

*Efficiency in tooth restoration*

## Let's Stick Together

Simplifying indirect and direct restoration choice, bonding, and cementation  
2012



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Accredited American Academy of Cosmetic Dentistry  
Master Academy of General Dentistry

**Thank you** for choosing to spend your time with us. We know that there are many choices in continuing education and we sincerely want this to be one of the best experiences in dental CE today. Our goal is to help you gain greater understanding, confidence, and skill that will allow you to take your restorative practice to the next level in dentistry.....making your practice more efficient.

**Please** let us know if there is anything we can do to help you as we take a journey down the road of long term restoration success together.

*If you don't know where you are going, any road will take you there.*

## Let's Stick Together

**How do we keep our restorations stuck to the teeth as long as possible? How do we choose materials that last for many years without sensitivity, leakage, fracture, or failure?**

**So many materials, so little time.** With a myriad of newer restorative materials and seemingly endless choices in luting materials and bonding systems **could this stuff be any more confusing?** There are excellent materials today that can help us minimize sensitivity, decrease de-bonding, stop micro-leakage, and reduce problems we may have with our restorations. The key is having an arsenal that is versatile and almost universal in application and understanding how and when to use them. When do we etch, bond, cement, rinse, blow, cure.....? How many layers do we need in a posterior composite and how do we get tight contacts and great contours every time? Ever had a patient say "Doc, that tooth was never a problem until you fixed it"? **Let's stop the madness.**

The goal of this course is to simplify materials and techniques to provide great success with an increased efficiency with both indirect and direct esthetic restorations. We will learn indications for newer indirect materials such as Lithium Disilicate and Zirconia with preparation and placement methods for each. The bonding of direct and indirect restorations will be explored with emphasis on conservative bridges and cosmetic temporaries for office efficiency and patient happiness. Next we will cover the placement of posts, cores, and build up materials that will provide us with the dependable infrastructure we need for years of patient pleasing service.

**C**ourse outline:

1. Lithium Disilicate – surface treatment, when to bond and when to cement and how to do each
2. Porcelain veneers – materials and techniques for simplified, esthetic bonding
3. Stress free temporizes and transitional restorations with IDS
4. Zirconia bridges and crowns – surface treatment, when to bond or cement or both
5. Esthetic posts – easy and strong posts and cores using simplified materials and efficient techniques
6. An overview of current cements and clinical uses
7. Predictable bonding, shaping, and contact formation for efficient posterior composites
8. Clean up and adjustment techniques to make you enjoy insertion appointments

### Indirect restorations:

They are sexy, they are strong. For many viable **reasons lithium disilicate and zirconia** have had most of the headlines for indirect restorations. Is there a good reason for this? In a word, YES!

In this busy practice, the vast majority of restorations placed are one of these 2 materials. If used correctly, we are seeing successes passing everything except all gold restorations. There are certainly some keys. Let's go over them...



**Monolithic:** mon-o-lith-ic [mon-uh-lith-ik] (from dictionary.com)

1. of or pertaining to a monolith.
2. made of only one stone: a monolithic column.
3. consisting of one piece; solid or unbroken: a boat with a monolithic hull.
4. constructed of monoliths or huge blocks of stone: the monolithic monuments of the New Stone Age.
5. characterized by massiveness, total uniformity, rigidity, invulnerability, etc.: a monolithic society.



In dentistry, we are talking about a material with no layering material or add on material. The weak link with many of our indirect materials is the add on porcelain which gives us only 80-150 MPa of bond to the substrate. Chipping, de-lamination, fracture and other problems are associated with this layering stuff. We have all seen many cases where the porcelain has broken off of the metal of a PFM crown or zirconia framework.

Basically material choice comes down to what the strongest material we can find that meets the minimum cosmetic needs of the patient.

**Lithium Disilicate**

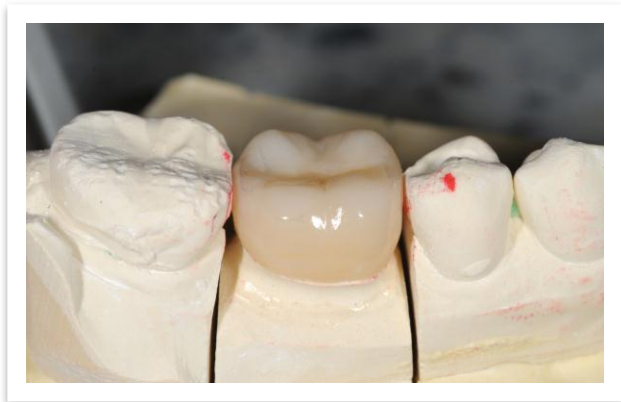
A glass with lithium disilicate fillers which is perhaps the most versatile indirect material we have today. As a monolithic restoration, we have a flexural strength nearly 400MPa and a choice in material opacity. Most of the “LiDi” crowns from the lab are used in a pressed form. In office CAD/CAM systems like CEREC and E4D use the material in a block form in a non-crystalized state often called a “blue block”. They become tooth colored and hardened when placed in an oven under vacuum = crystallization. **Can be cemented or bonded in place.** This makes it versatile. We bond in all with less than perfect retentive preps or when esthetics is critical. We cement very few.

**Esthetics of LiDi is at the limit of the ceramist.** With proper cut back and addition of layered porcelain, esthetics can be as good as any material out there. Again, lab selection is the determining factor. Blocking dark color is not quite as dependable as more opaque materials like metal and zirconia. Remember, a monolithic piece of LiDi has much less chance of failure than one with layering porcelain.



**Important points of interest:**

1. Always show lab the color of the tooth so they can use the correct opacity
2. Sand blasting with AlO3 may cause tiny fractures which may grow...use glass beads in stead
3. Cementation is allowed for retentive preps, but bonding improves retention and may strengthen porcelain by reducing crack propagation from inside
4. Don't over etch ... only 20 seconds with 5% HFI, rinse well, silanate
5. Not strong enough for posterior or high stress anterior bridges
6. For veneers, minimal prepping works best...0.5mm is plenty unless the tooth is too labial



### Zirconia

Also very versatile but not as natural looking. It is certainly less opaque and better looking than it has been in years past. Esthetic limitations for monolithic zirconia are overcome these days by using some of the less ugly newer zirconia formulations plus the external staining of the lab. With flexural strengths exceeding 1000MPa, the ability to withstand mastication forces is extremely good with proper prep and impression techniques.

Zirconia is certainly strong enough for bridge sub-structures but layering porcelain bond strengths are weak. Nothing sticks to zirconia very well. The beauty in our office of zirconia is how well it does as single unit posterior crowns.

### Cementation

Cement without bonding is much easier to clean up...less hygienists screaming at doctors. The reality is that bonding is stronger despite being more technique sensitive. We have to bond when retention is poor or the material is weak. Don't be afraid of adhesive cementation, work on your protocol and be rock solid in your decision making.

#### Important points of interest:

1. Cement whenever the retention is good – more than 3mm walls in all directions
2. When doing adhesive cementation, using a self-etch-self-adhesive resin cement gives less long term bond strengths than a separate DBA and resin cement
3. Don't etch unless significant enamel remains, use self etch adhesive with resin cement
4. Light cure buccal and lingual to make clean up easier
5. When cleaning up or flossing, make sure pressure is maintained to prevent movement
6. Isolate well when bonding...microleakage is often a direct result of contamination with blood or saliva
7. When bonding in zirconia: try in, clean with alcohol, apply zirconia primer (i.e. Z Prime Plus – BISCO), bond tooth, use dual cure resin cement (i.e. Duo Link – BISCO, Multilink – Ivoclar, Unicem – 3M)
8. When bonding in LiDi: try in, 20 seconds acid etch if not etched, clean with alcohol if etched, use dual cure resin cement (i.e. Duo Link – BISCO, Multilink – Ivoclar, Unicem – 3M)

### Direct restorations:

For many of us who don't live full time in the Beverly Hills front teeth only world, direct restorations is where we spend much of our clinical time. The key is to be efficient to be profitable while doing work that doesn't have to be "re-done" or adjusted later. We will briefly touch on a few procedures that can make or break our office efficiency.

### **Post and cores/build ups**

The foundation is the key. Often little thought goes into the strengthening of the tooth core and root system. Of course we were taught in school that the post and core does nothing to “strengthen the tooth” but merely to aid in restoration retention. Of course, that was before adhesive dentistry. We must be as diligent and meticulous with our pre-crown foundation as we are when we place veneers.

#### **Important points of interest:**

1. The strongest post is a sand blasted metal post bonded in place with a resin cement
2. We don't do them any more because of esthetics and potential root fracture
3. Use a post system with tapered drills and posts for easier seating and removal of less dentin
4. When using etch down a canal, rinse thoroughly and change angles with the water to make sure of complete removal
5. Only blot dry the canal or paper point, keep moist so the dual cure DBA goes into canal easier
6. Air thin, do not cure
7. Use a dual cure resin cement/build up from an automix gun (i.e. Core Flo – BISCO, Build-It – Pentron) and inject filling the canal only
8. Place DBA coated post into canal, cure – this will prevent movement of the post while shaping core
9. Complete the core with the build up material, shape, cure

### **Direct composites**

This is pretty basic stuff at this point. We will spend most of our time on 2 things, bulk filling and contacts. Everyone has their own favorite composite and much of the marketing is spent on delivery these days. Again, pay attention to details when placing them and be meticulous in your steps.

#### **Important points of interest:**

1. Isolation is key.
2. Selective etch if worried about dentinal tubules (etch only enamel, self etch-primer-DBA on dentin)
3. When doing total etch, phosphoric acid with antibacterial only 10-15 seconds, rinse thoroughly, blow only to remove standing water or use suction only to remove excess water
4. If more than 1mm between prep margins on back-to-back restorations, it is more predictable to do one at a time.
5. Use a sectional and ring system...it's a no brainer (ComposiTight 3d – Garrison, V3 – Triodent)
6. Clear dentin replacements (i.e. Venus Bulk Fill – Heraeus, Sure fill – Dentsply, SonicFill – Kerr)
7. Don't underestimate transenamel curing – cure from 30 seconds occlusal, then facial, then lingual for a more complete cure. Always have the assistant re-cure after final shaping

*Success is where preparation meets opportunity.*

Jack D Griffin, Jr DMD MAGD

[Esmilecenter@aol.com](mailto:Esmilecenter@aol.com)

[www.Eurekasmile.com](http://www.Eurekasmile.com)

Slide 1



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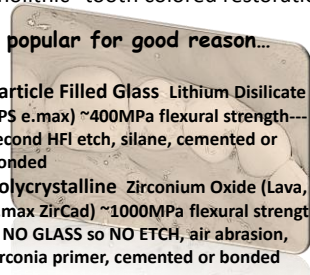
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Slide 2

"Monolithic" tooth colored restorations:  
Very popular for good reason...



1. Particle Filled Glass Lithium Disilicate (IPS e.max) ~400MPa flexural strength--- 20 second HFI etch, silane, cemented or bonded
2. Polycrystalline Zirconium Oxide (Lava, e.max ZirCad) ~1000MPa flexural strength-- -- NO GLASS so NO ETCH, air abrasion, zirconia primer, cemented or bonded

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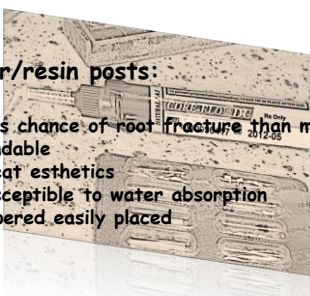
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Slide 3

Fiber/resin posts:



- ↳ Less chance of root fracture than metal
- ↳ Bondable
- ↳ Great esthetics
- ↳ Susceptible to water absorption
- ↳ Tapered easily placed

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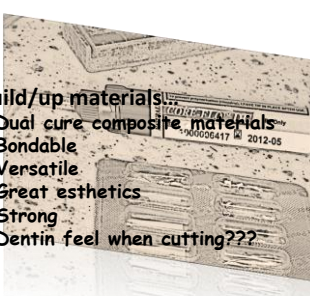
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Slide 4

Build/up materials:



- ↳ Dual cure composite materials
- ↳ Bondable
- ↳ Versatile
- ↳ Great esthetics
- ↳ Strong
- ↳ Dentin feel when cutting???

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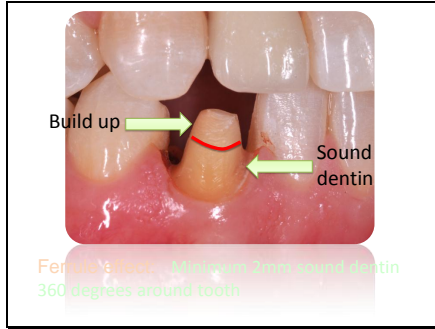
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Slide 5



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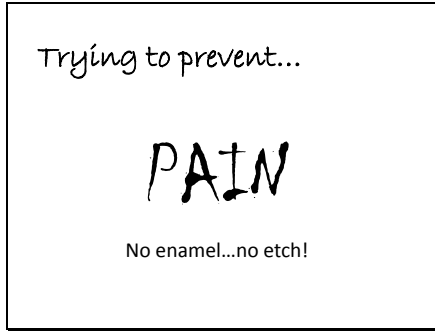
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Slide 6



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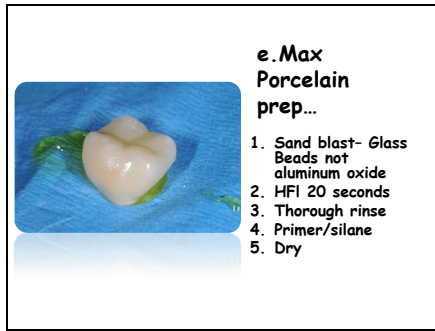
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Slide 7



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Slide 8

**Why cement instead of bond**

- ⦿ Faster
- ⦿ Easy ... even a dentist can do it
- ⦿ Simple clean up
- ⦿ Less sensitive
- ⦿ Esthetics no concern



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Slide 9

**Why bond instead of cement?**

- ⦿ More retention
- ⦿ Less chance of restoration fracture
- ⦿ Better esthetics
- ⦿ Sealed dentin
- ⦿ Hygienists need more work



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Slide 10



Good "retentive" prep  
Occlusion good  
No parafunctional habits  
Material that is cement-able  
Asymptomatic tooth

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Slide 11

[JADA](#), 2011 April;142(suppl):205-225.  
Cementing all-ceramic restorations. Recommendations for success.  
Vargas, Bergeren, Diaz-Arnold.

**CONCLUSIONS:**  
New dental ceramics have been developed to meet the demand for improved performance and esthetics. Care must be taken to not only choose the proper ceramic but also the appropriate cement and luting procedure. The clinician needs to give special consideration to the use of adhesives, resin cements, isolation, and manufacturer's instructions.

**Missouri speak:**  
Read directions.  
Cementing is easier than bonding.  
Self-adhesive cements not as good as DBA then resin.

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Slide 12

[J Prosthet Dent](#), 2011 Jun;105(6):387-93.  
**Influence of glass-fiber posts on the fracture resistance and failure pattern of endodontically treated premolars with varying substance loss: an in vitro study.**  
[Mangold JT](#), [Kern M](#).

**CONCLUSIONS:**  
The fracture resistance of endodontically treated premolars was dependent on the number of residual coronal dentin walls. Placement of a glass-fiber post had a significant influence on the fracture resistance when fewer than 2 cavity walls remained but no significant influence when 2 or 3 walls were present.

**Missouri speak:**  
Less dentin, more posts.  
More ferrule, more resistance to fracture.

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Slide 13

[Quintessence Int](#), 2005 Oct;36(9):737-46.  
Restoring endodontically treated teeth with posts and cores—a review.  
[Peroz J](#), [Blankenstein F](#), [Lange KP](#), [Naumann M](#).

**RESULTS:**  
Posts should only be used for the retention of core material in cases where little dental substance remains, ie, one or no cavity walls. A ferrule of 2 mm has to be provided, by surgical means if necessary. The post length is limited by the necessary apical seal of 4 to 6 mm. In cases of short posts, adhesive fixation is preferred. Ceramic posts show a higher risk of fracture than fiber posts which are retrievable. Composites have proven to be a good core material. Posts should be inserted if endodontically treated teeth are used as abutments for removable partial dentures

**Missouri speak:**  
Less dentin, more posts.  
More ferrule, more resistance to fracture.  
Minimum 2mm ferrule best.  
Bonded is significantly better.

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Slide 14

### Zirconia crowns



The strongest  
"tooth colored"  
material we  
have...  
A gold  
replacement?

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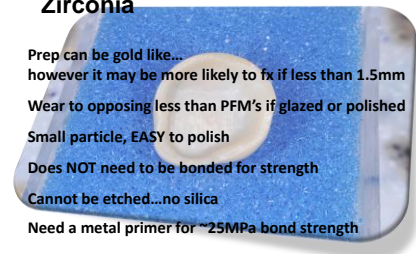
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Slide 15

### Zirconia



Prep can be gold like...  
however it may be more likely to fx if less than 1.5mm  
Wear to opposing less than PFM's if glazed or polished  
Small particle, EASY to polish  
Does NOT need to be bonded for strength  
Cannot be etched...no silica  
Need a metal primer for ~25MPa bond strength

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Slide 16

### Zirconia



**Cement** if highly retentive prep  
**Bond** if lower retention or to seal dentin

**Bond-Cem**  
Self-Adhesive Resin Cement  
REF D-45011  
Contents: Base/Catalyst (8g mixed)

Bisco, Inc.  
1735 Lakeside Blvd., #200  
U.S.A.  
Tel: 800.451.1000

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Slide 17

J Oral Science, 2010, 52(4):531-538.  
Current status of zirconia based fixed restorations. (a literature review)  
Komine, Blatz, Matsumura

**RESULTS:**  
Zirconia based restorations are a viable option and a promising alternative to metal based restorations. Excellent clinical performance has been demonstrated in many studies despite the frequency of chipping of the veneering porcelain. Work continues in the improvement of the layering materials and methods. Monolithic restorations have proven extremely durable. Cementation and bonding have both given similar clinical performance with little influence on restoration longevity.

**Missouri speak:**  
Zirconia good.  
Don't veneer unless really ugly not acceptable.  
Cement when you can.  
Bond with primer to increase retention.

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Slide 18

**Immediate  
Dentinal  
Sealing**

1. Best bond strengths are on immediately cut dentin
2. Bond matures with time
3. No effect on cement bond strength in a few weeks
4. Immediate sealing of dentinal tubules
5. Less sensitivity
6. Less microleakage
7. Predictable removal with separating medium



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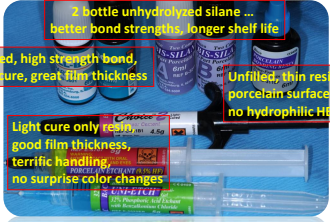
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Slide 19



2 bottle unhydrolyzed silane ...  
better bond strengths, longer shelf life

Unfilled, high strength bond,  
fast cure, great film thickness

Unfilled, thin resin for  
porcelain surfaces ...  
no hydrophilic HEMA

Light cure only resin,  
good film thickness,  
terrific handling,  
no surprise color changes

Choice 2 starter kit (Bisco) ---- order # C-3900K

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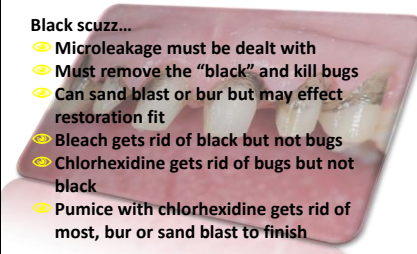
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Slide 20

**Black scuzz...**

- ⦿ Microleakage must be dealt with
- ⦿ Must remove the "black" and kill bugs
- ⦿ Can sand blast or bur but may effect restoration fit
- ⦿ Bleach gets rid of black but not bugs
- ⦿ Chlorhexidine gets rid of bugs but not black
- ⦿ Pumice with chlorhexidine gets rid of most, bur or sand blast to finish



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Slide 21



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Slide 22



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