Medium sized Lesions (1-2MM)
- Mostly superficial
- Good restoration longevity
- ½ enamel with ½ extending into dentin
- Dentin is becoming less dense
- Open &/or Closed defect
- Risks are low
- Minimal occlusal loading

Large sized Lesions (>2MM)
- Mostly dentin
- Dentin has more moisture and less substance
- Open and Closed defects
- Complications & Risks are higher
- Porous, Wet, Dentin Available
- Interproximal concerns
- Increased Occlusal Loading
- Remaining Tooth Structure

Properties of Deep Dentin
3x Tubule Density Equals Higher Fluid & Increased Difficulty for Bonding
50% Degrease in Bond Strengths with most bonding systems.

Bond Strengths Related To Type of Dentition
- Healthy Enamel to Dentin
- Tensile Strength: ~ 80 MPa & DEJ
- Superficial (Sound) Dentin
- Beveled Enamel
- Deep Dentin
- Affected Carious Dentin
- Infected Carious Dentin

Irie m, suzuki k, watts dc, 2004, marginal gap formation of light activated restorative materials, affects of immediate setting shrinkage and bond strength. Dent Mat 18, 2002; 203-210
Caries Detector

Caries Detector by Kuraray Dental is the original caries detecting stain material. It was developed by Dr. Fusayama & Kuraray Dental at the Tokyo Medical & Dental School in 1978.

How Caries Detector Works:

- The solution penetrates necrotic dentin and results in a red stain. The solution partially stains caries affected dentin and results in a pink stain. Caries Detector penetrates dentin because the cross link fibers are loose when necrotic and partially loosened when affected by caries.

Caries Detector 86% Accuracy:

- As noted by Southern Illinois Dental School in vitro research, “Caries Detector Solution Identified 86% of Subsequently Confirmed Caries Lesions After Sectioning”.

- Reference: Caries Detection Accuracy by Multiple Clinicians & Techniques, Thomas, Land, Wilson & Gregory Stewart DDS, Southern Illinois University School of Dental Medicine, IADR Abstract 3127, 1998.

Caries Removal Burs

- SS White
  - Single use
  - Polymer
  - Hardness
  - 5000-10,000 rpms

- Komet
  - Multi use
  - Ceramic
  - Hardness
  - 1000-1500 rpms

Round Burs (#6)

- Carbide (SS White)
  - 1,000-1,500rpm
- CeraBur (Komet)
  - 5-10,000rpm
- SmartBurs II (SS White)
  - 5-10,000rpm

Note Caries on Floor of 2nd Molar
Resin-Modified Calcium Silicate Pulp Protectant/Liner

Seals & Protects the Pulp:
- For Direct & Indirect Pulp Capping
- Light-curable, Radiopaque Liner based on improved MTA-technology.
- Significant Calcium Release:
  - Stimulates Hydroxy Apatite & Dentin Bridge Formation.

Indications for Use
- DIRECT PULP CAPPING
  - Carious Exposures
  - Mechanical Exposures
  - Exposures due to trauma

- INDIRECT PULP CAPPING
  - Under Amalgam restorations
  - Under Class I & II composite Restorations
  - Under other base materials
  - Under cements
  - As an alternative to:
    - Calcium Hydroxide
    - Glass Ionomer/RMGI
    - Cavity Varnish Sealer

Unique Benefits and Clinical Significance
- Calcium Release affects:
  1. Mechanical Sealing of the pulp
  2. Hydroxy apatite formation
  3. Secondary bridge formation

  Alkaline pH promotes Healing and Apatite formation & reduces risk of cavities
  Moisture tolerant - improves the ability to form a durable seal

Calcimol LC (VOCO)
- Light-cured, resin modified calcium ion releasing base liner and indirect pulp capping material
- pH 10-12
- High compressive strength
- Calcium ion release promotes hydroxyapatite and secondary dentin
- Radiopaque
- Acid resistant
Active Biosilicate Technology™

Dentin replacement
Calcium silicate material
Sets 10-12 minutes

“C-Factor” Definition
Configuration Factor:
“The ratio of bonded to un-bonded (free) surfaces”

Feilzer, DeGee, Davidson (1987)
University of Amsterdam, ACTA

“Adhesive dentistry could be expressed as a simple relationship between bonds and stress. If the bonds can withstand the stress, the restorative technique will be successful.”

Unterbrink and Liebenberg (1999)

Lowest Stress
Low Stress
Medium Stress
High Stress
Highest Stress

“A Simple Pain-Free Adhesive Restorative System by Minimal Reduction & Total-Etching (1993)
Takao Fusayma DDS,
Tokyo Medical & Dental University"
**Preparation**
- Limited to removal of pathology with the exception of access and bevels.
- Maintaining enamel and superficial dentin
- Preserving occlusal stops
  - Marginal ridges
  - Transverse ridges
  - Oblique ridges
- Rounded line angles
- Purge hand piece?
- Diamond or Carbide bur?

**Handpiece Lubricants**


Higher bond strengths when using tungsten carbide burs with SE adhesives

Long term failure occurs at gingival margins and adhesive interfaces.

**Bonding to Enamel/Dentin**

**Total-Etching**

**PLACEMENT TECHNIQUES**
For Direct Restorations

**How are you restoring these different preparations?**

Draw backs:
- MMP activity from acid etching
- Bond strength to dentin
- Technique
- Sensitivity
Problem with Total Etch Bonding (Over drying phenomenon)

Phosphoric acid

Dentin

Problem with Total Etch Bonding (Over drying phenomenon)

Water

Dentin

Problem with Total Etch Bonding (Over drying phenomenon)

No filtration into the collagen fiber Excess drying

Shrinkage of collagen fiber

Problem with Total Etch Bonding (Over drying phenomenon)

No filtration into the collagen fiber Excess drying

Adhesive

Bonding to Enamel/Dentin

Self-Etching

Drawbacks:
- Need to select etch enamel
- MMP activity from acidic monomers pH x<2
- Bond strength
- Technique
- Sensitivity
Use Carbide Burs

Adhesion process - Self-Etching

Self-etching adhesive

Smear layer

Dentin

Dentinal tubule

Dentin fluid

Odontoblast

Duration of exposure & acidity

Large layers inhibit acidic monomers

No Post-Operative Sensitivity

Excellent sealing and desensitizing

What substrate are we treating?

Class I or II

3x Tubule Density Equals Higher Fluid & Increased Difficulty for Bonding

50% Decrease in Bond Strengths with most bonding systems.
Decreased Bond Strengths due to
- Substrate
- Preparation technique
- Bur selection
- Hand piece oils
- Bonding agent
- Curing device and position
- Material selection
- Layering technique

Drawbacks of Any Composite Resin
- Material placement techniques
- Polymerization stress & shrinkage
- Water absorption
- Hydrophobic bonding agents
- Decreased adhesive bond strength over time
- Microleakage

Preparations > 2mm
- Traditionally, numerous increments have to be placed to diminish polymerization shrinkage as well as stress on tooth structure

1 increment used
- <2mm
- Dentin or Enamel shade?

2 increments >2mm (C-factor & Adhesion issues)
- Dentin or Enamel for both increments
- Dentin first then Enamel
- Flowable then Dentin or Enamel
- RMGI then Dentin or Enamel or Both
- Open & Closed Sandwiches

Layering Increments
Posterior Composites

- Kuraray – Clearfil Majesty ES2
- G.C. America - Gradia
  - Kalore
- Ivoclar - 4 Seasons, Tetric Evo Ceram, Empress Direct
- Heraeus - Venus Diamond
- Shofu - Beautiful II
- Dentsply - TPH Spectra, Esthet.X HD
- Septodont – N ‘Durance

- 3M - Filtek Supreme Ultra
- Ultradent – Vitalescence, Amelogen Plus
- Tokuyama - Estelite Sigma Quick & Omega
- SDI – Aura
- Pentron – Similie
- Voco - Grandio SO
- Denmat/Philips/Discus – Nuance
- Kerr – Premise, Herculite Ultra, SonicFil

Restoration variations for durable class I & II restorations

- Composite (bonding agent)
- Flowable (bonding agent)
- Glass Ionomer or Activa

Adhesion variations for durable class I & II restorations

- Shofu’s GIOMER Technology & Benefits
  - GIOMER Technology: Surface Pre-Reacted Glass Filler Particles.
  - A bioactive tri-laminar structure with a multifunctional glass core
  - Protected by a glass ionomer phase & surface modified layer
  - Bioactive – 6 ions released
  - High fluoride release/recharge acts as a preventative of secondary caries
  - Shown to neutralize acid & create an anti-plaque effect
Benefits of GIOMER Specific to a Bulk Fill System

- Hydrophobic S-PRG filler allows dense distribution in resin matrix (72.5wt% or 51.0 vol%)
- Dense S-PRG filler load reduces polymerization shrinkage and shrinkage stress
- Low shrinkage stress helps to improve marginal integrity and prevent postoperative sensitivity

Benefits of GIOMER Specific to a Bulk Fill System

- S-PRG filler allows ideal balance of light-diffusion and transmission, allowing a 4mm depth of cure
- S-PRG's unique light diffusion properties creates optimal opacity to match surrounding tooth structure – chameleon effect.
- Self-leveling feature for optimal adaptation to cavity walls helps to reduce voids, a common issue with bulk fill composites

Beautifil (SHOFU)

The term “Giomer” refers to any product containing Shofu’s proprietary Surface Pre-Reacted Glass, or “S-PRG” filler particles. S-PRG filler uniquely releases fluoride, sodium, strontium, aluminum, silicate, and borate; S-PRG filler has been shown to inhibit plaque formation and possess remarkable acid neutralization capabilities.

Indicated for:

- Direct posterior restorations including occlusal surfaces
- Liner and base
- New Technique!

Advantages of BEAUTIFIL® Bulk Restorative

- This is a BEAUTIFIL line extension.
- Giomer – benefits backed by 13 year study
- Bioactive – preventative benefits, high fluoride release & recharge
- Acid Neutralization
- Our advanced technology allows higher filler ratio, 87.0%, resulting in lower polymerization stress (number one concern).
- Vickers Hardness Value test displayed above 90% polymerization at each increment of depth of cure (1 - 4mm)

BEAUTIFIL® Bulk Restorative - Indications For Use

- Indicated for:
  - Direct posterior restorations including occlusal surfaces

BEAUTIFIL® Bulk Flowable Restoration Techniques

- BEAUTIFIL Bulk Flowable used for lining and base
- 8mm restoration by layering BEAUTIFIL Bulk Flowable and BEAUTIFIL Bulk Restorative
**Dentin Replacement with Composite Cap**

- Dentin substitute
  - Glass Ionomers
  - Flowable Resins
  - What bonding agent?
- Enamel Replacement
  - Modern NanoHybrid Composite
  - CR April 2014 NanoHybrid offers best results

**Substrate**

- Best long term bonds to phosphoric etched enamel.
- Superficial dentin can have high bond strengths but has MMP activity and water absorption which will disrupt bonds with time even though it offers higher bond strengths than deep dentin.
- Larger thicknesses of composite stress the bond to tooth structure

---

**Dentin Bulk Fill Composites**

- Bulk fill composites 4mm max typically
- More translucent
- Typical shrinkage is approx. 3.1-3.5%
- Shrinkage stress is 1.6-3.13 mpa
- Venus Bulk Fill composite & flowable (Kulzer)
- SureFill SDR Flow (Dentsply)*
- Tetric EvoCeram Bulk Fill (Ivoclar)
- Xtra Base (Voco)
- Filtek Bulk Fill (3M/ESPE)
- Beautifil Bulk Flow (Shofu)

**Advances in Composite Restorations:**

Flowables are being used to ensure wetting to the adhesive service and creating a layer with less polymerization stress because of a lower modulus of elasticity. (but higher shrinkage?)

ADA reports flowable resins are used by 82% of dentists as bases or liners.

---

**Bulk Filling**

- Dentin & Enamel Replacement
  - Requires one layer
- Bonding agent used?
- Long term research?

**Bulk Fill Composites**

- Bulk fill composites 4mm max typically
- More translucent
- Typical shrinkage is approx. 1.5-1.8%
- SonicFill, Kerr (5mm)
- Venus Bulk Fill (Kulzer)
- Quixx (Dentsply)
- Tetric EvoCeram Bulk Fill (Ivoclar)
- Xtra Fill (Voco)
- Filtek Supreme Plus (3M/ESPE)
**SELECT HV ETCH**

SELECT HV ETCH is a high viscosity 35% phosphoric acid etchant, available with or without Benzalkonium Chloride (BAC): an antimicrobial and Matrix Metalloprotenase (MMP) Inhibitor.

---

**One material for all posterior restorations**

- Bulk Composites
- Revolutionaray New Technology
- Nanohybrid
- Average particle size 0.4um
- 1.6% shrinkage
- Shrinkage stress 2.5mpa
- Acts like a flowable and a traditional composite in one.
- Low compressive strength
  - Optibond FL or XTR
  - Clearfil SE
  - Riva Bond LC

---

**SonicFill (Kerr)**

- Releases/recharges calcium, phosphate and fluoride
- Chemically bonds and seals tooth

---

**New Self Cure Material**

- Activator Base/Unic
- Activator Base/Unic
ACTIVA incorporates reactive ionomer glass, a patented ionic resin, and a patented, shock-absorbing synthetic rubber molecule to deliver excellent esthetics with high compressive and flexural strengths that mimic the physical and chemical properties of natural teeth.

ACTIVA materials are tougher, more durable, more impact resistant, have much higher flexural strength, and are more cohesive, elastic and esthetic than traditional glass ionomers and RMGs, without sacrificing their bioactive properties. These properties position ACTIVA as a bioactive dentin and tooth replacement material with the strength and esthetics of restorative composites.

Benefits of LED Lights
- More efficient than Halogens
- Halogen produces light from 370 to 800 nm then filters out all but blue light in 400-500 nm range
- Longer lasting
- Less heat at the tip of the light
- Nanometer range closely matched the CQ range (450-470)
- Smaller in size/lighter
- Units can be cordless
- Multiple settings

Demi Ultra LED (KERR)
VALO LED (ULTRADENT)

Study by Nassar Barghi found
- 36% of units tested had output less than 260mW/cm²
- Intensity of light inversely proportional to age of unit
- 10% had cracked filters
- Most doctors never replaced the bulb

**Proper care of curing light will ensure that your restorations are thoroughly cured.**

These CRA research results agree with Dr. Tagami’s results on SonicFill. Tagami stated SonicFill cures to only 70% on bottom at 4 or 5mm depth of cure.
Bond Degredation


Resin-dentin bonds are not as durable as was previously thought. Microtensile bond strengths often fall 30% to 40% in 6 to 12 months.
Potential ways to extend bond longevity

MDP inhibition with MPDB

MDP possesses both antimicrobial and anti-MMP activities.

Franklin Tay & Dave Pashley Med College of Georgia

Antibacterial Effect

Fig. Number of Bacterial Recovery

Bonding adhesion

- Mechanical Retention? or Adhesion?
- Do resins like moisture?
- Do resins absorb water over time?
- Do resins get weaker with time?
- Where does failure occur?
- What causes secondary decay?

The Bonding Agents

<table>
<thead>
<tr>
<th>Etchant</th>
<th>Primer</th>
<th>Adhesive</th>
<th>Generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total etch</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Self etch</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

What is the best adhesive?

Can you get good results?
Average Shear Bond Strength to Dentin: 24.2 MPa

Maximum/Minimum Shear Bond Strength per Bonding Material
11/24/2014

Remember…..

…”Fast is typically not the best unless we are discussing car racing.

Conclusions

- “Adhesive technology has undergone great progress in the last decade. In light of the major drawbacks attributed to all-in-one adhesives, conventional 3-step etch & rinse adhesives & (mild) 2-step self-etch adhesives are still the benchmarks for dental adhesion in routine clinical practice”.

Relationship Between Bond-Strength Tests & Clinical Outcomes, B. Van Meerbeek et al, Leuven Biomaterial Research Center, Dept of Conservative Dentistry, School of Dentistry, Catholic University of Leuven, Belgium

“Gold Standard” Bonding Systems

- Self-Etch (Mild) 2-Step
- Total-Etch 3 Step Etch & Rinse

New “Universal” Systems

- Simple & easy to use
- Direct & indirect techniques
- Use as Total, Selective or Self Etch
- Low sensitivity

Composite Drawbacks

- Material placement techniques
- Polymerization stress & shrinkage
- Water absorption
- Hydrophobic bonding agents
- Decreased bond strength over time
- MMPs and Cathepsins
- Microleakage
- Technique!
Based on principles of "biomimesis" (the replacement of tissue, or a part, using materials that most closely replicate the original essence), it can be argued that the properties of certain glass-ionomer cements make them the best dentin-replacement material currently available, and the resin-based composites are the best enamel substitute.

Bioactive Material
- affinity to tooth structure, when placing a glass ionomer a weak acid or conditioner is used to aid in releasing calcium and phosphate ions from the tooth structure. These calcium and phosphate ions combine into the surface layer of the glass ionomer and form an intermediate layer called the interdiffusion zone. This bond layer can be very strong and significantly reduce the microleakage that would occur at the margins of the restoration.
- Very good fluoride and ion release helps remineralize tooth structure in the remineralization–demineralization process that naturally occurs in the oral cavity.
- They bond to enamel, dentin, and metals.

Why Glass Ionomers?
- They produce good marginal integrity.
- They shrink only one ninth the amount of composite material.
- They are fluoride-rechargeable.
- There are no free monomers in the material.
- The cavity preparation can be bulk-filled, making the materials easy to place.
- They exhibit excellent biocompatibility.

Why Glass Ionomers?
- Eliminate sensitivity
- Lowest Shrinkage & Coefficient of Thermal Expansion
- Self-Bonding
- High Strength
- Improved Aesthetics
- Hydrophilic
- Continual Fluoride Release
- Long lasting sealant and adhesion
- Acid Resistant Layer

Glass Ionomer Sandwich
- Class I, II and V posterior restorations
- Open & Closed Sandwich techniques
- Composite replacement
- Amalgam replacement
- High caries risk patients
- Pediatric patients
- Geriatric patients
- Special needs patients
- Long term resistance to microleakage
Glass Ionomer Materials
- Dentsply-ChemFil Rock Restorative
- SDI-Riva LC/HV, Riva SC/HV
- G.C. America-Fuji II LC, Equia (Fuji IX)
- VOCO-Ionolux, Ionomil Molar AC
- 3M/ESPE-Ketac Nano, Photac Fil Quick, Vitremer, Ketac Molar Quick, Ketac Fil Plus

Base Placement (large filling)
- Caries indicator
- Antimicrobial
- Glass Ionomer
- Etchant
- Antimicrobial
- Bonding agent SE
- Composite (2mm increments)
- Flowable or Nano
- Surface penetrating sealant

Open & Closed Sandwich Techniques

EQUIA Fil
EQUIA™ Fil is a complete system that is an ideal solution for posterior restorations:
- Class I, II and V posterior restorations
- Composite replacement
- Amalgam replacement
- High caries risk patients
- Pediatric patients
- Geriatric patients
- Special needs patients
- Buildups
- Long term provisionals

What does EQUIA Coat do?
Fill porosities to increase physical properties of the restoration and offers a much smoother surface...

EQUIA FI
Pre-coating with FIl
EQUIA FI
After-coating

Some voids are observed
A smooth surface is obtained
EQUIA Fil
Polished by using silicon carbide paper (#600)
After coating
Glass Ionomer Bulk Fill


Glass Ionomer Bulk Fill

Compressive Strengths

- GC EquaFil Compressive Strength 255mpa
- Riva SC compressive strength 271mpa
- Chemfil Rock Compressive 200mpa
- voco Ionolux had higher compressive strength than Equa Fil or Chemfil Rock
- Surefil SDR compressive strength 220mpa
- dentin 280mpa-297mpa
- Enamel 384mpa
- Grandio SO HF has compressive 417mpa
- Fuji II LC 170mpa (RMGI) Compressive strength

Compressive Strengths

- GC EquaFil Compressive Strength 255mpa
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- dentin 280mpa-297mpa
- Enamel 384mpa
- Grandio SO HF has compressive 417mpa
- Fuji II LC 170mpa (RMGI) Compressive strength
CHEMfil Rock vs Conventional G.I.

Glass Ionomer Benefits
- Eliminate sensitivity
- Lowest Shrinkage & Coefficient of Thermal Expansion
- Self-Bonding
- High Strength
- Improved Aesthetics
- Hydrophillic
- Continual Fluoride Release
- Long lasting sealant and adhesion
- Acid Resistant Layer

Minimally Invasive Preparations
**Glass Ionomer Interface**

- Dentin Margin
- Acid Base Resistant Zone

**Resin to Dentin Hybrid Zone**

**Glass Ionomer vs. Open Sandwich**

- 6 years later.

**Interproximal Restorations**

- Groove or crack, flowable
- High wear, good strength & bond
- Small lesion, nanohybrid (<2mm)
- Large (>2mm)?

**Problem & Solution**

- Tofflemire vs. Sectional Matrices
Direct Class II Posterior Composite
(conservative preps)

(tight contacts)

- Contact height
- Width
- Pressure
- Gingival margin
- Wedge
- 30 um thin
- Yellow (premolars)
- Green (molars)

V3 Ring by TrioDent

Dentsply Palodent Plus System
- Nickel Titanium sectional rings
- Wedge Guards
- EZ Coat matrices
Polydentia SA
QUICKMAT DELUX

Class II Direct Composite

QUICK RINGS & SILICONE RUBBER ADAPTERS
MICROTHIN MATRICES 0.025MM (0.001 IN)
WOODEN WEDGES

info@polydentia.com
Two ring system for the widest variety of restorations

- Numerous Traditional Sectional Systems Available
  - Garrison
  - Polidentia
  - TrimDent
  - Dentsply - Palodent Plus

Lots of good options?
What works best for your practice and skills?
How much time do you have?
Bond Strengths?
Risks and Longevity?

Abfraction Lesions
Sometimes it presents as single teeth due to excursive interferences or as a pivot, fulcrum or "teeter totter" tooth.
Other times there are more in a quadrant and there is severe wear to the occlusion.
Other times it may be on the facials of anterior teeth, where there is wear on the incisal edges or wear facets on the linguals, however little to no wear on posteriors.
Occlusal guards should be fabricated along with an occlusal analysis in CR on models.

Flowables? Beautifil Flow Plus
Giomer Technology

- Abfraction lesions
  - Dentin 109-160mpa Flexural strength
  - Composites can have flexural strengths of 65MPA -159mpa
  - Chemfil Rock highest Flexural Strength 63mpa for a Conventional GI
  - Fuji II LC, bond strength 21.8mpa Flexural strength 64-68mpa
Abfraction Lesions & Class V Restorations

Latin words, ab – “away”, fraction – “breaking”

Pathological loss of tooth structure caused by biomechanical loading forces.
Static and cyclic flexural overloading of tooth structure ultimately leading to fatigue and failure of tooth structure away from the point of loading.

Resin Modified Glass Ionomer Restoration

Post-Op Photo – notice unlike typical class V composite RMGI restorative material.

Resin Modified Glass Ionomer Restoration

Post-Op Photo – notice unlike typical class V composite RMGI restorative material.

Restorative Therapy - Case 1

Typical treatment involves the placement of a #00 retraction cord on each tooth. Shade selection. Roughen tooth structure with air abrasion. Place cavity conditioner on all areas to be restored for 10 seconds, then wash and dry. Teeth should be isolated from saliva.

Mix RMGI and syringe into place. Utilize hand instruments to shape and remove gross excess. Cure each tooth for 20 seconds. Remove excess & contour using a handpiece with fine diamonds.

Six year post-op photos show the integrity of the material is still excellent. Note the lack of marginal microleakage stain often present with composite restorations.
GLASS IONOMER MATERIALS

- SDI-Riva LC, light cure HV
- G.C. America-Fuji II LC
- VOCO-Ionolux AC
- 3M/ESPE-Ketac Nano

RESIN MODIFIED GLASS IONOMER

- Light cured
- Dual cured
- High flexural strength
- Good polishability
- Excellent wear
- Hydrophilic
- Fluoride release
- No microleakage
- No adhesives
- Acid resistant layer
- Reduces sensitivity
- True chemical adhesion

Indications

[1] Treatment of dentin exposed by toothbrush abrasion, gingival recession, periodontal disease and/or acid erosion
[2] Treatment of dentin after mechanical tooth cleaning, scaling and/or root planing
[4] Treatment of prepared dentin for fillings and/or prosthetic restorations

Clinical Procedure

Dispensing
Mixing (30sec.)
Liquid
Powder
Applicator brush
Finish
Sealing of dentinal tubules
Slurry paste
Teethmate Desensitizer


Fig. 15 – Graph representing the mean annual failure rates per adhesive class, determined according to a systematic review of Class-V clinical trials of adhesives during the period 1998–2004 [2].
Clarification of Instructions:

1. Clean tooth:
   - Clean tooth surface with non-fluoride based pumice
   - Tooth may remain moist from rinsing after cleaning.
   - There is no need to air dry tooth after cleaning

2. Mixing Powder:
   - Shake the powder container gently before measuring.
   - Use the edge of the opening to level-off the powder for a precise amount.
   - Mix powder and liquid for at least 15 seconds
   - Use the paste mixture within 10 minutes of mixing

Application:

- Do NOT use other applicators besides cotton pellet, microbrush or applicator brush.
- It may be needed to apply mixture a second time to seal all open tubules.

Patient Instructions:
Patient Should Not eat or drink for 45 minutes after application of Teethmate Desensitizer

Characteristics

- **Rapid-sealing property**
  - Direct sealing by formation of hydroxy apatite (HAP).
- **Sealing durability**
  - Formation of more stable HAP in the dentinal tubule
    - Reduce sensitivity reoccurrence, Enhancement of reliability of treatment
- **Biocompatibility**
  - Biomimetic sealing by HAP ⇒ New type product
  - No damage to tooth structure and gum ⇒ Easy to use

Dentin Tubule Occlusion
(Without Pulpal Pressure)

<table>
<thead>
<tr>
<th>Teethmate Desensitizer (TMD)</th>
<th>Chelating acid type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>After 5 months in artificial saliva (37°C)</td>
</tr>
<tr>
<td>Initial</td>
<td>After 1 day in artificial saliva (37°C)</td>
</tr>
</tbody>
</table>

Dentin tubules opened again after short term

Dentin tubule occlusion (without dental pulp pressure)

<table>
<thead>
<tr>
<th>Teethmate Desensitizer (TMD)</th>
<th>Resin type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>After 4000 thermal cycles and tooth brushing 200 times</td>
</tr>
<tr>
<td>Initial</td>
<td>After 4000 thermal cycles and tooth brushing 200 times</td>
</tr>
</tbody>
</table>
Lasers

Soft Tissue Lasers: Dental lasers promote healing by stimulating cell growth and regeneration, while reducing bleeding and providing anti-inflammatory and biostimulatory effects.

Fluid/Tissue Management

- Single Cord Technique
- Double Cord Technique

Tissue Management

Diode LASERS

- Fast Tissue displacement
- Hemostasis
- No crevicular fluid
- No cord

Diode LASERS

- Portable, Fast, Efficient

Laser Troughing

Benefits:
- Predictable margins
- No tissue recession
- No bleeding
- No discomfort
- Faster procedure

Settings:
- Power: 1.2W
- Mode: Continuous
- Tip: Initiated
Closed-bite trays
- Lack of rigidity may cause distortion
- Spring back after impression potential
- No cross arch stabilization
- Thin spots or perforations can cause distortion
- Impression material shrinks towards bulk
- Unable to recreate excursive movements
- Potential for errors & adjustments extremely high

Criteria for Closed-bite trays
**INDICATIONS**
- 1-2 prepared teeth
- Tray will fit behind the tuberosity without impinging on the tissue
- Class I or II occlusion
- Prepared tooth has sound adjacent teeth on each side
- Natural occlusal stops

**CONTRAINDICATIONS**
- More than 2 prepared teeth
- Most distal tooth in the arch
- Class III occlusion
- Inadequate space for the tray posterior to the tuberosity
- No natural occlusal stops

Built in errors
- Rotation??
- Rocking??
- Thickness??

Disposable Articulators
Bite Registration

HeatWave by Clinician's Choice
- 4 upper & lower trays
- 60 sec. @ 158°F
- Fast, efficient
- Virtually custom
- 30% less impression material used

Impression Trays

HeatWave by Clinician's Choice

Impression Materials
- Still account for 85%-90% of the market.
- Types
  - Vinyl/polysiloxanes
  - Polyethers
  - Vinylsiloxanether (VSXE)

Impression Materials
- Dimensional stability
- Good flow ability & wettability
- High tear strength & elastic recovery
- Accurate detail reproduction <25μm
- Non slumping
Panasil Initial Contact (VPS)

- Lowest contact angle of any VPS impression material
- Fast set and Regular set
- Best Value Materials Available

Kettenbach

Cracked tooth

Identium (Vinylsiloxanether-VSXE)

- Fast set and Regular set
- Medium or Heavy viscosity
- Light viscosity flow
- Excellent flow ability
- Exceptional hydrophilicity
- Easy removal from mouth and model
- Odorless and neutral taste
- Can be poured immediately
- Identium Scan is a new scanable Vinylsiloxanether that handles like a polyether with a long working time & snap set

Kettenbach

Identium combines the advantages of the most tried and tested materials, A-silicone and polyether. Test results reporting excellent flow and hydrophilic properties were published in the CLINICIANS REPORT® volume 5, Issue 3.
Syringe Placement

- Dry all teeth in arch
- Place tip in most difficult area first
- Keep tip on margin and immersed in material
- Go around entire margin first
- Next go to adjacent teeth
- Then do coronal aspect of teeth
- Double Mix Single Impression is the most accurate

Identium for single teeth

Identium for multiple teeth - two cord technique
Provisionals
- Utilize an accurate preliminary over impression
- Maintain over impression
- Check contacts and occlusion

Visalys (Kettenbach)
Inspire (Clinician’s Choice)
Structure (VOCO)

Provisionals
- Utilize an accurate preliminary over impression
- Maintain over impression
- Check contacts and occlusion
- Place temp cement only on margins
  - Do not fill temp with cement
  - Otherwise create one or two vent holes on facial and lingual.

Resin Modified Glass Ionomers

Cement Options
- Acidic pH
- Moisture Tolerant
- Fluoride Release
- Degradates over time
- Low bond strength
- Biocompatibility-Fair
- Bioactivity-None
- Sealing Quality-Ok

Acidic pH
Insoluble
 Moisture Tolerant
Fluoride Release
Stronger Than Traditional Glass Ionomers
Degradates over time
Improved bond strength
Biocompatibility Ok
Bioactivity-None
Sealing Quality-Ok

Acidic/Neutral pH
Not moisture tolerant
Low-moderate initial bond strengths
Decreased bond strength over time
Water sorption
Biocompatibility-Ok
Bioactivity-None
Sealing Quality-Ok

Acidic/Neutral pH
Not moisture tolerant
Best initial bond strengths but also decreases w/ time
Decreased bond strength over time
Water sorption
Biocompatibility-Ok
Bioactivity-None
Sealing Quality-Good but technique sensitive
Ceramir® Crown & Bridge

- Ceramir Crown & Bridge is indicated for permanent cementation of:
  - Porcelain fused to metal crowns and bridges
  - Metal (gold, etc.) crowns and bridges
  - Gold inlays and onlays
  - Cast or prefabricated metal posts
  - Strengthened core all-zirconia or all-alumina ceramic crowns and bridges
  - Lithium Disilicate (eMax)
  - Stainless steel crowns
  - Ortho bands and appliances

Ceramir® Technology / NIB

The technology is called NIB (Nanostructurally Integrating Bioceramics).
- Bioceramic powder
- Reacts with water
- Dissolution
- Nano crystals formed on:
  - Tooth walls
  - Filler particles
  - Pre-existing crystals
  - Prosthetic construction
- Stable sealing of the interface

Crown Retention

Results Zirconia crowns (Kg/F)

<table>
<thead>
<tr>
<th>Material</th>
<th>24 h</th>
<th>8 days</th>
<th>30 days</th>
<th>90 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rely X Luting</td>
<td>96 ± 10</td>
<td>138 ± 15</td>
<td>157 ± 10</td>
<td>160 ± 27</td>
</tr>
<tr>
<td>Fuji Plus</td>
<td>138 ± 15</td>
<td>157 ± 10</td>
<td>160 ± 27</td>
<td></td>
</tr>
<tr>
<td>Rely X Unicem</td>
<td>157 ± 10</td>
<td>160 ± 27</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ceramir compressive strength over time, storage in phosphate buffer

<table>
<thead>
<tr>
<th>Strength (MPa)</th>
<th>24 h</th>
<th>8 days</th>
<th>30 days</th>
<th>90 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>160 ± 27</td>
<td>176 ± 24</td>
<td>176 ± 18</td>
<td>210 ± 24</td>
<td></td>
</tr>
</tbody>
</table>

In vitro tests, Temple University

Compressive strength after 24 hours storage in phosphate buffer at 37°C

Results are published in J Dent Res. 2008;87(8):3100 by Jefferies et al.

0% Sensitivity
100% Retention
100% Marginal Integrity
0% Recurrent Decay
0% Marginal Discoloration
Zirconia Restorations

Cementation Technique

Lithium Disilicate (eMax)

Lithium Disilicate (eMax)

Zirconia Restorations
Ceramir key features

- Nano-structural integration
  - Permanent seal of the tooth–restoration interface
- Biocompatibility
  - Creates Apatite when in contact with phosphates
- No shrinkage
- No post-op sensitivity
- Hydrophilic system with Alkaline pH
- Chemically stable
- Acid Resistant

Ceramir key features

- Retention equal to or better than resin cements
- Material gets stronger over time & remains stable
- No etching, bonding or conditioning
- Easy seating to completion of indirect restoration
- Easy to clean up
- Does not require optimal conditions for a good seal
- Self sealing
Cosmetic cases....

Cosmetic cases....

Cosmetic cases....

Cosmetic cases....

Cosmetic cases....

Cosmetic cases....
Veneer Cementation
Final Restorations
Minimally Invasive Dentistry

Provides patients with a higher level of service by evaluating the whole oral facial area with modern devices and testing for pathogenic bacteria with modern means to control their disease rather than amputation being the only option.