



Let's Be Direct:

Predictable Protocols That Meet the Challenges

Being Bioactive:

Saving Tooth Structure for the Future




Daniel H Ward DDS

1

Daniel H Ward DDS

- Fellow Academy of General Dentistry
- Fellow American College of Dentists
- Fellow International College of Dentists
- Fellow American Society for Dental Aesthetics
- Associate Member American Academy of Esthetic Dentistry



2

Success is Dependent Upon



Material Knowledge

Patient Communication

Skill & Experience

3


Material Knowledge is Vital



How do you Choose?

4

Communication is Essential



We MUST Listen to our Patients

5

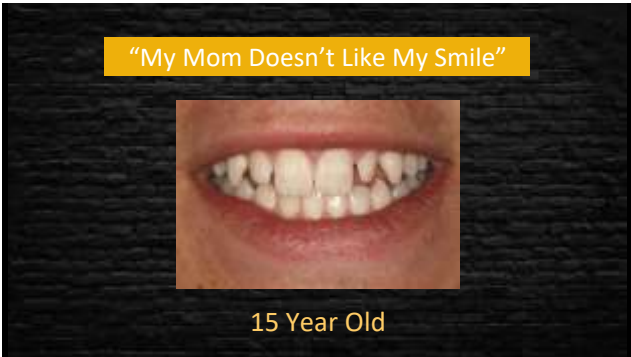
Skill & Experience is Important



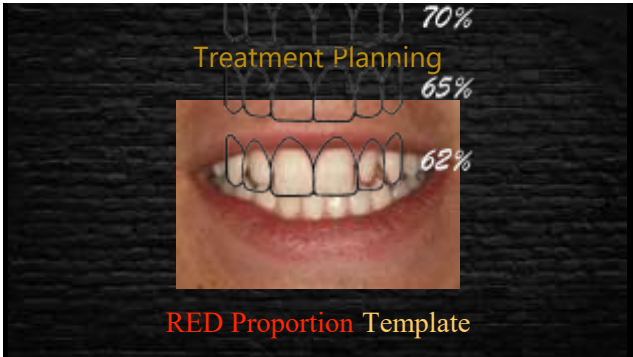
Knowledge

Hands

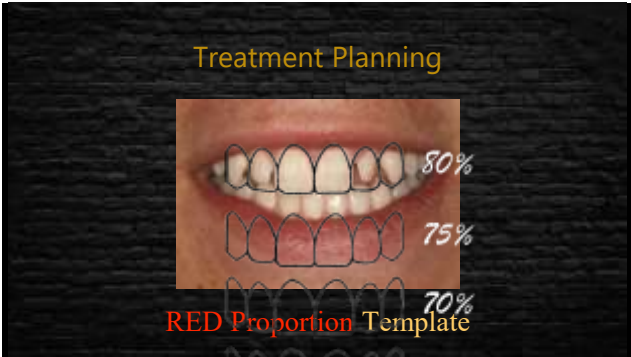
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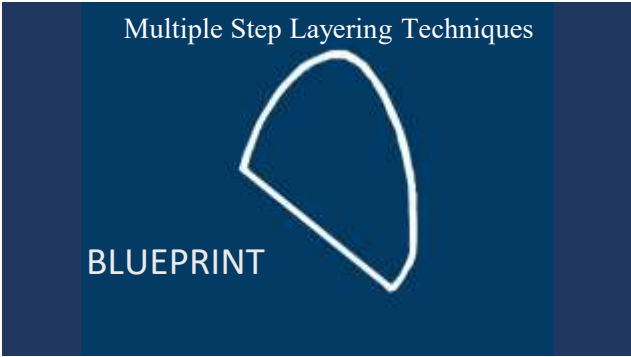
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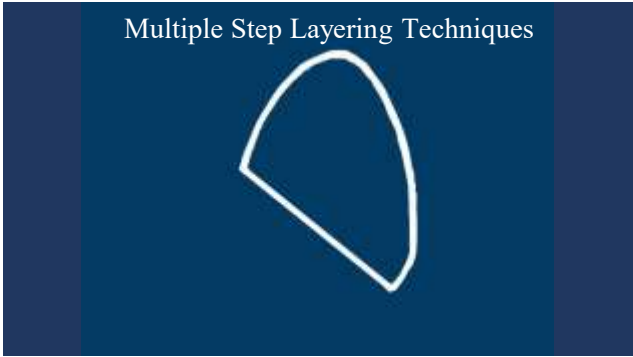
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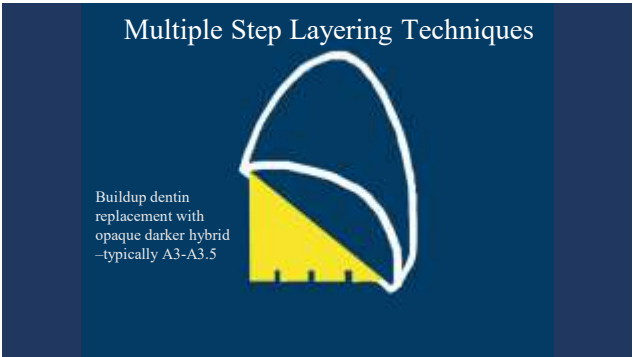
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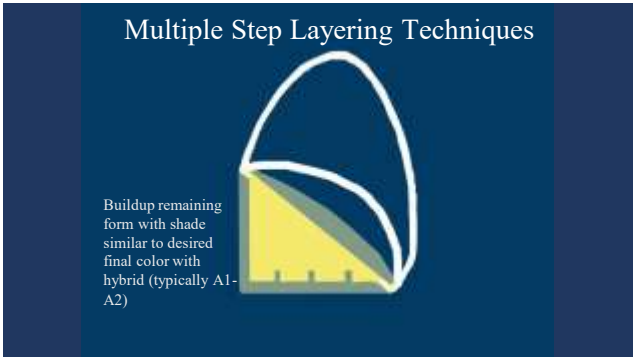
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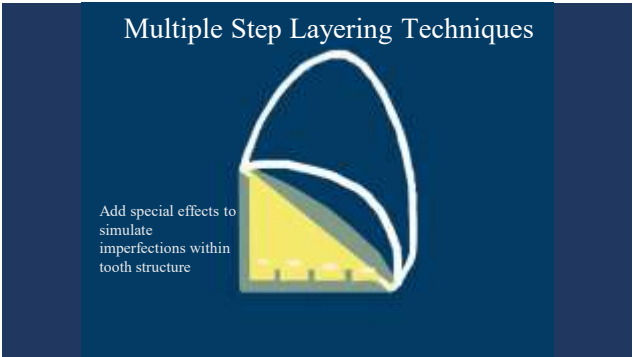
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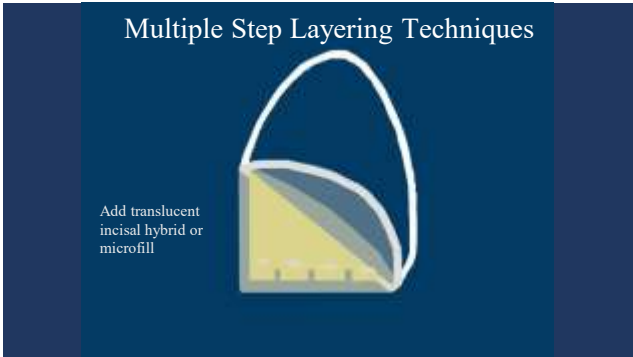
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16

LAYERING Principles
(from Inner to Outer)

- Darker to Lighter
- Opaque to Translucent
- High Chroma to Low Chroma
- Larger Particle to Smaller Particle
- Low Polishability to High Polishability

17

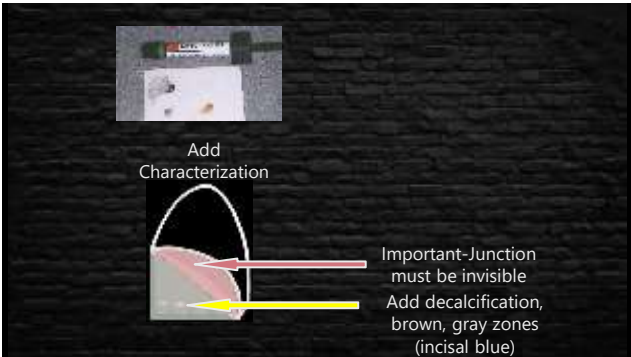
Add dentin shade

- Aura Dentin 6
- Miris

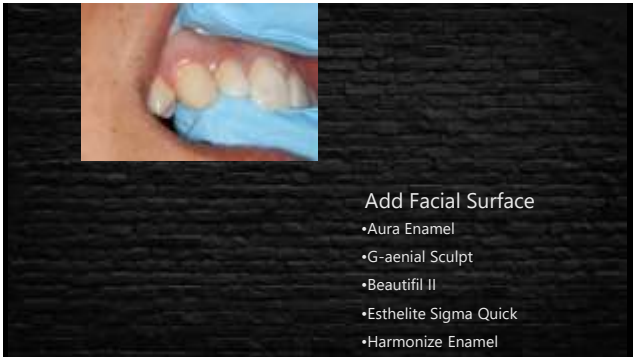
Add General Purpose Shade

- Aura MC 3
- TPH Spectra
- Coltene Brilliant

18



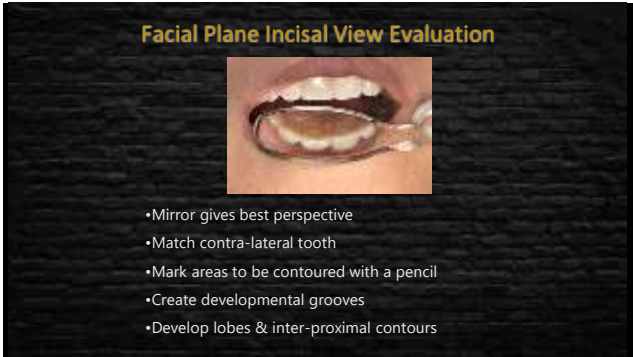
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20



21



22



23



24

Super-Snap X-TREME



Gross contouring of facial surface
Incisal edge

- No metal in the center
- Very Flexible
- Double Sided
- Available in Unit Dose

25



Pre-Operative




Finished Restorations

26


Simplified Margin Perfect Matrix Technique




27



Pre-Shaped matrix



Margin Perfect Matrix



28



Place and cut excess ends of matrix
Hold instrument against band



MPM in place sealed against gingival margin

29



Etch



Thoroughly wash and dry
Place bonding agent and light cure

30



31



32



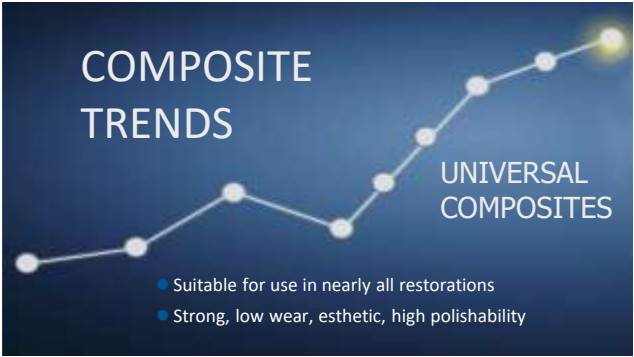
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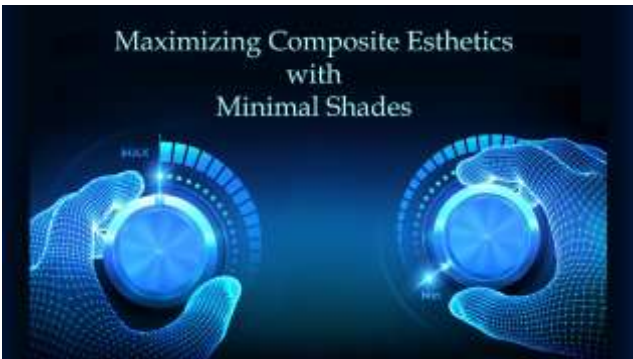
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Universal Composites

- GrandioSO
- Mosaic
- Venus Pearl
- G-aenial A'Chord
- Brilliant Ever Glow
- Spectra TPH ST
- SimpliShade
- Tetric Evo-Ceram
- Filtek Supreme Ultra
- Beautifil II
- Esthetite Sigma Quick-Omnichroma

Translucency

37

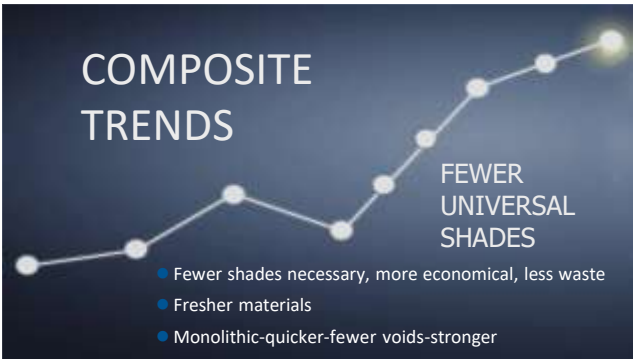


38

HOW CAN WE SIMPLIFY COMPOSITES?

- Universal Composite
 - Use Same Composite for All Restorations
- Reduced Shades
 - Use Same Composite Throughout
- Bulk Fill
 - Place & Cure in One Layer
- Reduce Inventory
 - Fewer Brands & Shades
- Reduce Confusion for Staff

39



40

Simplified Shades
Universal Composites

- Omnicroma
- SimpliShade
- Genial A'Chord

Translucency

41

Blended Shades Universals

- G-aenial A'Chord
- SimpliShade
- Omnicroma

G-aenial A'Chord

SimpliShade

OmniChroma

OPACITY

42

Universal Composites



1
Shade

Universal
Omnicroma

44

Universal Composites




2
Opacities

Universal
Omnicroma

★ Blocker

45

Omnicroma



2
Opacities

- Properties
 - High translucency-natural tooth shines through
 - Use Layering technique to block out
 - Uniform spherical particles-optimized for tooth colors
 - Similar to D2 Enamel Shade
- Advantages
 - Two shades-Economical
 - Use fresher composite material
 - Works best for smaller restorations with limited “through & through”

46

Anterior Restorations



- Smaller
- Incisal edge
- Limited through & through



47

Universal Composites



3
Shades

Light, Medium, Dark
SimpliShade

48

Universal Composites



3
Shades

Light, Medium, Dark
SimpliShade



★ Plus 2 More Shades

- Bleach White
- Universal Opaque

49

Simpli Shade

- Properties
 - Medium translucency
 - Nano-hybrid
 - Optimized for light reflection & refraction
- Advantages
 - Fewer shades means less waste
 - Easy to select color
 - Allows fresher composite material
 - Works best for small-medium restorations with limited “through & through”



50

Anterior Restorations

•Patient said placed 5 years ago



51

CASE II Restorations

•Patient said placed 5 years ago



52

Universal Composites




A1, A2, A3, A3.5, A4

G-aenial A'Chord



53


G-aenial A'Chord



Core shades of G-aenial A'Chord (shown in the middle of each shade tab)

A1, A2, A3, A3.5, A4 Core Shades


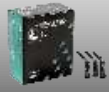
G-aenial A'Chord



54

G-aenial A'Chord

- Properties
 - Good masking and blending properties
 - Excellent polishability
 - Low wear
- Advantages
 - Universal in large anterior and posterior cases
 - Blocks out stains and dark dentin-Class I & V
 - Fewer shades needed to better match all VITA shades
 - More economical, allows fresher material
 - Natural esthetics and fluorescence



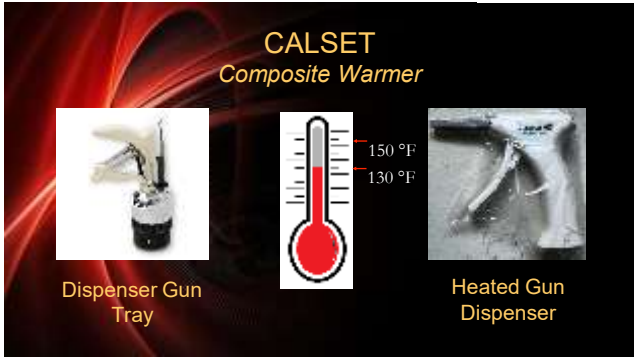
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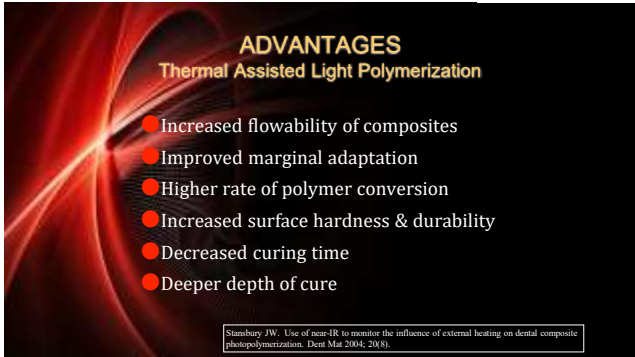
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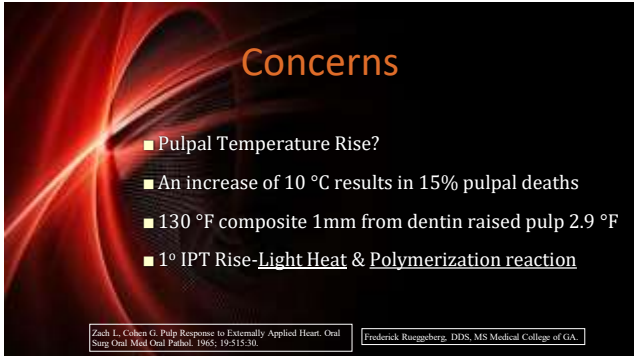
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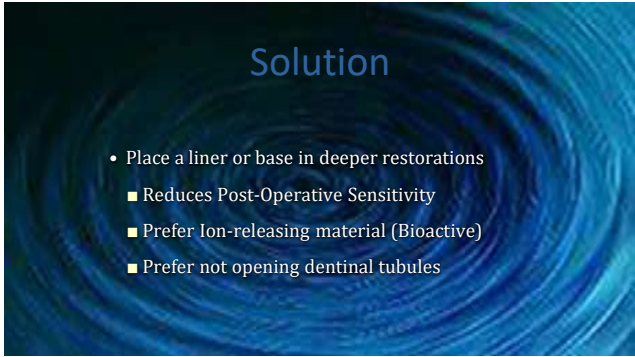
58



59



60



61

Very deep <0.5mm

■ Liner first, then covered by a base

■ Stimulates & provides ions for reparative dentin



TheraCal LC


Lime-Lite

62

Deep >0.5mm

■ Buildup to ideal depth

■ Provide insulation & reduce recurrent decay



Calcium Silicate Resin




Enhanced Ion Resin RMGI

63

Large >0.5mm

■ Buildup to ideal depth

■ Provide insulation & reduce recurrent decay



GI

RMGI

64

Below ideal depth

■ Reduce sensitivity

■ Provide insulation & reduce recurrent decay



Vitrabond Powder/Liquid RMGI

GC Fuji Lining LC Paste/Paste RMGI

65

Ideal depth

■ Reduce sensitivity

■ Disinfect

■ Increase bond strength

■ Provide bond strength stability-MMP Inhibition

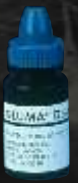


GLUMA

HemaSeal & Cide

66

GLUMA
Contains:



• Gluteraldehyde

• Disinfects surface

• Inhibits MMPs

• HEMA

• Seals dentinal tubules

• Wets surface to prevent collagen collapse

67



Hemaseal & Cide Desensitizer

Contains:

- HEMA
 - Seals dentinal tubules
 - Wets surface to prevent collagen collapse
- Chlorhexidine
 - Disinfects surface
 - Inhibits MMPs

68



Hemaseal & Cide

- Reduced post-operative sensitivity
- Antimicrobial activity
- Inhibits enzymatic degradation
- Enhanced dentin bond strength
- Reduced micro-leakage
- No soft tissue burning
- Economical

69




Bactericidal

Chlorhexidine provides Excellent antimicrobial activity.




Dental Advisor Evaluation

70




Better Hybrid Zone Bonding


Infuses the dentin surface bringing HEMA and water with it. It helps the collagen fibers stand up for better hybrid zone bonding



71




Increased dentin bond strength




Dentin Type	Tensile Bond Strength (MPa)	
	With HS & C	Without HS & C
Deep Dentin	29	28
Superficial Dentin	36	27

JM Powers, Dept of Restorative and Biomaterials 1999.

72



Best Overall Performing Desensitizer



Desensitization

Disinfection

Enhanced Bond Longevity

CRA Newsletter

73



74



75



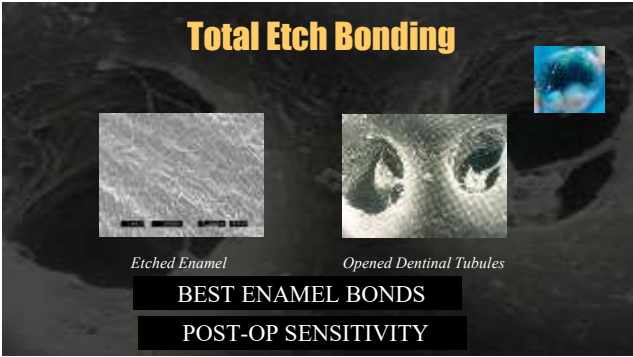
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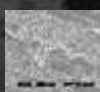



78



79

Self-Etching Bonding Agents





DO NOT ADHERE AS WELL AS THEY DO TO PREVIOUSLY ETCHED &

Self Primer Etched Enamel

80

Self-Etching Bonding Agents



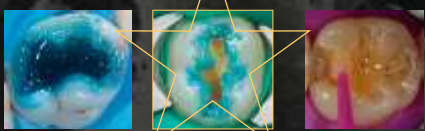
DO NOT ADHERE WELL TO UN-PREPARED ENAMEL

Self Primer Etched Enamel

81

Universal Bonding Agents

Challenges-SOLVED




Total-etch Selective-etch Self-etch

82

Dentin Bonding Stability

AN IN-VIVO STUDY REPORTED A 35% REDUCTION IN DENTIN BOND STRENGTH @ 12 MOS WHEN USING A TOTAL-ETCH TECHNIQUE ACCORDING TO MANUFACTURER'S IFU.




Carvalho M, Carvalho R, de Góes M, et al. Chlorhexidine arrests subclinical degradation of dentin hybrid layers in vivo. J Dent Res. 2005; 84:504.

83

Dentin Bonding Stability


AN IN-VITRO STUDY REPORTED A 36% REDUCTION IN DENTIN BOND STRENGTH @ 12 MOS WHEN USING A SELF-ETCH TECHNIQUE ACCORDING TO MANUFACTURER'S IFU.



Carvalho M, Carvalho R, de Góes M, et al. Chlorhexidine arrests subclinical degradation of dentin hybrid layers in vitro. J Dent Res. 2005; 84:504.

84

Bonding Stability



More than half of the 166 million dental restorations placed in the US were replacements for failed restorations. This is expected to grow as dentists use more composite restorations. Composite restorations have higher failure rates, more recurrent caries and increased frequency of replacement as compared to amalgam.

Seaton, Pavesio, et al. "Microleakage interface: the weak link in the composite restoration." Annals of biomedical engineering 38.4 (2010): 1088-1093.

85

Dentin Bonding Stability

Challenges

The cured layer of many 1-step self-etching adhesives are hydrophilic and a permeable membrane

Hydrolytic Degradation

Tan F, Sait B, Paltsev D, Carvalho R. Single Layer Adhesives are Permeable membranes. J Dent 2002;30:371-382

86

Difficult Balance

Hydrophilic

• Strong bond to dentin
• Bond failures occur at restoration/bonding interface

Hydrophobic

• Strong bond to restoration
• Bond failures occur at tooth/bonding interface

87

Dentin Bonding Stability

Challenges-Solved

1-Use 2 separate layers-a hydrophilic layer covered with a hydrophobic layer

Hydrophilic layer creates a better hybrid zone

Hydrophobic layer prevents water permeation

Hydrolytic Degradation

Horikita Y, Yoshikawa K, Nagata N, Hayakawa S, Tani Y, Ogawa T, Ozaki A, Van Meerbeek B. Self-assembled nano-layering at the adhesive interface. J Dent Res 2012;91:378-381

88

Dentin Bonding Stability

Challenges-Solved

2-Use MDP containing bonding agents which become hydrophobic upon polymerization due to high amount of cross-linkage.

MDP-containing adhesives form nano-layering at the adhesive interface. Stable MDP-Ca salt deposition with nano-layering creates high bond stability by preventing water permeation

Hydrolytic Degradation

Horikita Y, Yoshikawa K, Nagata N, Hayakawa S, Tani Y, Ogawa T, Ozaki A, Van Meerbeek B. Self-assembled nano-layering at the adhesive interface. J Dent Res 2012;91:378-381

89

Dentin Bonding Stability

Challenges

- MMPs are naturally occurring proteases involved in dentin formation and trapped during odontogenesis
- Not bacteria but proteolytic enzymes found within dentin capable of degrading collagen within newly created adhesive hybrid layers
- Low pH causes dentin to release these inherent MMPs which attack exposed collagen fibrils

MMP-Matrix Metalloproteases

Oliveira R, Yamamoto M, Oliveira E, et al. Effect of dentin etching on metalloproteinase-mediated collagen degradation. Eur J Oral Sci 2011;119:79-85

90

MMP-Matrix Metalloproteases

A

B

C

D

←
w/CHX
in 14 mo

E

F

	Immediate (MPa)	14 mo (MPa)
Control	29.3 (9.2)	19.0 (5.2)
CHX	32.7 (7.6)	32.2 (7.2)

Carrilho et al., JDR 2007; 86: 529

Brackett et al., Operative Dentistry; 2009;34(4):381-385

91

15

MMP Inhibitors

- Chlorhexidine (CHX)
- Benzalkonium Chloride (rinse, etch, comp)
- MDPB (in Clearfill Protect)
- GLUMA
- Tetracycline
- Epigallocatechin-3-gallate (green tea polyphenol)

Perdigao J, Rest A, Loguercio AD. Dentin Adhesion and MMPs: A Comprehensive Review. J Endoth Resour Dent 2012; 23: 219-241.

Zheng P, Chen H. Evaluate the effect of different mmps inhibitors on adhesive physical properties of dental collectives, bond strength and temp substrate activity. Sci Rep. 2017;7:4975.

92

MMP Inhibitors Disinfect to prevent MMPs

Total Etch

Apply 2% Chlorhexidine after acid etching for 30 sec



Self Etch

Apply 2 coats 2% Chlorhexidine prior to application of primer

93


Universal Bonding Agents

- ♦ Total-etch, self-etch or selective-etch technique
- ♦ Can be used for direct and indirect restorations
- ♦ Bond to all indirect substrates-metal, ceramics, zirconia, porcelain and lithium disilicate.
- ♦ Compatible with light-cured, self-cured and dual-cured composite and luting cements.


94

Universal Bonding Agents

Contain MDP



- ♦ Ionically bonds to calcium
- ♦ More resistant to biodegradation
- ♦ Bonds to Zirconium



95

Universal Bonding Agents

Contain MDP







96

Universal Bonding Agents

Contain MDP







.....& others

97

Improved Universal Bonding Agents

2-Bottle Systems

G-2 Bond

Hydrophilic Primer
Wets surface
Facilitates resin infiltration
Prevents gap formation

Hydrophobic Bonding Agent
Strong bonding interface
Reduces hydrolytic degradation
Reduces risk of debonding

98

G2 Bond

Components

- MDP-ZR bond, cross linkage
- 4-META-improves bond to metals
- MDTP-improves bond to metals
- HEMA-free-decreases hydrolytic degradation

99

G2 Bond

Properties

Self-Etch Mode

Mode	Dual Cure	Etch and Prime	H+Prime
MPa	38.7	38.4	38.8
MPa	35.1	34.2	34.1

Total-Etch Mode

Mode	Dual Cure	Etch and Prime	H+Prime
MPa	41.8	40.2	39.5
MPa	38.7	38.4	37.8

VERY HIGH BOND STRENGTHS

100

G2 Bond

Challenges-Solved

- Universal-Total, Self, *Selective* Etch
- Reduces Hydrolytic Degradation
- Hydrophilic/Hydrophobic layers
- Contains MDP, 4-META, MDTP
- HEMA Free
- Very high, long lasting bond to dentin (35-45 MPa)

101

Class V Restorations

102

Buccal View

Facial View

Use opaque on bicuspid to avoid gray

103

Beautiful II Gingiva



- Class V restorations (exposed cervical areas, replacement of lost tooth substance, optimization of wedge-shaped defect, etc.)
- Protection of receding gingiva (root exposure)
- Restoration of the appearance of gingiva
- Reconstruction of gingiva after periodontal surgery

Dr. Frank Manos

104

Beautiful II Gingiva



*5 Available Shades

*Multiple Custom Shades

	LP	DP	Cr	Br	V
LP					
DP					
Cr					
Br					
V					

105

Composite Direct Placement Challenges

♦ Interproximal Contacts



Composites Should **NOT** be Viewed as Short-Term Crown Buildups

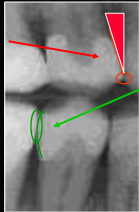
Christensen J]. Duplicating the form and function of posterior teeth with Class II resin-based composite. Gen Dent. 2012;60:104-108.

106

Tofflemire vs. Sectional Matrices

Tofflemire System

- Thin contact at the marginal ridge
- Non-anatomical
- Food trap below contact
- Increased likelihood of: fracture, recurrent caries and periodontal disease.




Sectional Matrices

- ✓ Broad contacts at the proper height of contour
- ✓ Anatomically shaped contacts
- ✓ Tight Contacts
- ✓ Proper contacts that floss properly for better gingival health


107

Sectional Matrix-Retainers

Strong separating force



Universal V3 Ring Narrow V3 Ring



TrioDent/Palodent

108

Sectional Matrix-Bands

Anatomical form

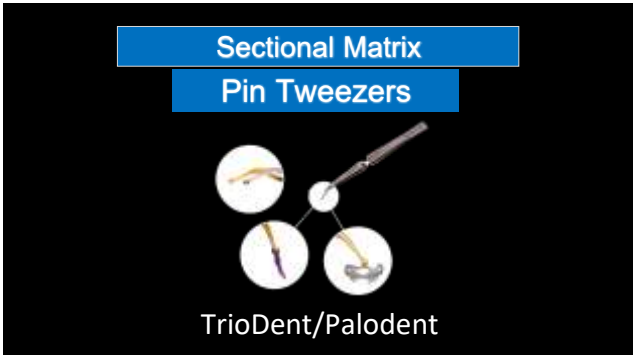


TrioDent/Palodent

109



110



111



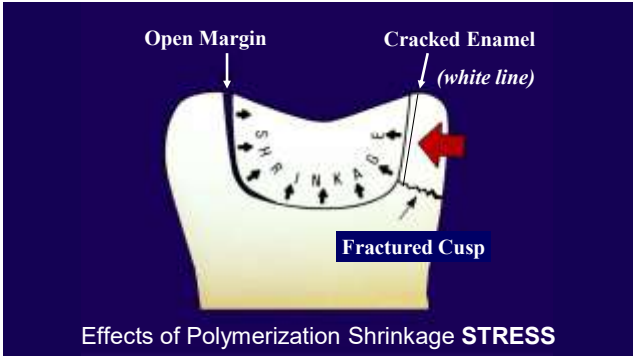
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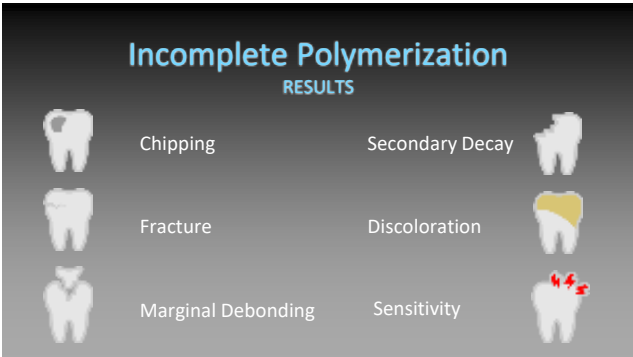
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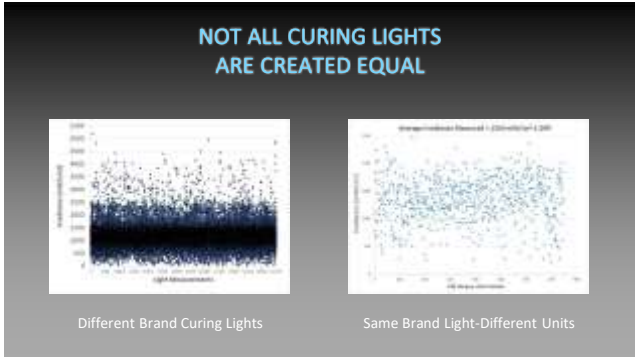
115



116



117



118



119






120



121

Databases Created by Bluelight



- Each Curing Light Characteristics
- Each Popular Composite & Shade



122

In-Office Procedures

- Test Output of All Curing Lights
- Enter Light, Composite & Shade



123



124

Bulk Fill Composites

- Modes of Action
 - Initiators more light sensitive
 - Greater translucency allows better light transmission
 - Delayed gel state formation
 - Increased elasticity
- Advantages
 - Quicker, easier
 - Deeper depth of cure
 - Decreased polymerization shrinkage STRESS
 - Fewer air voids between layers
 - Gives dentist confidence to tackle larger restorations



125

Bulk Fill Flowable Composites

- Excellent with smaller preparations
- Difficult access-2nd or 3rd molars
- Challenging anxious patients
- Cusp-buildup technique
- Increased translucency
- Results are surprisingly good




126



SONIC FILL 3

Sonic Energy Assisted Light Polymerization

- Improved flowability of composites
- Improved marginal adaptation
- 5mm depth of cure
- Delayed gel state decrease stress
- Increased sculptability
- Designed for large posterior use



127



Sonic Fill Composites

- Simpler
- Easier
- Quicker
- Fewer bubbles & voids between layers
- Confidence in placing large restorations

128



Fill box 2/3's full
Compress w 1P
Finish buildup
Cure



129



Re-contour
diamond/finishing
carbides

Finishing strips

Place V-Ring on
adjacent tooth
Burnish desired
contact area

130



Selective
etching

Place Universal
bonding agent
Light Cure

131



Peel back
band

Cure from
both sides at
gingiva

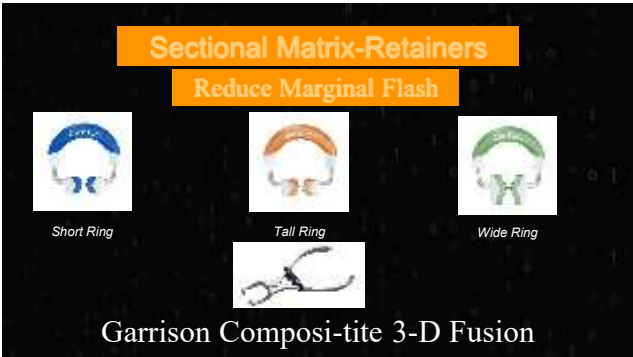
132



Adjust
occlusion

Finish and
polish

133



134



135



136



137



138



139

Sectional Matrix

Wide Variety-Bands

Preparation	Band	Band	Band	Band	Band	Band
Class I	Class I	Class I	Class I	Class I	Class I	Class I
Class II	Class II	Class II	Class II	Class II	Class II	Class II
Class III	Class III	Class III	Class III	Class III	Class III	Class III
Class IV	Class IV	Class IV	Class IV	Class IV	Class IV	Class IV
Class V	Class V	Class V	Class V	Class V	Class V	Class V
Class VI	Class VI	Class VI	Class VI	Class VI	Class VI	Class VI
Class VII	Class VII	Class VII	Class VII	Class VII	Class VII	Class VII
Class VIII	Class VIII	Class VIII	Class VIII	Class VIII	Class VIII	Class VIII
Class IX	Class IX	Class IX	Class IX	Class IX	Class IX	Class IX
Class X	Class X	Class X	Class X	Class X	Class X	Class X
Class XI	Class XI	Class XI	Class XI	Class XI	Class XI	Class XI
Class XII	Class XII	Class XII	Class XII	Class XII	Class XII	Class XII
Class XIII	Class XIII	Class XIII	Class XIII	Class XIII	Class XIII	Class XIII
Class XIV	Class XIV	Class XIV	Class XIV	Class XIV	Class XIV	Class XIV
Class XV	Class XV	Class XV	Class XV	Class XV	Class XV	Class XV
Class XVI	Class XVI	Class XVI	Class XVI	Class XVI	Class XVI	Class XVI
Class XVII	Class XVII	Class XVII	Class XVII	Class XVII	Class XVII	Class XVII
Class XVIII	Class XVIII	Class XVIII	Class XVIII	Class XVIII	Class XVIII	Class XVIII
Class XIX	Class XIX	Class XIX	Class XIX	Class XIX	Class XIX	Class XIX
Class XX	Class XX	Class XX	Class XX	Class XX	Class XX	Class XX

Garrison Composi-tite 3-D Fusion

140

Adjacent Class II
Composite Restorations

Preparations Maxillary
Right quadrant

Restore center tooth
using Toffelmire

Adjust mesial & distal
so gingiva is visible

141

Place band & retainer

Quadrant restored

142

Preparations Maxillary
Left quadrant

Place Toffelmire band
& retainer on center
tooth

Maxillary arch
restored

143

Sectional Matrix-Retainers

Refinements

Garrison Strata-G

144

Sectional Matrix
Retainers

- Nitinol nickel titanium-superior separation
- Green retainers best for wide inter proximal
- Form-fitting to reduce flash
- Predictable interproximal contours

Garrison Strata-G

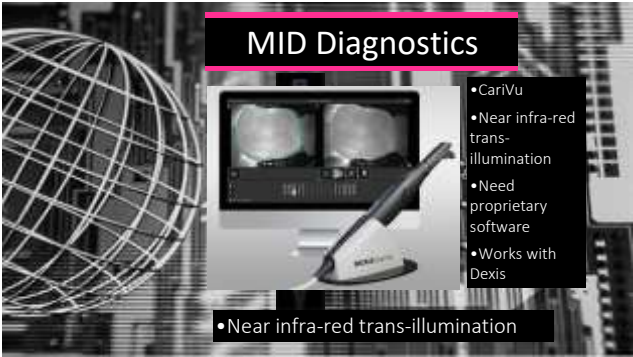
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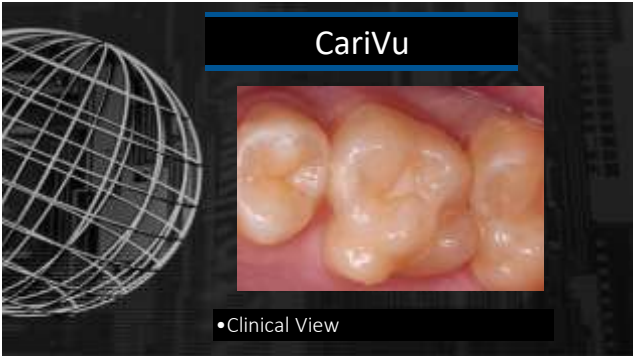
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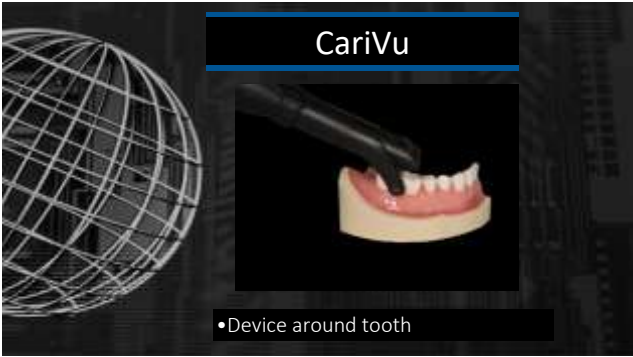
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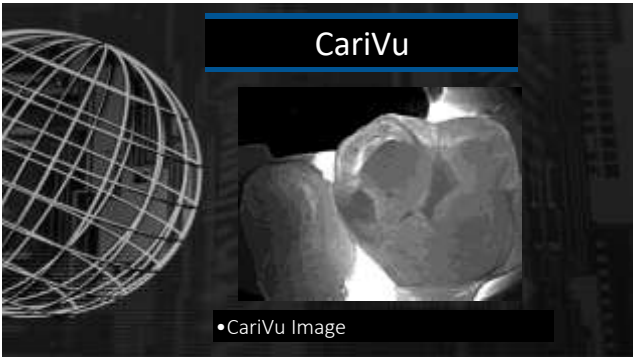
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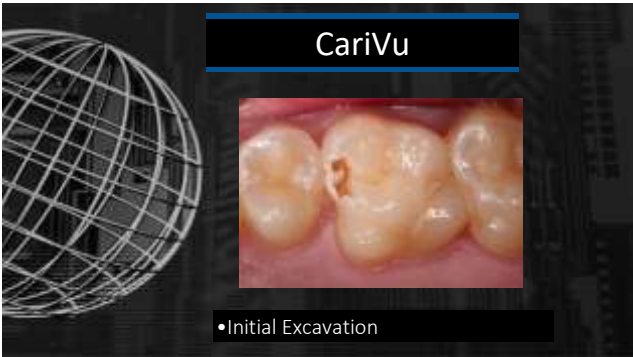
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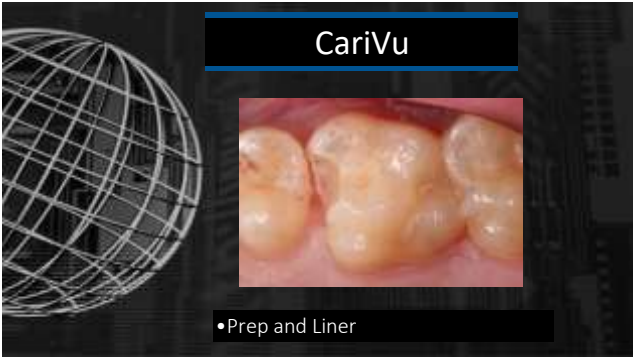
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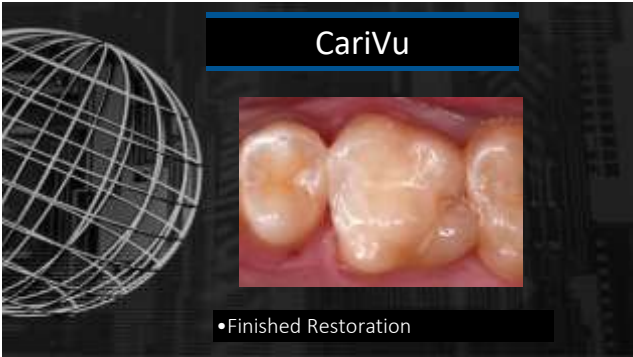
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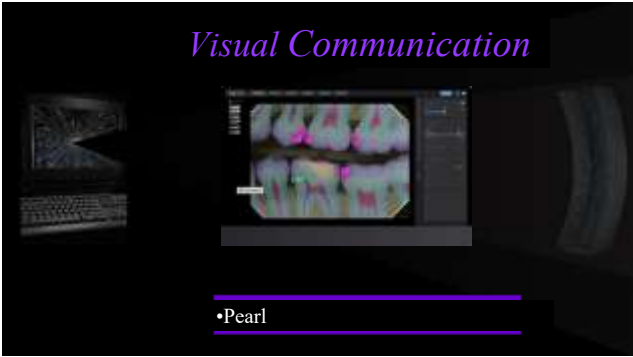
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155



156



157

Basic Definition

AI

Computer systems that can simulate the problem-solving and decision-making capabilities of the human mind.

158

Dental Radiology | BY THE NUMBERS

1.4B
dental x-rays captured annually in US¹

39%
of medical x-rays are dental²

Dentistry³
86%
US patients with dental imaging captured

Other medical fields⁴
10-15%
US patients with medical imaging captured

159

Dental Radiologic Deficiency | BY THE NUMBERS

43% of caries in x-rays are undiagnosed³
20% of caries diagnosed in patients are not actually caries⁴
49% of periapical radiolucencies in x-rays are undiagnosed⁵

160

The Average Human Eye can differentiate 30-50 shades of Gray

161

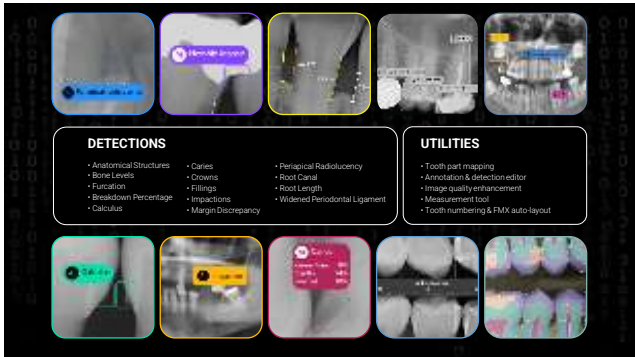
The Computer can differentiate 550-700 shades of Gray

162

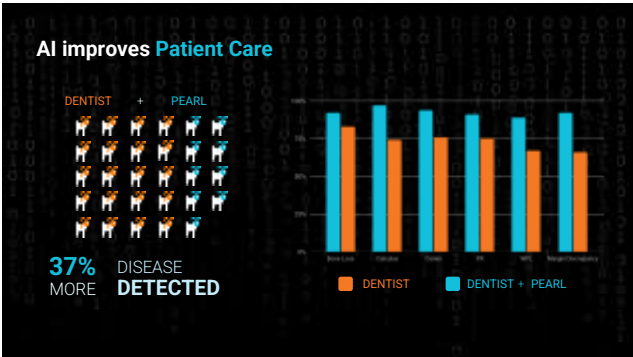
Second Opinion®

By Pearl
A comprehensive real-time AI diagnostic aid for dentists.

163



164



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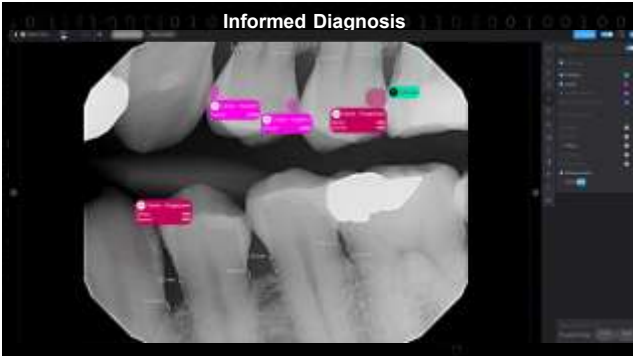
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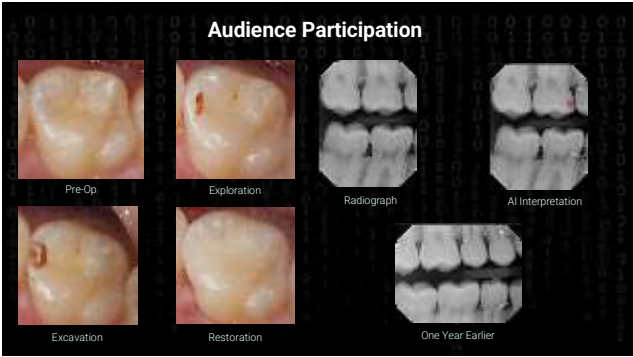
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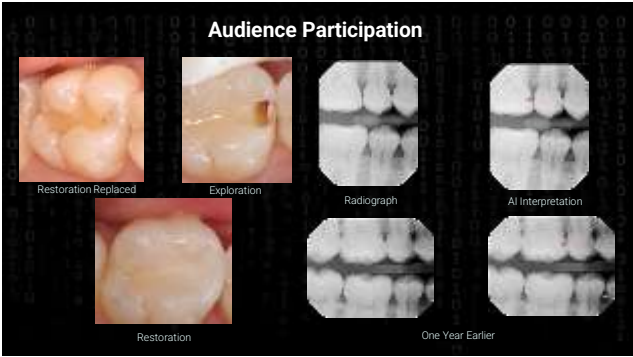
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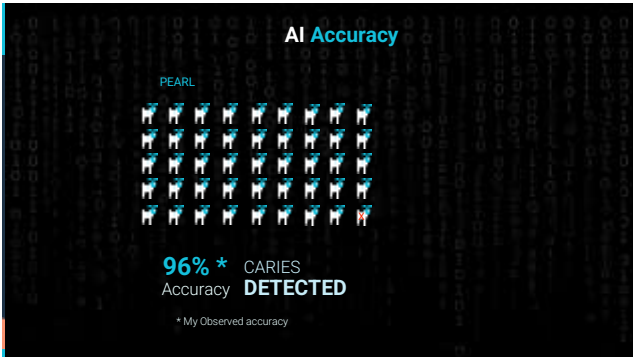
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174



175



176

AI improves Patient Treatment Acceptance



- Helps Patients Visually Understand Need for Treatment
- Educates Patients About Their Teeth
- Helps Dentists Better Detect Pathology
- Confirms Trust in Dentist's Recommendations
- Demonstrates Practice Provides State of the Art Technology
- Builds Confidence in Office
- Patients More Likely to Talk About It & Refer Friends

177

Second Opinion®

By Pearl
Improves Patient Care



178

“Dentistry begets Dentistry”
Or simply stated...



22 crowns were placed at age 18

“The more dentistry you do for a patient, the more dentistry they will eventually need.”

179

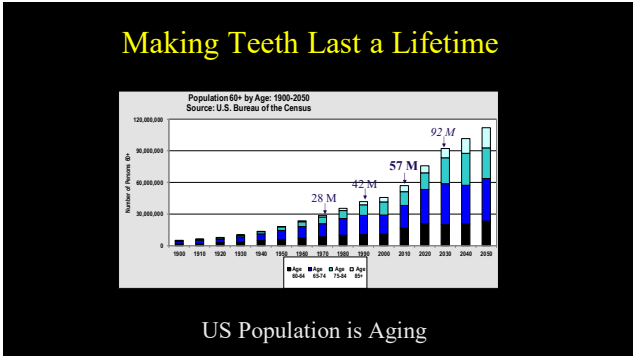
“Dentistry begets Dentistry”
Unhappy Patient



Now age 32

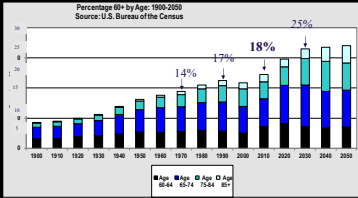
“The more dentistry you do for a patient, the more dentistry they will eventually need.”

180



181

Making Teeth Last a Lifetime



US Population is Aging

182

Minimally Invasive Dentistry

- ◆ Conservative approach
- ◆ Detect & Treat Earlier
- ◆ Remove only diseased portion of tooth
- ◆ Patients are living longer
- ◆ Preserve healthy tooth structure for future restorative needs (90-100 year olds)



183

Treatment performed at age 18

- Black Triangles
- Opaque Crowns
- Dark Roots visible
- Recurrent decay



184

Smile Evaluation

- Long Central Incisors
- Inadequate buccal corridor display
- Steep Curve of Spee
- Color



185

Trial Evaluation

- Teeth Prepared
- Fabricate desired shape in provisionals
- Allow patient to wear, evaluate and accept



186

Lab Communication

- Once approved take final impressions-send model of provisionals
- Send photos of desired color shade tab, stump shades and provisionals



187



188



189



190



191



192



193



194



195



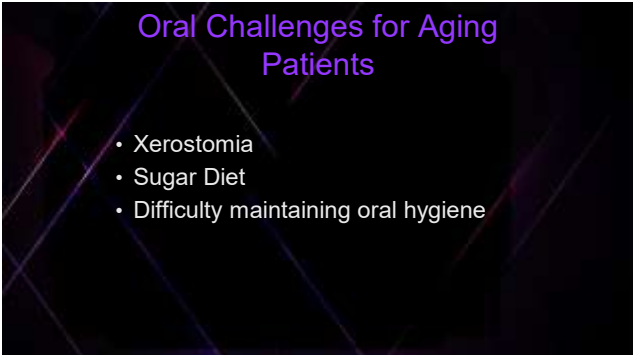
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197



198



199


Aging Population Challenges-
Xerostomia

"One study states that dry mouth
impacts 30% of the elderly."

Ship JA, Pillemer SR, Baum BJ. Xerostomia and the geriatric patient. *J Am Geriatr Soc* 2002;50:535-543.

200

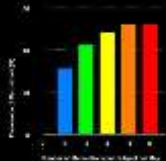
Aging Population Challenges-
Xerostomia



Multiple Medications

201

Aging Population Challenges-
Xerostomia



- Incidence increases with # of drugs taken

50% of patients taking 4 or more medications had Dry Mouth

202

Aging Population Challenges-
Sugar Diet



Lack of Taste Increases Sweets

203

Aging Population Challenges-
Sugar Diet



Ingredients: Calcium carbonate, adipic acid, corn starch, croscopovidone, dextrose, flavors, malodextrin, sucrose, talc, colors.

204

Aging Population Challenges-
Oral Hygiene





Sonicare

205

Clinical Challenges for
Treating Aging Patients

- Unable to tolerate long appointments
- Difficulty coming to office
- Fixed Income
- No Longer have Insurance


206

Long-Term Interim Restorations


Using Glass Ionomer Restorative Materials



207




Band w Opening




Tooth Excavation

208



← Before




After →

209


Direct Bonded Provisional Crown

Using bis-Acryl resins




- Take alginate impression
- Pour up model

210



- Remove decay
- Place GI base
- Reprepare

•Cut off crown



211



212



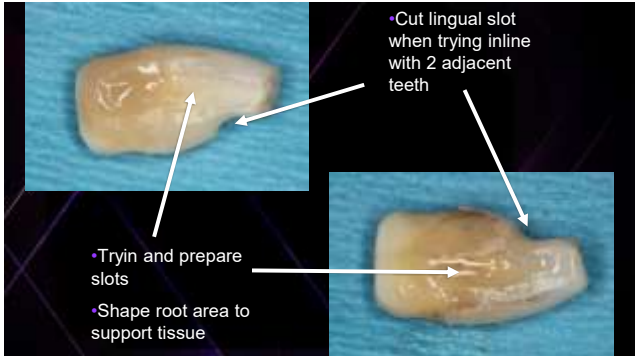
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216



217

Prevalence of Xerostomia




"In one study approximately 1 in 4 adult patients complained of dry mouth symptoms"


Orellana MF, Lagraverre MO, Boychuk DG et al. Prevalence of xerostomia in population-based samples: A Systematic Review. *J Public Health Dent*. 2006;152-158.

224

Oral Environment Challenges-
Carbohydrates



Nutrition Facts: 16 fl oz; calories 140; total fat 0g; sodium 220mg; potassium 60mg; total carbs 28g; **sugars 28g**



Nutrition Facts: Serving Size: 8.3 fl oz; Calories: 140; Total Fat: 0g Sodium: 200mg Protein: 0g Total Carbohydrates: 28g; **Sugars: 28g**

225

Oral Environment Challenges-
Bottled Water





Fluoride-less water Fluoridated water

226

Oral Environment Challenges-
Illegal Drugs




"Meth mouth" or chronic marijuana use

227

ORAL ENVIRONMENT

Acid

Saliva



Demineralization

2. ACP: Amorphous Calcium Phosphate – very high quantities

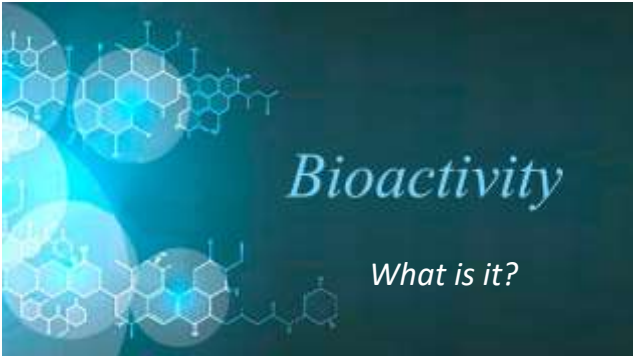
Remineralization

- If the mouth is constantly being challenged by acid attacks, saliva cannot keep the balance.
- Result is an environment that favors demineralization

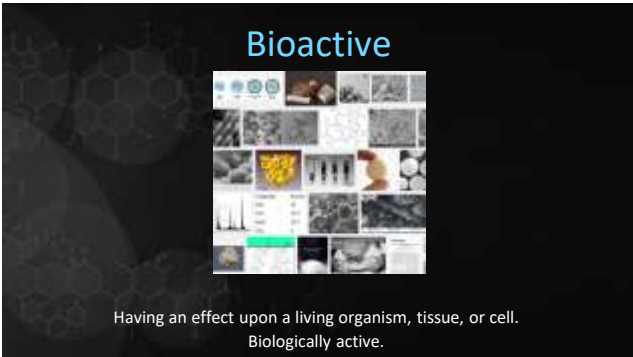
228

Bioactivity

What is it?



229



230



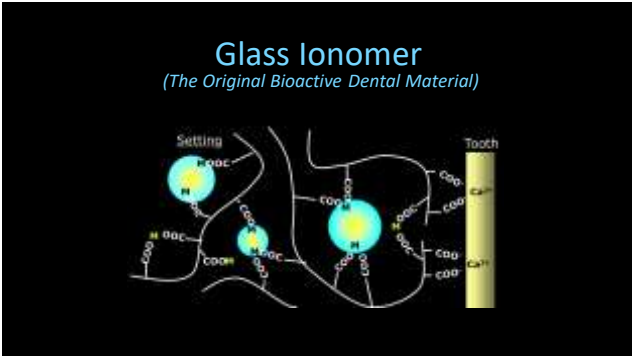
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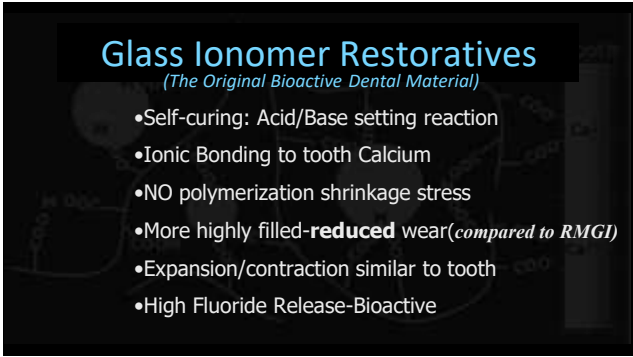
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233



234



235

Glass Ionomer Uses

(The Original Bioactive Dental Material)

- Class III, V Restorations
- Pediatric Patients
- Sealants
- Sandwich Technique (open & closed)
- Crown Buildups
- Posterior Restorations
- Long term interim restorations
- (Cements)

236

Need Therapeutic Restorations

- > Xerostomia patients
- > High carbohydrate users
- > Non-fluoridated water users
- > Drug abusers

237

Composite Challenges

- Post-operative sensitivity
- Recurrent decay
- Achieving proper moisture
- Polymerization shrinkage
- Increased time-layering
- Technique sensitivity

Glass Ionomer

- ✓ Low post-op sensitivity
- ✓ Fluoride Release
- ✓ Moisture variability
- ✓ No shrinkage
- ✓ Bulk placement
- ✓ Simple-more forgiving

238

Glass Ionomer Restorative Materials



Fuji IX Self Cure
Glass Ionomer




RIVA Self Cure
Glass Ionomer



FX-II Self Cure
Glass Ionomer

239

Glass Ionomer Cervical Caries



Patient on multiple meds



Remove decay-place matrices
Treat dentin with PAA

240

Glass Ionomer Cervical Caries



Place, shape and wait 2:30



Shape w very fine diamonds & water
Place matrix and surface sealant

241



242



243



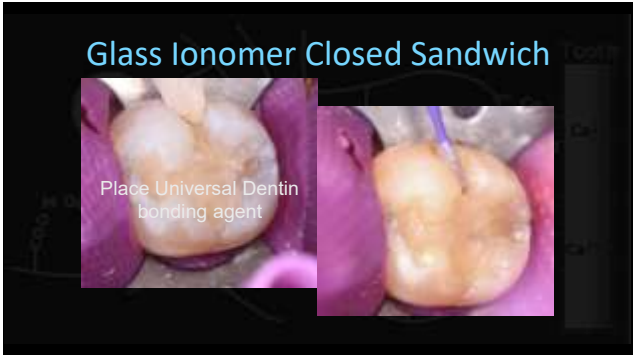
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245



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247

Glass Ionomer Closed Sandwich



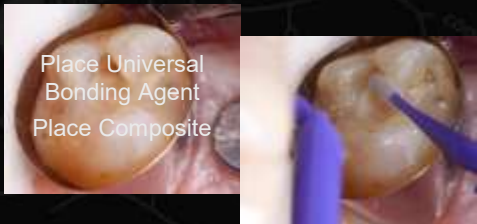
248

Glass Ionomer Open Sandwich



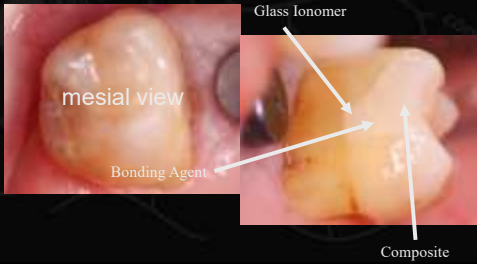
249

Glass Ionomer Open Sandwich



250

Glass Ionomer Open Sandwich



251

Glass Ionomer Crown Buildup



252

Glass Ionomer Posterior Restorations



253




254



255

GC FUJI TRIAGE EP



- Highest Fluoride Release
- Added benefits of bio-available calcium and phosphate
- Inhibits biofilm formation
- Helps prevent caries caused by acid and bacteria

256


RECALDENT (ACP-CPP)

ACP: Amorphous Calcium Phosphate

- Active carrier molecule

CPP: Casein Phosphopeptide

- Delivery vehicle
- Binds to enamel, pellicle, plaque, and soft tissue
- Binds Calcium and Phosphate
- Milk Protein



ACP-CPP release dependent on pH of the oral environment

- Acidic environment-releases more ACP
- Stable environment-releases appropriate level

257



RECALDENT (ACP-CPP)

ACP: Amorphous Calcium Phosphate

- Carrier molecule


CPP: Casein Phosphopeptide

- Do not use on patients with a proven or suspected milk protein allergy or with sensitivity to benzoate preservatives
- Lactose content is less than 0.01%



258

RECALDENT (ACP-CPP) PRODUCTS



MI Paste

MI Paste Plus

MI Paste ONE

GC Fuji TRIAGE Plus

MI Varnish

259

Glass Ionomer High Caries



Drug User

260

Glass Ionomer High Caries



Spoon out decay and refine prep

261

Glass Ionomer High Caries



Place and rinse Poly-acrylic acid

262

Glass Ionomer High Caries



Mix Gi and quickly place and push out

263

Glass Ionomer High Caries



Allow to set 2:30

264

Glass Ionomer High Caries



Hold down gingiva and shape

265

Glass Ionomer High Caries



Final Immediate Result

266

Expanded Use of Glass Ionomer



- Recommended expanded used for glass ionomers
- Use in Class II restorations
- Use in core buildups
- Long-term Interim Restorations

Ward DH. Broadening the Spectrum of Use for Glass Ionomer Restorations. Dent Today 2014;33(12):62-66.

267

Posterior Glass Ionomer



Riva Self Cure HV

- Stronger, more opaque
- Long-term provisional restoration
- High-caries risk patients
- Deep sub-gingival molar interproximal restorations
- Thin buccal walls
- Cracked teeth
- Transitional restoration before a crown

268

Posterior Glass Ionomer



High caries risk patient

269

Posterior Glass Ionomer



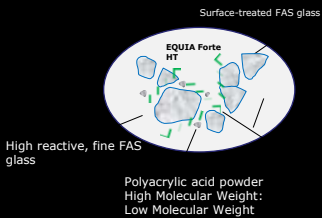
High caries risk patient

270

EQUIA Forte HT



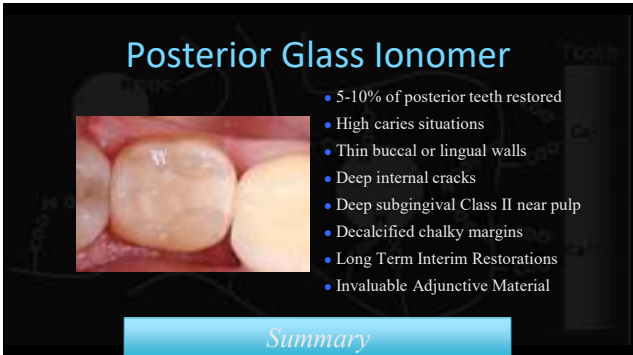
- High Translucency
- Higher Fluoride Release
- Higher Compressive Strength
- Long-term Interim Restorations



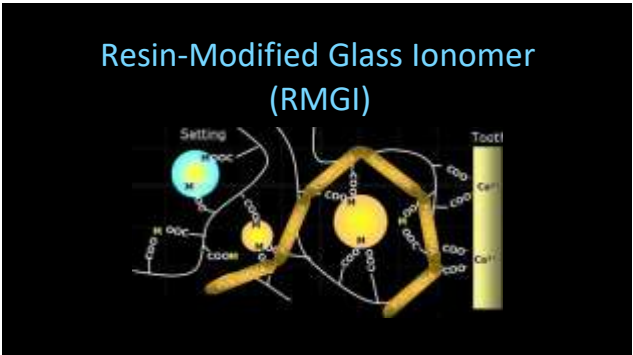
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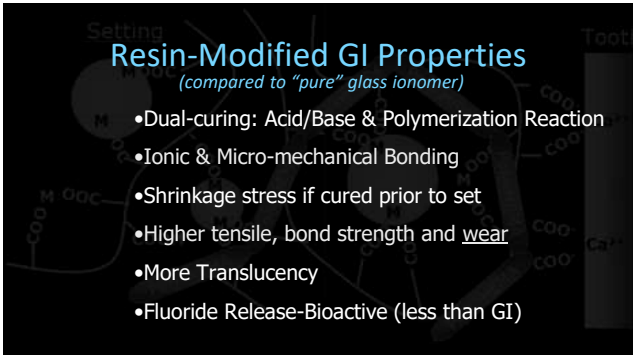
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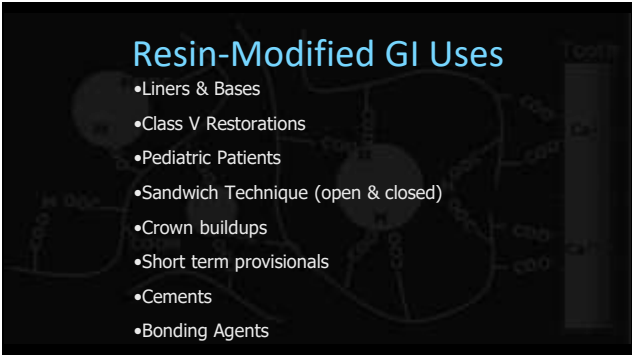
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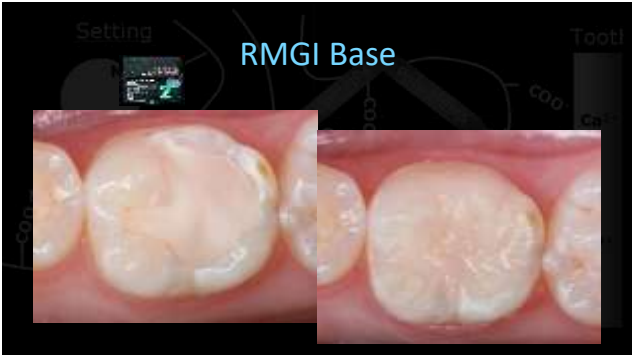
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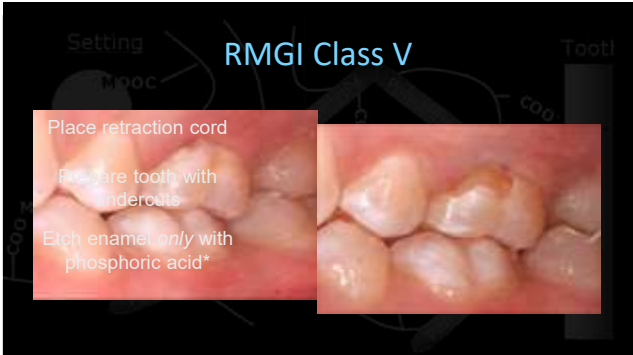
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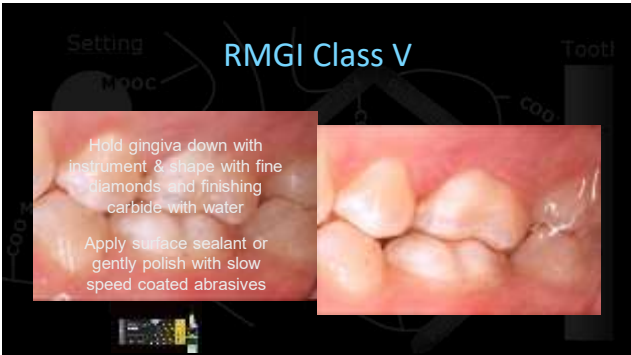
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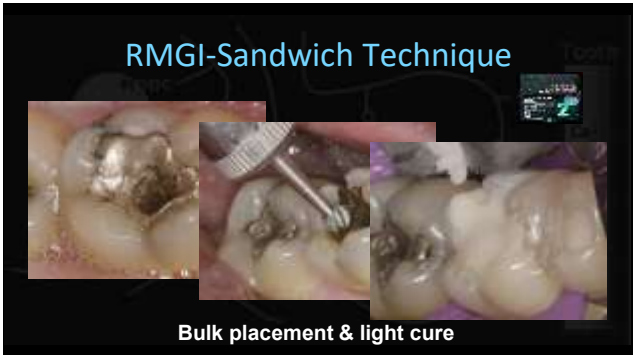
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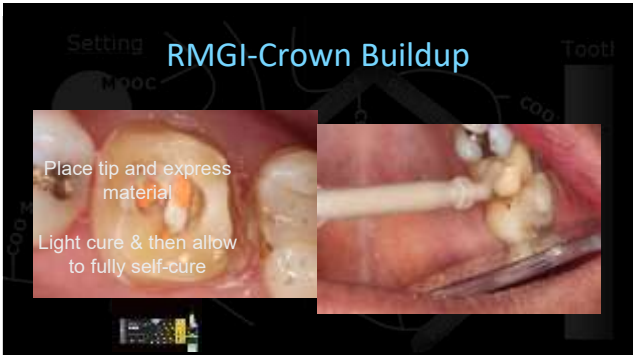
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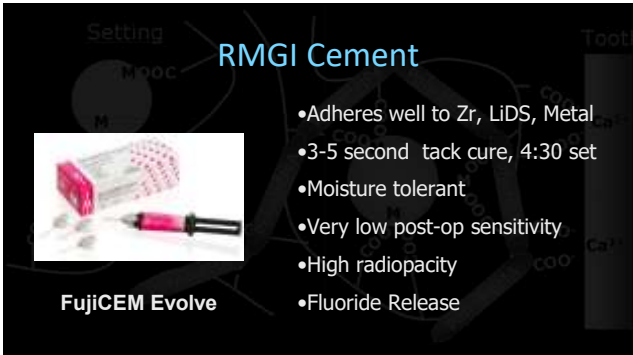
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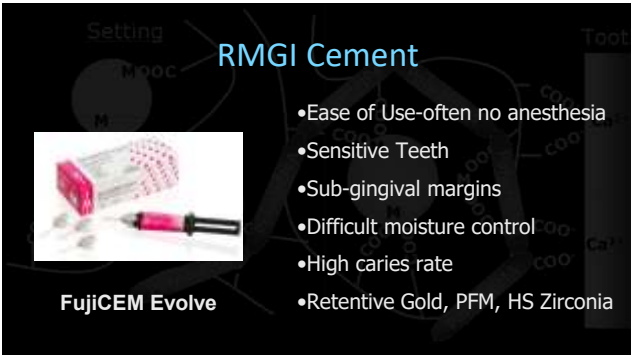
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293




294



295

Bioactive Ion Releasing Resins

- Responds to an Acidic Oral Environment
- Exchanges ions to and from biological structure
- Releases Calcium, Phosphates, Fluoride, other ions
- Regeneration/remineralization
- Maintains an alkaline environment
- Antimicrobial
- Promotes healing



296

Resin Based Bioactives

vs. Glass Ionomers

- Resin Matrix
- Primarily micro-mechanical retention-self adhesive
- Calcium & Phosphate release
- Lower fluoride release
- Higher compressive strength
- Dual cured

297

PHILOSOPHY

Resin-Based Bioactives	Glass Ionomers (Pure)
•Newer Technology	•Proven Technology
•Importance of Calcium	•Importance of Fluoride
•Higher initial bond strength	•Consistent bond strength
•Higher compressive strength	•No polymerization shrinkage
•Low post-op sensitivity	•Lowest post-op sensitivity
•Past experience/bias	•Past experience/bias

298



Bioactivity

Ca, PO₄, F Releasing Resin Liner/Bases
Restoratives & Cements

299




Activa Products

Unique Formulation

- Ionic Resin Matrix-allows ion exchange
- "Rubberized" Resins-tough, fracture resistant*
- Reactive Ionomer Glass-fluoride release
- Works in a moist environment
- Contains NO Bis Phenol A**

*Hydrogenated polybutadiene rubber
**Urethane dimethacrylate


300



Activa Products

- Higher compressive & flexural strength
- Lower wear than GI & RMGI
- Glass ionomer filler particles
- Ionic resin matrix
- Calcium, phosphate & fluoride release
- Dual cure, self cure, light cure
- Bioactive

301



Activa Bioactive

EASY TO USE

- No phosphoric acid or bonding agent needed
- Express through mixing tip onto tooth
- Rub into tooth 20 seconds- light cure
- Light cure 20 sec low setting or 3 min self cure
- Reprepare, etch, bond & place composite


302

Activa Bioactive Liner/Base



Restored w Composite

303



Activa Restorative

- Class V restorations
- Class I II III restorations
- Pediatric patients
- Geriatric patients
- Crown buildups

304

Activa Restorative



Class I

305


Activa Restorative



Quick prep then remove restoration Excavate Place buildup and refine preparation

Restoration Under Crown

306




Activa Presto

(High Viscosity Flowable Composite)

- Releases and recharges Ca, P & F1
- Calcium phosphate soluble in monomer
- Light cured
- Reduces detrimental MMP effects
- Good compressive strength & toughness
- A1, A2, A3, A35, A4, A6, B1, BW

307




Activa Presto

Physical Properties

- Depth of light cure: 2.5mm
- Radiopacity: 2.5 AI (250%)
- Percentage filler by weight: 70%
- Compressive strength: 327 MPa
- Diametral tensile strength: 53 MPa
- Polymerization shrinkage: 2.1%

308



Activa Presto

Uses

- Liners
- Class V restorations
- Class I II III restorations
- Pediatric patients
- Geriatric patients
- Crown buildups

309

Activa Presto



Class I



310

Activa Presto



Class I

311

Activa Presto

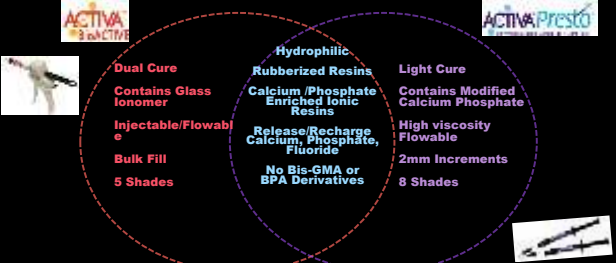


Class I



312

Activa Bioactive vs Presto



Activa Bioactive (Left):

- Dual Cure
- Contains Glass Ionomer
- Injectable/Flowable
- Bulk Fill
- 5 Shades

Activa Presto (Right):


- Light Cure
- Contains Modified Calcium Phosphate
- High viscosity Flowable
- 2mm Increments
- 8 Shades

Shared Properties (Center):

- Hydrophilic Rubberized Resins
- Calcium /Phosphate Enriched Ionic Resins
- Release/Recharge Calcium, Phosphate, Fluoride
- No Bis-GMA or BPA Derivatives

313


Activa Bio-Active Cement



- Bonds to zirconia, ceramic and metal
- Stimulates apatite formation
- Absorbs shock, stress & occlusal forces
- Resists chipping, crumbling and wash out
- Easy Clean-up
- Low 11-micron film thickness

314

Activa Bio-Active Cement



- Dual Cure
- Neutralizes sensitivity
- Ionic and mechanical bonding
- Moisture Tolerant
- Fluoride, Calcium, Phosphate Release/Recharge
- Contains No Bisphenol A
- Radiopaque

315

Activa Bio-Active Cement



Tooth Preparation

Crown seated &
tackeured

Easy cement
removal

Cemented
Crown

316

Thera Products

Unique Formulation




- Hydrophilic Calcium Silicate Matrix
- Releases Calcium, Phosphates, F1

317

Therabase

(Calcium Silicate-Resin based liner/base)




- Releases and recharges Ca, PO₄ & F1
- Self-adhesive bonding
- Dual-cured
- Contains MDP
- Good compressive strength
- Radiopaque

318

Therabase

EASY TO USE



- No phosphoric acid or bonding agent needed
- Express through mixing tip onto tooth or mix onto a pad and place with explorer or Perio probe
- Spread out and light cure
- Initial acidic pH for self-adhesion- changes to alkaline in minutes
- Reprepare, etch, bond & place composite

319



320



321



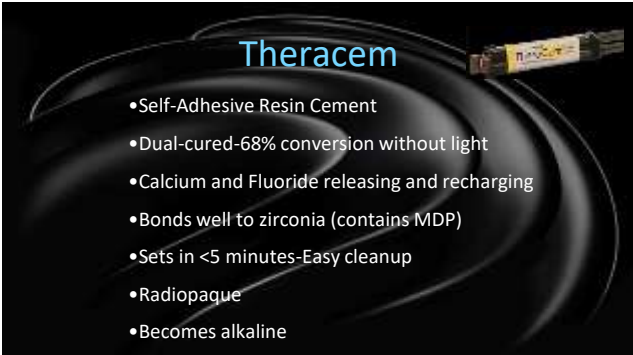
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324



325

Alkalinity


- Initial pH is 4
- Raises to 8 in 5 minutes
- Raises to 10 in 30 minutes
- Promotes apatite formation
- Inhibits bacteria growth
- Neutralizes bacterial activity



326

Theracem Uses


- Porcelain fused-to-metal crowns
- Cast metal crowns
- Zirconia crowns
- Resin crowns
- Metal & non-metallic posts
- Implants (prefer custom abutments)



327

Theracem

- Often not necessary to anesthetize
- Chlorhexidine on tooth & primer/cleaner in crown
- Just place in crown & seat
- Able to thoroughly seat multiple crowns
- Easily remove flash 2 minutes after seating
- Light cure after margins cleaned
- Check occlusion after 4 minutes



328

Theracem



- Easily able to seat multiple crowns



329

Theracem




- Full Mouth High Translucent Crowns



330

Giomer Products

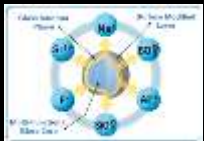


- Multifunctional glass core**
 - High radiopacity
 - Excellent light transparency
 - Hardness is equal to Enamel
- Surface modified layer**
 - High mechanical property
 - Long-term stability
- Combination of 2 layer structures**
 - Excellent color shade match (light diffusion and light transparency)
 - Maintain mechanical property
- Glass ionomer phase**
 - Fluoride release and recharge
 - Multi-ion release
 - Bio-activity

•Surface Pre-Reactive Glass Fillers

331

Giomer Ion Release



- F (Fluoride Ion)
Forms Fluorapatite
Anti-bacterial effect
Remineralization effect of decalcified areas
- B (Borate Ion)
Anti-bacteria effect
Bone formation
- Si (Silicate Ion)
Induce remineralization
- Al (Aluminum Ion)
Reduces hypersensitivity
- Na (Sodium Ion)
helps other ion's function
- Sr (Strontium Ion)
Accelerates Bone formation & remineralization
Improve Acid Resistance

332

Giomer Products


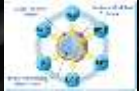


Unique Formulation



•Surface Pre-Reactive Glass Fillers

333

Beautifil-Bulk Flowable




- Ion releasing Giomer fillers
- FI, SR release -lower critical pH
- Minimal bacterial surface adherence
- Filled>50% by volume
- Great handling & Self leveling
- Good polishability & wear resistance
- Universal & Dentin shades-F03
- 4 mm cure

334

Beautifil Flow Plus X

(High Viscosity Flowable Composite)



- Releases and recharges FI
- Can be used as liner, base or restoration
- Light-cured
- Releases Giomer Ions
- Excellent Polishability
- Radiopaque

335

Beautifil Flow Plus X



336


Bioactivity



Ca, PO₄, F Releasing RMGI/Resin Restoratives

337

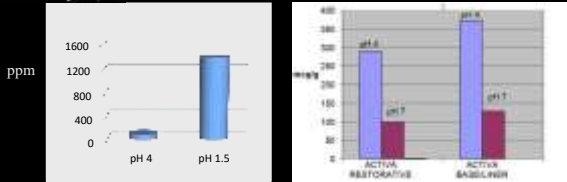
ACTIVA Restorative Properties



- Higher compressive & flexural strength
- Lower wear than GI & RMGI
- Glass ionomer filler particles
- Ionic resin matrix
- Calcium, phosphate & fluoride release
- Dual cure, self cure, light cure
- Bioactive

338

ACTIVA



Releases Calcium as pH lowers

pH	Calcium Release (ppm)
pH 4	~200
pH 1.5	~1400

Releases Phosphates as pH lowers

pH	Phosphate Release (ppm)
pH 4	~100
pH 1.5	~350

339

Activa Restorative Uses

- Class V restorations
- Class I II III restorations
- Pediatric patients
- Geriatric patients
- Crown buildups

340

Activa



Class I

341

Activa



Selective etch enamel only

Class I

342

Activa



Quick prep then remove restoration

Excavate

Place buildup and refine preparation

Restoration Under Crown

343



344




Fit SA

(Resin based liner/base/restorative)

- Releases and recharges Ca & F
- Self-adhesive bonding
- No mixing, single component
- Light-cured
- Releases Glomer Ions
- Radiopaque

345



Glomer Products

Multifunctional glass core

- High radiopacity
- Excellent light transparency
- Hardness is equal to Enamel

Surface modified layer

- High mechanical property
- Long-term stability

Combination of 3 layer structures

- Excellent color shade match (light diffusion and light transparency)
- Maintain mechanical property

Glass ionomer phase

- Fluoride release and recharge
- Multi-ion release
- Bio-activity

•Surface Pre-Reactive Glass Fillers

346



Glomer Products

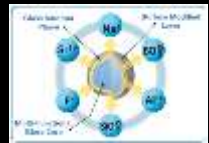
Unique Formulation



•Surface Pre-Reactive Glass Fillers

347

Glomer Ion Release



- F (Fluoride Ion)
Forms Fluorapatite
Anti-bacterial effect
Remineralization effect of decalcified areas
- Sr (Strontium Ion)
Accelerates Bone formation & remineralization
Improve Acid Resistance

- B (Borate Ion)
Anti-bacteria effect
Bone formation
- Si (Silicate Ion)
Induce remineralization
- Al (Aluminum Ion)
Reduces hypersensitivity
- Na (Sodium Ion)
helps other ion's function

348

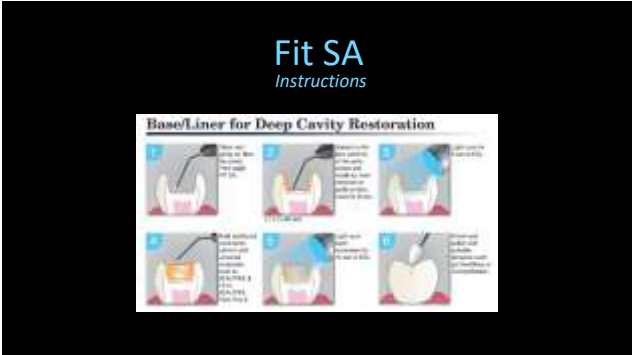


Fit SA

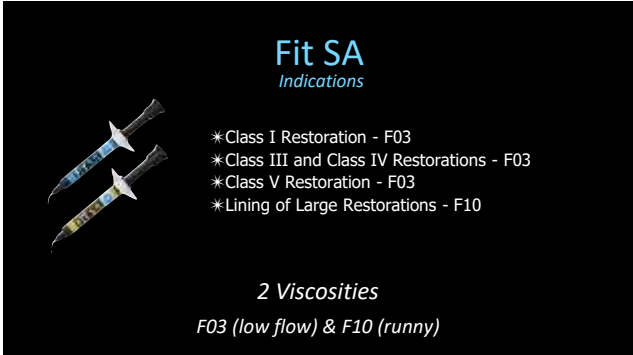
EASY TO USE

- No phosphoric acid or bonding agent needed
- Self-adhesive bonding reduces sensitivity
- 2 viscosities-F03 (low flow) F10 (runny)
- Express through tip onto tooth
- Leave for 20 seconds-then light cure
- Cover with composite or continue to buildup

349



350



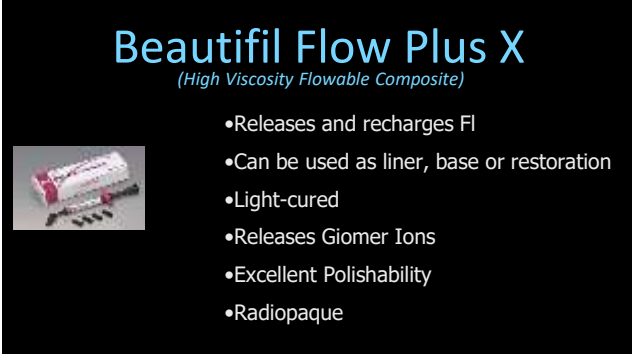
351



352




353



354



355




Activa Presto

(High Viscosity Flowable Composite)

- Releases and recharges Ca, P & F
- Calcium phosphate soluble in monomer
- Light cured
- Reduces detrimental MMP effects
- Good compressive strength & toughness
- Radiopaque

356



Activa Presto

Uses

- Liners
- Class V restorations
- Class I II III restorations
- Pediatric patients
- Geriatric patients
- Crown buildups

357

Activa Presto

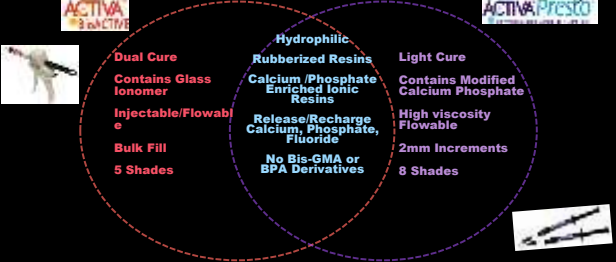


Class I



358

Activa Bioactive vs Presto



Activa Bioactive	Both	Activa Presto
Dual Cure	Hydrophilic Rubberized Resins	Light Cure
Contains Glass Ionomer	Calcium /Phosphate Enriched Ionic Resins	Contains Modified Calcium Phosphate
Injectable/Flowable	Release/Recharge Calcium, Phosphate, Fluoride	High viscosity Flowable
Bulk Fill	No Bis-GMA or BPA Derivatives	2mm Increments
5 Shades		8 Shades

359

Bioactive Restoratives

- Glass Ionomer
- RMGI-Powder/liquid
- RMGI-Paste/paste
- Enhanced RMGI
- GI Glass Filler/resin



Fluoride Release

360

Bioactive Restoratives

- Glass Ionomer
- RMGI-Powder/liquid
- RMGI-Paste/paste
- Enhanced RMGI
- GI Glass Filler/resin



Strength appearance


361



362

Endodontic Root Canal Therapy?

Perhaps not IF:




- Asymptomatic
- Single small exposure
- Able to achieve hemostasis

363

Direct Pulp Capping

Goals

- Mechanical Sealing of the Pulp
- Stimulate hydroxyapatite formation
- Dentin bridge formation



364

Direct Pulp Capping

MTA (Mineral Trioxide Aggregate)

- Thera-Cal LC-Bisco [Tricalcium silicate](#) $(CaO)_3 \cdot SiO_2$
- ProRoot-Dentsply [Dicalcium silicate](#) $(CaO)_2 \cdot SiO_2$
- Biodentine-Septodont [Tricalcium aluminate](#) $(CaO)_3 \cdot Al_2O_3$

[Tetracalcium aluminoferrite](#) $(CaO)_4 \cdot Al_2O_3 \cdot Fe_2O_3$

[Gypsum](#) $CaSO_4 \cdot 2 H_2O$

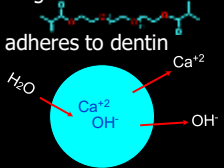
[Bismuth oxide](#) Bi_2O_3

365

Resin Direct Pulp Capping

TheraCal

- (Resin Modified Calcium Silicate)
- Light cured apatite forming MTA in a hydrophilic resin
- Material sets hard and adheres to dentin
- Alkaline pH
- Releases Ca^{++} ions



366



367



368

Resin-Free Direct Pulp Capping

Biodentine

- Tri-calcium silicate (Portland Cement)
- Self Curing (12 minutes)
- Material sets hard and adheres to dentin
- No Shrinkage
- Alkaline pH
- Releases Ca^{++} ions
- Kindest to Pulp

H_2O Ca^{++} OH^-

369

Resin-Free Direct Pulp Capping

- Place liquid into capsule-mix 30 sec
- Wait 12 minutes
- Can place RMGI bonding agent & composite

370

Biodentine XP

- Simplified placement 6200 rpm Tritrator
- Comes in 200mg & 500mg sizes
- Expanded uses

371

Biodentine XP Expanded Uses

- Base for deep restorations
- Base for indirect pulp caps
- Interim restoration
- Direct pulp cap
- Partial Pulpotomy for Irreversible Pulpitis?

372



373

PHILOSOPHY

Resin- MTA Non-resin MTA

•Dual Cure	•Self Cure
•Immediate Set	•12-minute Set
•\$1	•\$18
•Syringe delivery	•Uses triturator
•Can irritate Pulp	•Kindest to Pulp
•Very good results	•Best long-term results
•Practical Alternative	•GOLD Standard

374

Direct Pulp Capping



- Best is to avoid
- IFF Asymptomatic
- IFF 1 small exposure
- IFF Able to control bleeding
- Irrigate with chlorhexidine
- MTA is most effective
- Theracal-quicker, easier, less expensive

Summary

375



E-Mail Questions to:
danwarddds@gmail.com



376