keeping it SMART* and simple

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*Silver Modified ART

digitally inspired amputation dentistry is the antithesis of managing a bacterial infection

the pharmacological management of dental caries using Minimal Intervention techniques saves tissue, saves time and saves expense to both patients and dentists while improving productivity

there are 2 types of MI restorative dentistry coexisting side by side within the profession

- MI primary restorative care is the pharmacological management of an initial carious lesion, that aims to restore a tooth with minimal tissue removal as a single surface restoration

- MI secondary restorative care is the repair of previously restored teeth damaged by traditional treatment so that minimal further tissue removal is required

Jo Frencken

Survival ART and amalgam restorations in Primary and Permanent teeth

Evidence-based results of ART/HVGIC restorations: Meta-analysis

- ART using a high-viscosity glass-ionomer can safely be used in single-surface cavities in both primary and permanent posterior teeth

(De Amorim et al, 2012)

10 year Fuji IX, hand-mix

Courtesy Prof. F. de Lima Navarro

anatomy of a carious lesion

demineralized or missing enamel

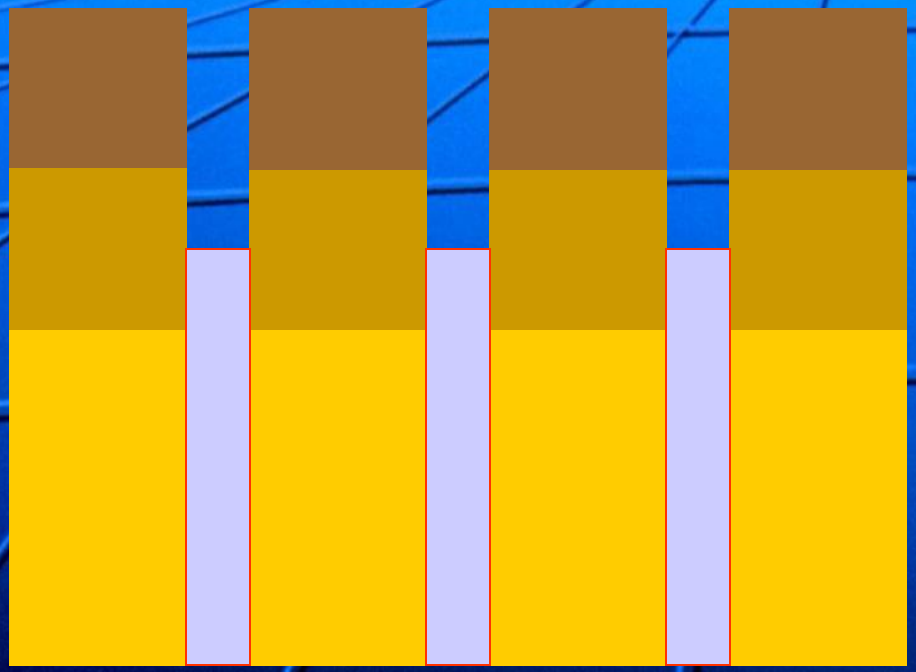
infected dentine, bacterial invasion into dentinal tubules

affected dentine, demineralized dentine, low pH, no bacteria in tubules, collagen intact

sclerotic dentine, ppted tooth mineral in dentinal tubules

reparative dentine, odontoblasts laying down dentine as a result of bacterial invasion

the restorative interface



infected dentine

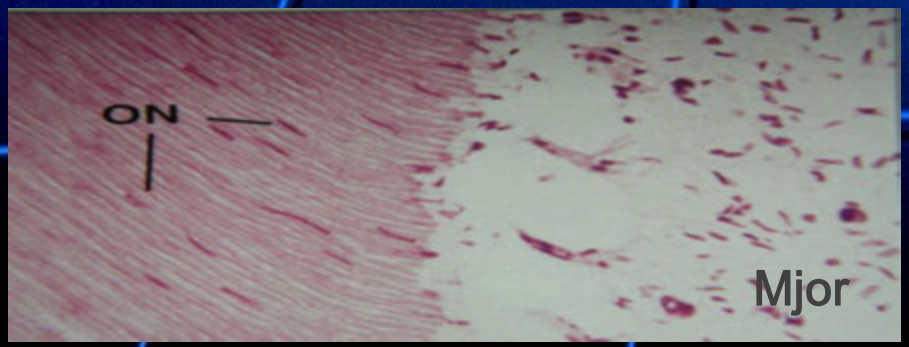
affected dentine

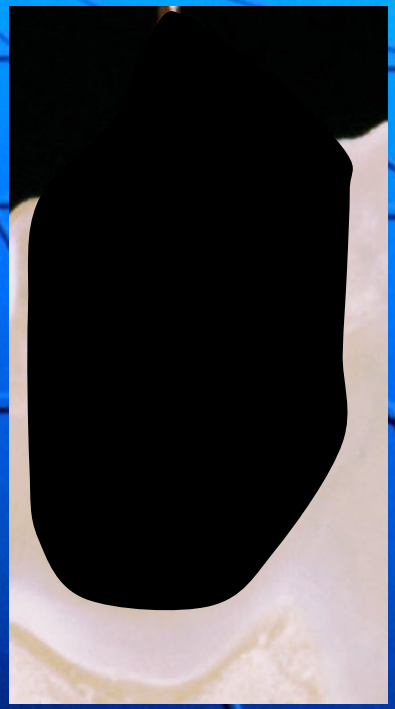
sound dentine

all tooth structure forms as carbonated apatite ($CaC0_3$ apatite) not fluor apatite

the restorative interface

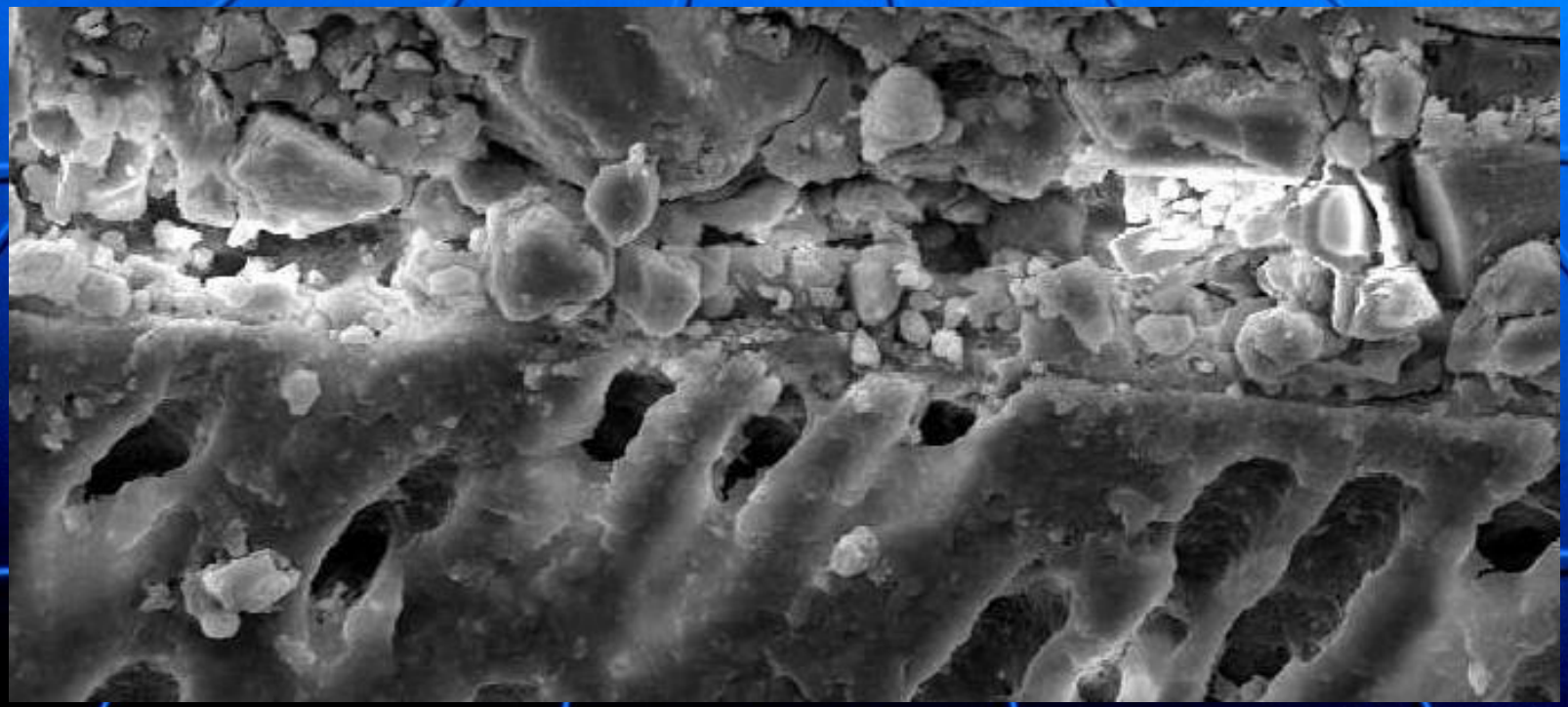
restoring with composite resin using amputation technology





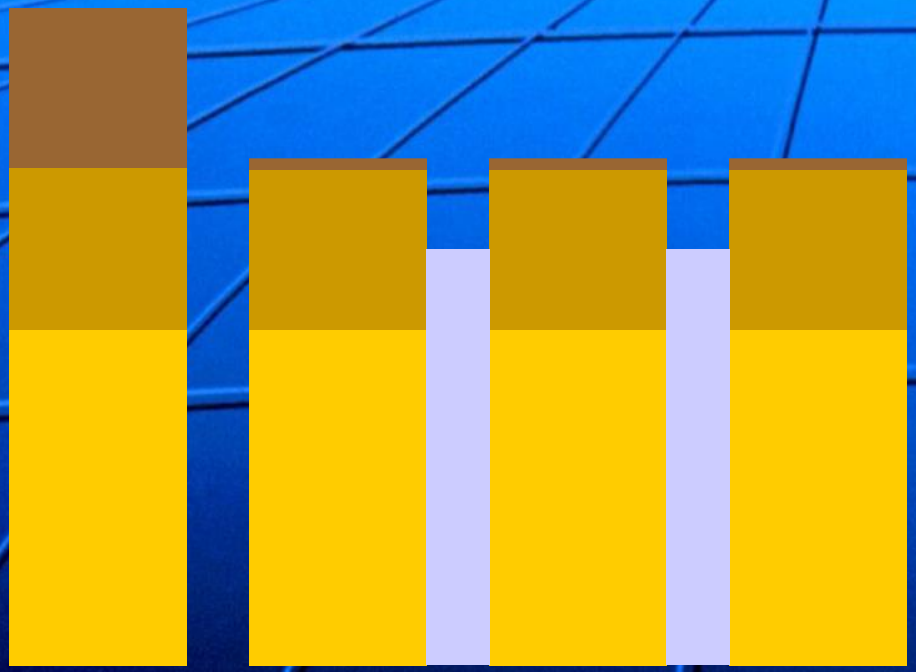
sound Ca apatite dentine
remin pH 5.5

GIC restorative interface



the restorative interface

glass ionomer cement



infected dentine 0.5 mm

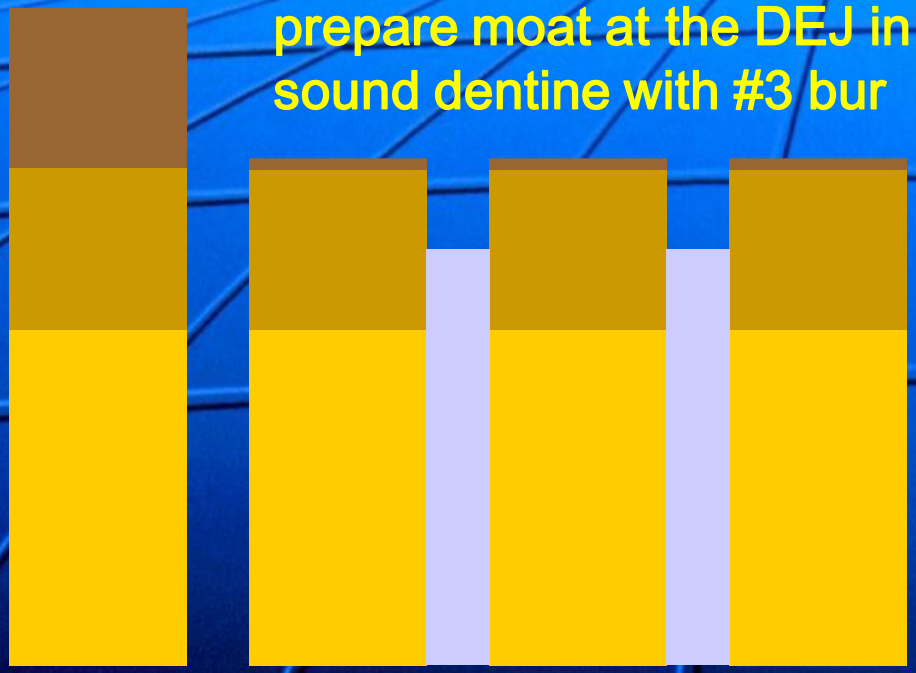
affected dentine

sound dentine

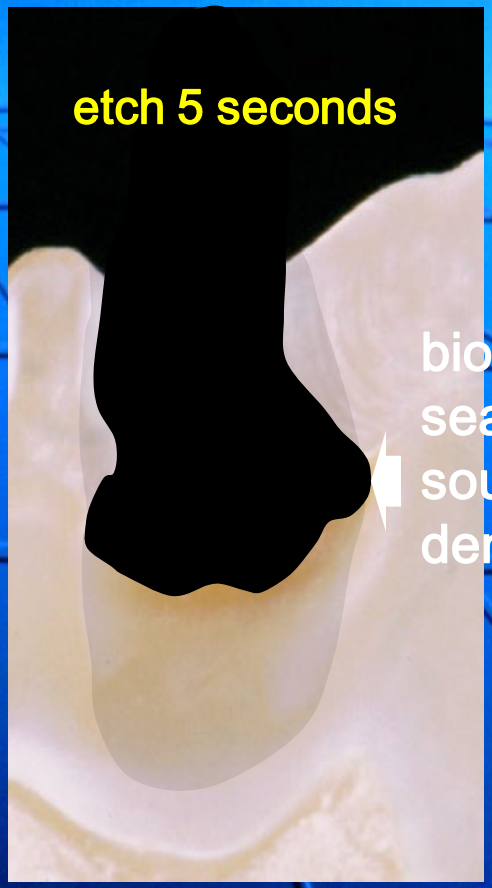
remove contaminated infected dentine to just above infected/affected dentine zone

the restorative interface

glass ionomer cement

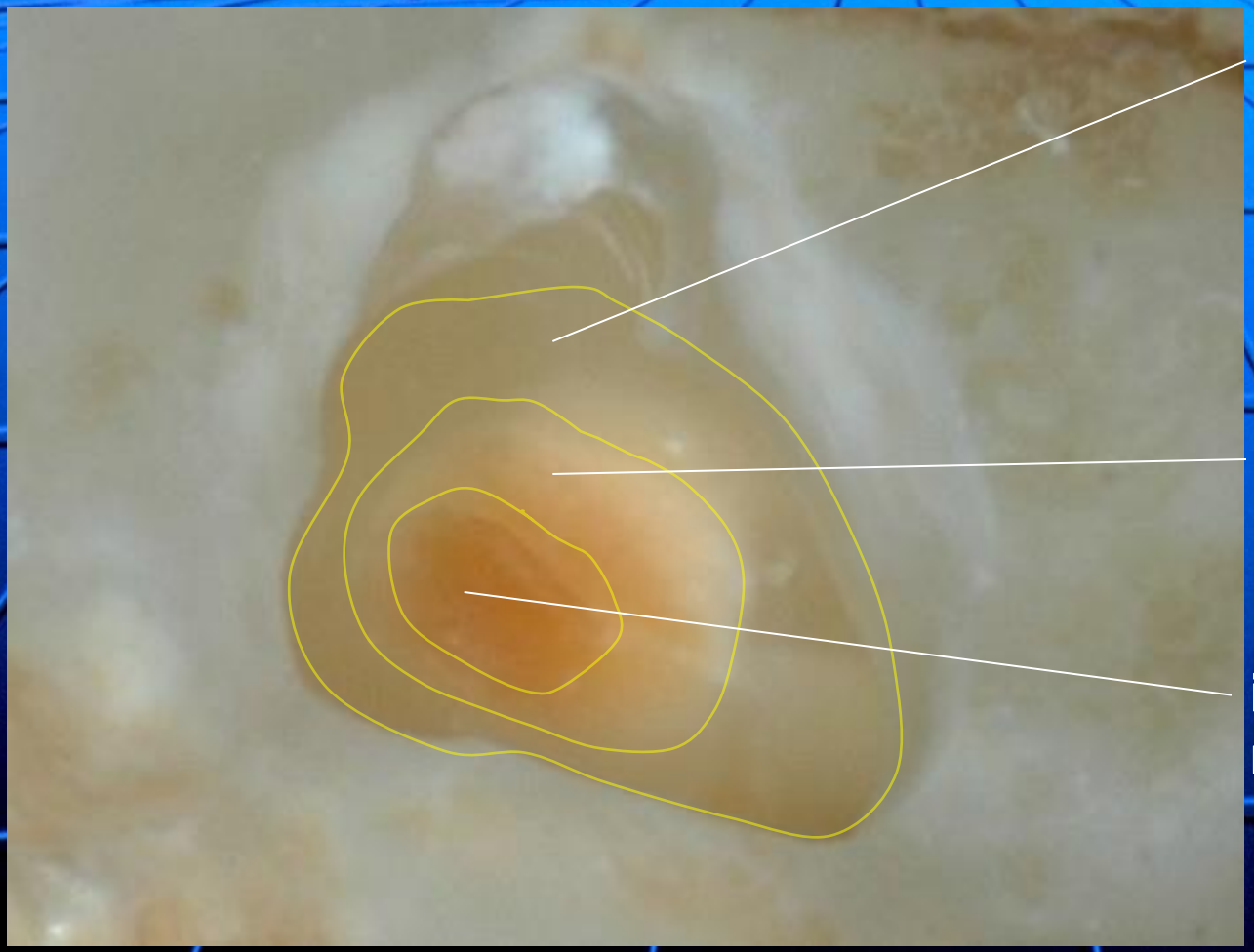


prepare moat at the DEJ in sound dentine with #3 bur



remove contaminated infected dentine just above affected leave affected dentine

caries removal for a small occlusal cavity restored with auto cure glass ionomer cement



peripheral moat #3 round bur into sound dentine

affected dentine

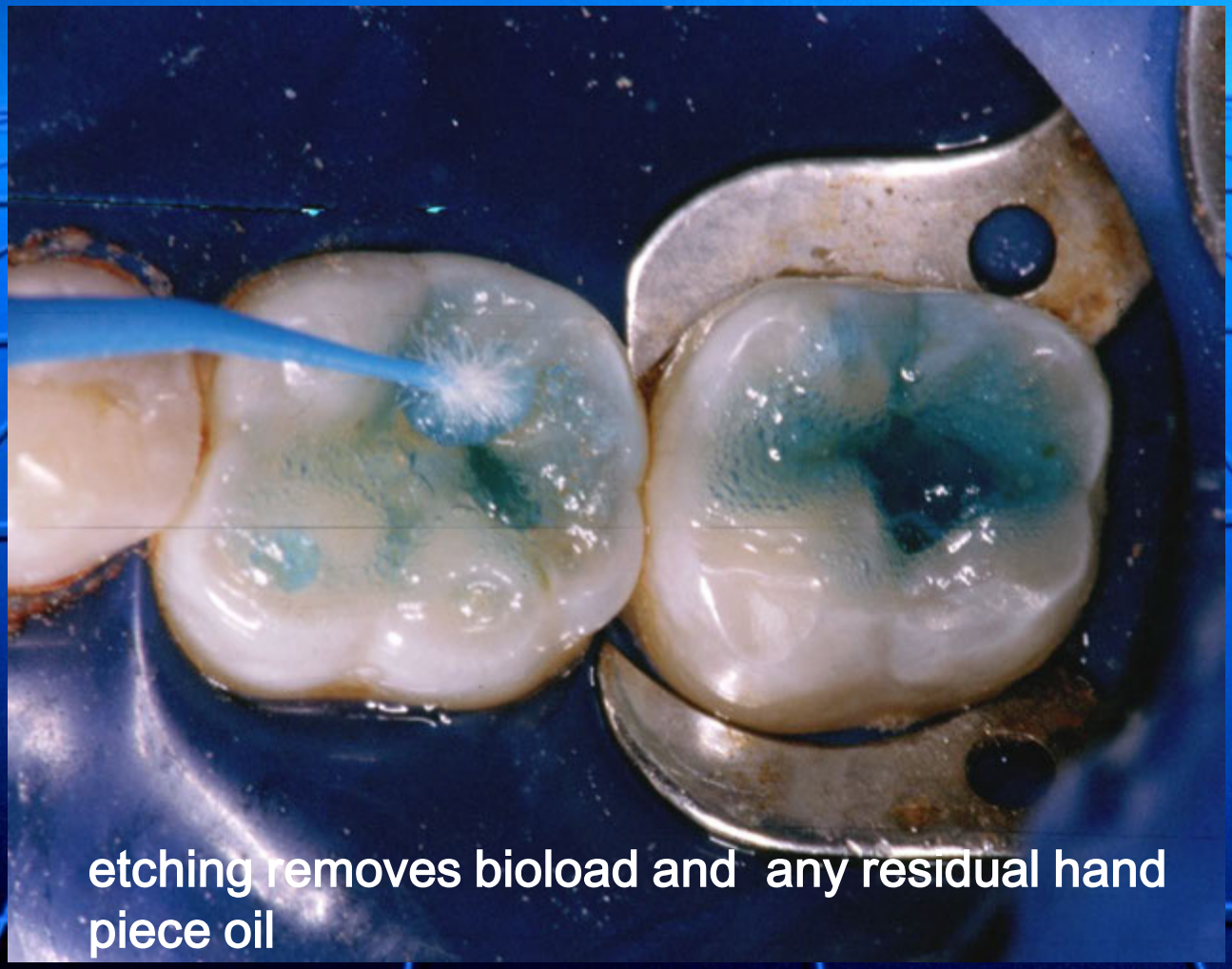
infected dentine .5mm remaining

initial lesion

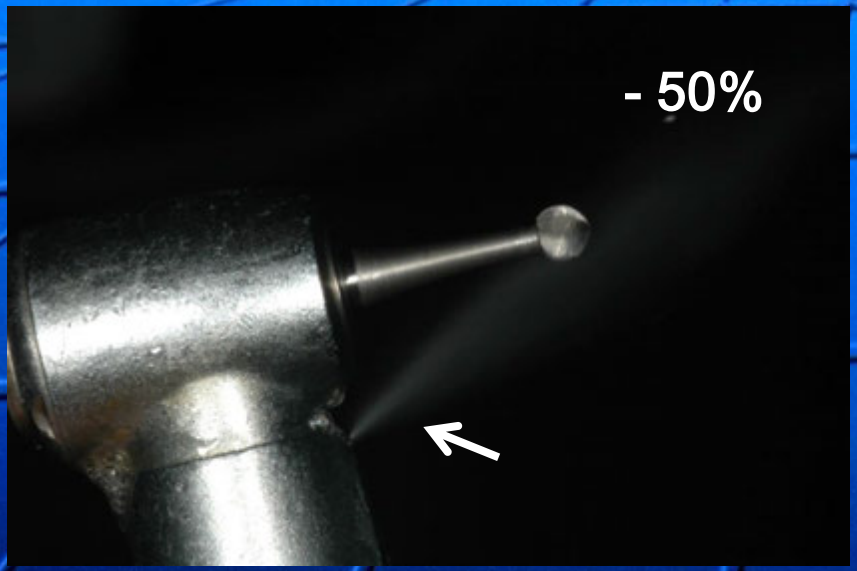
cavity preparation

note small amount of slightly stained carious dentine on cavity floor

etch 5 seconds , wash and dry



effects of handpiece oil on etch and conditioners



oil spray from a freshly autoclaved handpiece

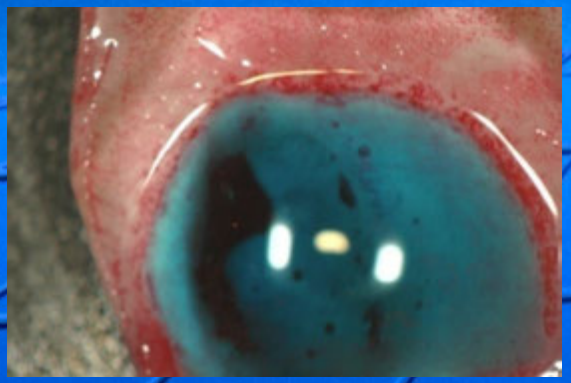
oil contamination removing caries with a slow handpiece

Matos AB, Oliveira DC, Vieira SN, Netto NG, Powers JM. Influence of oil contamination on in vitro bond strength of bonding agents to dental substrates. Am J Dent. 2008 Apr;21(2):101-4

effects of handpiece oil on etch and conditioners

conditioner

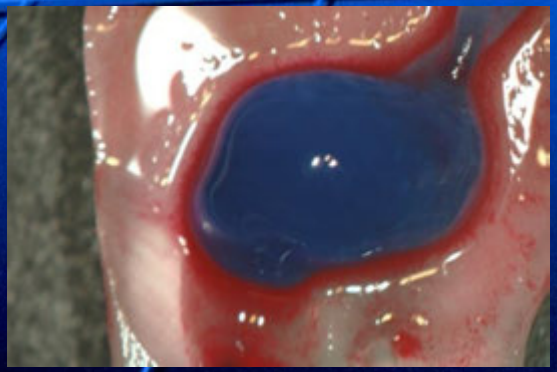
7th generation self etching bonds ?



before

after 10 sec scrub, wash & dry

etch

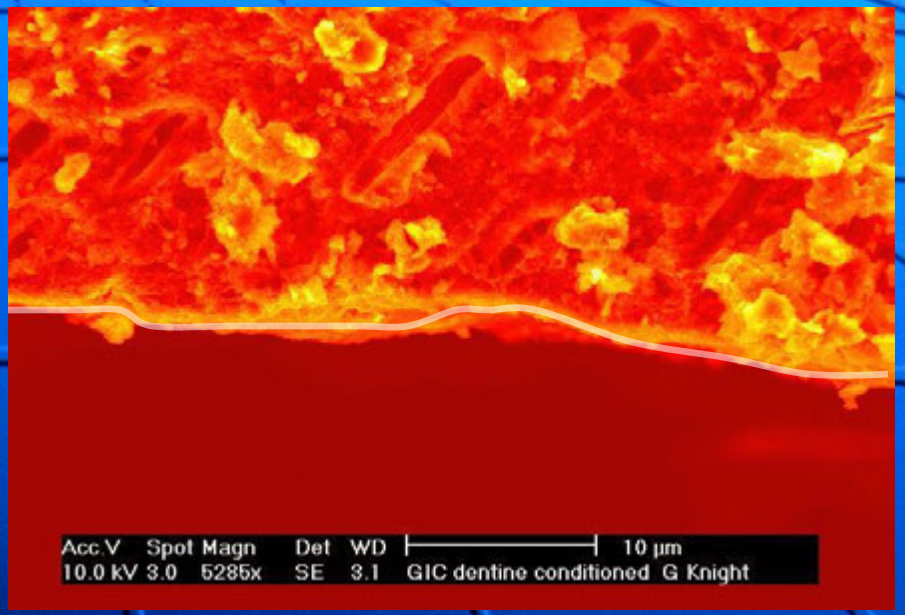


before

after 5 sec, wash and dry

Effect of dentine conditioning on adhesive of resin modified glass ionomer adhesives. Hanama HH, Burrow MF, Yiu C. Aus Dent J 2014;59: 193-200

comparison between etched and conditioned dentine samples fractured at dentine /GIC interface

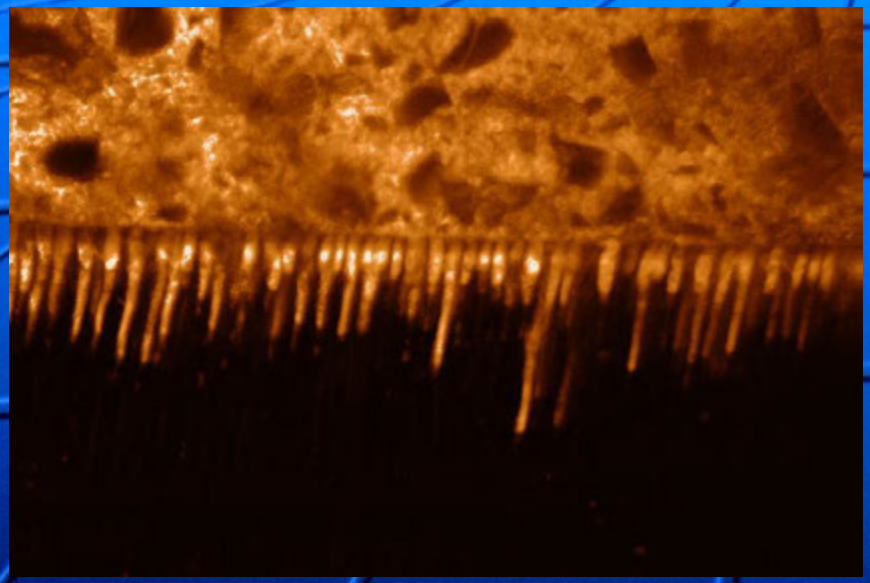


etched

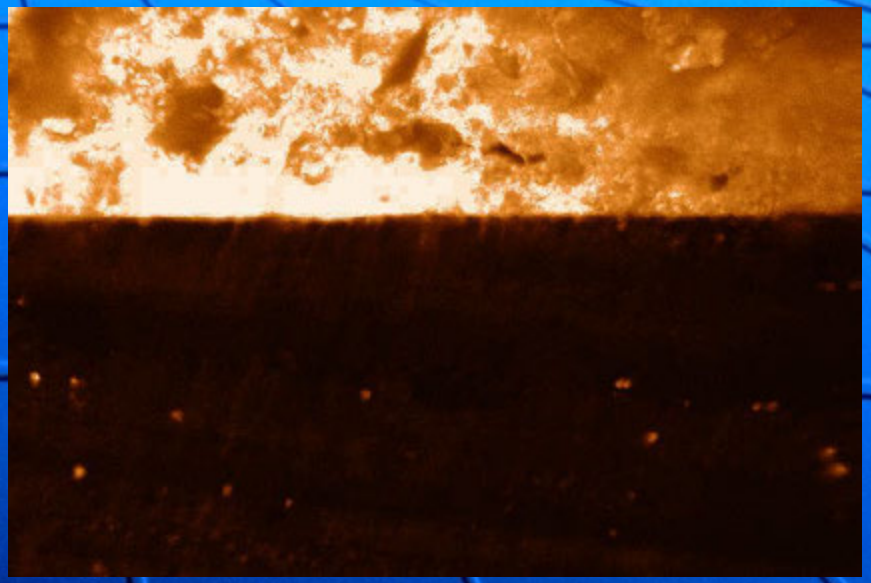
conditioned

interaction zone, GIC in etched dental tubules leads to cohesive fracture, conditioned dentine fails adhesively

RMGIC penetration into non vital dentinal tubules

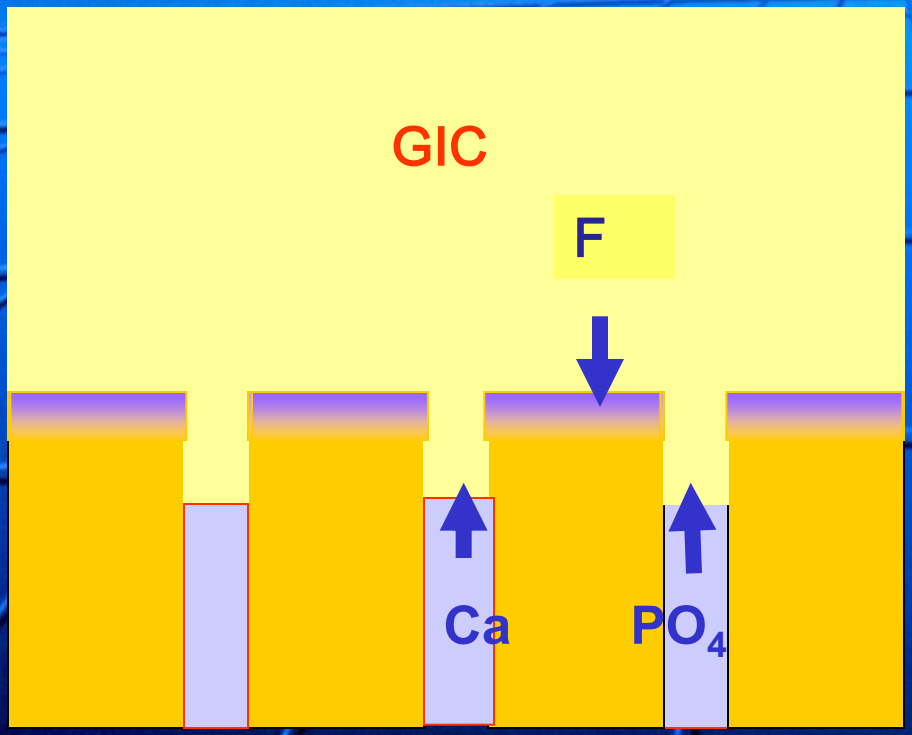


etch 5 seconds



condition 10 seconds

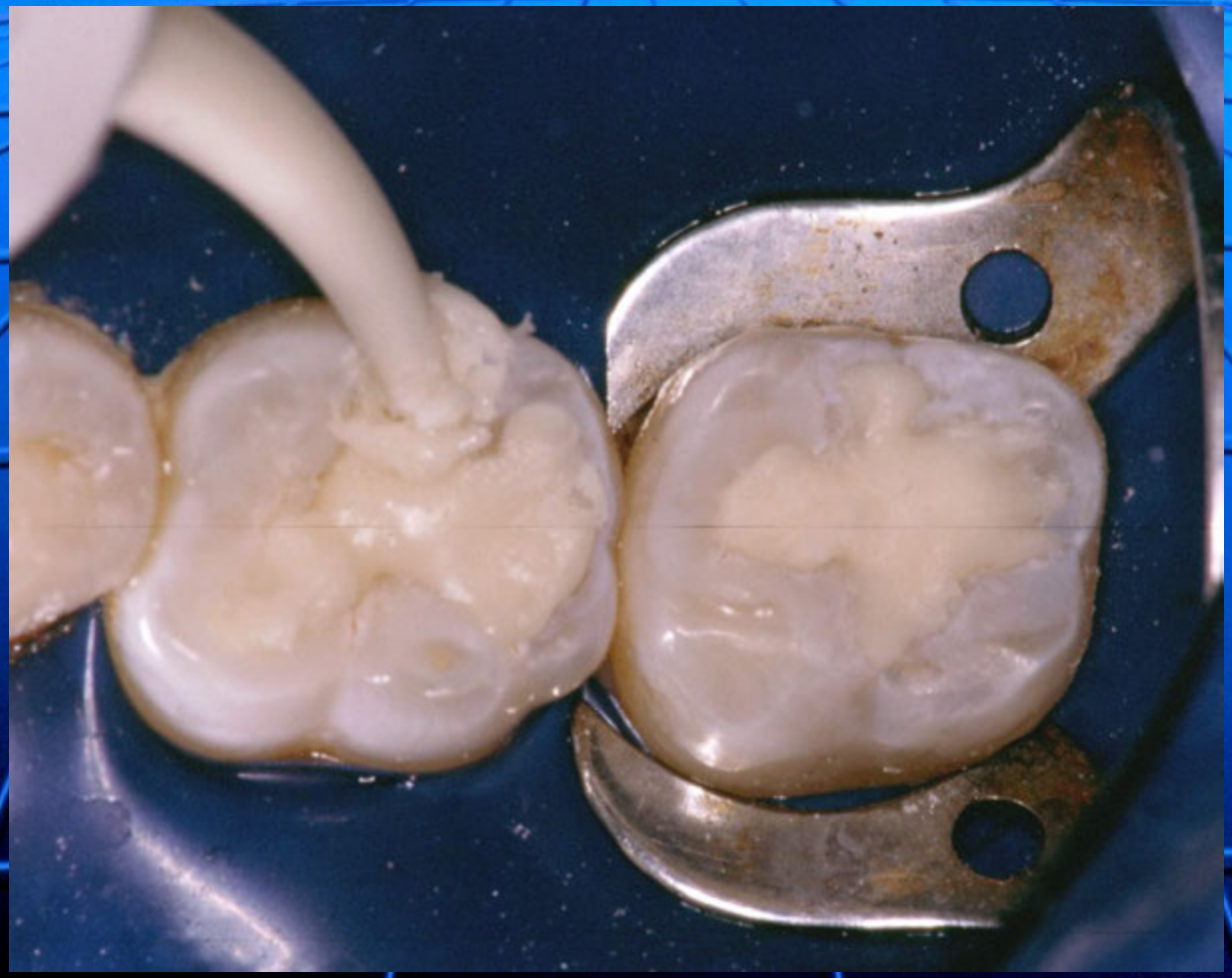
etch or condition



etched carbonated apatite dentine remineralizes as fluor apatite

demineralized carbonated apatite remineralizes as F apatite due to minerals from dentine tubular fluid and F from GIC

insert GIC



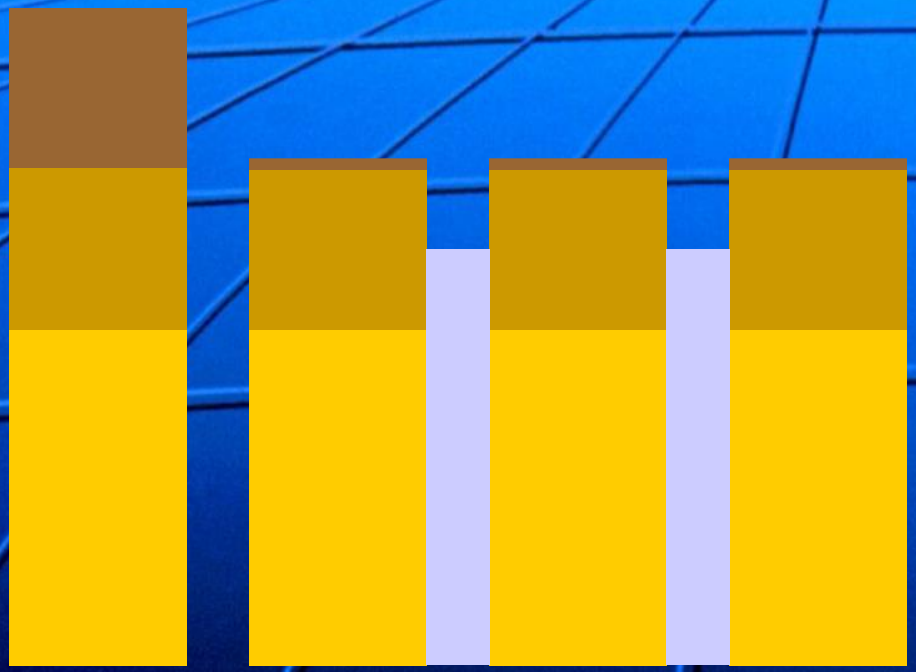
completed restoration

auto cure glass ionomer cement is indicated for small cavities that do not involve a centric stop and have no undermined cusps associated with it

glass ionomer cements do not require the removal of caries affected dentine, are fast and easy to place, relatively aesthetic and provide ongoing caries protection at the cavo margins

the restorative interface

glass ionomer cement



infected dentine

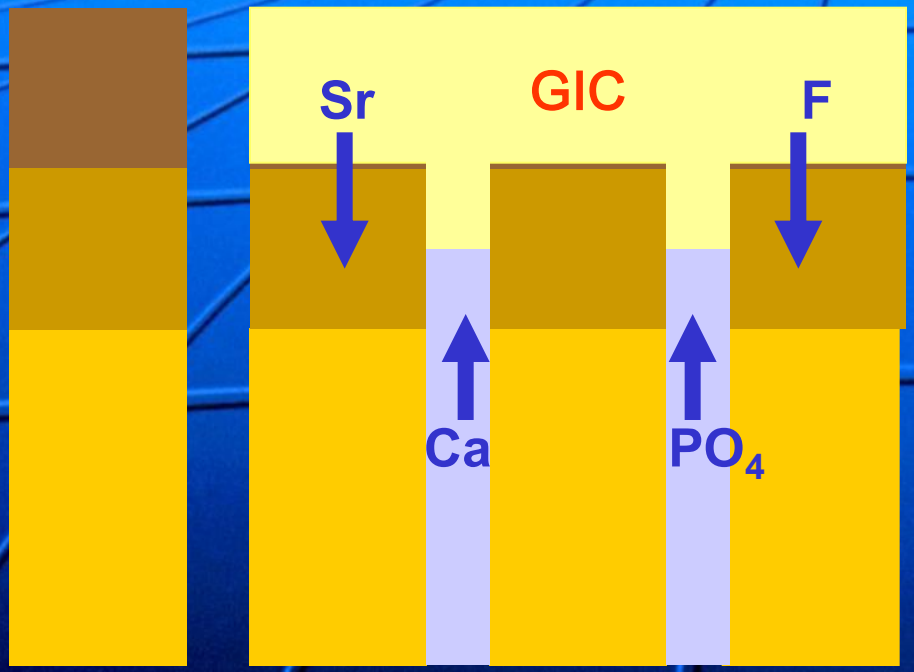
affected dentine

sound dentine

remove contaminated infected dentine to just above infected/affected dentine zone

the restorative interface

glass ionomer cement



infected dentine

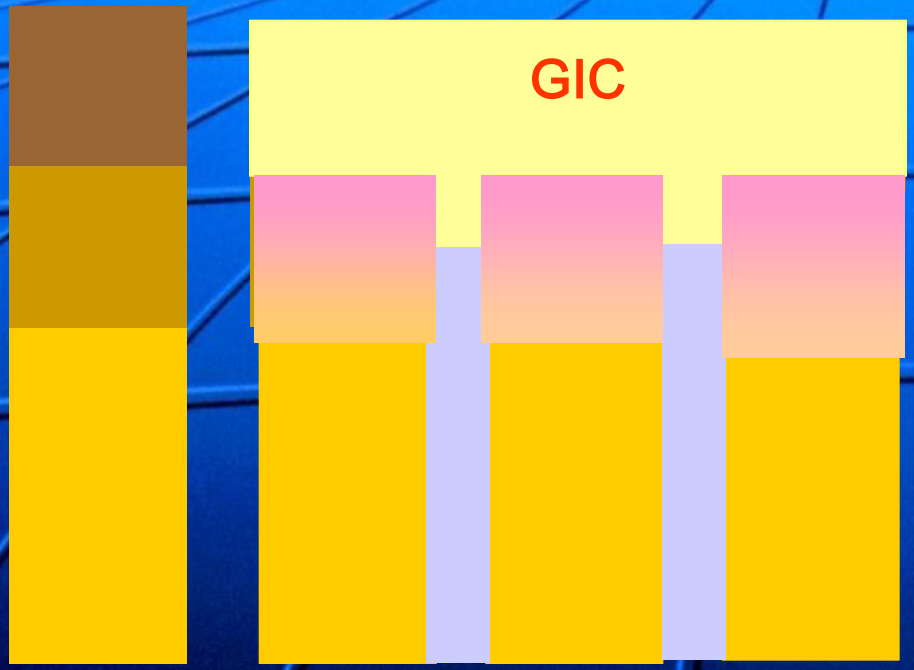
affected dentine

sound Ca ap dentine

strontium and fluoride ions from GIC, Ca and PO_4 from dentinal tubules causes remineralization of infected and affected dentine

the restorative interface

glass ionomer cement



.5 mm layer of infected dentine remineralizes as arrested caries

affected dentine remin as fluor apatite dentine remin 4.5

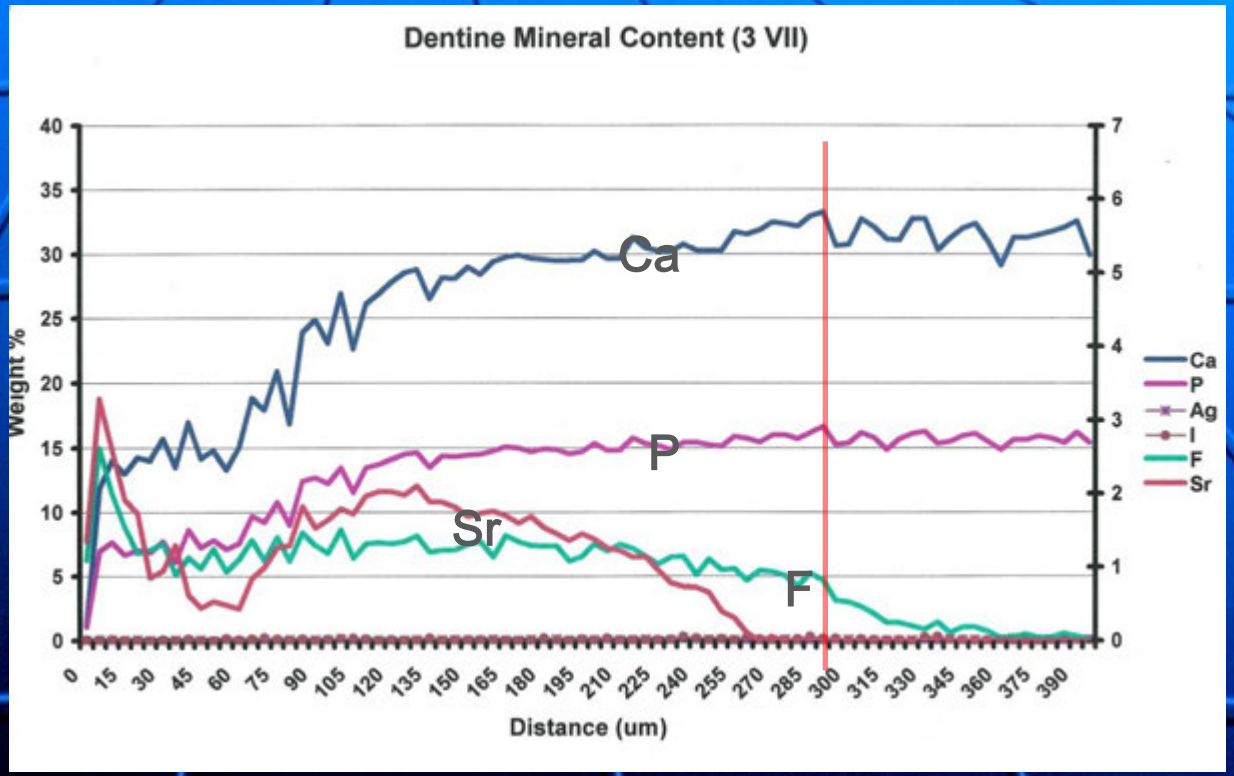
sound Ca apatite dentine remin 5.5

all caries affected dentine remineralizes as fluor apatite to form a protective base below the GIC restoration

Electron Probe Micro Analysis

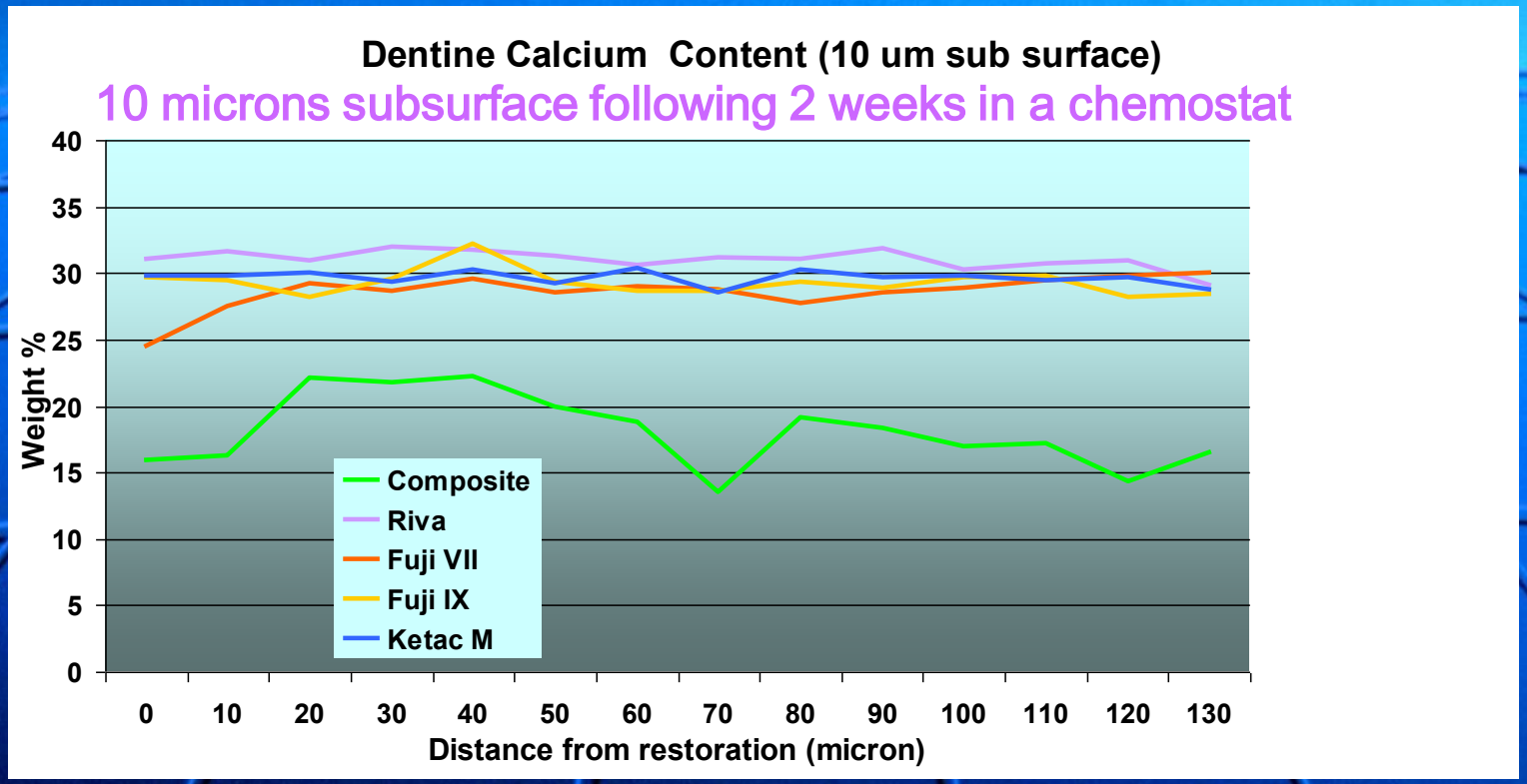
2 weeks in a *S Mutans* chemostat then restored with a GIC restoration, EPMA scanned after 2 weeks GIC placement

- left hand scale shows % weight Ca and P right hand scale shows Sr, and F
- red line shows depth of demin
- fluoride penetrates to base of demin to reform as fluor apatite



F and Sr ions move from GIC into demineralized dentine

the effects of caries on composite and GIC restoration and surrounding dentine



130 microns from cavo surface no evidence of demin of GIC restorations, 50 percent of dentine calcium mineral lost adjacent to composite resin

Knight GM, McIntyre JM, Craig GG, Mulyani, Zilm PS, Gully NJ. An *in vitro* investigation of marginal dentine and enamel caries abutting composite resin and glass ionomer cement restorations. Australian Dental Journal. 2007;52:187-192

Riva SC UHV

future of GIC's as an amalgam replacement

ultra high viscosity GIC approaching composite like hardness and handling properties

triturate, remove ball from capsule, role into a cylinder, take increments and packs like a composite resin

Riva SC UHV

future of GIC's as an amalgam replacement

minimal tissue removal, etch, pack contour and finish

benefits of GIC as a restorative material

- suitable for single surface (occlusal and proximal caries :tunnel restoration) with supported enamel
- chemical bond to infected and affected dentine
- bactericidal in first 500 microns of infected dentine and aids remineralization of caries affected dentine
- protects restorative margins from demineralization
- stress free bond with low clinical sensitivity

Silver Diamine Fluoride

SDF is playing a disruptive role in managing caries in vulnerable populations

- enables emergency patients to have caries triaged (if they wish) before they leave the emergency clinic
- introduces efficiencies in caries management in the public health system
- dramatically reduces the need for GA's in young children
- simple treatment protocols that facilitate providing care at remote locations (nursing homes, schools)
- provides a means of treating high caries rates in emerging economies that have little or no dental infrastructure

challenges using SDF

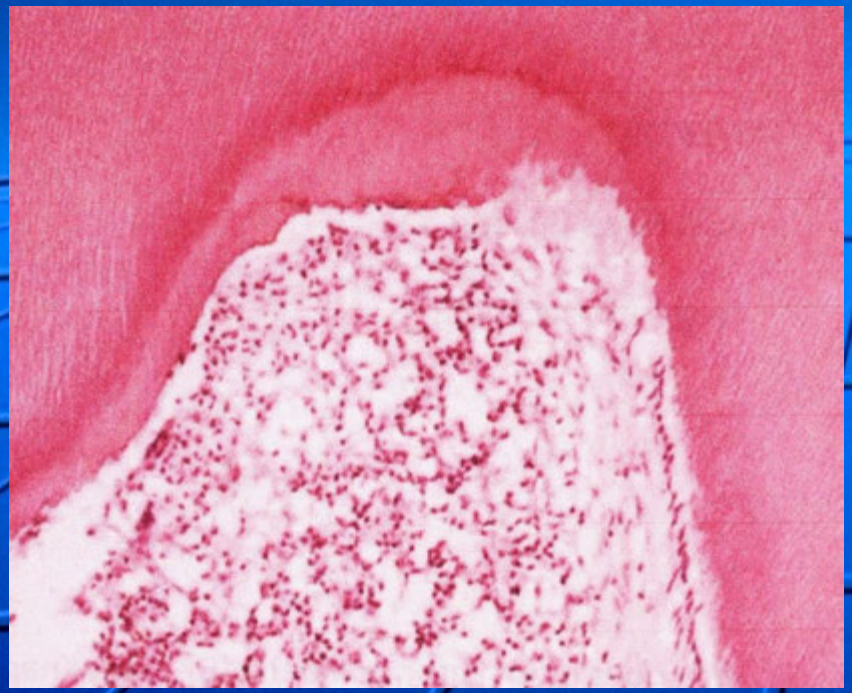
- toxicity : there have been claims that ingestion of SDF may be toxic
- eschar : the high pH of SDF can burn gingival tissues
- fluorosis: there are concerns that inadvertent ingestion of high doses of SDF can cause fluorosis
- 80% effective: search for a delivery system that increases the clinical effectiveness of SDF
- staining: limiting the use of SDF use in mainstream dentistry

Atraumatic Restorative Treatment (ART)

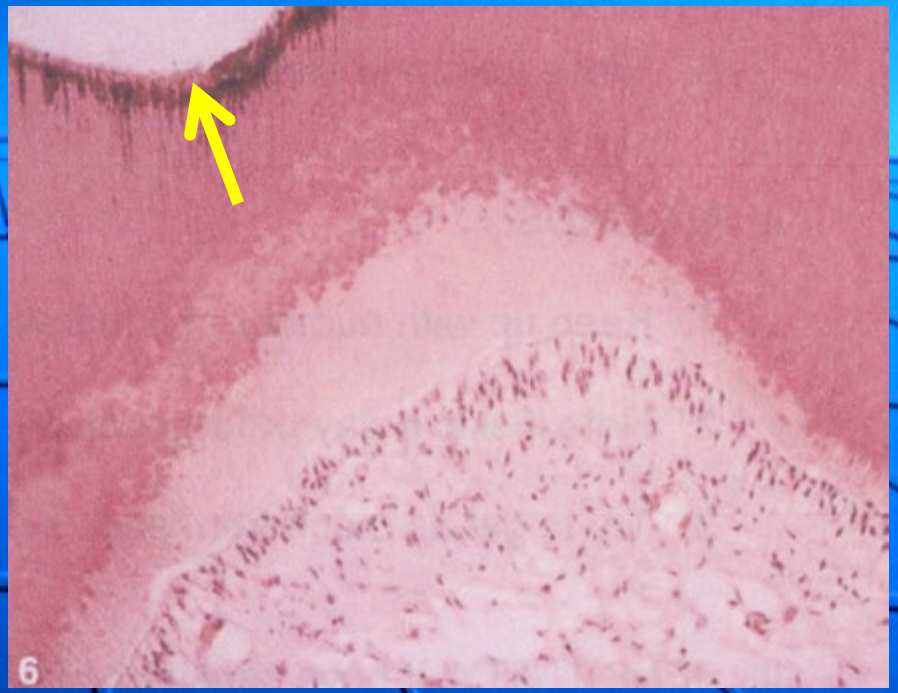
- a minimal intervention, glass ionomer cement restorative technique that leaves some caries in situ and is as effective as amalgam and composites in single surface restorations

- incorporating SDF into the ART protocol before placing a glass ionomer cement, has become known as Silver Modified ART or the acronym SMART

pulpal response to SDF (not SDF/KI)



GIC
minimal secondary dentine,
heavy polymorph infiltration



GIC + SDF
healthy secondary dentine, low
polymorph infiltration

SDF is lethal to caries, removes toxins , allowing dentine to heal

Gotjamanos T. Pulp response in primary teeth with deep residual caries treated with silver fluoride and glass ionomer cement (‘atraumatic technique’) A Dent J 1996; 41:328-334

- placing a GIC restoration over caries treated with SDF creates a stabilized ART restoration that requires minimal caries removal

- unfortunately SMART using SDF alone causes dark staining around the margins of a GIC restoration limiting its application as an aesthetic restorative technique

- because of this, clinical use of SMART currently limited mainly to public dental facilities, deciduous teeth and root caries

Riva Star

- the staining associated with SMART restorations can be avoided by applying potassium iodide (KI) immediately after SDF application and washing away the reactant

- KI scavengers any unbound silver ions to form silver iodide(AgI), a creamy white precipitate that prevents staining at the cavity margins

6 weeks in water in direct sunlight

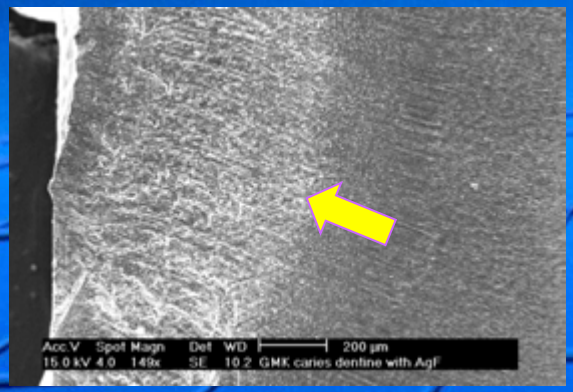
financial interest

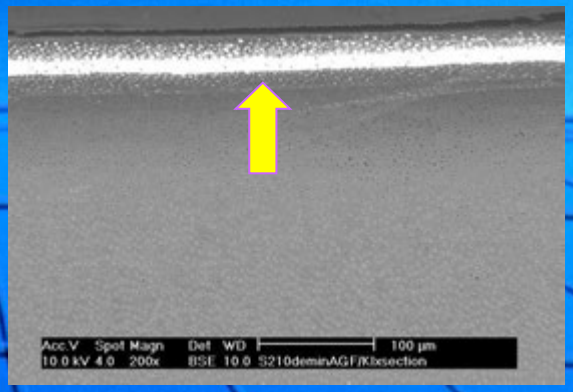
Riva Star and ART gives dentists a non staining pharmacological solution to treating decay in both deciduous and permanent teeth that only requires access to a carious lesion with minimal caries removal prior to placing a restoration

IMPORTANT

this treatment is only suitable for asymptomatic caries and requires following a strict treatment protocol that will maximize the clinical benefits and prevent any future marginal staining

difference between SDF and SDF/KI (Riva Star)





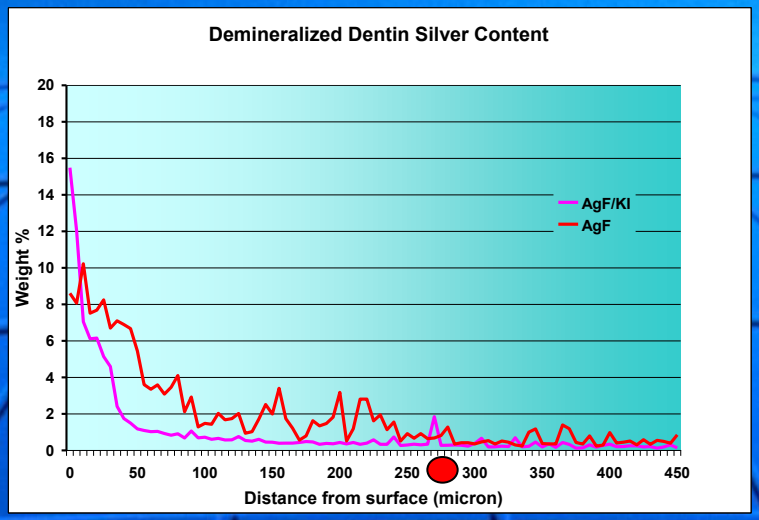
- with SDF, silver penetrates into the tubules to the base of the caries
- with SDF/KI the silver salts are limited to the first 50 microns to form a sub surface bactericidal seal in the carious dentine.

Knight GM, McIntyre JM, Craig GG, Mulyani, Zilm PS, Gully NJ. Inability to form a biofilm of *Strep Mutans* on silver fluoride and potassium iodide – treated demineralized dentin.
QI 2009; 40:156-161

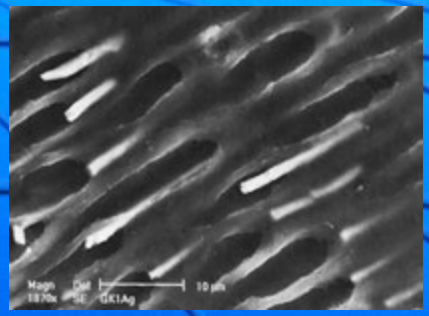
difference between SDF and SDF/KI

SDF and SDF/KI EPMA after 2 weeks in *S Mutans*

spikes in silver concentration indicate Ag limited to dentinal tubules



depth of caries



- SDF/KI deposits silver at the dentine surface to form a layer of AgI to a depth of about 50 microns.
- SDF deposits free silver to the depth of the caries in the dentinal tubules , staining the carious dentine.

Knight GM, McIntyre JM, Craig GG, Mulyani, Zilm PS, Gully NJ. Inability to form a biofilm of *Strep Mutans* on silver fluoride and potassium iodide – treated demineralized dentin.
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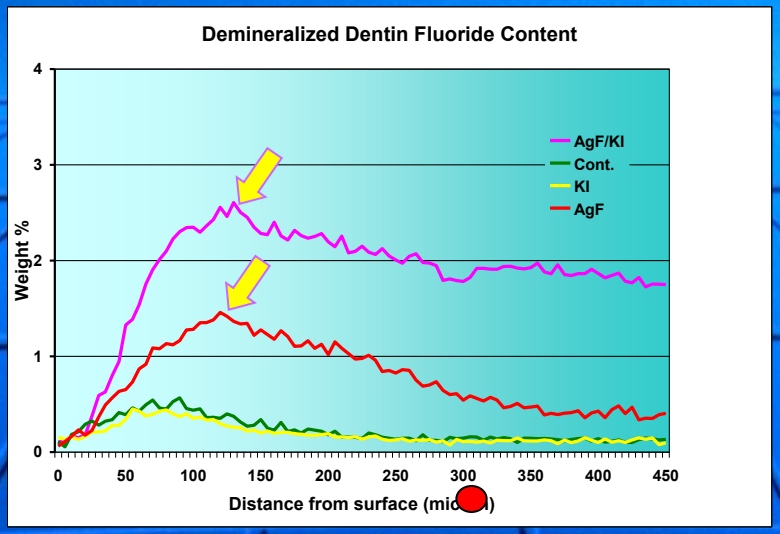
SDF and SDF/KI EPMA after 2 weeks in *S Mutans*



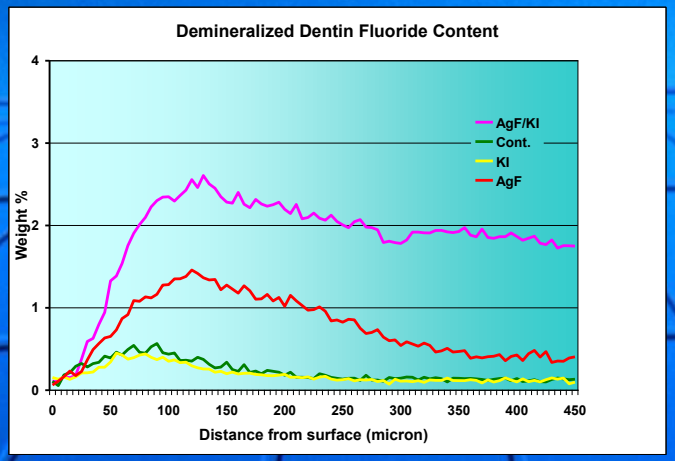
The lethal dose of fluoride for *S Mutans* is about 2,000ppm

- SDF deposits fluoride into caries around 1% (5,000 ppm)
- SDF/KI deposits fluoride at around 2% (10,000 ppm) and beyond into sound dentine

Knight GM, McIntyre JM, Craig GG, Mulyani, Zilm PS, Gully NJ. Inability to form a biofilm of *Strep Mutans* on silver fluoride and potassium iodide – treated demineralized dentin.
QI 2009; 40:156-161

SDF and SDF/KI EPMA after 2 weeks in *S Mutans*

$Ag(NH_3)_2F$



- the difference in fluoride concentration between SDF and SDF/KI can be attributed to the fact that SDF is a large molecule that binds up the fluoride atoms limiting their penetration into the dentine
- after reacting with the KI, silver and fluoride atoms are separated enabling the small fluoride atoms to pass freely through the dentine

Knight GM, McIntyre JM, Craig GG, Mulyani, Zilm PS, Gully NJ. Inability to form a biofilm of *Strep Mutans* on silver fluoride and potassium iodide – treated demineralized dentin.
QI 2009; 40:156-161

effect of sodium hypochlorite, chlorhexidine and SDF/KI on *S mutans* in dentine tubules

green stain
vital
bacteria
red stain
non vital
bacteria

SDF/KI penetrated deeper into dentine with a much higher bactericidal rate than either CHX or NaClO

Hamma HH, Yiu CK, Burrow MF. Effect of silver diamine fluoride and potassium iodide on residual bacteria in dentinal tubules. Aust DJ 2015;60:80 -87

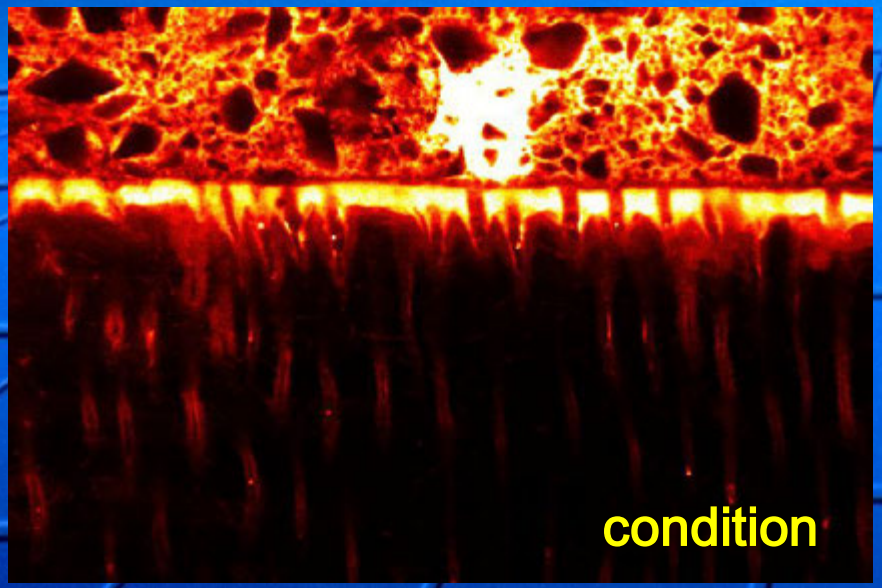
Riva Star is an EXTRA SMART technique that successfully overcomes the staining associated with SDF. Adding a solution of potassium iodide (KI) immediately after SDF treatment to form AgI that pptes just below the surface of the carious dentine

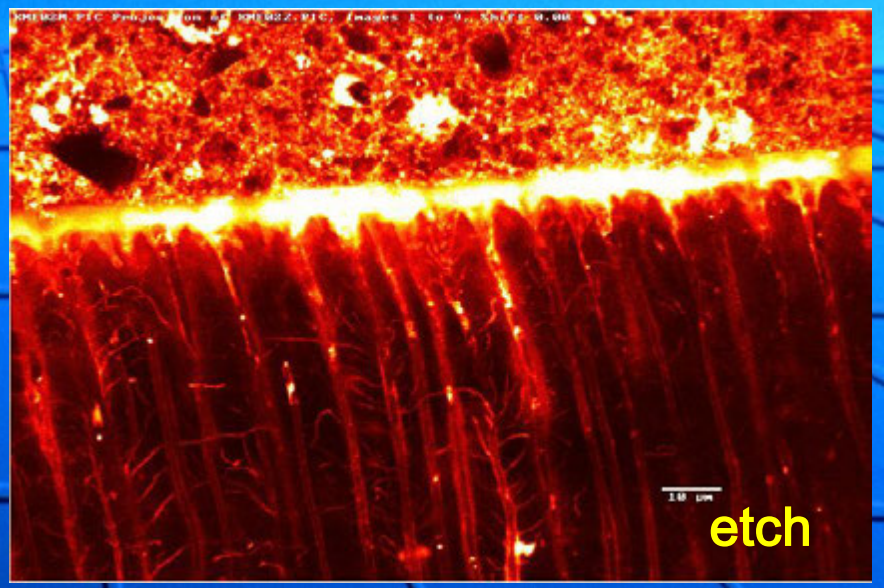
- creates a bactericidal seal of AgI just below the surface of the the carious dentine
- deposits fluoride at twice the concentration of SDF and beyond the depth of the caries

surface preparation

restorative surface preparation – condition or etch

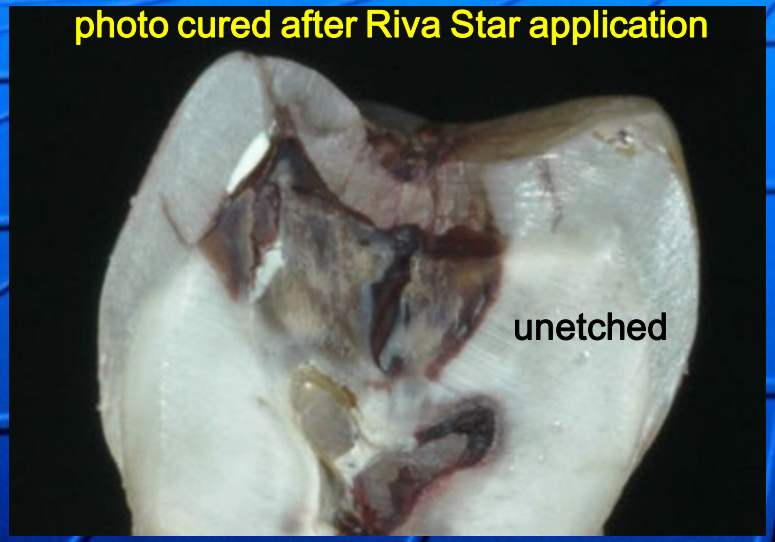
confocal images using rhodamine B dye added to KI solution prior to GIC placement

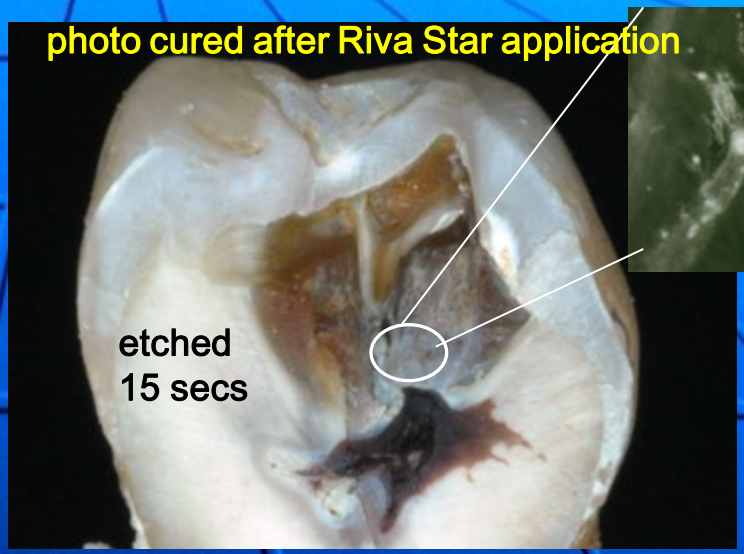




- surface conditioning with polyacrylic acid does not assist the penetration of AgI into infected dentine
- etching for 15 seconds, washing and drying, facilitates the penetration of AgI into the caries

not etching: etching prior to SDF/KI application and photo curing





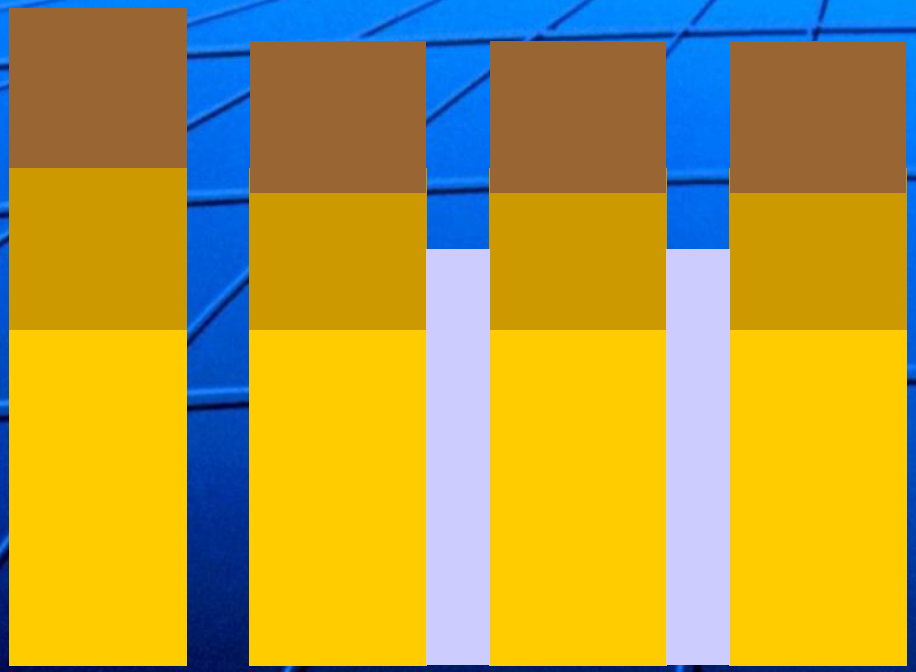
sub surface AgI bound to collagen protein in carious dentine

- unetched, staining due to unstable AgI breaking down to Ag and I after photo cure
- etched 15 seconds, AgI ppte bound to protein visible on carious dentine surface but not stained and neither is carious enamel after photo curing

etching for 15 seconds facilitates penetration of Riva Star into dentine and exposes collagen protein to bond to AgI

the restorative interface

glass ionomer cement and SDF/KI



extra carious dentine

affected dentine

sound Ca apatite dentine

remove minimal carious dentine when applying AgFKI

the restorative interface

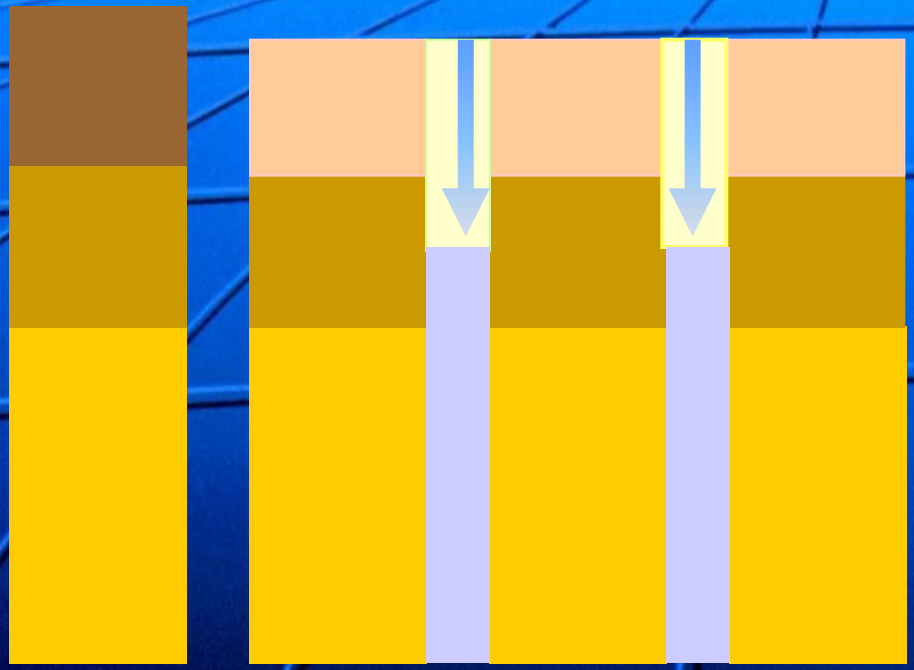
glass ionomer cement and SDF/KI 2019

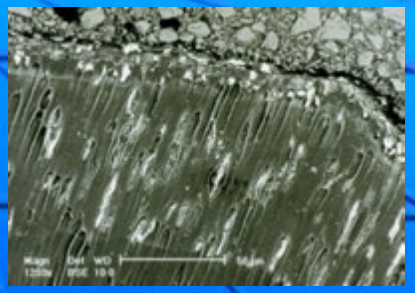
- SDF/KI disinfects and remineralizes infected carious enamel and dentine (arrested caries)
- remineralizes affected dentine from carbonated apatite into enhanced fluoride, fluor apatite

the SMART restorative interface

glass ionomer cement and SDF/KI

AgI pptes 50 microns in dentinal tubules





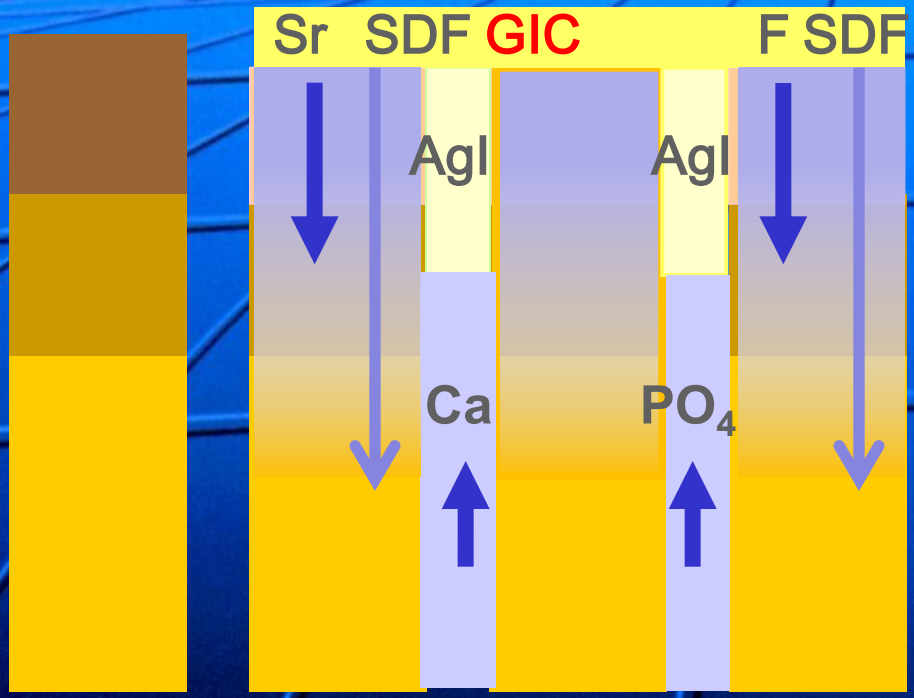
affected Ca apatite dentine

sound Ca apatite dentine

SDF/KI solution penetrates into dentinal tubules to the depth of odontoblastic processes forming AgI unstable on the cavity surface but not within the tubules

the restorative interface

glass ionomer cement and SDF/KI



turns infected caries into fluoride enhanced arrested caries

remin affected dentine as fluoride enhanced fluor apatite

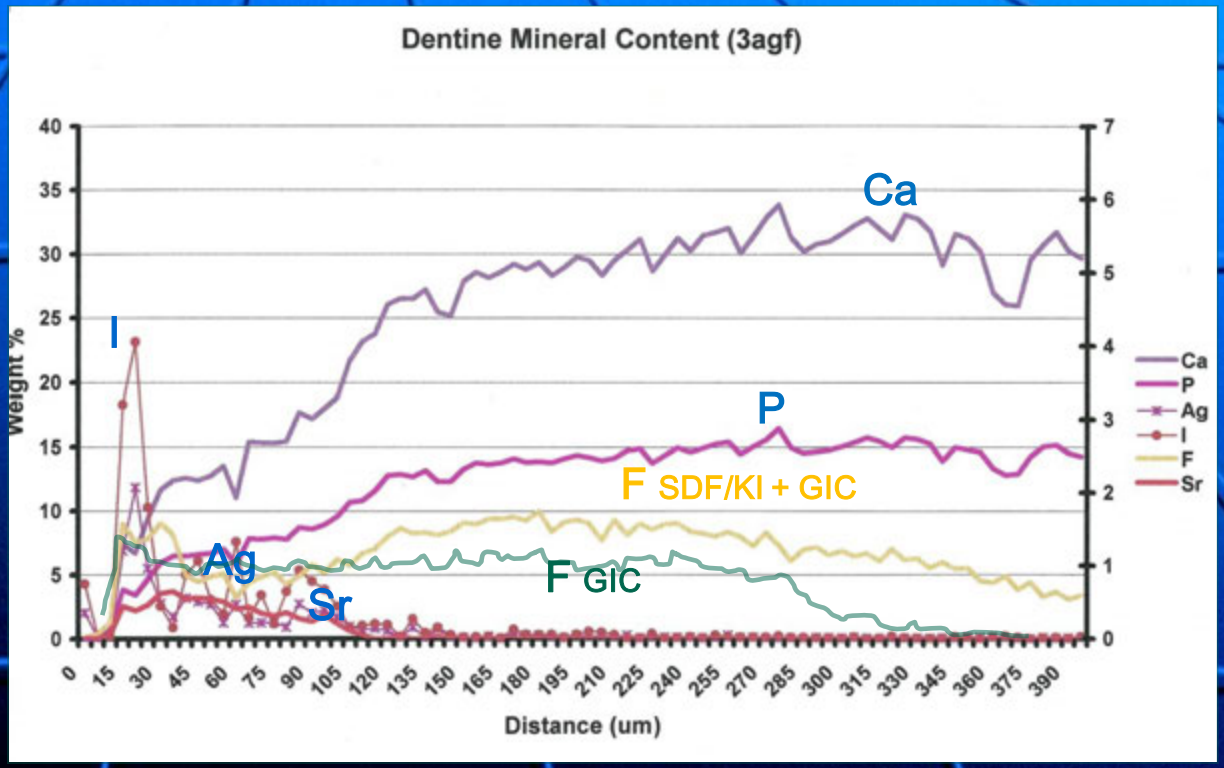
sound Ca apatite dentine plus extra fluoride .3mm

infected dentine forms enhanced arrested caries beneath GIC and assists fluor apatite formation in affected dentine. fluoride ions penetrate at least .3 mm thru lesion into sound dentine beneath

Electron Probe Micro Analysis

2 weeks in a *S Mutans* chemostat followed by SDF/KI application, restored with a GIC restoration, EPMA scanned after 2 weeks GIC placement

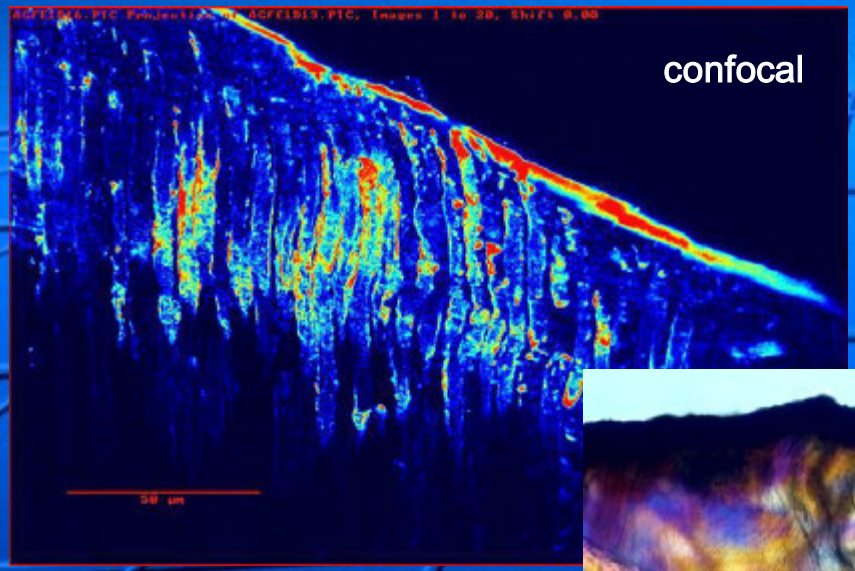
- left hand scale shows % weight Ca and P right hand scale shows Ag, I, Sr, and F
- Ag and I only found about 50 microns below the surface
- fluoride released from GIC and SDF/KI orange curve. Fluoride released from GIC only green curve, SDF/KI increases F conc 50% and depth penetration



AgF and I spikes due to tubular pptes

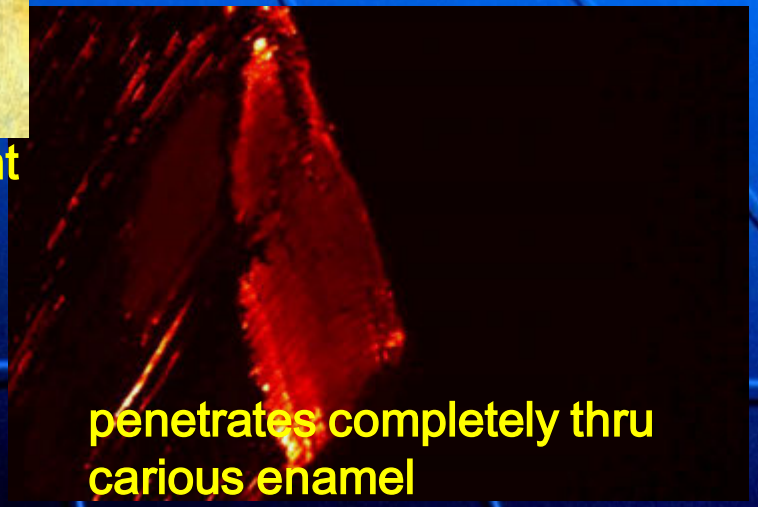
Riva Star effect on enamel

AgI penetrates at least 50 microns into sound enamel

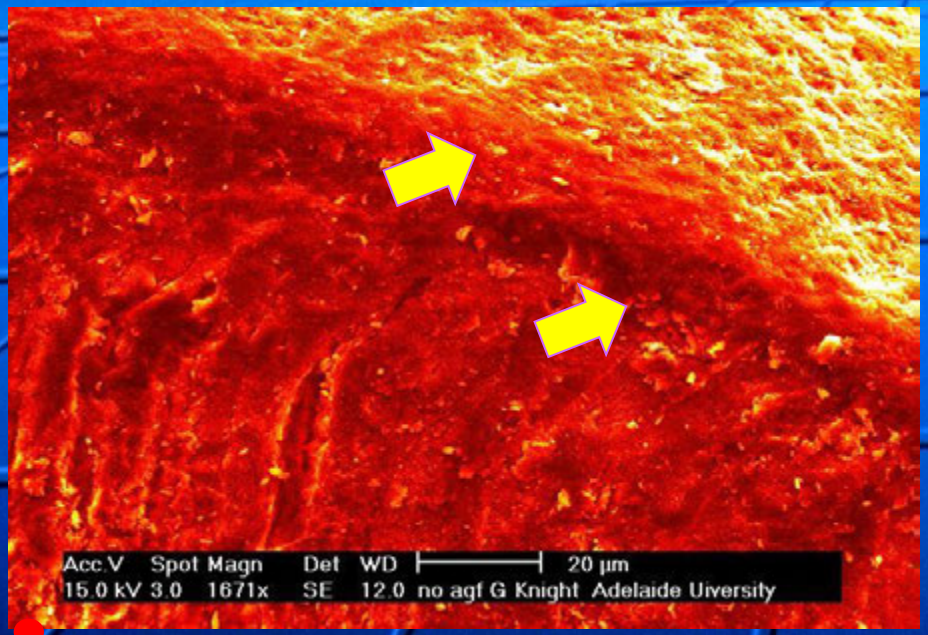


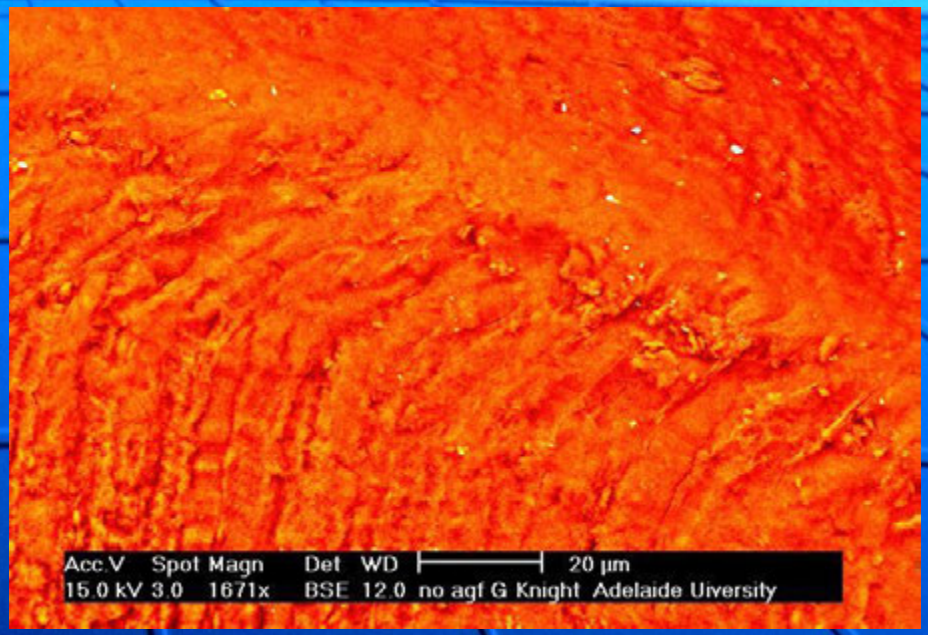
crossed Polaroid light

more effective into carious enamel



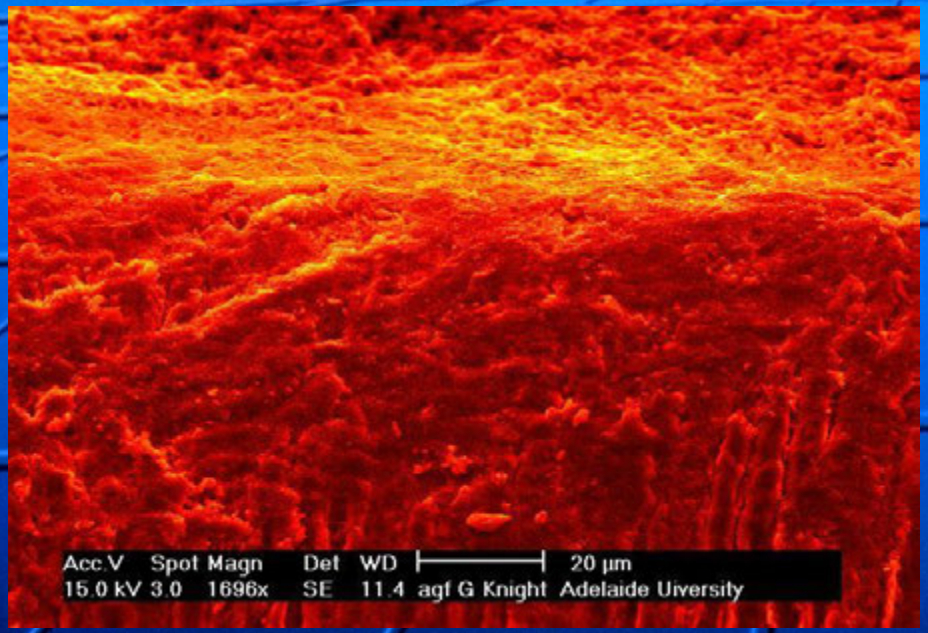
untreated enamel in a chemostat for 2 weeks

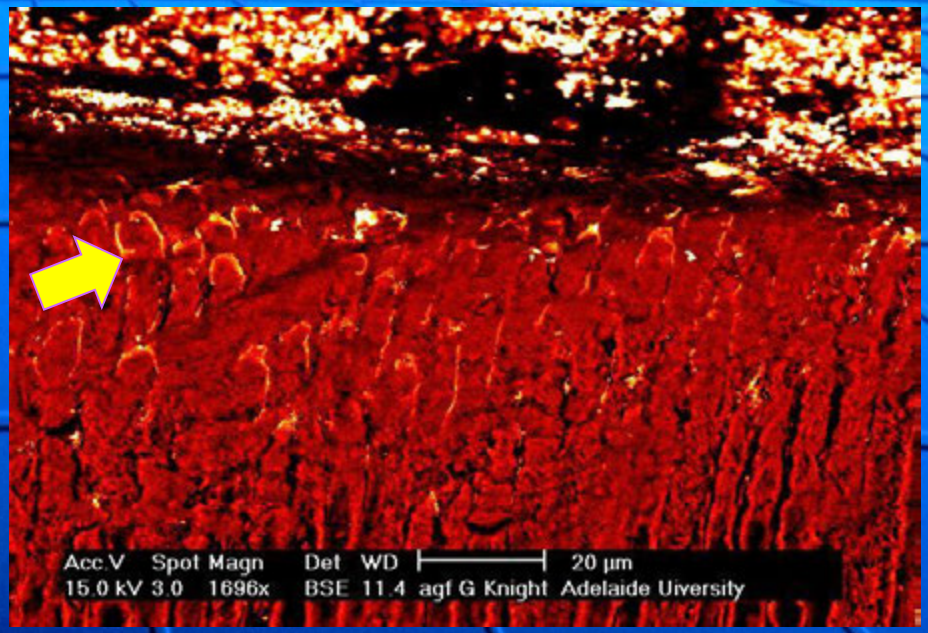




- observe the subsurface breakdown of enamel prisms in carbonated apatite (demin 5.5) below,
- surface caries resistant fluor apatite (demin 4.5) above
- back scatter SEM shows no mineral deposits on the surface of enamel

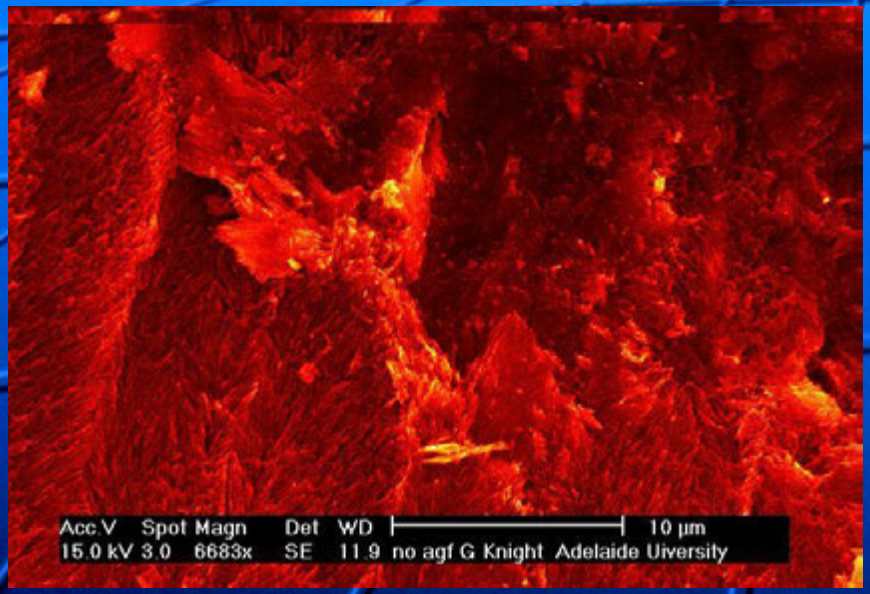
SDF/KI treated enamel in a chemostat for 2 weeks

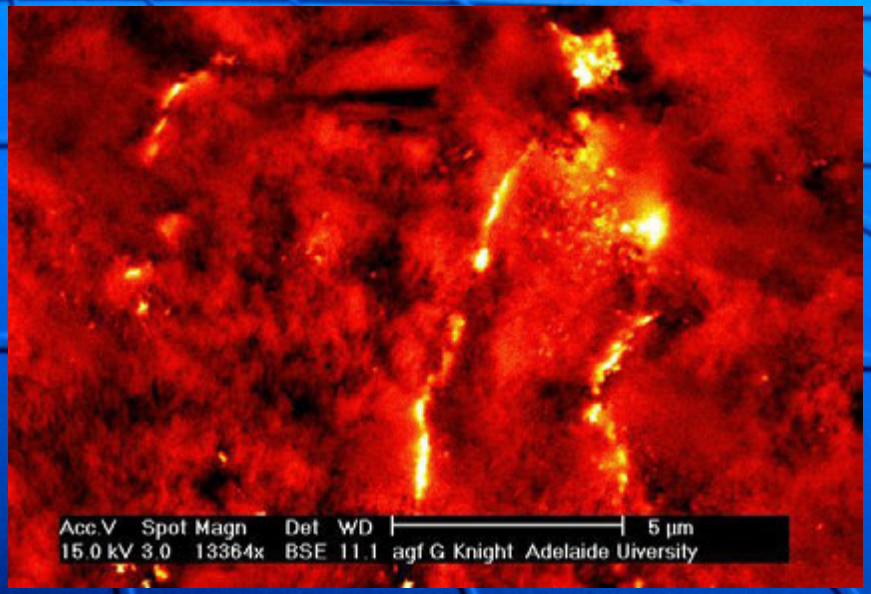




- observe no subsurface breakdown of SDSF/KI treated enamel
- SEM back scatter view shows AgI deposits on the surface and in the interprismatic spaces of the enamel

effects of SDF/KI on enamel at high magnification



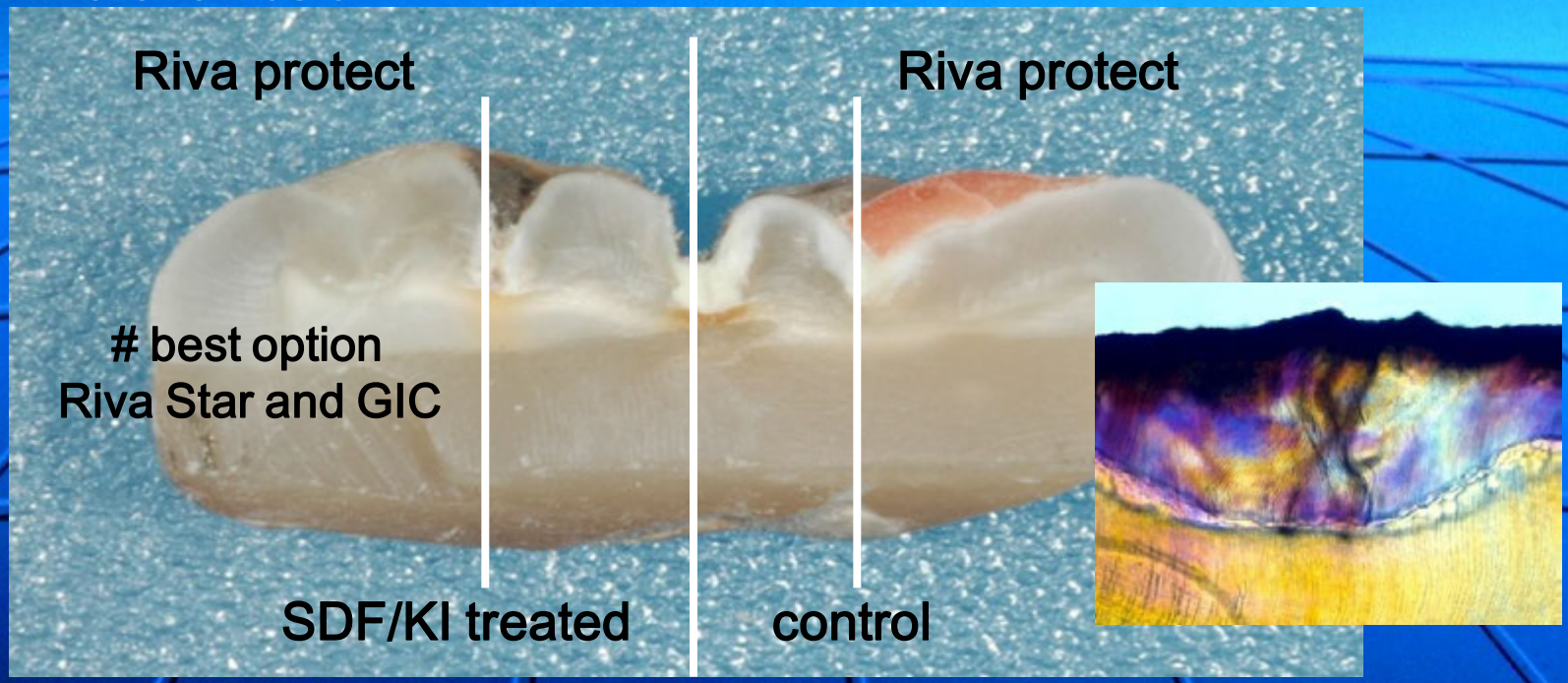


- no SDF/KI treatment shows a chaotic breakdown apatite crystals within enamel
- SDF/KI treated enamel shows no breakdown and evidence of AgI deposits between the prisms

initial caries protection using Riva Star

initial caries protection with Riva Star and GIC

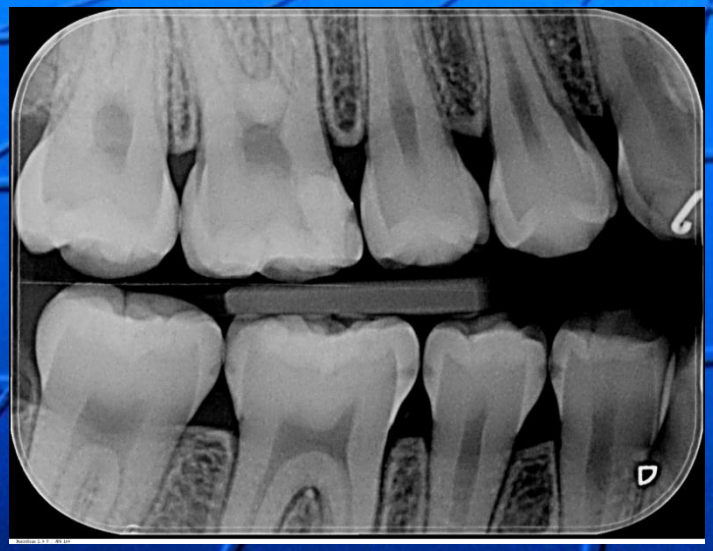
coronal section of occlusal surface of a tooth after 3 weeks in a chemostat



fissure protection technique

- clean fissures with and a probe and etch for 15 seconds
- apply SDF then KI until ppte becomes clear, wash and dry
- apply auto cure GIG sparingly into fissures, occlude on a freezer bag until set, remove any excess

initial proximal caries protection with Riva Star and GIC



1 year

15 year old girl, mother a dentist

Rx Neutrafluor 5000+ (prevident)
tooth separator 46/45 riva star, plus riva bond

initial proximal caries management , Riva Star, Riva Luting

two extracted premolars with deep proximal lesions prepared just below the contact areas

initial proximal caries management , Riva Star, Riva Luting

- clean interproximal area with an interdental brush
- arrest proximal bleeding with TCA on a micro brush if required
- wash dry interdental brush, apply 37% etch proximally 15 sec
- wash and dry

initial proximal caries management , Riva Star, Riva Luting

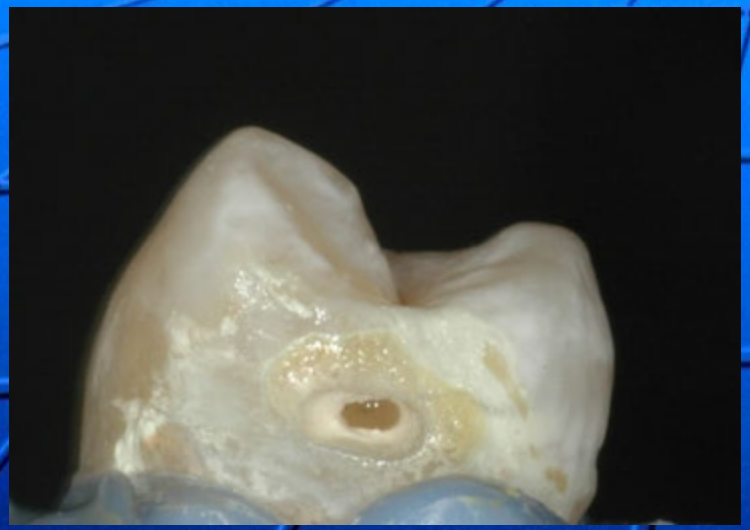
wash and dry brush, apply SDF from silver vial, insert interproximally and rotate back and forth

initial proximal caries management , Riva Star, Riva Luting

- apply KI from green vial, insert interproximally and rotate back and forth, noting a white ppte forming

- continue to apply KI until there is no white ppte remaining

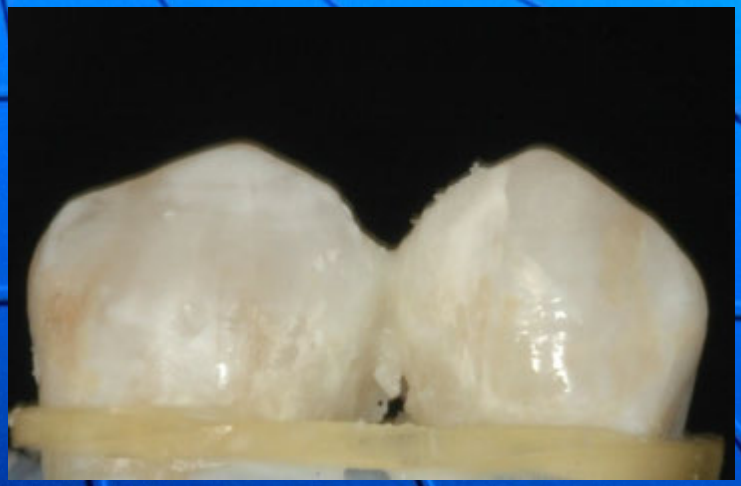
initial proximal caries management , Riva Star, Riva Luting



SDF/KI ppte has penetrated deeply into both preparations

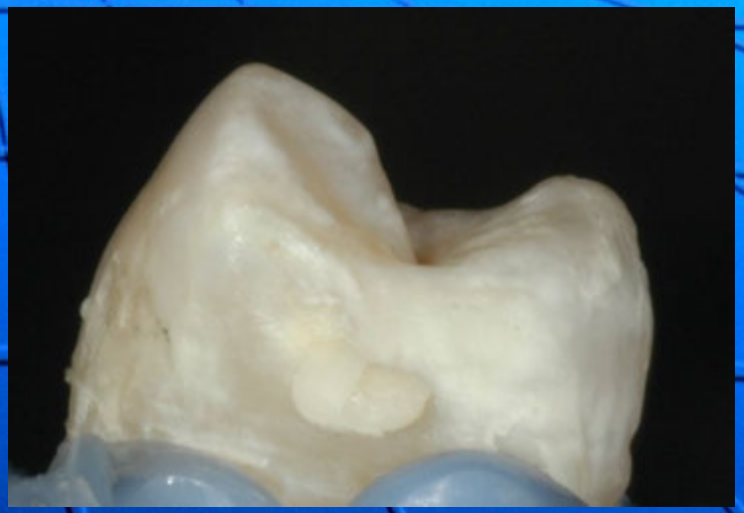
- wash with water and dry the preparation

initial proximal caries management , Riva Star, Riva Luting



mix Riva Luting Cement, apply to a clean proximal brush and insert brush interproximally, rotating the brush back and forth

initial proximal caries management , Riva Star, Riva Luting

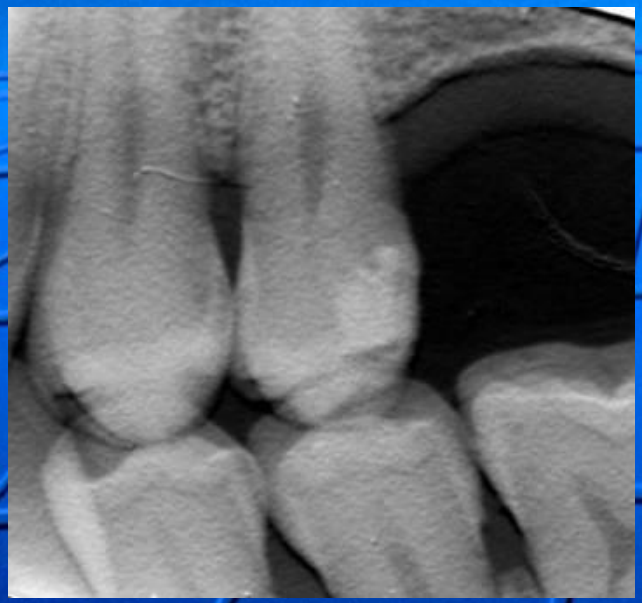


- post GIC setting shows penetration of GIC into proximal cavities
- followed by cleaning the interproximal surfaces with an abrasive strip removes excess GIC

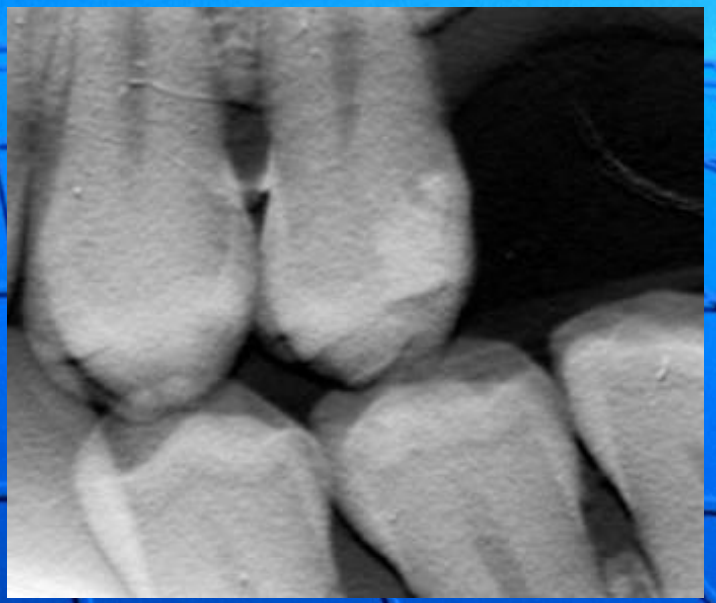
proximal caries management , Riva Star, Riva Luting

rotating the interproximal brush loaded with luting cement pushes the GIC at least 1mm into the proximal cavitations sealing the lesions from the external environment

initial proximal caries protection , Riva Star, Riva Luting



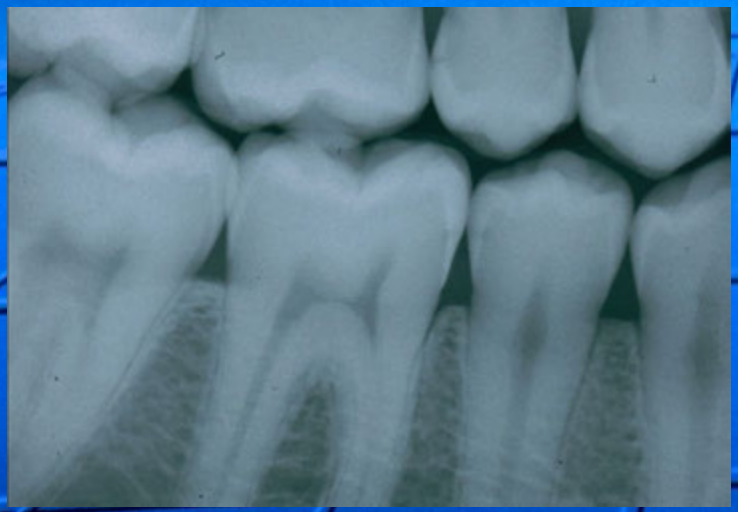
initial caries distal 24
into dentine,
enamel mesial 25



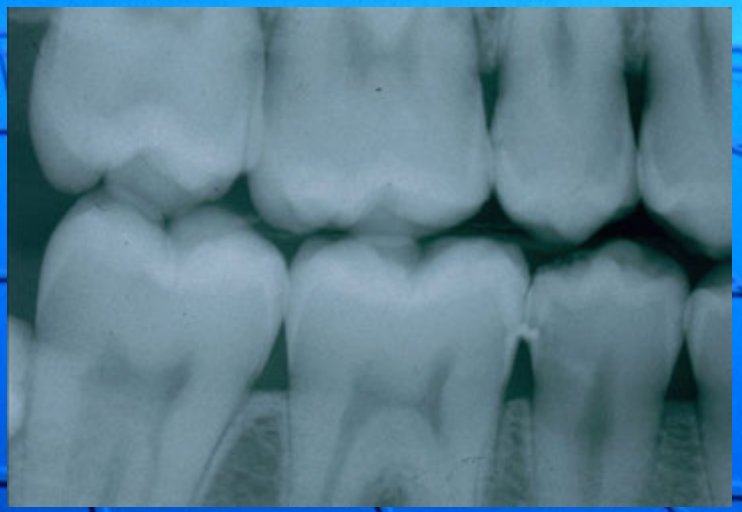
TCA , etch, wash dry
SDF/KI, wash dry,
Riva Luting Cement,
floss note AgI deposit at
gingival margin

arresting initial caries without tooth preparation

initial proximal caries protection , Riva Star, Riva Luting



initial caries distal 45 and mesial 46 both into dentine



TCA , etch, wash dry, SDF/KI, wash dry, Riva Luting Cement, floss

arresting initial caries without tooth preparation

fissure and proximal surface protection

- etch area for 15 seconds, wash and dry
- apply SDF (grey) and KI (green) to surfaces
- wash and dry
- apply Riva Luting cement over surfaces with a mini brush or interproximal brush
- brush over exposed surfaces and/or rotate into interproximal surfaces
- bite onto a freezer bag on the occlusal surface or floss interproximally when almost set to limit excess luting cement
- after setting remove excess GIC with excavators or abrasive strips

EXTRA SMART restorations

restorative techniques for EXTRA SMART

1. single surface restoration using auto cure GIC and Riva Star (either occlusal or proximal tunnel preparations)

2. multiple surface restoration using a cocured ‘sandwich’ restoration (composite resin bonded to auto cure GIC) and Riva Star

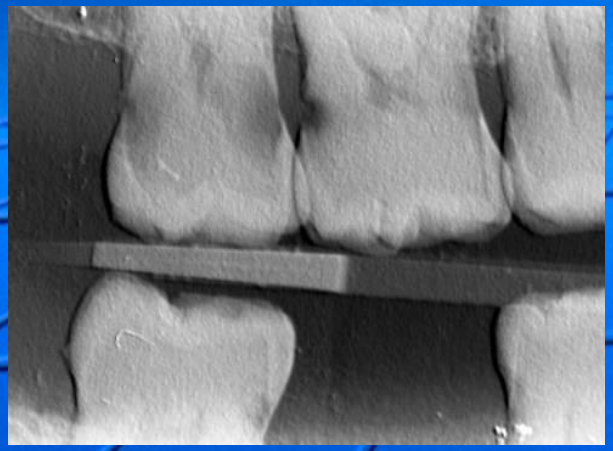
1. single surface auto cure GIC restoration

use a dental explorer to disrupt any existing biofilm and badly broken down caries, etch for 15 seconds, wash and dry
15 second etch essential

apply the SDF (only on the caries) from the grey capsule, followed immediately by KI from the green capsule until the ppte becomes clear

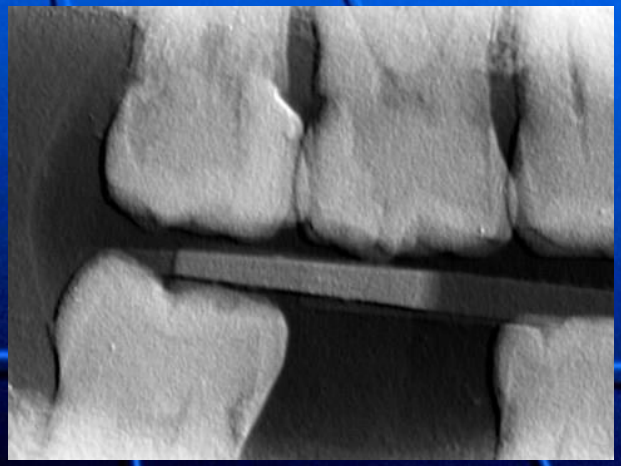
wash, dry and restore the lesion with an auto cure GIC, (Riva SC, Fuji IX, Ketac Molar) allow to set and contour

clinical case - single surface tunnel GIC



pre treatment

immediately post placement



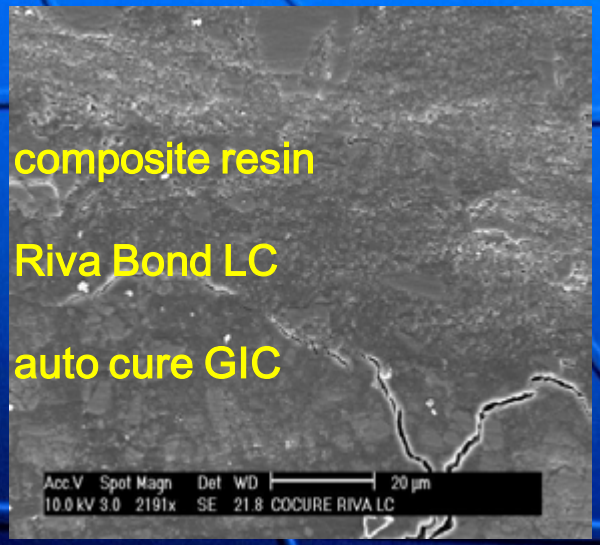
6 weeks post restoration placement

2. multiple surface cocured “sandwich” restoration

cocuring involves the chemical bonding of an auto cure GIC to a composite resin to make a sandwich restoration

Knight GM. The co-cured, light-activated glass-ionomer cement-composite resin restoration. QI 1994 Feb; 25 (2):97-100

adhesion between an auto cure GIC and composite resin involves placement of an intermediary resin modified GIC adhesive (Riva Bond LC) that will chemically bond to both materials. Riva Bond LC can be applied to the surface of the GIC either before setting or immediately afterwards



Knight GM, McIntyre JM, Mulyani. Bond strengths between composite resin and auto cure glass ionomer cement using the co-cure technique. Aust Dent J 2006; 51:175-179

2. multiple surface cocured “sandwich” restoration

use a dental explorer to disrupt any existing biofilm and badly broken down caries, etch for 15 seconds, wash and dry 15 second etch essential

apply the SDF (only on the caries) from the grey capsule, followed immediately by KI from the green capsule until the ppte becomes clear

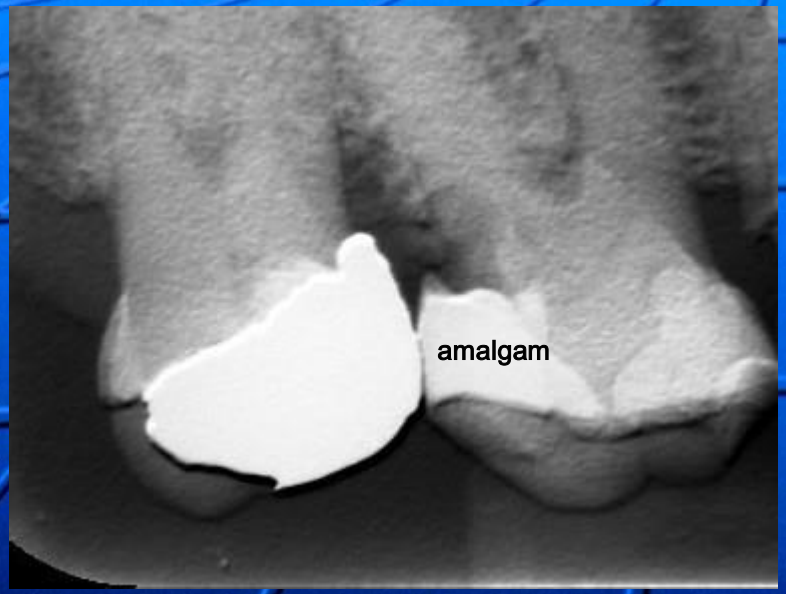
wash, dry and restore the lesion with an auto cure GIC up to dentine /enamel margin

2. multiple surface cocured “sandwich” restoration

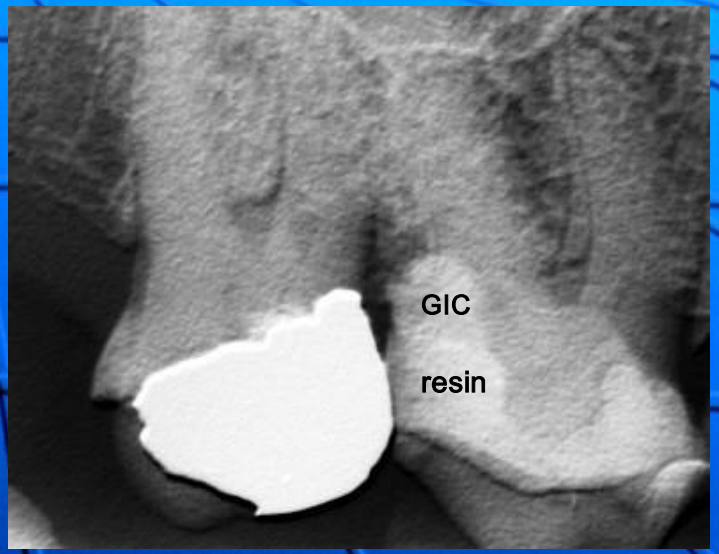
apply Riva Bond LC over an auto cure GIC (either before or just after it has set) to chemically bond the GIC to composite resin) and all remaining cavo margins

add composite resin to fill the remaining cavity and photo cure for 20 seconds. photo curing the composite resin heats up the setting GIC, speeds up the setting time and improves the structural strength of the GIC

cocured “sandwich” restoration - clinical case



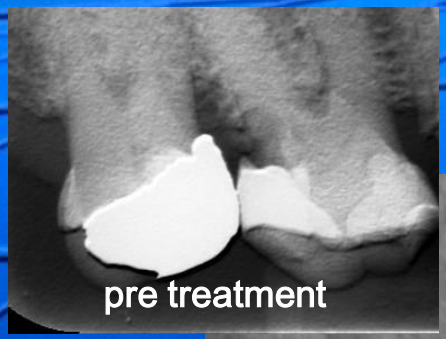
large asymptomatic lesion

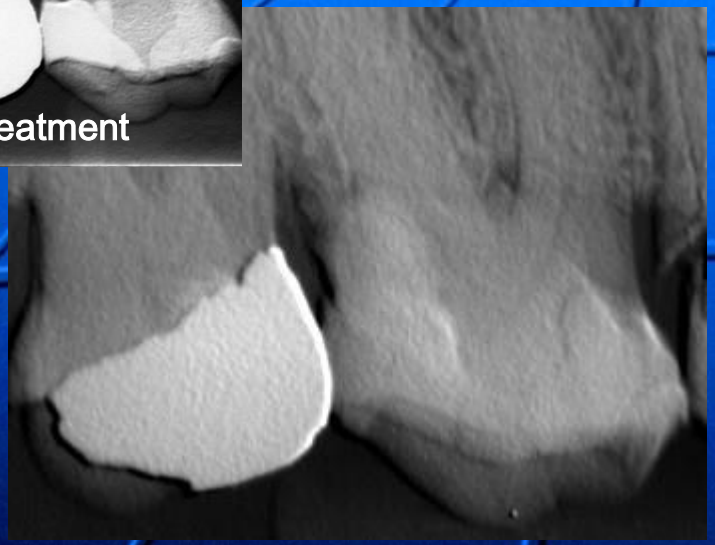


immediately after placement of a sandwich restoration

dramatic rise in pH pptes out dissolved tooth mineral from within the caries and increases radiopacity

cocured “sandwich “restoration - clinical case





3 months after restoration placed

3 month clinical photograph

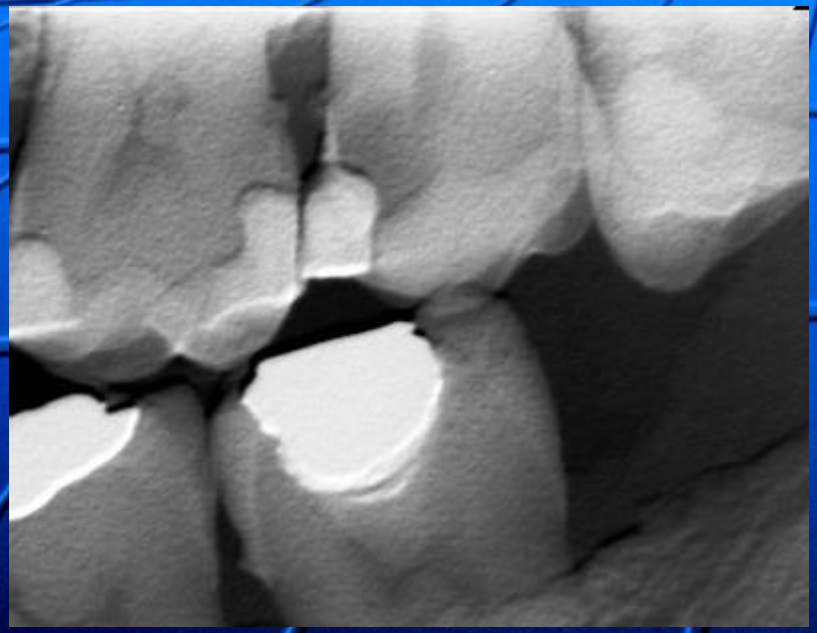
Riva Star: need to know

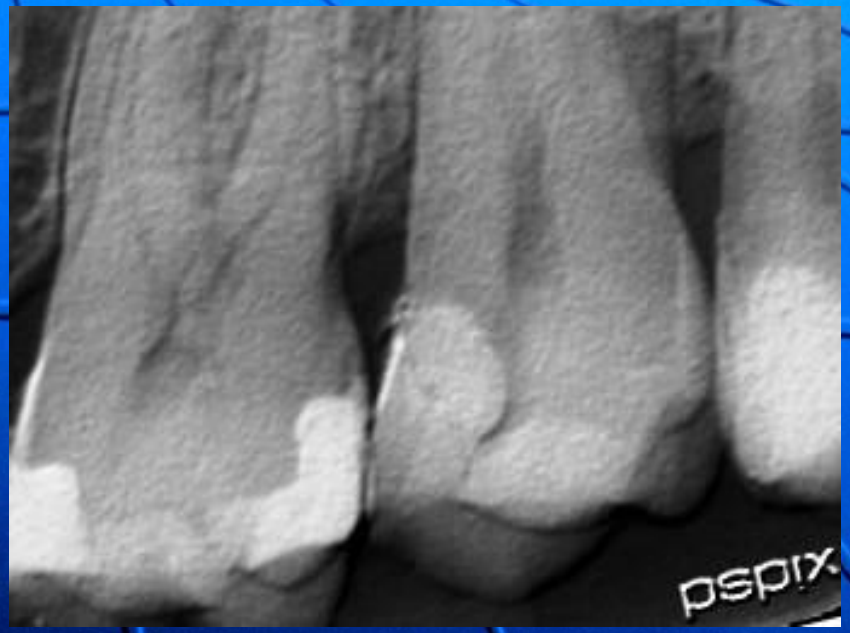
caries healing beneath an EXTRA SMART restoration

- SDF/KI treated caries left open to the oral environment will stain black due to sulphur compounds in the oral environment deposited into the remineralizing arresting caries
- isolated from sulphur compounds under a GIC, SDF/KI treated lesions do not stain

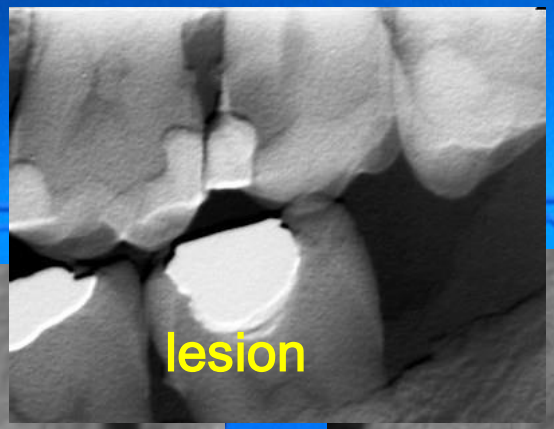
after 3 years, affected caries has healed as fluoride enhanced fluorapatite and infected caries has healed as fluoride enhanced arrested caries that combine to become a caries resistant base beneath a restoration

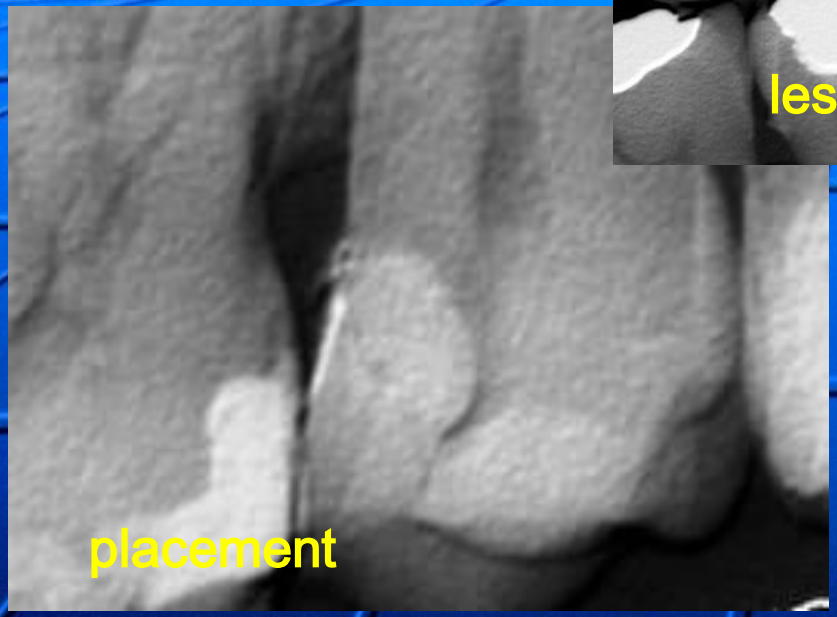
existing restoration was removed to access caries, etched 5 secs. 37% phosphoric acid, washed and dried, applied Riva Star, washed and dried, GIC, composite sandwich restoration placed. GIC protects AgI from curing light

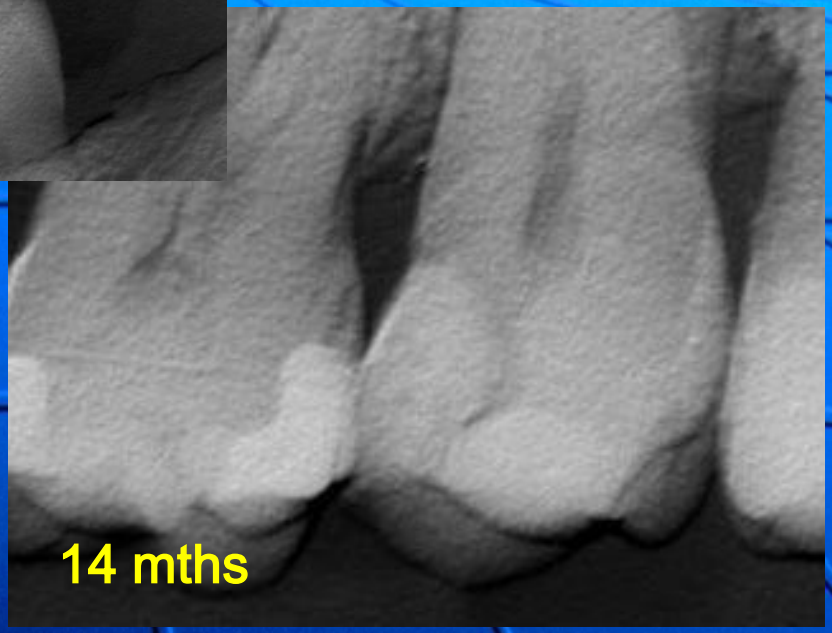




immediate increase in radiopacity due to tooth minerals deposited out from carious lesion

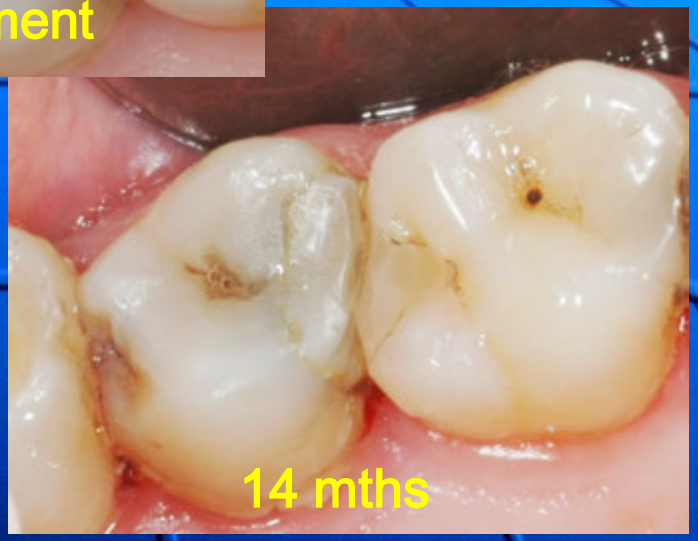






immediately after placement high pH pptes tooth mineral from caries and after 14 mths there has been ongoing increases in radiopacity

5 second etch



after a 5 second etch staining is evident at GIC margins immediately and becomes vaguely apparent in the composite after 3 months, then appears to stabilize

LETHAL DOSES

- Dosage is based on 1 drop per 10 kg with weekly intervals at most
  - Horst, J, Ellenikiotis, H, Milgrom,P. "UCSF Protocol for Caries Arrest Using Silver Diamine Fluoride: Rationale, Indications and Consent" CDA Journal. (2016) 44(1): 16-28

- In terms of safety it is appropriate to look at the number of capsules (A or B) that need to be consumed to produce a possibly toxic dose. Presented below is the estimated number of capsules of Riva Star required to reach toxicological or upper recommended limits for each of the constituents in an 80 Kg adult using the data given below

Constituents	Capsule	No. of capsules to reach toxic/upper limit
Silver	Part 1	652
Ammonia	Part 1	218
Fluoride	Part 1	143
Potassium	Part 2	204
Iodide	Part 2	(pregnancy 49)-128

Managing SDF staining

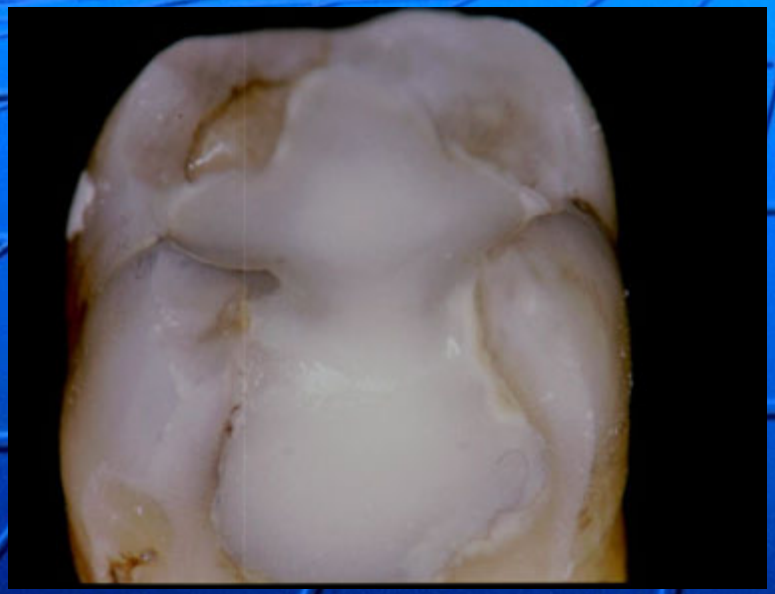
SDF stain

apply sodium hypochlorite

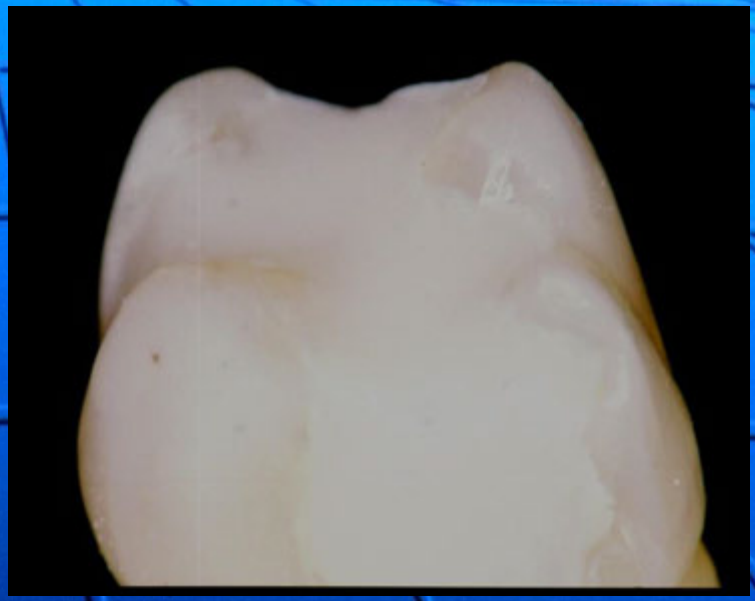
cover stain with sodium hypochlorite on paper towel, leave overnight

next morning stain has disappeared

long term stability of Riva Star



SDF 4 years



SDF/KI 4 years

beware the aesthetic zone

only restore with auto cure GIC in “A” zone

potential for staining! essential to apply KI until ppte has cleared, first become comfortable with application outside aesthetic zone by etching for 15 seconds prior to using Riva Star

4 way mode of action SDF/KI on carious dentine

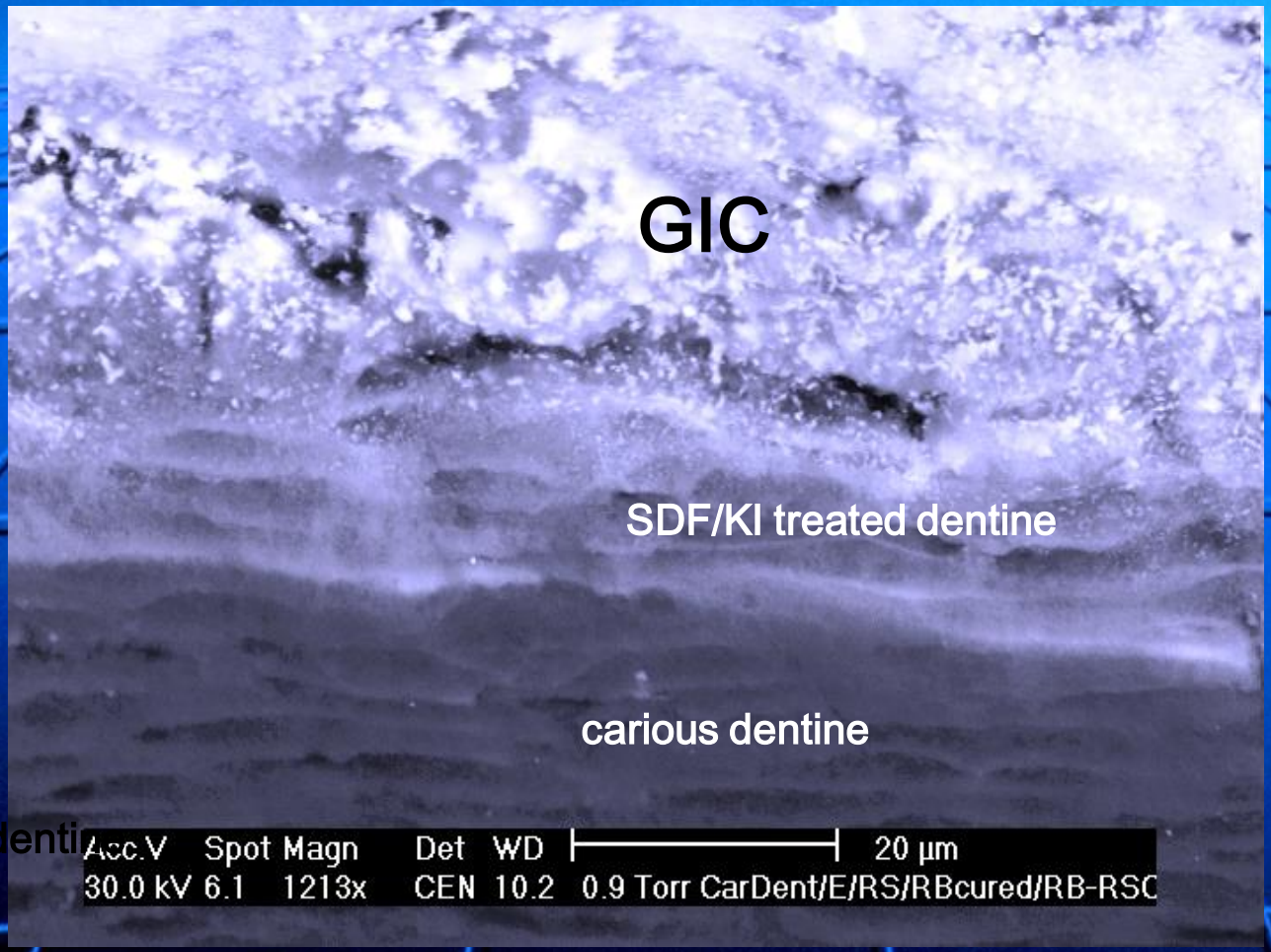
- high 13 pH of SDF is both bactericidal and encourages precipitation of minerals within the caries increasing radiopacity
- following KI application pH drops to 9 forming a stable, sub surface bactericidal seal of silver complexes of AgI bound to carious dentine
- fluoride is transported at up to 2% conc. (10,000ppm) to the depth of caries and beyond and encourages f apatite formation
- ongoing antimicrobial action of silver, iodine and fluoride

EXTRA SMART restorations of deciduous teeth

atraumatic caries management of deciduous teeth

- biannual application of SDF reduces caries about 80%
- one off treatment of SDF/KI sealed with GIC permanently protects against caries

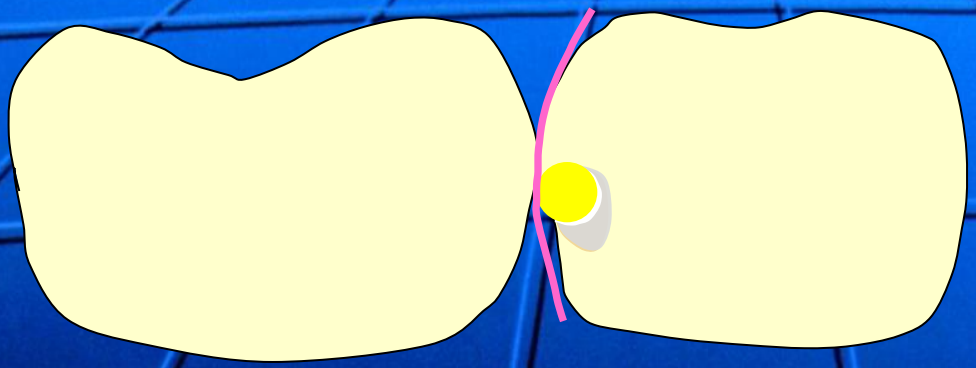
GIC bonding to carious dentine



GIC adhesive to SDF/KI treated caries

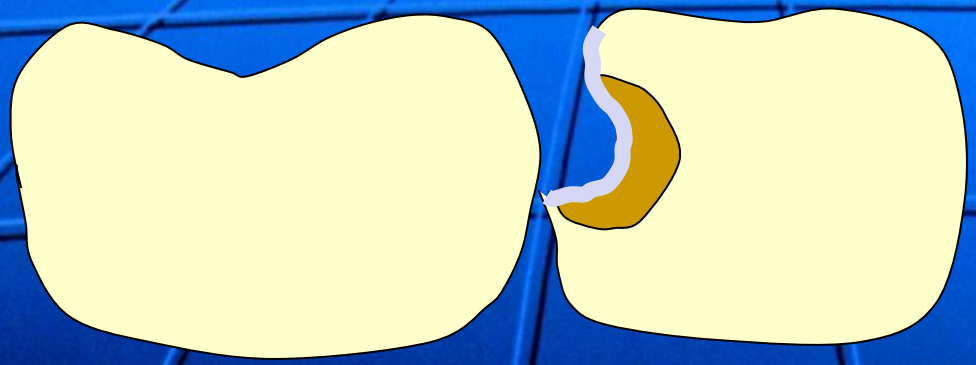
SMART caries management of deciduous teeth

large proximal caries intact marginal ridge



- access into caries via small lateral slot
- etch 15 secs, wash and dry
- Apply SDF/KI, wash and dry and place mylar strip proximally
- insert GIC nozzle and place auto cure GIC

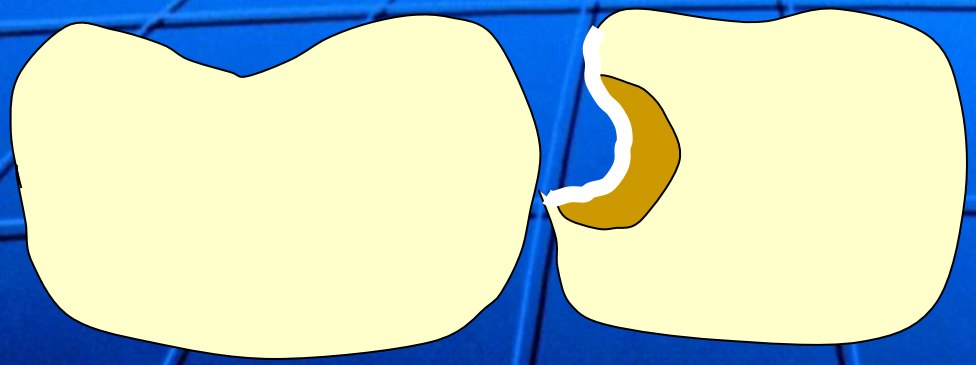
SMART caries management of deciduous teeth



no preparation just etch 15 secs, wash and dry

- caries management in deciduous teeth by converting active caries into decay resistant arrested caries

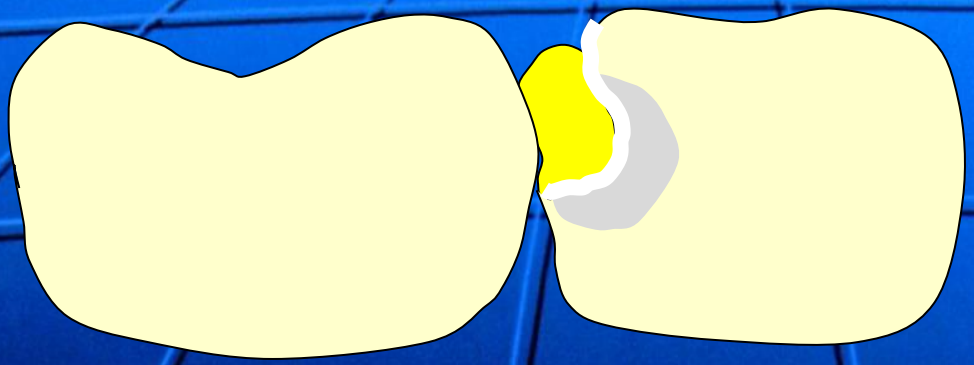
SMART caries management of deciduous teeth



- isolate with cotton rolls, add SDF then KI until ppte clears, wash with water and dry.

SMART caries management of deciduous teeth

- use either Riva Luting or Riva SC as a restorative agent depending upon the nature of the lesion

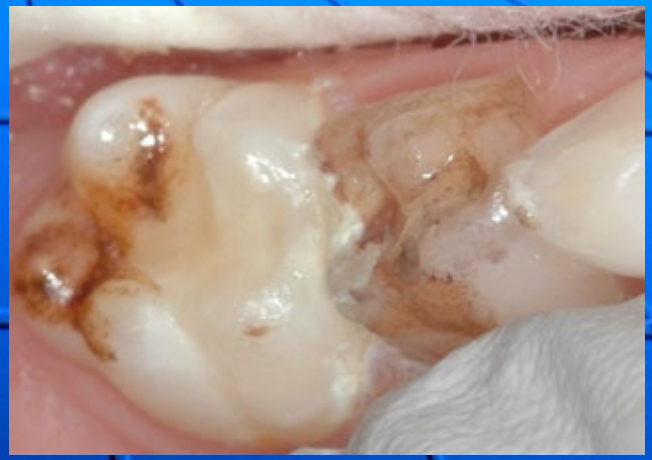


- riva star penetrates thru caries into sound dentine killing bacteria and complimenting caries remineralization
- auto cure glass ionomer cement seals riva star from oral environment for at least a week to enable reaction with caries
- any future loss of GIC only requires attention if food packing occurs

unmanageable 7 yr old referred for GA

stress to parents this management may require ongoing maintenance as its not about restoring teeth but rather atraumatically keeping them there

avoid using RMGIC as black ppte forms



curing light reduces silver in AgI and may turn area black if not etched for 15 seconds prior to Riva Star placement

EXTRA SMART for developing economies

triage for emerging ecomomies

use a dental explorer to disrupt any existing biofilm and badly broken down caries, etch for 15 seconds, wash and dry 15 second etch essential

apply the SDF (only on the caries) from the black bottle , followed immediately by KI from the orange bottle until the ppte becomes clear

wash, dry and restore the lesion with an auto cure GIC. After placement ,smear Vaseline on a gloved finger and swipe across the surface to clear the occlusion. A Mylar strip may be used as a proximal matrix or contour with hand instruments.

Timor Leste

paint on

set

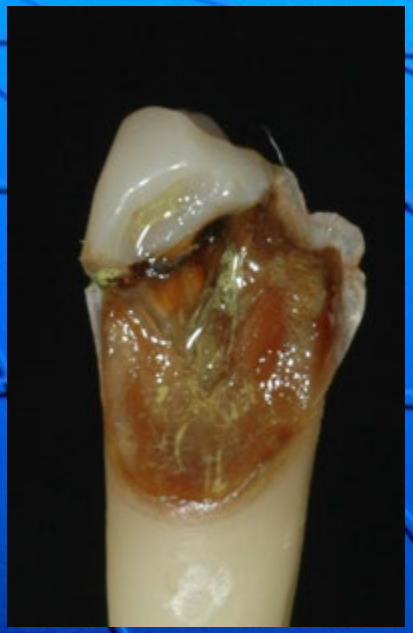
enables multiple treatment of carious lesions per day

EXTRA SMART for root caries

SMART management of root caries

root caries with bioload removed

etch for 15 seconds, wash and dry



Apply SDF

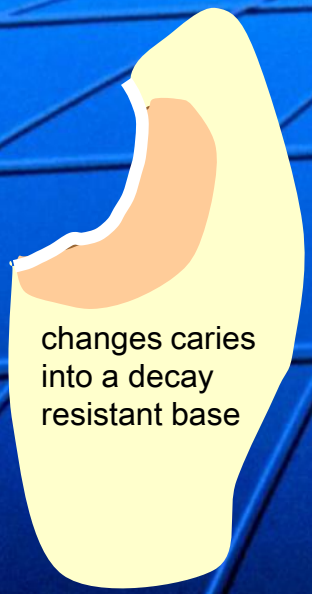
SMART management of root caries

apply KI

continue to apply KI until ppte clears

wash and dry

SMART management of root caries



apply Riva Luting Cement with mini brush allow and to set

EXTRA SMART for tunnels and slots

proximal lesion with supported cusps

site	supported cusps I	unsupported cusps II	missing cusps III
occlusal "O"			
proximal "P"	●		
cervical "C"			

type "PI" cavity (tunnel restoration)

SMART tunnel restorations

* Knight GM The tunnel restoration Dental Outlook 1984; 10: 53 - 57

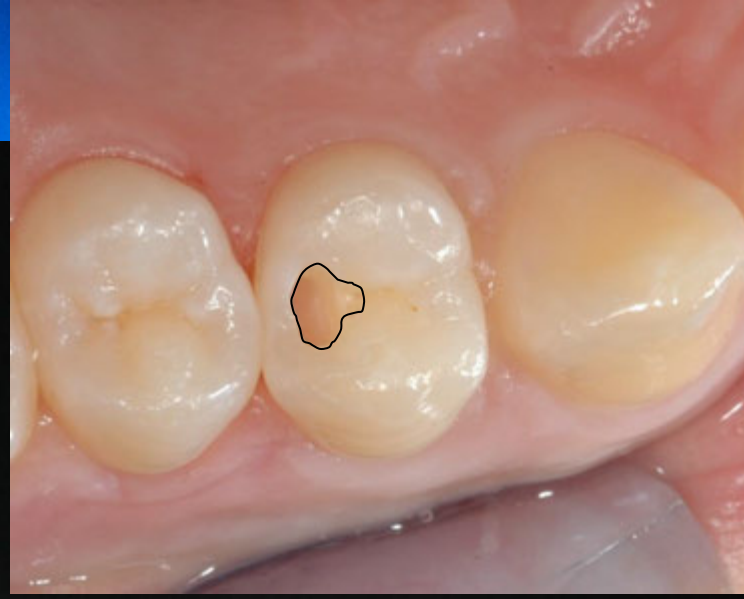
* Knight GM The use of adhesive materials for the conservative restoration of posterior teeth. Aust D J 1984; 25: 324-331

*Knight GM. The tunnel restoration – nine years of clinical experience using capsulated glass ionomer cements. Case report. Aus Dent J 1992 ; 37: 245 - 251

SMART tunnel restorations

proximal caries
situated just below
contact area

SMART tunnel restorations



2mm

"T" access through enamel only

SMART tunnel restorations

run slow speed bur inside DEJ and loop around lesion staying clear of pulpal wall, better to leave caries here than try and remove

SMART tunnel restorations

- enamel prep high speed
- dentine access slow speed
- peripheral moat #3 bur into sound dentine

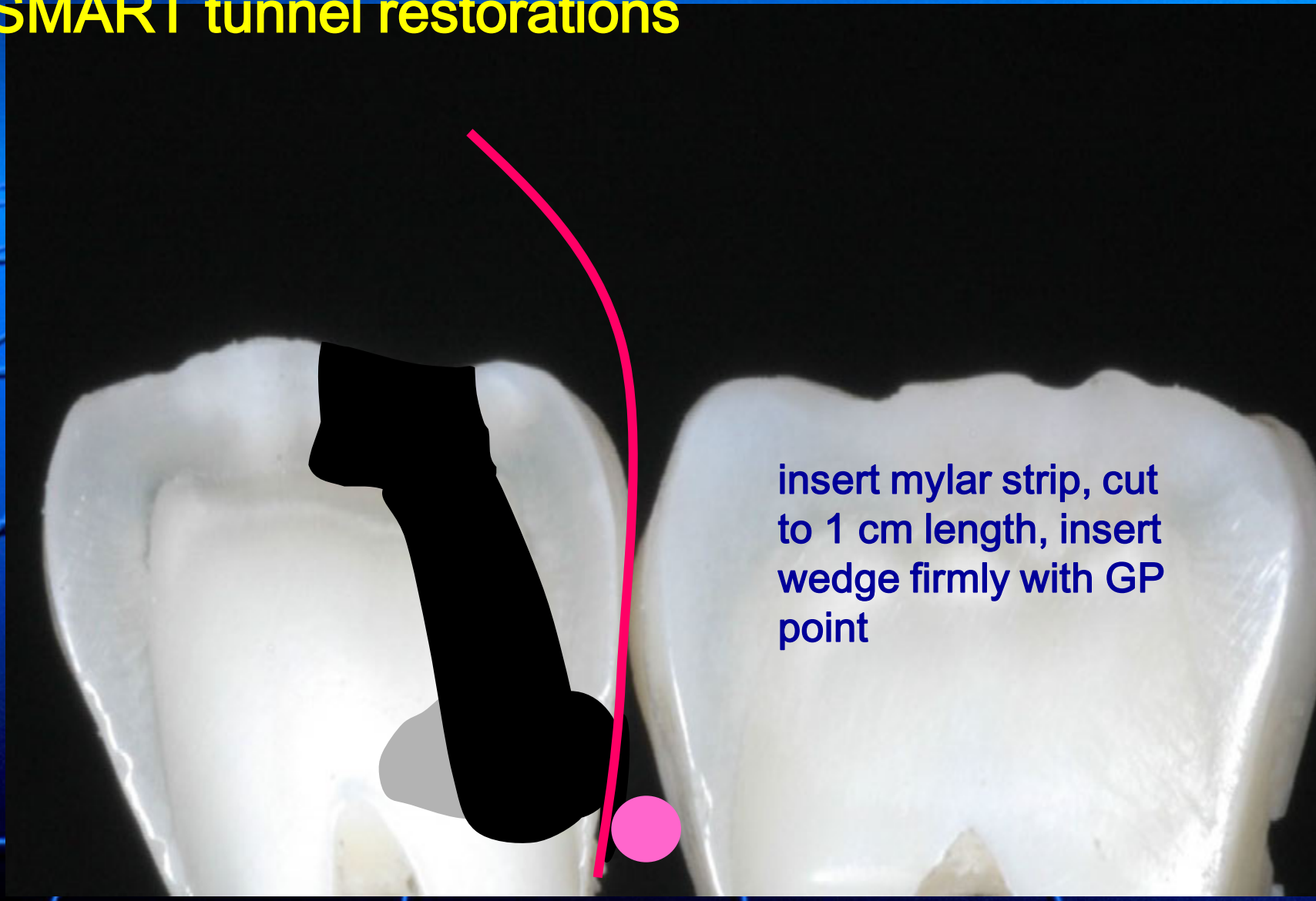
SMART tunnel restorations

complete cavity prep by removing carious proximal enamel margins

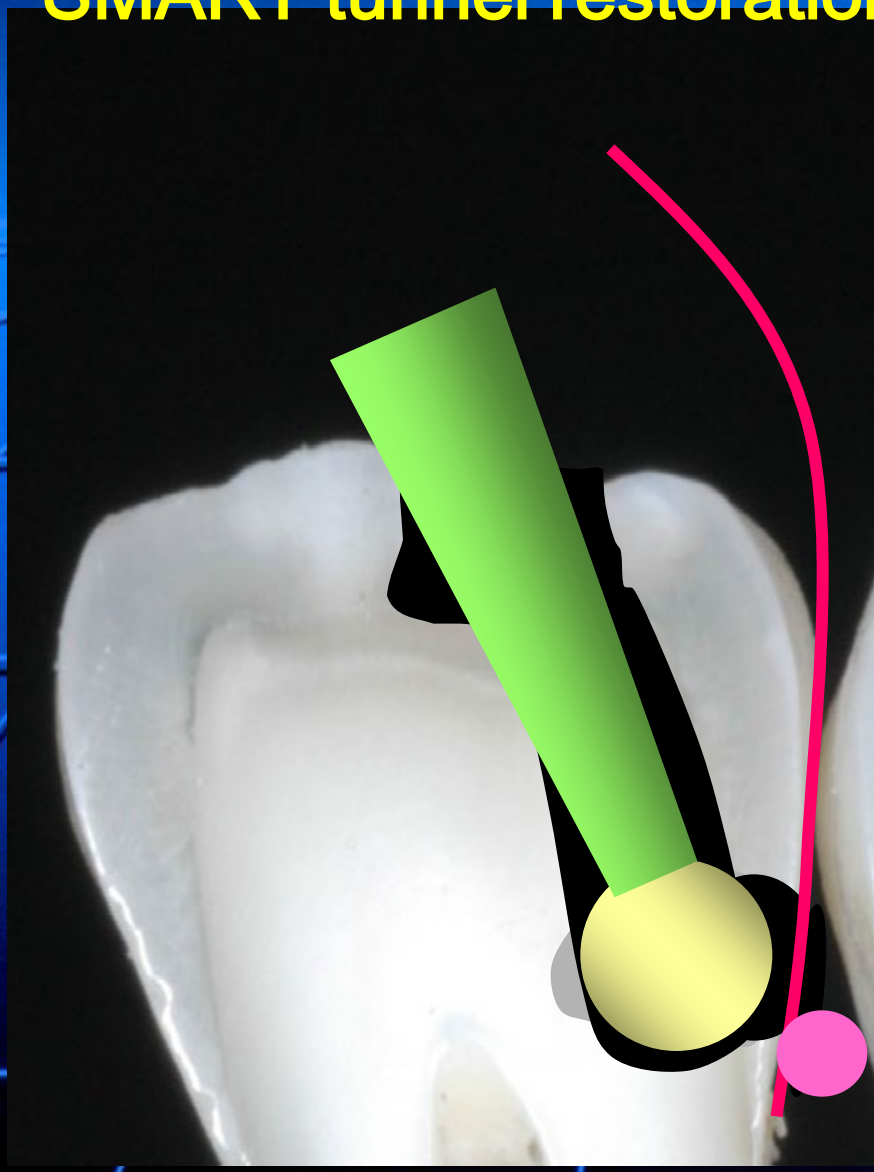
SMART tunnel restorations

SMART tunnel restorations

SMART tunnel restorations

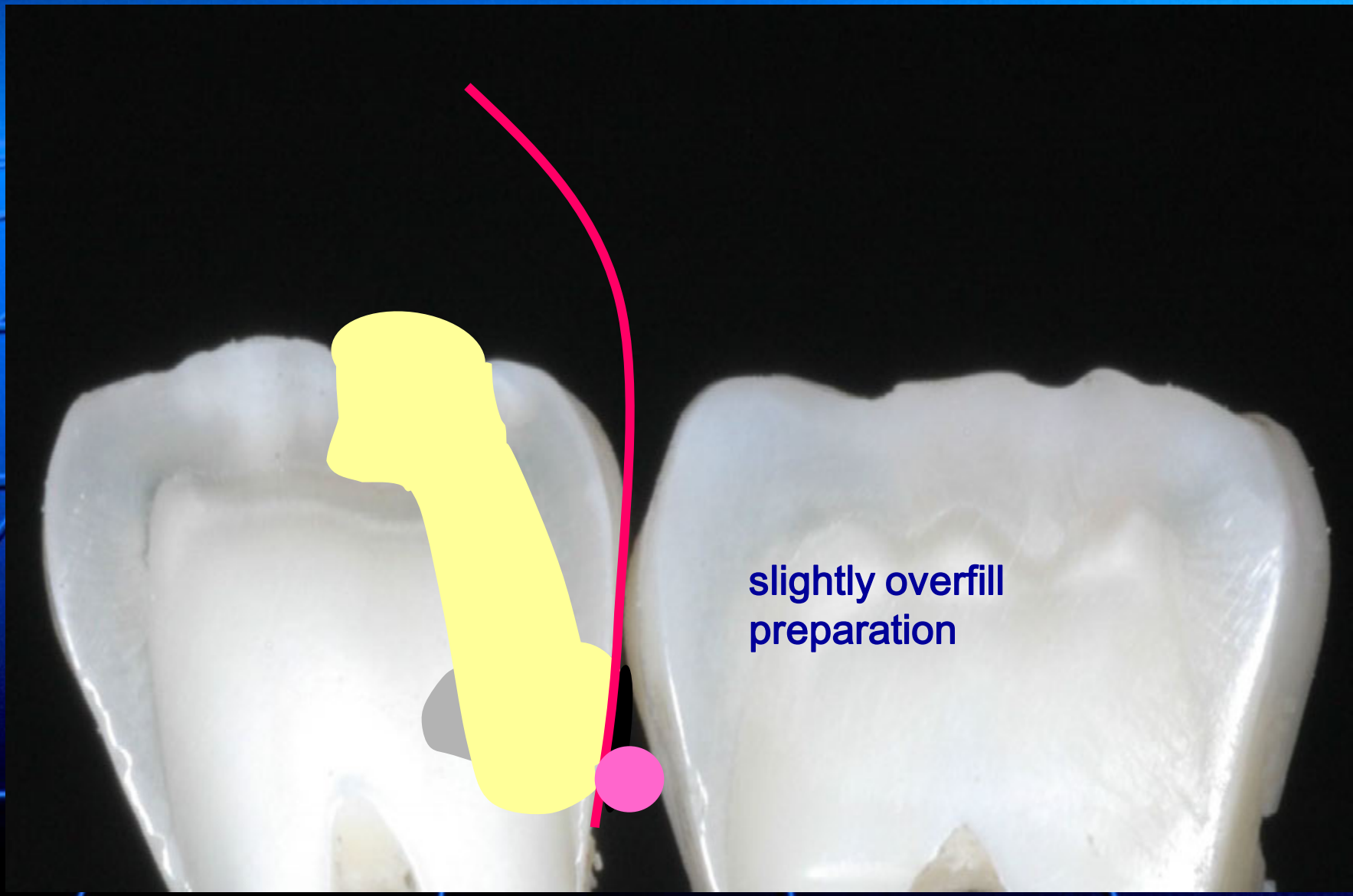


SMART tunnel restorations



insert GIC nozzle to depth of cavity start injecting GIC as withdrawing nozzle

SMART tunnel restorations



SMART tunnel restorations

forces GIC into prep
1. eliminating voids and
2. acts as occlusal matrix

ask patient to close slowly in retruded occlusion

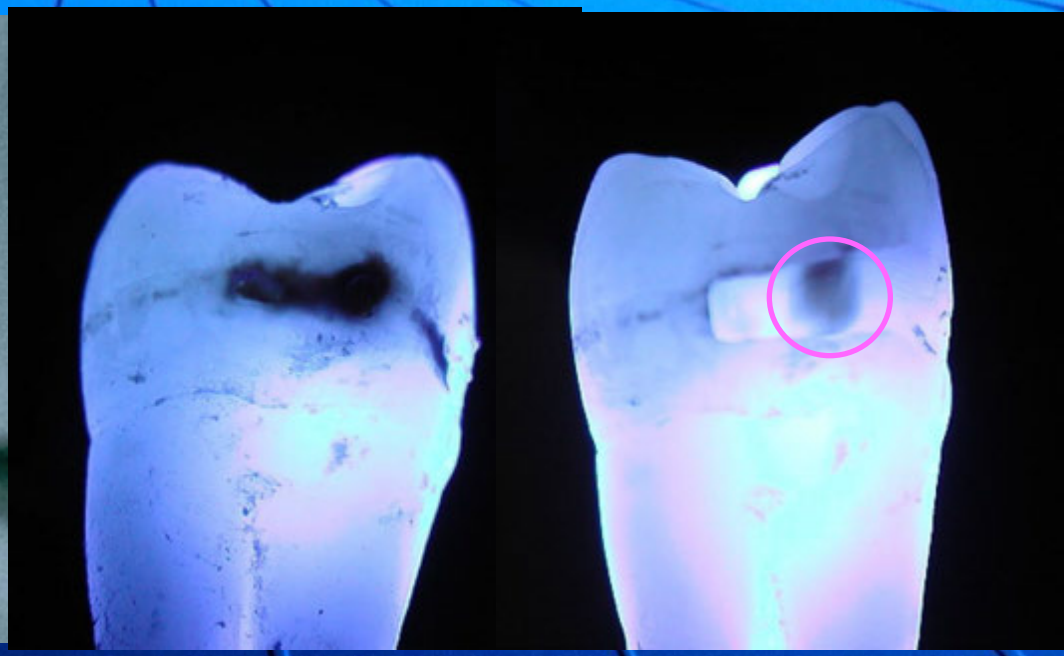
use a perio probe to fold mylar strip over the occlusion

SMART tunnel restorations

14 months after placement

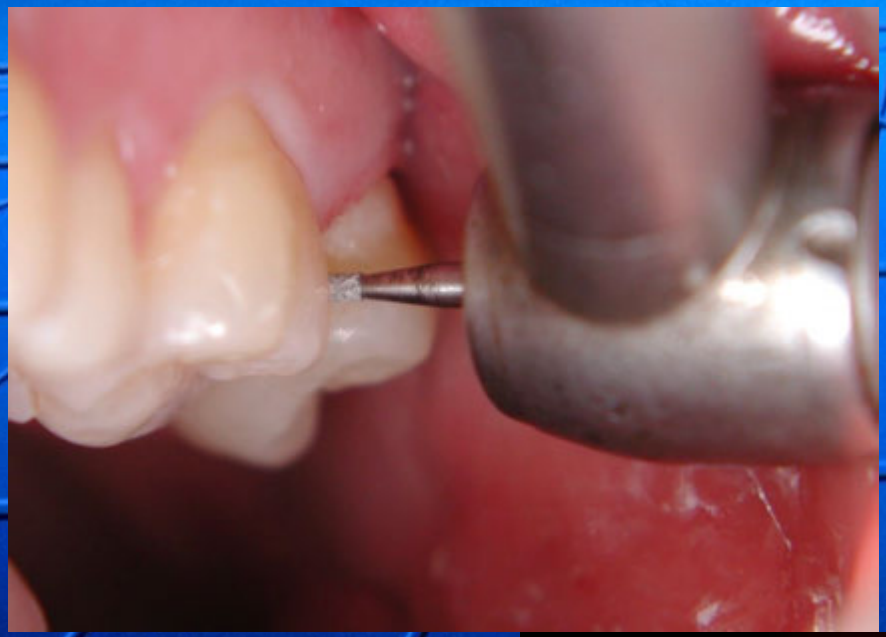
completed restoration maintains structural integrity of tooth

single surface slot restorations

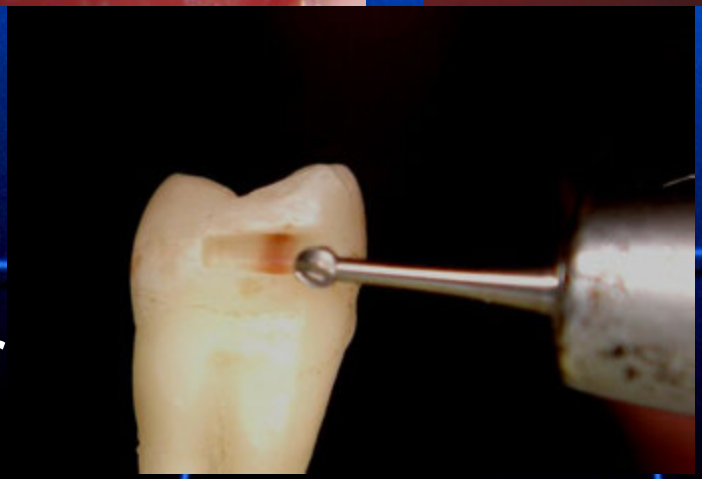


conservative alternative to tunnels when lesion situated at CEJ. A GIC seal alone enables deep caries to be left in situ, better with SDF/KI.

slot restorations



access from buccal with a high speed bur



extend into softened dentine with a 5 round bur

slot restorations

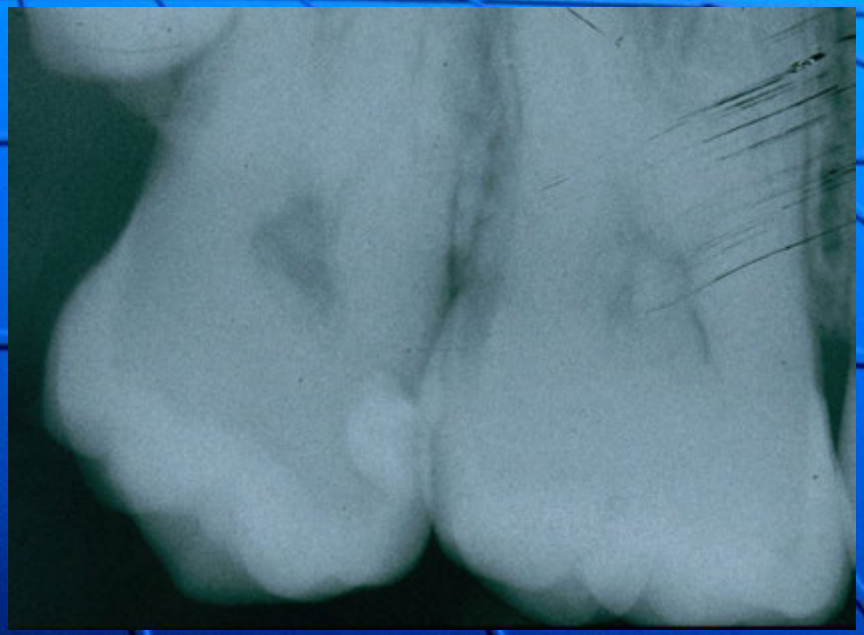
etch wash and dry

insert sectional matrix and wedge buccally and lingually

insert GIC nozzle to far end of cavity and slightly overfill

slot restorations

allow to set contour finish and resin surface



conservative preparation leaves peripheral rim in tack without unduly weakening tooth

EXTRA SMART for patients significantly reduces the time and discomfort associated with a dental visit

EXTRA SMART for dentists reduces stress, improves clinical efficiency and has a high level of patient acceptance of care that builds practices

published references to much of the material presented available at www.dentalk.com.au go to publications

thank you

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