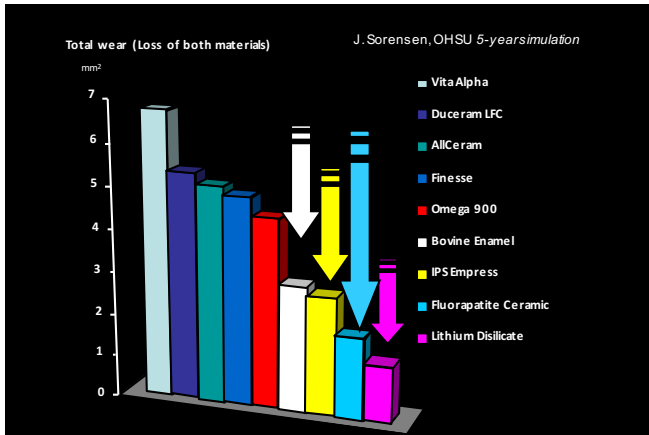
All-Ceramics

*Results limited by your
Creativity and Imagination,
not the
Materials*

IPS Empress
(Leucite reinforced glass ceramic)

e.Max
(lithium disilicate)

Zirconium oxide
(Full contour and core supported)



Wear of Enamel Against Antagonist Incisal Enamel with Lava Full Contour

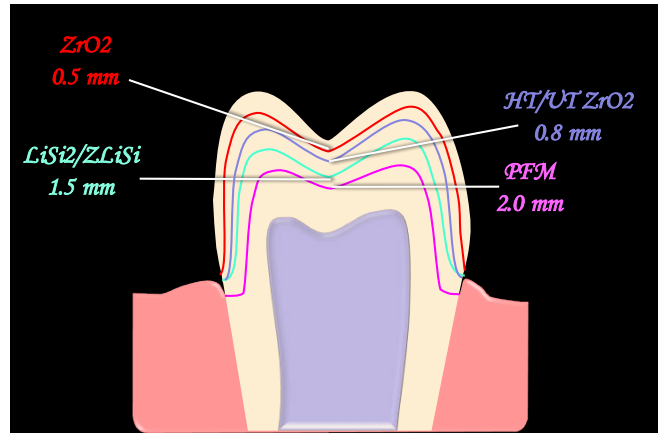
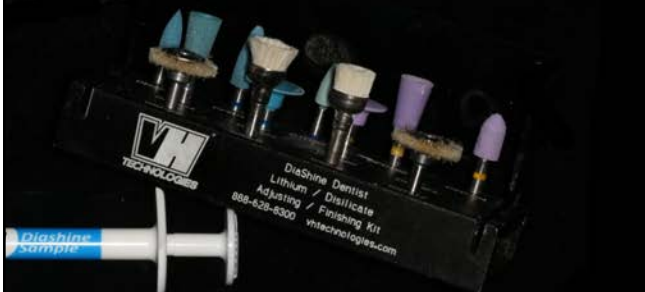
“The results of these studies indicate that Lava Esh etc is wear-friendly to opposing enamel.”

Dr. John O. Burgess and
Dr. Nate Larsson
University of Alabama at Birmingham School of Dentistry
Source: Internal Report to 3M Oral Care

*What do we adjust
and polish with?*



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Desirable properties of our restorations

PFM

- ❖ Strength
- ❖ Fit
- ❖ Wear Compatibility
- ❖ Aesthetics
- ❖ Conservation of tooth Structure
- ❖ Biocompatibility
- ❖ Lab cost

All-Ceramic

- ❖ Strength
- ❖ Fit
- ❖ Wear Compatibility
- ❖ Aesthetics
- ❖ Conservation of tooth Structure
- ❖ Biocompatibility
- ❖ Lab cost

Review of scientific literature

Fracture strength of four-unit Y-TZP core designed with varying connector diameter: an in-vitro study

Larsson C, Holm L, Looqren, Kokubo Y, Vult von Stryen
J Oral Rehabil. 2007;34:702-709

Connector dimensions required 4 x 4 mm with ZrO2 frameworks. Metal supported PFD can have 2.5 x 2.5 mm

Fabrication techniques

(IPS Empress and e.Max)

- ❖ Pressed: "Lost wax" technique
- ❖ Milled: CAD/CAM in-office or in-laboratory

Finishing Techniques

- ❖ Shaded or stained
- ❖ Cutback and layered