Welcome to the NDDA Mid-Winter Meeting

- Be SMART: Improve your Practice with Silver Diamine Fluoride, Glass Ionomer Cement
- Dr. Jeanette MacLean
- Sponsored By: NuSmile and Nowak Dental Supplies Inc

Jeanette MacLean, DDS

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Thank you for attending the NDDA Mid-Winter Meeting

➡ CE Certificates can be downloaded from the NDDA website ***Monday, January 19th***.

SAVE THE DATES - NDDA Annual Session
September 17 & 18, 2026

NDDA Mid-Winter Meeting
January 21 & 22, 2027

Please visit and THANK ALL our conference sponsors!

Jeanette MacLean, DDS

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Be SMART

Improve your Practice with SDF & GIC

JEANETTE MACLEAN, DDS

YouTube

Affiliated Children's Dental Specialists

@drmaclean

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Jeanette MacLean, DDS

Diplomate, American Board of Pediatric Dentistry
Fellow, American Academy of Pediatric Dentistry
Fellow, American College of Dentists
Fellow, Pierre Fauchard Academy
Fellow International College of Dentists
Owner, Affiliated Children's Dental Specialists

AMERICAN BOARD OF PEDIATRIC DENTISTRY

Affiliated Children's Dental Specialists
DENTISTRY FOR TODDLERS, CHILDREN, TEENS AND SPECIAL NEEDS

BS Chemistry, Northern Arizona University 1999
DDS University of Southern California 2003
Pediatric Dentist, University of Nevada School of Medicine/Sunrise Children's Hospital 2005

Disclosures: Neither myself nor my family members have any owner interest or stock in any of the products mentioned in this presentation, nor do I receive sales commission
I have received speaking honoraria in the past from: Elevate Oral Care, Oral Science, GC America, DMG America, NuSmile, DryShield, vVardis, Young Innovations, Garrison, DeNovo, Nowak, and P&G/Crest Oral B

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The New York Times

Dr. MacLean said, "People assume that parents will reject it because of poor aesthetics." But "if it means preventing a child from having to be sedated or having their tooth drilled and filled, there are many parents who choose S.D.F.," she added.

After Dr. MacLean treated Knox, she gave him a sticker.
CAITLIN O'HARA FOR THE NEW YORK TIMES

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7

You don't have to drill everything!

8

Restoring teeth without addressing the underlying problem is akin to replacing the windows on a burning building

9

"It is now known that surgical intervention of dental caries alone does not stop the disease process. Additionally, many lesions do not progress, and tooth restorations have a finite longevity. Therefore, modern management of dental caries should be more conservative."

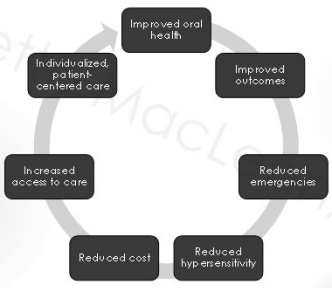
AAPD GUIDELINE ON CARIES-RISK ASSESSMENT AND MANAGEMENT FOR INFANTS, CHILDREN, AND ADOLESCENTS

10

Avoid or delay entering the restorative dentistry "death spiral"

11

Benefits to Patients



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Nonsurgical Caries Treatments

- Diet and oral hygiene counseling
- Fluoride Varnish
- Povidone Iodine
- Rx Toothpaste
- Resin Infiltration
- Curodont
- Silver Diamine Fluoride
- ART/SMART
- Hall Technique

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Nonsurgical Caries Treatments

- Diet and oral hygiene counseling
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- Silver Diamine Fluoride
- ART/SMART
- Hall Technique

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Silver Diamine Fluoride

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SDF Advantages

- Reduce use of sedation
- Reduce cost
- Reduce risk
- Increase access to care
- Improve the patient experience
- Improve oral health

Silver Diamine Fluoride (SDF) without Aerosols

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AAPD & ADA Guidelines


Use of Silver Diamine Fluoride for Dental Caries Management in Children and Adolescents, Including Those with Special Health Care Needs

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SDF Chairside Guide

Free Download:
kidsteethandbraces.com

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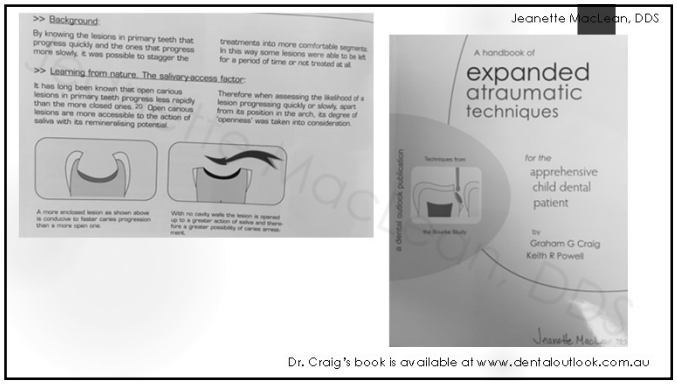
Jeanette MacLean, DDS
>> Background:
By knowing the lesions in primary teeth that progress quickly and the ones that progress more slowly, it was possible to stagger the treatments into more comfortable segments. In this way some lesions were able to be left for a period of time or not treated at all.
>> Learning from nature. The salivary-access factor:
It has long been known that open carious lesions in primary teeth progress less rapidly than the more closed ones. 20 Open carious lesions are more accessible to the action of saliva with its remineralising potential.
Therefore when assessing the likelihood of a lesion progressing quickly or slowly, apart from its position in the arch, its degree of 'openness' was taken into consideration.
A more enclosed lesion as shown above is conducive to faster caries progression than a more open one.
With no cavity walls the lesion is opened up to a greater action of saliva and therefore a greater possibility of caries arrestment.
A handbook of
expanded atraumatic techniques
for the apprehensive child dental patient
by
Graham G Craig
Keith R Powell
a dental outlook publication
Dr. Craig's book is available at www.dentaloutlook.com.au

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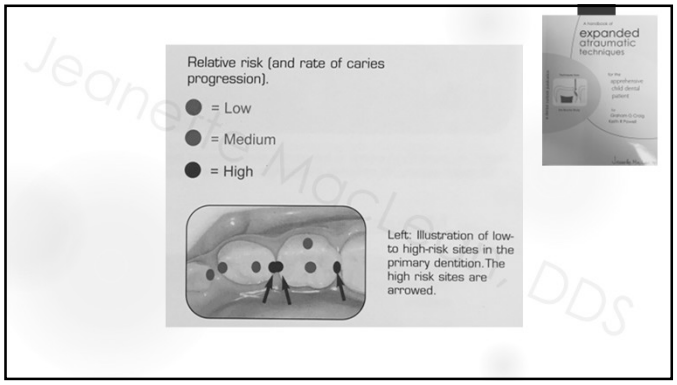
Relative risk (and rate of caries progression).
= Low
= Medium
= High
Left: Illustration of low- to high-risk sites in the primary dentition. The high risk sites are arrowed.

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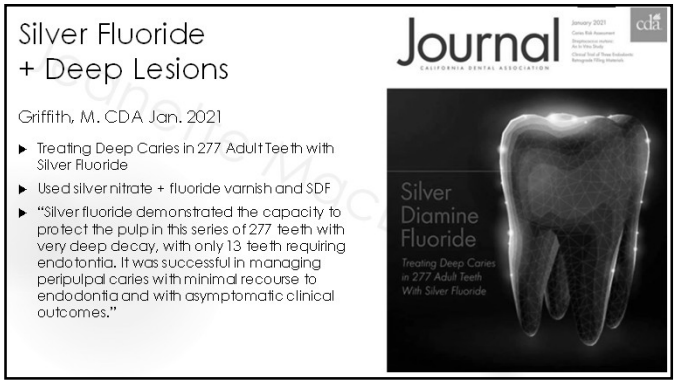
Silver Fluoride + Deep Lesions
Griffith, M. CDA Jan. 2021
Treating Deep Caries in 277 Adult Teeth with Silver Fluoride
Used silver nitrate + fluoride varnish and SDF
"Silver fluoride demonstrated the capacity to protect the pulp in this series of 277 teeth with very deep decay, with only 13 teeth requiring endodontia. It was successful in managing peripulpal caries with minimal recourse to endodontia and with asymptomatic clinical outcomes."
Journal
CALIFORNIA DENTAL ASSOCIATION
cda
Silver Diamine Fluoride
Treating Deep Caries in 277 Adult Teeth With Silver Fluoride

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- SDF biannual application effectively prevented major complications of early childhood caries and was well accepted by children and their parents
- Biannual SDF had a significantly lower rate and risk of major and minor complications

Clinical effectiveness/child-patient and parent satisfaction of two topical fluoride treatments for caries: a randomised clinical trial

Ilze Maldupa [1], Nicola Innes [2], Ilona Vidusaksne [3], Anda Brinkmane [3], Egita Senakola [3], Karina Krumina [3], Sergio E Uribe [3 4 5]

Affiliations + expand

PMID: 38582806 PMCID: PMC10998094 DOI: 10.1038/s41598-024-58850-w

Abstract

Knowledge gaps exist regarding optimal silver diammine fluoride (SDF) regimens and the efficacy of new products for arresting dental caries in young children. We evaluated the effectiveness of 38% SDF (SDF RivaStar), Tiefenfluorid (TF) comparing with Placebo (P), all in conjunction with behavioural modification (BM), in preventing major complications (endodontic/extractions/pain)-a patient-centred outcome due to early childhood caries over 12 months in children under 71-months. A six-arm, patient/parent-blinded, superiority, placebo-controlled randomised control trial at the university clinic in Riga, Latvia, from 1/8/20-31/8/22 (Protocol registration ISRCTN17005348). The trial tested six protocols, using three compounds (P/SDF/TF) under two regimes: annual and biannual (P1/P2/TF1/TF2/SDF1/SDF2) for major complications. Secondary outcomes included minor complications and parental satisfaction. All groups received BM. 373/427 randomised children (87.3%) completed the study. SDF2 had a significantly lower rate and risk of major (21.5%, OR = 0.28, 95%CI [0.11, 0.72], $p < 0.05$) and minor complications (OR = 0.16 (95%CI [0.05, 0.50], $p = 0.002$). Overall

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BILLING

- FEE
- PER TOOTH
- FREQUENCY
- COVERAGE
- LIMITATIONS
  - WAITING PERIODS ON RESTORATIONS

23

SDF CODES

- 1354 = CARIES ARREST
  - Interim caries arresting medicament application
- 1355 = PRIMARY PREVENTION
  - Caries preventive medicament application per tooth
  - This is an ADDITIONAL code
  - It does NOT replace 1354
  - Coverage and limitations ?
- Both per tooth

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APPLICATION BEST PRACTICES

25

DRY, APPLY, and say GOODBYE!

26

Isolate well

27

Fluoride Varnish increases the efficacy of SDF by 4%

jcda.ca
ESSENTIAL DENTAL KNOWLEDGE

The Effectiveness of Silver Diamine Fluoride and Fluoride Varnish in Arresting Caries in Young Children and Associated Oral Health-Related Quality of Life

Rena Sihra, DDS, MDent; Robert J. Schroth, DMD, MSc, PhD; Mary Bertone, RDH, BSc(DH), MPH; Heather Martin, BSc; Brayden Patterson, BSc; Betty-Ann Milfenmuller; Victor Lee, BSc; Michael E.K. Moffatt, MD, MSc; Bradley Klus, DMD, MDent; Margherita Fontana, DDS, PhD; Lawrence Robertson, MD, MPH

Published June 1, 2020

Cite this as: *J Can Dent Assoc.* 2020;86:k9

Abstract

Objective: To investigate the efficacy of silver diamine fluoride (SDF) with 5% fluoride varnish (FV) in treating cavitated caries in young children and to explore the association between SDF treatment and oral-health-related quality of life (OHRQoL).

Methods: Children with active dentinal caries in primary teeth underwent treatment with 38% SDF and 5% FV at baseline and 4 months later. Treated lesions were assessed 4 and 8 months after baseline. Child-level analysis focused on classifying SDF treatment as completely successful if all of a child's treated lesions were arrested or incompletely successful if at least 1 lesion was not arrested. The Early Childhood Oral Health Impact Scale questionnaire was completed at second and third visits. Statistical analyses

Research Square

Preprints are preliminary reports that have not undergone peer review. They should not be considered conclusive, used to inform clinical practice, or referenced by the media as validated information.

Silver Diamine Fluoride with Sodium Fluoride Varnish versus Silver Diamine Fluoride in arresting early childhood caries: A randomized field trial

Enas B Abdellatif (enas.belal@alexu.edu.eg)
Alexandria University
Maha El Tantawi
Alexandria University
Mona K Elkashlan
Alexandria University

Research Article

Keywords: Early childhood caries, Silver Diamine Fluoride, Sodium Fluoride Varnish, Children, Enamel caries, Dentin caries, Primary teeth, Rural

Posted Date: August 30th, 2023

DOI: https://doi.org/10.21203/rs.3.rs-3083824/v1

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What's new for SDF ?

- More products on the market
  - Gel formula
  - Nano silver fluoride
- Advantage Arrest is eligible for approval as a drug (vs. device clearance)
- More published studies on proximal lesions
  - I stopped using floss for proximal lesions about 3 years ago
- Utilizing AI to diagnose, treatment plan, and monitor incipient lesions + patient education

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SDF clinical trial evidence for efficacy and safety does NOT carry over to different formulations

31

AMERICA'S PEDIATRIC DENTISTS
THE BIG AUTHORITY on little teeth

Assessing the Safety & Efficacy of Silver Diamine Fluoride in Children in Light of Wide Off-Label Use

ASSESSMENT: The existing US scientific literature on safety and efficacy of silver diamine fluoride use in children largely employs the Advantage Arrest® Silver Diamine Fluoride 38% formulation. Based on a review of the available research, the American Academy of Pediatric Dentistry (AAPD) supports that Advantage Arrest® Silver Diamine Fluoride 38% is both safe and effective for caries arrest in children. The AAPD will continue to monitor research on safety and efficacy of all commercially available SDF formulations.

The American Academy of Pediatric Dentistry supports that Advantage Arrest® Silver Diamine Fluoride 38% is effective for caries arrest and safe for use in children based on the existing evidence base. This statement should not be construed to imply an AAPD endorsement of this, or any other, individual product utilized for treatment of dental disease.

April 4, 2025

211 East Chicago Avenue, Suite 1600 • Chicago, Illinois 60611
312-337-2169 • Fax: 312-337-6329 • www.aapd.org • www.mychildrensteeth.org

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New Proximal SDF Study

- 90% of lesions arrested at 12 months
- SDF treatment was superior in arresting initial approximal caries lesions

Original Article

Silver diamine fluoride effectiveness in arresting initial approximal caries lesions in adults: A triple-blinded, randomized controlled clinical trial

Abstract

INTRODUCTION

892 © 2025 Journal of Conservative Dentistry and Endodontics | Published by Wolters Kluwer - Medknow

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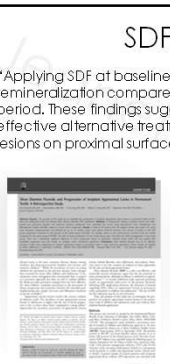
SDF for proximal lesions

"Applying SDF at baseline and 6 months resulted in significant remineralization compared with the control group over the 12-month period. These findings suggested that applying SDF can serve as an effective alternative treatment option for remineralizing early caries lesions on proximal surfaces."

Prompak, K., Trairatvorakul, C., Pornprasertsuk-Damrongsri, S. et al. Digital subtraction analysis after application of silver diamine fluoride on early proximal caries lesions: a 12-month randomized controlled trial. Sci Rep 15, 2571 (2025). https://doi.org/10.1038/s41598-025-07764-2



"Silver diamine fluoride may be an effective therapy to slow caries progression of incipient approximal lesions in permanent teeth in high caries-risk populations."

Polacek J, Malnik N, Yang YJ, Scully AC, Seki FN, Boynton JR. Silver Diamine Fluoride and Progression of Incipient Approximal Caries in Permanent Teeth: A Retrospective Study. Pediatr Dent. 2021 Nov 15;43(6):478-480. PMID: 34927619.

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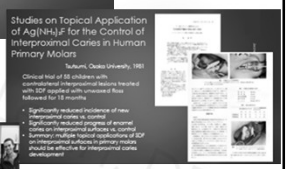
You know these oldies but goodies…

GV Black applied silver nitrate to proximal lesions with silk floss



Studies on Topical Application of AgNH4F for the Control of Interproximal Caries in Human Primary Molars

Tsutumi, Osaka University, 1981

Clinical trial of 55 children with contralateral interproximal lesions treated with SDF applied with unwaxed floss followed for 18 months

- Significantly reduced incidence of new interproximal caries vs. control
- Significantly reduced progress of enamel caries on interproximal surfaces vs. control
- Summary: multiple topical applications of SDF on interproximal surfaces in primary molars should be effective for interproximal caries development

Interproximal SDF Research with Ohio State University

JOCPD

84.0% showed radiographic evidence of non-progression at 12-month

Silver Diamine Fluoride and Fluoride Varnish May Halt Interproximal Caries Progression in the Primary Dentition. Hammersmith KJ, DeFazio JR, Casamassimo PS, MacLean JK, and Peng J. Journal of Clinical Pediatric Dentistry: 2020; Vol. 44, No. 2, pp. 79-85.

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Proximal SDF without floss

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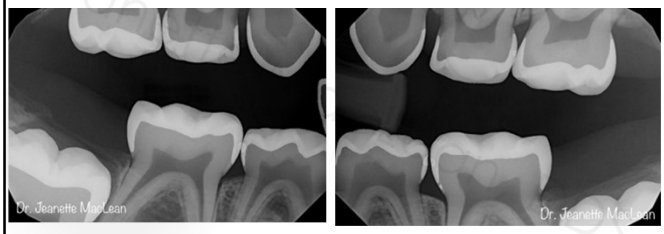
Treatment planning strategies



OVERJET

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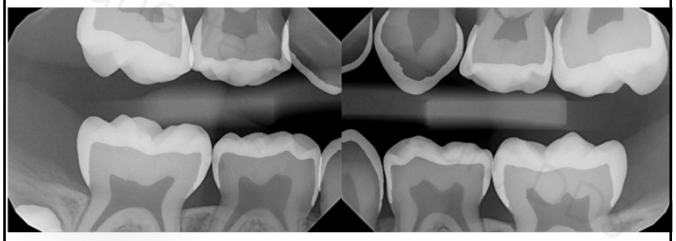
Treatment planning strategies



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NEW GEL FORMULA

- UNIT DOSE
- SYRINGE
- COMBO

  3mL LIQUID MINI + UNIT DOSE GEL

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New gel option


Clinical Report

Using sequential applications of a novel silver diamine fluoride gel and sodium fluoride varnish to arrest severe early childhood caries lesions

A clinical trial with single group assignment

Tania Carola Padilla Cáceres, DDS; Sheyla Cervantes-Alagón, DDS; Jorge Luis Castillo, DDS, PhD; Claudia Marcela Vera Reyes, DDS; Marilynn Rothen, RDH, MS; Lloyd A. Mancl, PhD; Peter Milgrom, DDS

"Two applications of 38% SDF gel and 2.5% sodium fluoride varnish arrested greater than 90% of carious surfaces at 1 year and with high levels of parental satisfaction."

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Gel SDF Application

@drmaclean

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Stain Removal

- Fabrics
  - Iodine
  - Napisan
- Surfaces
  - Bar Keeper's Friend
  - Mr. Clean Magic Eraser
  - Comet
  - Bleach
- Skin
  - Hydrogen Peroxide
  - Salt slurry
  - Hair dye remover pads
- **Remember – prevention is the best stain remover!**


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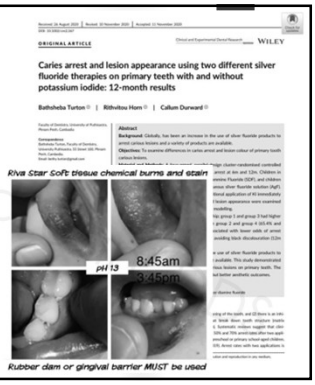
SDF + KI

Turton, B. Clinical and Experimental Dental Research Nov. 2020

- Those teeth which had KI placed had around twice the odds of becoming pulpally involved
- The use of KI reduced the staining, however, it also reduced the chances of caries arrest. A higher proportion of lesions progressed to involve the pulp over a 12-month period in those teeth where KI was used


ORIGINAL ARTICLE

WILEY

Caries arrest and lesion appearance using two different silver fluoride therapies on primary teeth with and without potassium iodide: 12-month results

Bathchelea Turton | Rithvitou Hom | Callum Durward

Abstract

Background: Globally, has been an increase in the use of silver fluoride products to arrest carious lesions and a variety of products are available.

Objectives: To examine differences in caries arrest and lesion colour of primary tooth carious lesions.

Riva Star Soft: tissue chemical burns and stain

pH 13

8:45am

3:45pm

Rubber dam or gingival barrier MUST be used

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Parental Acceptance of SDF

- Chu et al 2002, Yee et al 2009, and Zhi et al 2012, found that actually < 7% of parents were concerned with the staining
- Tesoriero and Lee 2016
  - 73% of parents preferred SDF treatment
- Crystal et al 2017
  - "Although parents may perceive the staining of SDF in anterior teeth as esthetically unacceptable, 70-76% prefer this treatment option to advanced behavior techniques."

45

TeamSmile

- Parental Consent:
- 86% SDF
- 80% restorative
- 65% extraction of primary teeth

46

Dr. MacLean said, "People assume that parents will reject it because of poor aesthetics." But "if it means preventing a child from having to be sedated or having their tooth drilled and filled, there are many parents who choose S.D.F.," she added.

After Dr. MacLean treated Knox, she gave him a sticker.
CAITLIN O'HARA FOR THE NEW YORK TIMES

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GA OR THE HIGHWAY

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TREATMENT PLANNING STRATEGIES

- SDF AS A TIME BUYER
- SDF AS THE ONLY TREATMENT
- SDF FOR INCIPIENT LESIONS
- SDF FOR HYPERSENSITIVITY
- SDF FOR INDIRECT PULP THERAPY

50

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SDF AS THE ONLY TREATMENT

LOW RISK SITES

TEETH CLOSE TO EXFOLIATING

52

3 year follow up, SDF only

- 2nd opinion = "IV sedation only or risk sepsis"
- Both parents are physicians
- Research and find NYT SDF article
- FIT drinking Pediasure, frequent eating
- Diet and hygiene improve
- SDF applied 4 times; 3/17, 4/17, 10/17, 5/18
- Patient has been seen q6mo, FV applied, no additional cosmetic treatment desired, teeth remain asymptomatic
- Lesions are shiny, hard and arrested

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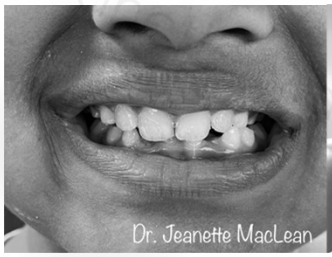
6 year follow up, SDF only



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SDF FOR INCIPIENT LESIONS

- NONCAVITATED LESIONS
- PROXIMAL LESIONS
- WHY WAIT UNTIL THERE IS A HOLE?
  - UNINTENDED CONSQUENCE OF EVIDENCE BASED GUIDELINES DUE TO WHAT STUDIES WERE AVAILABLE AT THE TIME
  - SDF WILL STILL PENETRATE A POROUS SURFACE

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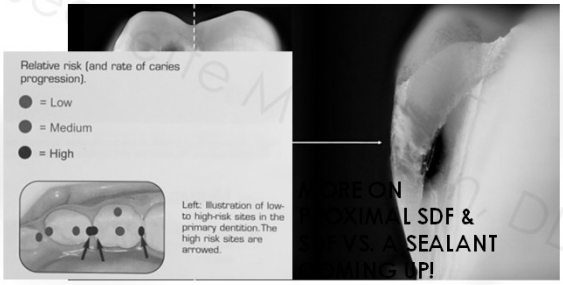
SDF Penetration

- Photo from Dr. Gabriel Dominici



RE ON
L SDF &
VS. A SEALANT
MING UP!

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SDF FOR HYPERSENSITIVITY

- MIH
- RECESSION
- EXPOSED ROOTS

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THE "SDF MULLET"

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FOR FAMILIES THAT PREFER NOT TO HAVE SDF APPLIED ON THE FRONT TEETH

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Proximal SDF

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New Proximal SDF Study

- 90% of lesions arrested at 12 months
- SDF treatment was superior in arresting initial approximal caries lesions


Original Article

Silver diamine fluoride effectiveness in arresting initial approximal caries lesions in adults: A triple-blinded, randomized controlled clinical trial

Abstract

INTRODUCTION

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Proximal gel ?

- I not aware of any clinical studies on this yet
- I'd still use Superfloss or unwaxed floss for the gel due to the viscosity, but this is based on feelings, not facts

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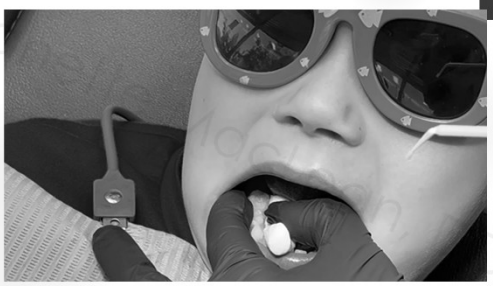
Proximal SDF without floss



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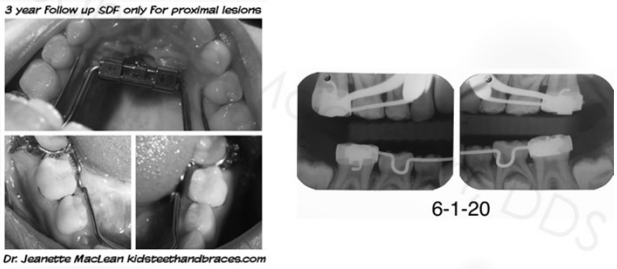
3 year follow up



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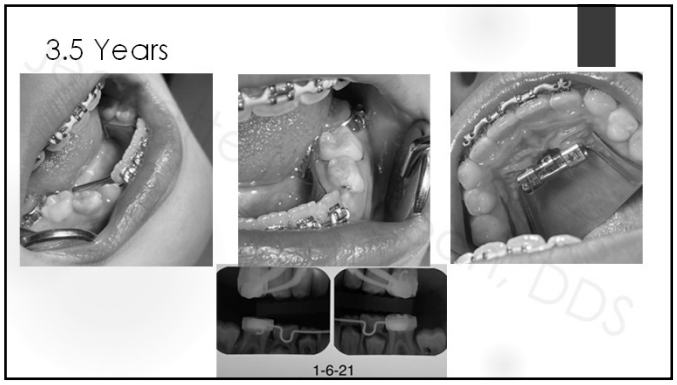

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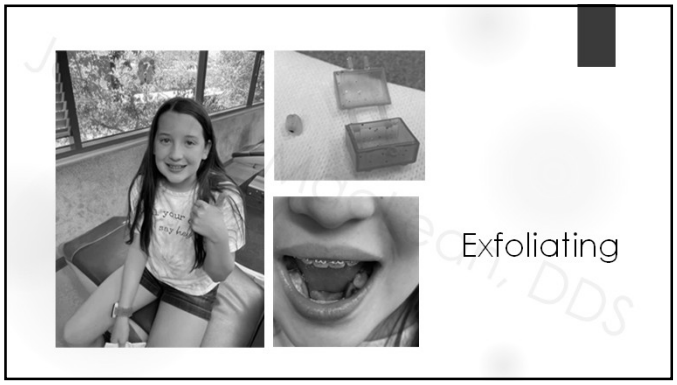

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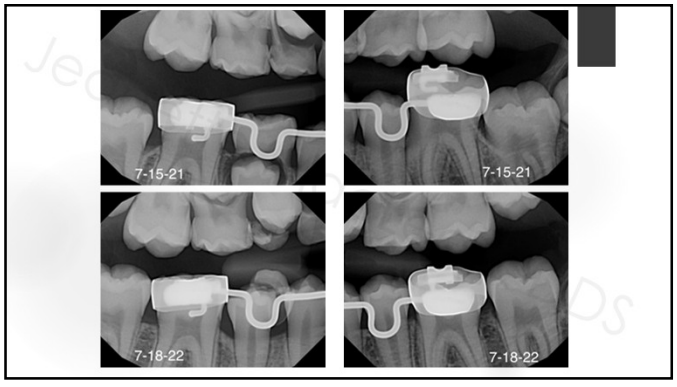

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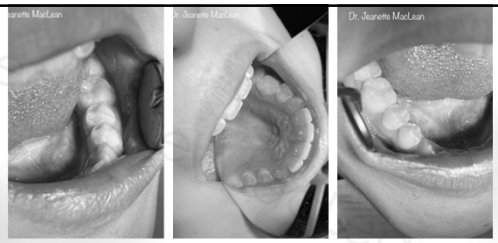
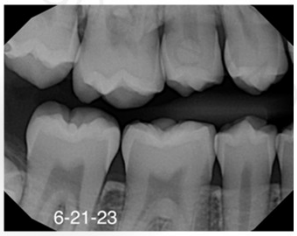


6+ Years

70

6+ Years



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7 years – all new, healthy permanent teeth!

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Frequency of application

- Reapplication frequency varies depending on the clinical trial
  - Do not reapply more than once a week
- Minimum biannual reapplication to unrestored caries lesions

(aka Q6 months)

- asymptomatic, it is not necessary to keep reapplying the SDF

*** It is important to communicate that this is a treatment, not a cure, and proper diet, hygiene, and daily fluoride use will play a critical role in the success of this treatment. Further, if the tooth is non-cleansable and broken down, a restoration is favorable when possible

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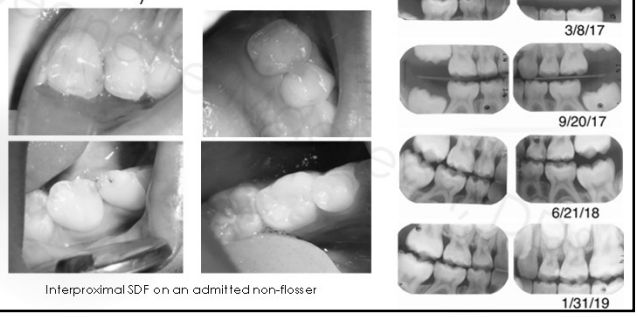
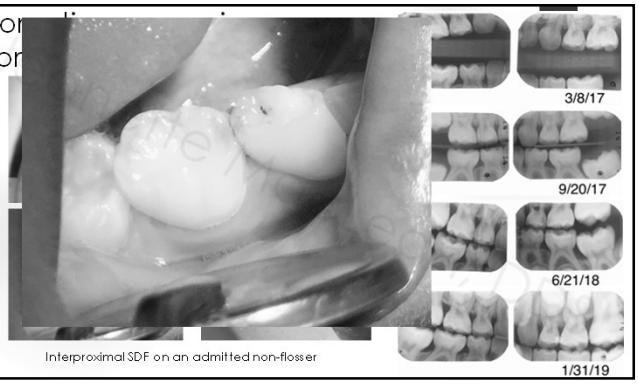
Sometimes you win, sometimes you lose…



Interproximal SDF on an admitted non-flosser

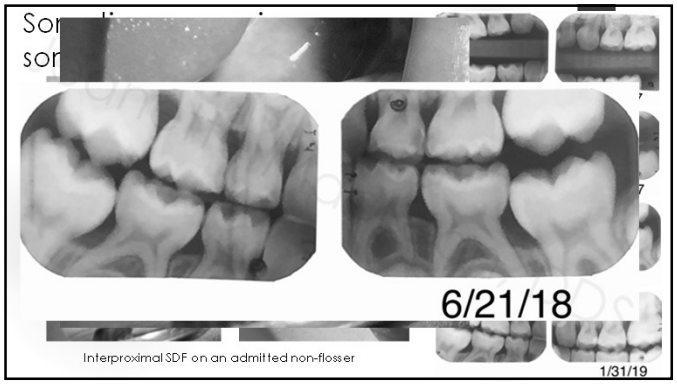
74

Sometimes you win, sometimes you lose…



Interproximal SDF on an admitted non-flosser

75



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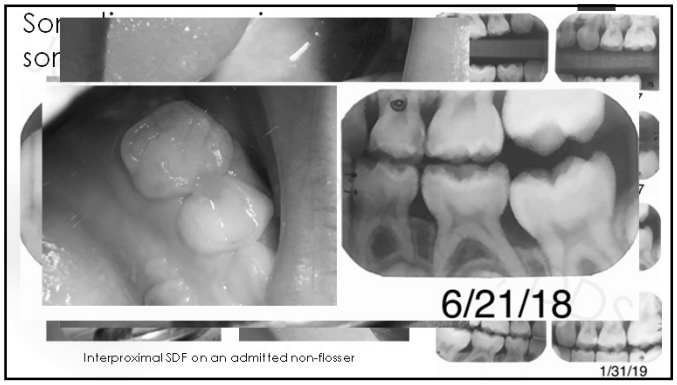
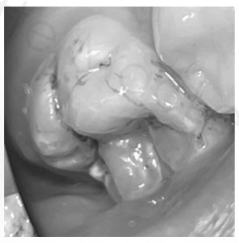


77

SDF as a "sealant?"

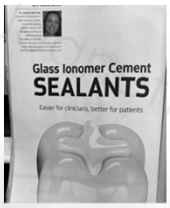


78

SDF as a "sealant?"

79

Benefits of GIC Sealants



80

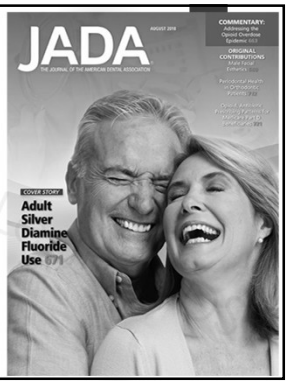
AAPD Releases New Guidance on the Use of CDT 2021 Code D1355

With the release of the CDT-2021 dental coding manual on January 1, 2021, the CDT code **D1355 – caries preventive medicament application, per tooth** –was approved. A recent analysis by experts from the AAPD's Councils on Clinical and Scientific Affairs, and Committee on Dental Benefit Programs concluded that, although Silver Diamine Fluoride (SDF) has proven efficacy as a secondary preventive agent (i.e., arrest of carious lesions) in numerous clinical studies, evidence of its efficacy as a primary preventive agent on children is insufficient at present. Therefore, without solid scientific evidence, the AAPD does not support the use of the code D1355 for use of SDF as a primary preventive agent in children. Accordingly, the AAPD recommends D1354 as the appropriate code for SDF when used as a caries arresting agent on cavitated carious lesions in primary teeth.

81

Controlling caries in exposed root surfaces with silver diamine fluoride: A systematic review with meta-analysis

- "Yearly 38% SDF applications to exposed root surfaces of older adults are a simple, inexpensive, and effective way of preventing caries initiation and progression."
  - Oliveira JADA August 2018



82

'CariedAway' Clinical Trial

83

84

In a study of nearly 3,000 schoolchildren, silver diamine fluoride—a liquid that is brushed onto the surface of teeth to prevent cavities or keep them from worsening—was as effective against cavities as dental sealants, the standard of care. A single dose of either topical treatment given in elementary schools prevented roughly 80% of cavities and kept 50% of cavities from worsening when children were seen two years later.

85

'CariedAway' Clinical Trial

- No radiographs taken
- Returning SDF patients = only 20% of the original 3K patients
  - 110 more SDF at the start
  - 176 GI group in the end
- 61% of the SDF group dropped out
- WHERE DID ALL OF THE SDF TREATED PATIENTS GO??


JAMA Network Open

Effect of Silver Diamine Fluoride on Caries Arrest and Prevention
The CariedAway School-Based Randomized Clinical Trial

86

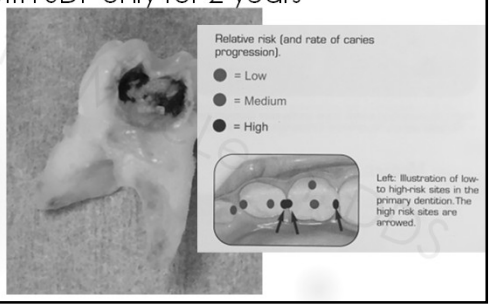
87

88

SDF is not a cure-all

89

Extracted primary molar treated with SDF only for 2 years



90

SDF Pitfalls

- Poor case selection
- Inadequate isolation and drying
- Rinsing
- Light curing
- Not covering with varnish
- Patient/parent is not on board with behavior modification
- "Cure all" or "one and done" mentality
- Lack of understanding of caries etiology
- Delayed placement of a sealed restoration (SMART, Hall) in cavitated lesions that are not easily cleansed or open to saliva

91

10 Minute Break

92

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Protection Agency

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Thank you for attending the NDDA Mid-Winter Meeting

CE Certificates can be downloaded from the NDDA website ***Monday, January 19th.***

SAVE THE DATES - NDDA Annual Session
September 17 & 18, 2026

NDDA Mid-Winter Meeting
January 21 & 22, 2027

Please visit and THANK ALL our conference sponsors!

94

Glass Ionomer Cement (GIC) Restoratives

- Biocompatibility – mimics dentin
- Ease of use - hydrophilic
- Antimicrobial effect
- Fluoride uptake and release (+ others)
- Superior marginal seal – via ion exchange and chemical bonding

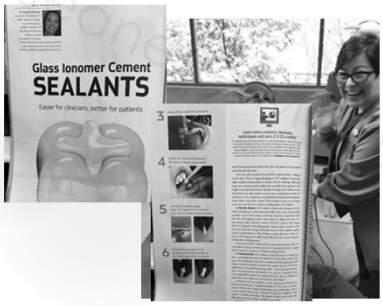
95

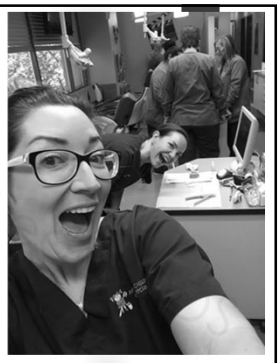
INTRODUCING GIC INTO YOUR PRACTICE

- Start with simple sealants and single surface restorations
- Work up to Class IIs & IIIs
- More advanced – strip crowns
- Look for hands-on opportunities, lunch and learns, practice on typodonts and extracted teeth

96

GIC SEALANT WORKSHOP





97

Past challenges with resin sealants;

- Difficult to achieve ideal isolation
- Time consuming
- Young and/or phobic patients cannot tolerate procedure
- Etch syringe looks like a "shot"
- Etch burns
- Can't seal partially erupted molars with resin
- Chipping and leaking over long term
- Decalcification and/or decay present
- RESIN DOES NOT EFFECTIVELY BOND TO MIH AFFECTED ENAMEL

98

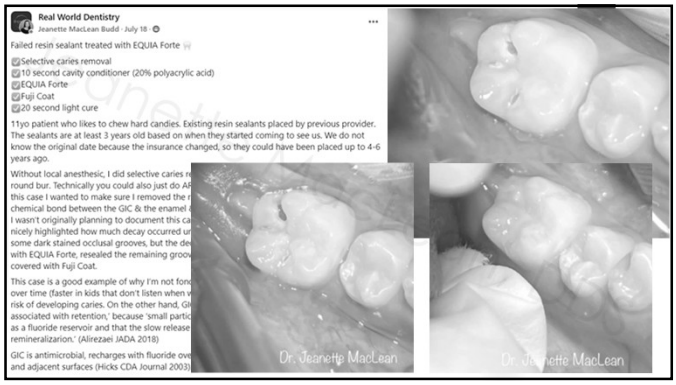
What defines sealant SUCCESS ?

- Is it RETENTION of the sealant material ?
  (common study metric/dentist mentality)
- Or is it PREVENTION of caries ?

99

Leaking resin sealant

100



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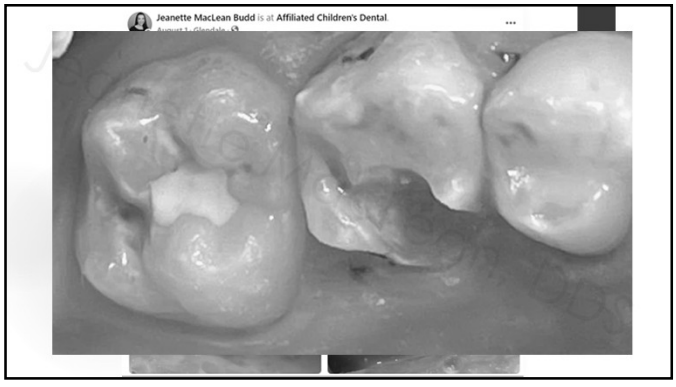


102

LOW VISCOSITY GLASS IONOMER CEMENT

- SIMPLICITY OF APPLICATION
- HYDROPHILIC
- BIOCOMPATIBLE
- RELEASES/RECHARGES W/ FLUORIDE
- WELL TOLERATED BY WIDE RANGE OF PATIENTS
- CAN BE USED ON PARTIALLY ERUPTED MOLARS
- FLOWS INTO PITS AND FISSURES
- GIC SEALANT WEAR/LOSS IS NOT ASSOCIATED WITH CARIES

103

"These findings indicate that the caries prevention effect of GIC-based sealants is not associated with retention."

Alirezaei et al. JADA 2018

Original Contributions

Systematic Review

Glass ionomer cements as fissure sealing materials: yes or no?

A systematic review and meta-analysis

104

105

- "Mickenautsch and Yengopal indicated that the risk of loss of complete retention of sealant materials was associated with the risk of developing caries occurrence for RBSs but not for GIC-based sealants. The explanation of this result was that small particles remained in the bottoms of fissures that acted as a fluoride reservoir and that the slow release of fluoride enhanced nearby enamel remineralization."

Alirezaei et al. JADA 2018

106

Cross section view

Tooth has been sectioned bucco-lingually to demonstrate the penetration of the GIC into the depths of the fissure. It is apparent that the restoration is very efficient.

Mount, G.J., Hume, W.R. (2006). *Preservation and Restoration of Tooth Structure*. Queensland, Australia: Knowledge Books and Software.

107

- "It seems that GIC-based sealants, with their lower technique sensitivity, good adherence, and fluoride-releasing properties, have an additive effect of being a sealant and fluoride provider for the prevention of occlusal caries. Therefore, GIC-based sealants may be a good alternative to RBSs specifically in community procedures when there is limited equipment, no chairside assistant for the dentist or dental hygienist, and a considerable number of children at high risk of developing caries."

Alirezaei et al. JADA 2018

108

Longitudinal caries prevalence in a comprehensive, multicomponent, school-based prevention program

Starr et al JADA 2021

- 6-year prospective open cohort study in 33 US public elementary schools, providing care to 6,927 children in communities with and without water fluoridation. After dental examinations, dental hygienists provided twice-yearly prophylaxis, glass ionomer sealants, glass ionomer interim therapeutic restorations, fluoride varnish, toothbrushes, fluoride toothpaste, oral hygiene instruction, and referral to community dentists as needed.
- The prevalence of untreated caries decreased by more than 50%
- Fuji IX


Original Contributions

Longitudinal caries prevalence in a comprehensive, multicomponent, school-based prevention program

109

Triage Pink

- Command set w/ curing light (absorbs heat)
- Visual/color indicator
- Great for partially erupted molars
- Interim restorations
- Toothbrush abrasion
- Exposed roots

110

HYDROPHILIC


J Formos Med Assoc. 2009 Nov ;108 (11):844-8 19933027

Comparison of caries prevention with glass ionomer and composite resin fissure sealants.

Aylin Akbay Oba, Turksel Dulgergil, I S Sonmez, Salih Dogan

Department of Pediatric Dentistry, School of Dentistry, University of Kirikkale, Turkey.

Background/Purpose: Atraumatic restorative treatment (ART) was developed primarily for use in underserved areas of the world. This study was designed to compare caries prevention with high-viscosity glass ionomer cement (GIC) sealants placed according to the ART procedure and light-cured composite resin sealants after 3 years. Methods: The study was conducted in a boarding school in the city of Kirikkale. Four experienced dentists placed a total of 207 sealants (91 GIC and 116 composite resin), without chair-side assistance, on the school premises. Results: A total of 137 sealants were available after 3 years. 55.3% of the GIC and 93.8% of the composite resin sealants were lost completely, and the difference between the two groups was statistically significant. Only six of 56 teeth in the GIC group and eight of 81 in the composite resin group showed caries. Conclusion: Under field conditions in which moisture control was not effective, a high-viscosity and less technique-sensitive glass ionomer material can be used as an effective sealant material, rather than resin.

Keywords: sealant; gic; composite resin; resin; glass ionomer; ionomer; cary; composite; fissure sealant; cary prevention; glass; fissure; resin sealant; high-viscosity; art;

GI Better in Wet Field

111

On a cooperative patient you can do all 4 first permanent molars with one capsule of Triage in under 5 minutes

- Teeth are protected!
- Parents are happy because you can do them right at the checkup
- Kids are happy because it's fast, easy, and painless
- Saves chair time and supplies
- Increases productivity and access to care

112

On a cooperative patient you can do all [illegible] one c minut

- Tee
- Par
- Kid
- Sav
- Inc

113

Partially Erupted Molars


Inside

Preventing Caries in Partially Erupted Molars

Glass ionomer sealants provide a superior alternative to resin sealants

Jeanette MacLean, DDS

"Because poor isolation and a poor resin bond can actually contribute to the development of caries rather than preventing it, a bad sealant is worse than no sealant at all."

114

Benefits of GIC Sealants

115

WHEN SHOULD GIC SEALANTS BE REAPPLIED?

- Not aware of a specific replacement recommendation for GIC or resin sealants in terms of "replace every X years"
- Sealant loss will vary patient to patient
  - How long they last will vary based on the pH of the patient's mouth and eating habits (i.e. they'll be gone faster in an acidic mouth and/or someone that chews ice or hard candies)
- Sealants are subject to frequency limits, age limits, and some are a 'once in a lifetime benefit"
- My practical approach is to add more GIC sealant "as needed" based on the look and feel of the tooth. If I see a food trap or a stained groove, I would like to add more GIC

116

GIC sealants, occlusals, ARTs & SMARTS have the same application technique, which I will review a little later

117

GIC Sealant Application Videos

GC Fuji TRIAGE: Application with Dr. Jeanette MacLean

38K views • 5 years ago

GC America

Triage Sealant Application Tutorial for Low Viscosity Glass Ionomer...

25K views • 5 years ago

Affiliated Children's Dental Specialists

118

Atraumatic Restorative Treatment (ART)

119

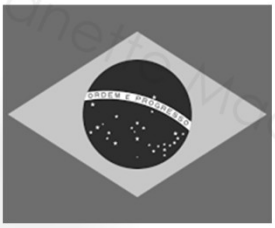
What's new for ART?

- US access to Chemomechanical Caries Removal agents (CMCR)
  - Papacarie Duo

120

I first heard of papain enzyme to treat caries in 2017

121



A colleague in Brazil sent the products to me

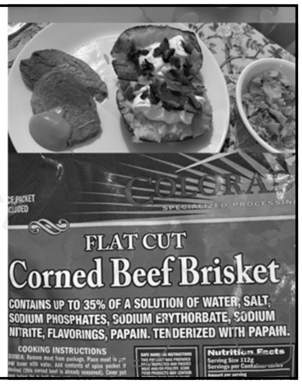
122

Papain

- Nontoxic
- Natural
- Extracted from the raw fruit of papaya
- Breaks proteins down into peptides and amino acids

123

Literally safe enough to eat!



124

"Papacarie™ gel is a product designed for CMCR. This gel unites the cleaning and healing (antibacterial and anti-inflammatory) properties of papain with the disinfecting properties of chloramine."

Bussadori SK, et al. J Contemp Dent Pract. 2014 Mar 1;15(2):250-3

Jeanette MacLean, DDS

125

Bussadori
J Clin Pediatr Dent 30(20): 115–120, 2005

- Papain is a proteolytic enzyme with bactericidal, bacteriostatic, and anti-inflammatory characteristics
- Chloramine inactivates gram-positive and gram-negative bacteria
  - Largest Papacarie activity in streptococcus and lactobacillus
- Softens the pre degraded collagen of the lesion without pain or undesirable effects to adjacent healthy tissues, allowing it to be scraped off without pressure

Papain Gel: A New Chemo-Mechanical Caries Removal Agent

Sandra Kalil Bussadori DDS*/Laura Camacho Castro DDS**/Ana Claudia Galvão DDS***

The chemo-mechanical caries removal method has been a solution for treatment of patients seeking alternatives to conventional methods. Among different kinds of chemo-mechanical caries removal systems, Papacarie® – a papain gel – was found to be easy to manipulate, simple and cheap, as well as effective in removing infected tissues.
J Clin Pediatr Dent 30(20): 115-120, 2005

INTRODUCTION

Caries continues to affect a significant portion of the world population and treatment of the decay is associated with pain by many patients.

Conventional caries removal and cavity preparation entail the use of burs. Disadvantages of this system include (i) the perception by patients that drilling is unpleasant, (ii) local anesthesia is frequently required, (iii) drilling can cause deleterious thermal effects, (iv) drilling can also cause pressure effects on the pulp, and (v) the use of a handpiece may result in removal of softened, but uninfected dentin, resulting in an excessive loss of sound tooth tissue. As a result, there is a growing demand for procedures or materials that facilitate caries management.

The chemo-mechanical method for caries removal was developed to overcome these shortcomings. It is not only more comfortable for the patient but also able to better preserve the healthy tissue.

According to Banerjee *et al.*, the chemo-mechanical method is an effective alternative for caries removal because it brings together (i) atraumatic characteristics and (ii) bactericide and bacteriostatic action. The method was created so as that an active ingredient would soften the pre degraded collagen of the lesion without pain or undesirable effects to adjacent healthy tissues.[1]

In 1975, Habib *et al* introduced a method using 5% sodium hypochlorite to remove carious tissues.[2] Since then, many studies have attempted to improve this early technique. The sole use of 5% sodium hypochlorite was known to be toxic and aggresive to adjacent healthy tissues. Therefore, a new solution was developed adding sodium hydroxide, sodium chloride and glycine to the 5% sodium hypochlorite. This modified formula was known as GK-101 and it was comprised by N- monochloroglycine.[3] It was more effective than the hypochlorite alone but was very slow in carious tissue removal. Also, at the time of the introduction of GK-101, the use of adhesive dental materials was not common, and dentists still prepared teeth according to Black's cavity design. Therefore, the use of a method that only removed carious dentin could not significantly reduce the need of drilling to create mechanical retention.

Caridex™ was later developed from a formula made of N-monochloroglycine and amino butyric acid.[4] Caridex™ disrupted the carious dentin collagen making it easier to remove. Despite its effectiveness, Caridex™ had certain clinical limitations, among them, (i) it was expensive, (ii) it required a large reservoir with pump, (iii) it required large quantities of solution, (iv) it presented several problems during heating, and (v) it had a short shelf life.[5]

Recently, Carisolv™ was introduced to the European market as a successor to the Caridex™ system. Carisolv™ reached the market promising to be more effective and easy to manipulate. Carisolv™ key difference to other products already in the market was the use of three amino acids - lysine, leucine, and glutamic acid - instead of the amino butyric acid. These amino acids counteracted the sodium hypochlorite aggressive behavior at the oral healthy tissues.[6] Despite its effectiveness, Carisolv™ was not a blockbuster mainly

* Sandra Kalil Bussadori, Pediatric Dentistry Professor at FUNDECTO/USP, Universidade de São Paulo (USP)
** Laura Camacho Castro, Assistant Clinical Professor Pediatric Dentistry Department, Tufts University School of Dental Medicine
*** Ana Claudia Galvão, Universidade de São Paulo (USP)

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Phone: 55-11-3019-6130
Fax: 55-11-3814-1877

Email: [illegible]

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Bussadori SK, et al
J Contemp Dent Pract. 2014 Mar 1;15(2):250-3.

- Acts only on the carious dentin, allowing its easy removal with a blunt curette
- Maximizes the preservation of sound dental tissue capable of remineralization
- "The discomfort caused by the use of high-speed burs, such as noise, overheating, possible harmful effect on the pulp tissue and patient anxiety, has motivated the use of CMCR"

CASE REPORT

Chemo-Mechanical Caries Removal with Papacarie™: Case Series with 84 Reports and 12 Months of Follow-up

127

Lee YL, et al
J Adhes Dent. 2021 Dec 3;23(6):513-525.

- Deproteinising pretreatment using Papacarie Duo gel followed by the application of Scotchbond Universal in Etch & Rinse mode led to increased microshear bond strength of resin composite to hypomineralized enamel

Bonding Universal Dental Adhesive to Developmentally Hypomineralised Enamel

Yu-Lynn Lee, Kai Chun Li, Cynthia Kar Yung Yiu, Dorothy H Boyd, J Neil Waddell, Manikandan Ekambaram

PMID: 34817967 DOI: 10.3290/j.jad.b2288247

Abstract

Purpose: To investigate the effect of pretreatment protocols involving Papacarie Duo gel and Scotchbond Universal (SU) on the microshear bond strength (μSBS) of resin composite (RC) to hypomineralised enamel (HE).

Materials and methods: Specimens of normal enamel (NE) and HE were derived from extracted hypomineralised first permanent molars (FPMs). Based on the colour of demarcated opacities, HE specimens were classified as creamy/white (CW) or yellow/brown (YB). The specimens were randomly allocated into eight groups ($n = 20$). Each group involved pretreatment with Papacarie Duo gel or no pretreatment, and SU applied in etch-and-rinse (E&R) or self-etch (SE) mode. All specimens were bonded with RC and subjected to μSBS testing. Failure modes were analysed using an optical microscope and SEM.

Results: Comparing NE with HE, the following factors were found to be significant ($p < 0.001$): type of enamel substrate, deproteinising pretreatment, and etching mode. Comparing CW HE with YB HE, a significant interaction between "deproteinising pretreatment" and "etching mode" was demonstrated ($p = 0.028$). When subjected to the concurrent use of Papacarie Duo gel and phosphoric acid etching, HE specimens showed a significant increase in μSBS ($p < 0.001$).

Conclusion: Deproteinising pretreatment using Papacarie Duo gel followed by the application of SU in E&R mode led to increased μSBS of resin composite to HE.

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CHEMOMECHANICAL CARIES REMOVAL (CMCR)

PAPACARIE DUO BENEFITS

- NONINVASIVE
- ANTIMICROBIAL
- PAINLESS
- IMPROVES BOND STRENGTH TO GIC AND RESIN
- ENHANCES SELECTIVE CARIES REMOVAL WITHOUT REMOVING HEALTHY DENTIN

129

Papacárie Duo achieved superior clinical success rate than Brix 3000 and selective caries removal by hand excavation alone

ART enhanced by CMCR provides an effective alternative to conventional caries removal methods, particularly for children who are afraid of drills and burs

Superior antimicrobial efficacy against S. mutans, and Lactobacilli compared to ART alone

Chemo-mechanical caries removal agents can improve oral health-related quality of life in children with caries

BMC Oral Health

RESEARCH Open Access

One-year clinical and radiographic evaluation of young permanent molars treated with brix 3000 vs. papacárie duo: a randomized controlled clinical trial

BMC

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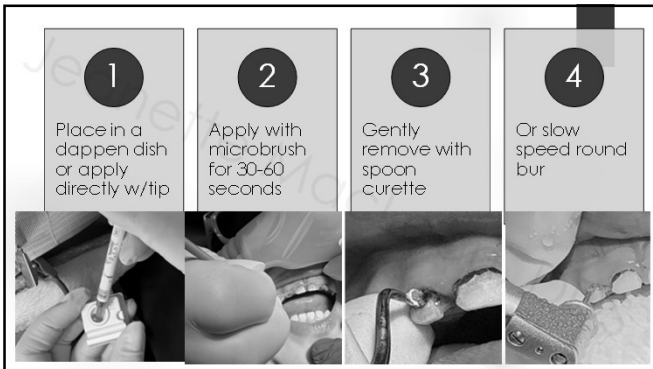

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If the gel remains blue and viscous, no further application needed

Cloudy when active

Color lightens

Repeat if desired

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PAPACARIE DUO CAN BE USED FOR:

ART	**ATRAUMATIC RESTORATIVE TREATMENT** Helpful for patients that can't tolerate the noise, smell or vibration of the handpiece Helpful for minimally invasive restorations where a bulk of material is needed for esthetics
SMART	**SILVER MODIFIED ATRAUMATIC RESTORATIVE TREATMENT** 'Two step' Caries removal is not always necessary, however, it is sometimes necessary if the goal is to place an esthetic restoration
CONVENTIONAL RESTORATIVE DENTISTRY	Helpful for clinicians that struggle with selective caries removal Preserves healthy tooth structure Cavity cleanser, improves bond strength

133

Jeanette MacLean Budd
Mar 24, 2021 ·

Chemomechanical caries removal with Brix 3000 or PapaCarie Duo. Papain enzyme (derived from papaya) dissolves the carious dentin, softening it for easy removal by gentle spoon hand excavation and/or slow speed round bur. No local anesthetic or sedation necessary. A nice adjunct for anterior aesthetic atraumatic restorative treatment (ART)

134

Is there a CDT code for Papacarie Duo?

- NO
- You don't bill out a separate procedure code
- It would be part of the restorative code, like a DryShield, bur, etch, etc.
- Document in the clinical, along with the other materials you use

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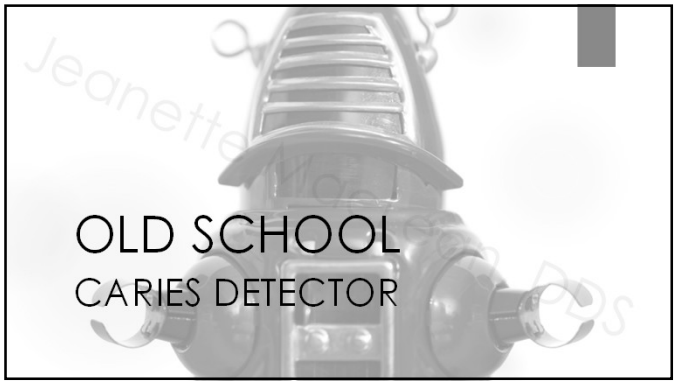
OLD SCHOOL
CARIES DETECTOR

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NEW SCHOOL
SELECTIVE CARIES REMOVAL

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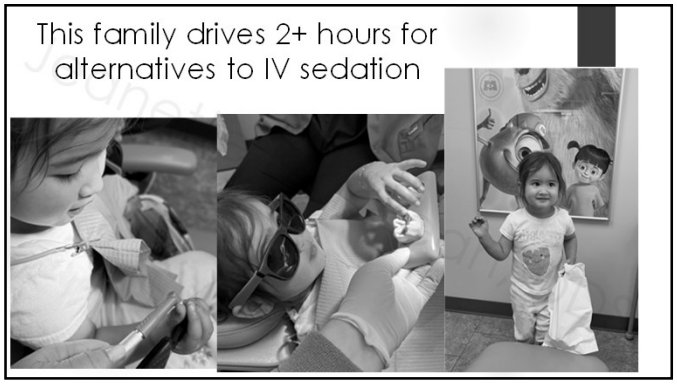
This family drives 2+ hours for alternatives to IV sedation

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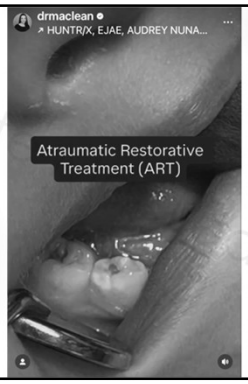
Papacarie ART



@drmaclean

139

Frencken re: ART vs. ITR

- "To name as "interim" a dental procedure (ART) that has evidence that its survival percentages is not significantly different from amalgam and resin composite in single-surface cavities is to say that amalgam and resin composite restorations should not be considered permanent procedures."

140

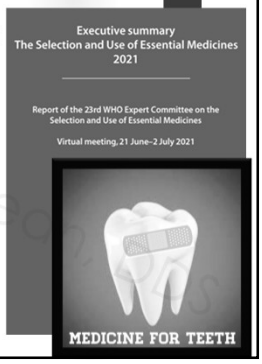
2941
Deleted from CDT codes in 2025

2940
Now use for both primary and permanent "interim" restorations

141

World Health Organization
October 2021

- "Essential Medicines"
  - SDF
  - GIC
  - Fluoride Toothpaste



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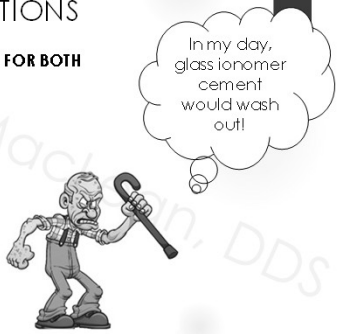
GIC MISCONCEPTIONS

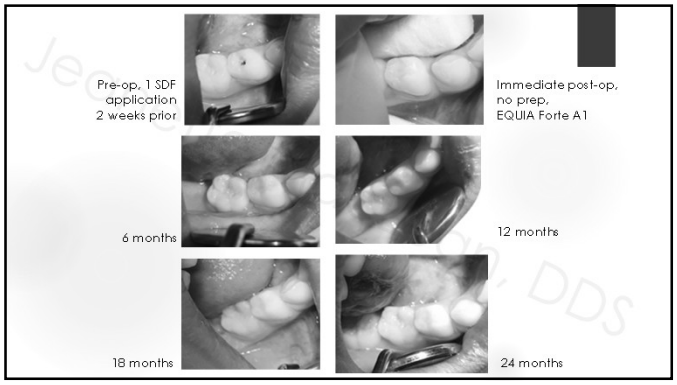
GLASS IONOMERS CAN BE USE FOR BOTH "INTERIM" AND "DEFINITIVE" RESTORATIONS



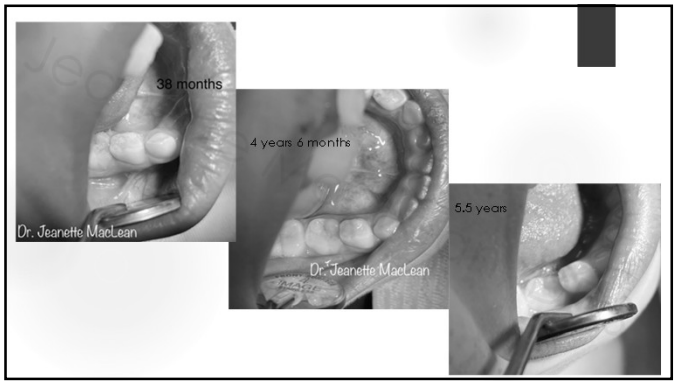
143

Sometimes the "interim" restoration becomes the definitive treatment

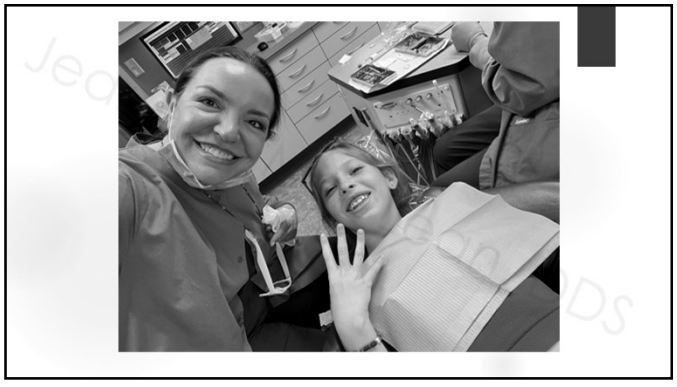
144


Pre-op, 1 SDF application 2 weeks prior
Immediate post-op, no prep, EQUIA Forte A1
6 months
12 months
18 months
24 months

145


38 months
4 years 6 months
5.5 years
Dr. Jeanette MacLean
Dr. Jeanette MacLean

146



147

6 years later…

148

#S exfoliates naturally!

"DEFINITIVE" SMART

- SDF applied 10/5/17
- EQUIA Forte placed 11/2/17
- Sheds December of 2023
- I paid better than the Tooth Fairy

149

Glass Hybrid Restorative

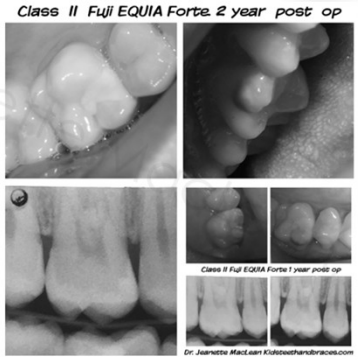
- Bulk fill
- Biocompatible
- Increased flexural strength
- Max fluoride release
- Antimicrobial
- Hydrophilic
- Wear resistant
- Esthetic
- Self-cure

150

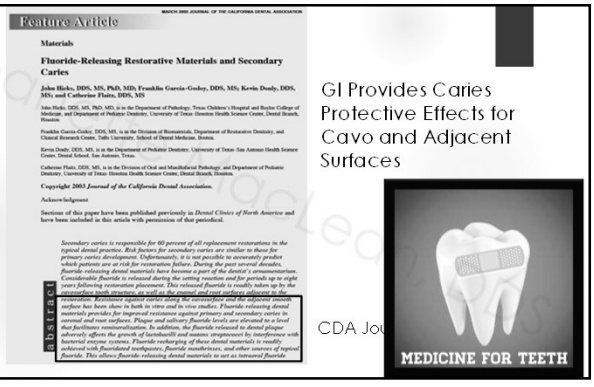
MANDIBULAR PERMANENT INCISOR BONDING ON MY DAUGHTER!

Thank you Nowak strip crown form!

151



152



GI Provides Caries Protective Effects for Cavo and Adjacent Surfaces

CDA Jou

153

TRAC Research by Rella Christensen, RDH, PhD

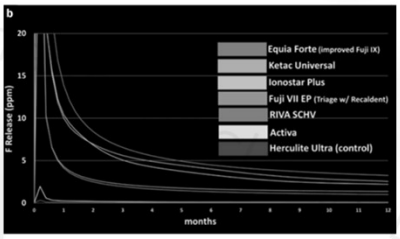


Figure 9. In vitro fluoride release in parts per million from 7 restorative materials we assayed weekly for one year. In **Figure 9a**, the scale of this graph allows the reader to see the typical spike in fluoride release that occurs within the first 24 hours after placement. The scale in **Figure 9b** allows the reader to see the differences in fluoride release among the 7 products tested. EQUIA Forte showed the consistently highest fluoride release throughout the one-year test.

154

TRAC Research by Rella Christensen, RDH, PhD

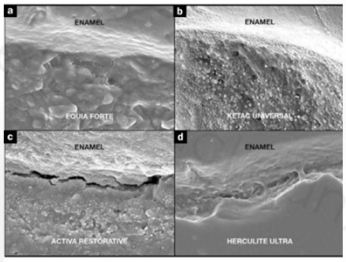


Figure 8. Scanning electron microscope images of replicas made in vivo of one-year margins of restorations serving clinically. **Figures 8a** and **8b** show examples of the excellent margin seal of EQUIA Forte (GC America) and Ketac Universal (3M) conventional glass ionomer (GI) products. **Figures 8c** and **8d** show examples of the separation at the tooth-material interface typical of non-GI, current dental products.

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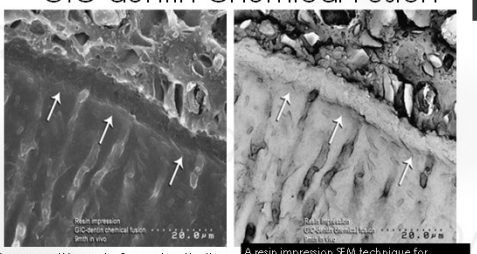
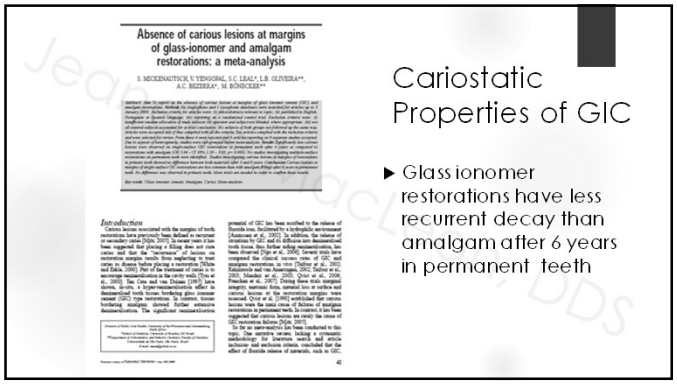
GIC-dentin Chemical Fusion



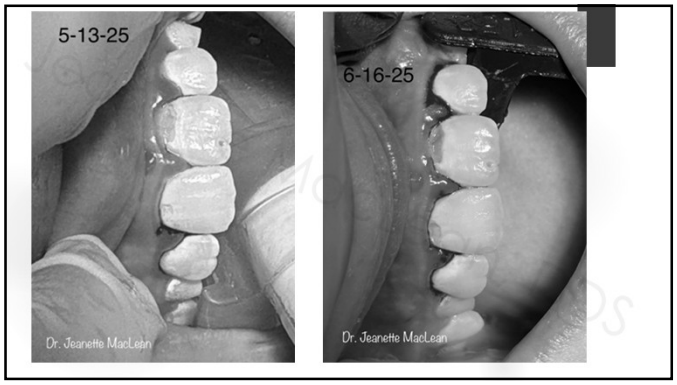
Ionic constituents from both the GIC and the underlying dentin

A resin impression SEM technique for examining the glass–ionomer cement chemical fusion zone. Millichi G. Journal of Microscopy, Vol. 217, Pt 1 January 2005, pp. 44–48

156


Absence of carious lesions at margins of glass-ionomer and amalgam restorations: a meta-analysis
Cariostatic Properties of GIC
Glass ionomer restorations have less recurrent decay than amalgam after 6 years in permanent teeth

157


5-13-25
6-16-25
Dr. Jeanette MacLean
Dr. Jeanette MacLean

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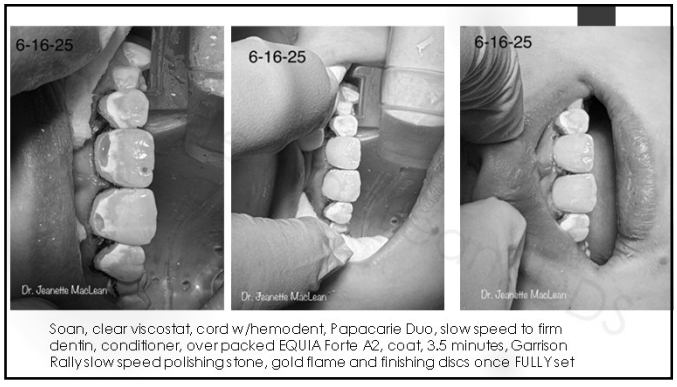
6-16-25
6-16-25
6-16-25
Dr. Jeanette MacLean
Dr. Jeanette MacLean
Dr. Jeanette MacLean
Soan, clear viscostat, cord w/hemodent, Papacarie Duo, slow speed to firm dentin, conditioner, over packed EQUIA Forte A2, coat, 3.5 minutes, Garrison Rally slow speed polishing stone, gold flame and finishing discs once FULLY set

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Survival of ART and Amalgam Restorations in Permanent Teeth of Children after 6.3 Years

Frencken et al J Dent Res 2006

"We conclude that the restorations produced with the ART approach, with high-viscosity glass ionomer, survived longer than those produced with the traditional approach, with amalgam, in the permanent teeth of young children. We recommend the ART approach as a complement to the preventive activities in the Syrian school oral health programs."

RESEARCH REPORTS
Clinical

J.E. Frencken*, D. Taifour², and M.A. van 't Hof³

Survival of ART and Amalgam Restorations in Permanent Teeth of Children after 6.3 Years

J Dent Res 85(7):622-626, 2006

ABSTRACT

INTRODUCTION

MATERIALS & METHODS

Sampling Procedure

Implementation

KEY WORDS: restorations, atraumatic restorative treatment, amalgam, glass ionomer, survival.

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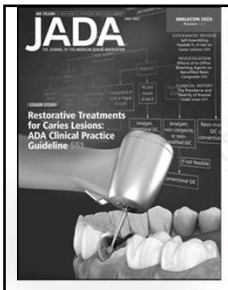
Evidence-based clinical practice guideline on restorative treatments for caries lesions



Vineet Dhar, BDS, MDS, PhD, Lauren Pilcher, MSPH, Margherita Fontana, DDS, PhD, Carlos González-Cabezas, DDS, MSD, PhD, Martha Ann Keels, DDS, PhD, Ana Karina Mascarenhas, BDS, MPH, DrPH, Marcelle Nascimento, DDS, MS, PhD, Jeffrey A. Platt, DDS, MS, Gregory J. Sabino, DDS, PhD, Rebecca Slayton, DDS, PhD, Norman Tinanoff, DDS, MS, Douglas A. Young, DDS, EdD, MBA, MS, Domenick T. Zero, DDS, MS, Saran Pahlke, MS, Olivia Urquhart, MPH, Kelly K. O'Brien, MLIS, Alonso Carrasco-Labra, DDS, MSc, PhD

The Journal of the American Dental Association
Volume 154 Issue 7 Pages 551-566.e51 (July 2023)
DOI: 10.1016/j.adaj.2023.04.011

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KEY FINDING FOR ADVANCED LESIONS:

- More conservative caries tissue removal approaches were associated with fewer clinical failures

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Many US trained dentists are still "Bondodontists"

- Complete caries removal
- Extension for prevention
- Drilling based on color vs. hardness

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THIS IS NOT A 'NEW' CONCEPT

OLD NEWS

Vol. 23, No. 19 *Est. 1923* *Fall 2018*

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Treatment of deep carious lesions by complete excavation or partial removal
A critical review

ABSTRACT

JADA 2008

Background. The classical approach to treatment of deep carious lesions approaching the pulp mandates removing all infected and affected dentin. Several studies call this approach into question.

Clinical Implications. There is substantial evidence that removing all vestiges of infected dentin from lesions approaching the pulp is not required for caries management

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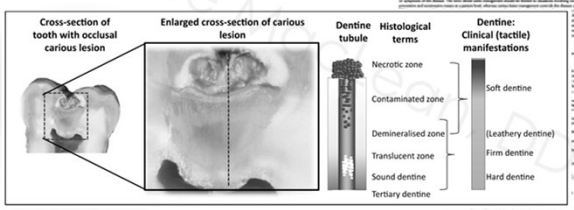
International Caries Consensus Collaboration 2016



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Implications for practice

- Two important recommendations of this guideline highlight the prioritization of more conservative CTR to treat advanced caries lesions on primary and permanent teeth over nonconservative CTR.
- A paradigm shift in the last 20 years to preserve healthy tooth structure has changed how clinicians should treat advanced lesions.
- The panel urges clinicians to use more conservative CTR approaches that align with restorative dentistry's 2 main aims: preserving healthy tooth structure and protecting the pulp-dentin complex.

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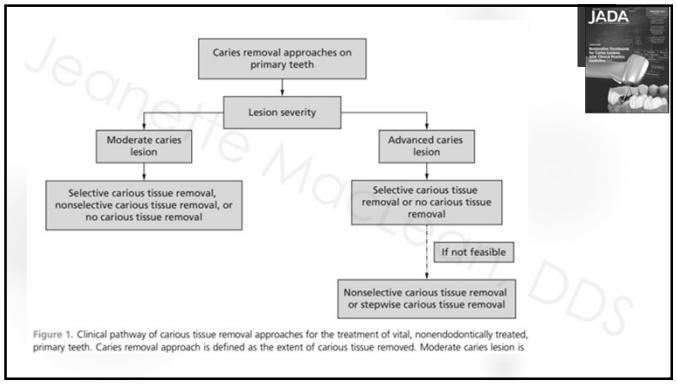

Figure 1. Clinical pathway of carious tissue removal approaches for the treatment of vital, nonendodontically treated, primary teeth. Caries removal approach is defined as the extent of carious tissue removed. Moderate caries lesion is

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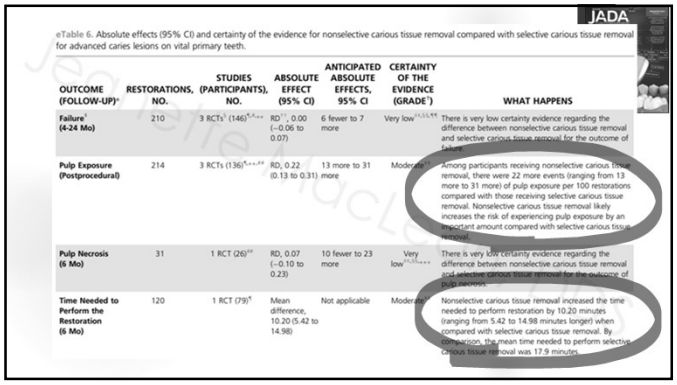

eTable 6. Absolute effects (95% CI) and certainty of the evidence for nonselective carious tissue removal compared with selective carious tissue removal for advanced caries lesions on vital primary teeth.

OUTCOME (FOLLOW-UP)[a]	RESTORATIONS, NO.	STUDIES (PARTICIPANTS), NO.	ABSOLUTE EFFECT (95% CI)	ANTICIPATED ABSOLUTE EFFECTS, 95% CI	CERTAINTY OF THE EVIDENCE (GRADE[b])	WHAT HAPPENS
Failure[c] (4-24 Mo)	210	3 RCTs[3] (146)[d,e,f,g,h]	RD[i], 0.00 (−0.06 to 0.07)	6 fewer to 7 more	Very low[j,k,l,m]	There is very low certainty evidence regarding the difference between nonselective carious tissue removal and selective carious tissue removal for the outcome of failure[c]
Pulp Exposure (Postprocedural)	214	3 RCTs (136)[d,e,f,g,h,n]	RD, 0.22 (0.13 to 0.31)	13 more to 31 more	Moderate[o,p]	Among participants receiving nonselective carious tissue removal, there were 22 more events (ranging from 13 more to 31 more) of pulp exposure per 100 restorations compared with those receiving selective carious tissue removal. Nonselective carious tissue removal likely increases the risk of experiencing pulp exposure by an important amount compared with selective carious tissue removal
Pulp Necrosis (6 Mo)	31	1 RCT (26)[d,q]	RD, 0.07 (−0.10 to 0.23)	10 fewer to 23 more	Very low[r,s,t,u,v,w,x]	There is very low certainty evidence regarding the difference between nonselective carious tissue removal and selective carious tissue removal for the outcome of pulp necrosis
Time Needed to Perform the Restoration (6 Mo)	120	1 RCT (79)[y]	Mean difference, 10.20 (5.42 to 14.98)	Not applicable	Moderate[z]	Nonselective carious tissue removal increased the time needed to perform restoration by 10.20 minutes (ranging from 5.42 to 14.98 minutes longer) when compared with selective carious tissue removal. By comparison, the mean time needed to perform selective carious tissue removal was 17.9 minutes

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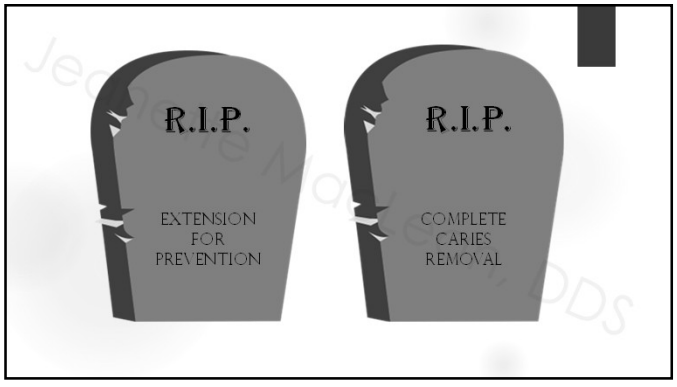

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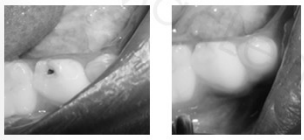
SMART = Silver Modified Atraumatic Restorative Treatment

- Silver Diamine Fluoride (SDF) to arrest and remineralize
- Glass Inomer Cement (GIC) to restore and remineralize



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'Same Day' SDF + GIC will turn gray

Typical long term appearance of SDF treatment + same day placement of a self-cure GIC

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Selective caries removal, especially with prior SDF application, may have some discoloration

Typical appearance of SDF arrested decay + placement of GIC on a separate day (EQUIA)

The GIC stays white, but visible gray at margins Due to no removal of tooth structure

And that's ok!

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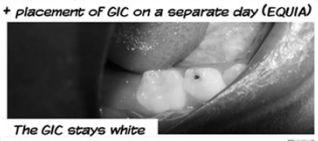
No caries tissue removal may look white once masked by EQUIA Forte, because it is very opaque

BUT, it is also an option to do selective removal with a slow speed round bur or even high speed carbide, typically without the need for local anesthetic thanks to the SDF desensitization

Typical appearance of SDF arrested decay + placement of GIC on a separate day (EQUIA)



The GIC stays white when not retreating with SDF same day

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High Viscosity Glass Ionomer Cement HVGIC or Glass Hybrid Restoratives

176

GIC Material Options

- Fillings with High Viscosity GIC/ GLASS HYBRID RESTORATIVES
  - Fuji EQUIA Forte (new and improved Fuji IX) + new HT
  - You can use for everything!
- Sealants with Low Viscosity GIC
  - Fuji Triage (we'll discuss more in the PM workshop)
- Fillings with Resin Modified Glass Ionomer (RMGI) – a good option for situations in which you want to light cure for speed
  - Fuji II LC (we'll discuss more in the PM workshop)
  - Primary Class II, III (tip – use Fuji coat like bond to finesse/seal)
- Hall crowns
  - SSCs
  - Seated with a GIC such as Fuji CEM2 or automix tip Fuji CEM Evolve

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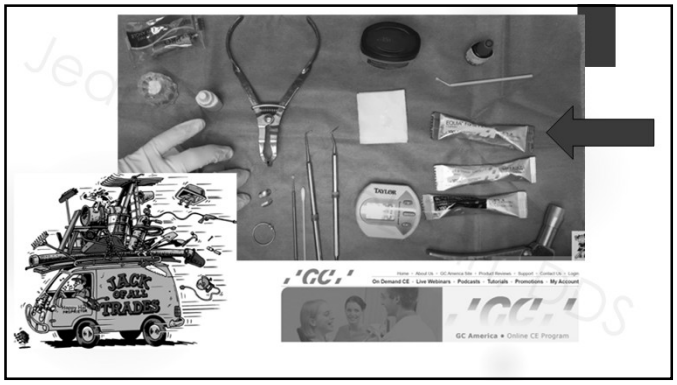

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LEARNING CURVE

179

EQUIA Forte is like "white amalgam"

180

Basic Aesthetic SMART

- SDF applied at exam
- Patient returns in 2-4 weeks for re-eval
- Lesion is matte black and ideally has sound margins
  - Remove soft dentin with hand instruments or slow speed round bur if needed or tolerated, this is optional but it can improve long term retention and performance of the restoration

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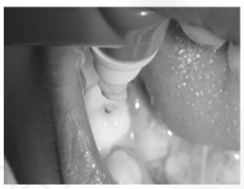
- Clean with plain pumice



- Apply PAA for 10 seconds

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Cavity Conditioner "PAA" = Polyacrylic Acid

- PAA and phosphoric acid etch for resin composite are NOT the same thing!
- PAA should be used whenever possible for SMART and GIC restorations
- Improves chelation and chemical bond
- A bonding agent is NOT necessary

- GC Cavity Conditioner =
  - 20% Polyacrylic Acid: removes the smear layer to enhance the bond of GIC to enamel and dentin
  - 3% Aluminum Chloride Hexahydrate seals dentinal tubules to reduce sensitivity

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- Rinse, dry, but DO NOT DESSICATE
  ***remember GIC needs moisture to set
  "rinse" with wet gauze
  "dry" with dry gauze
  (vs. air/water syringe)

- Isolate

185

Turn suction isolation systems WAY down or OFF

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PREPARE GI RESTORATIVE

187

Basic Capsule Mixing Steps

1. Remove from wrapper immediately before use
2. Tap capsule on its side to loosen the glass particles

188

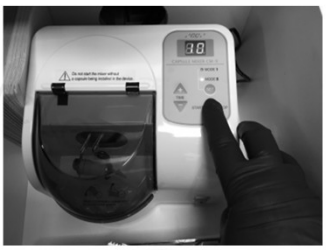
3. To activate the capsule, push the plunger until it is flush with the main body and hold it down for 2 seconds

189

4. Ensure the plunger is fully pressed to avoid the incorrect mixing ratio of powder and liquid
5. The capsule should be activated just before mixing and used immediately

190

5. Place in capsule mixer and mix for 10 seconds



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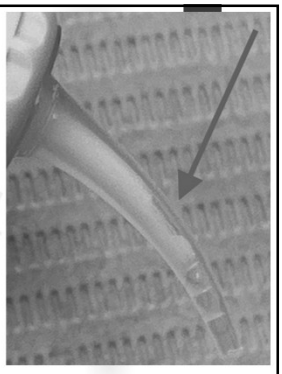
WORKING TIME IS SHORT!

192

Place capsule into the applicator gun and click twice to extrude material through the tip

193

Express some of the material out before using on the tooth, watch for air bubbles



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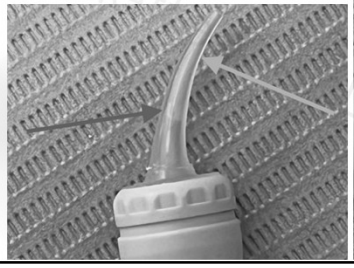
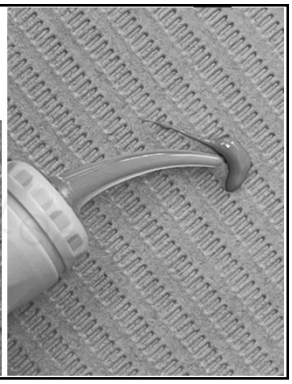
This will help eliminate voids or material that isn't evenly mixed



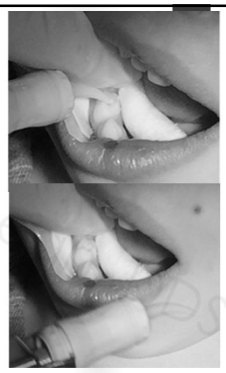


195

WORKING TIME IS SHORT!

196

- Activate and triturate your HVGIC according to the manufacturer's specifications
  - In this example I am using Fuji EQUIA Forte
- Set a timer for 2 ½ minutes (3.5 for Class II)
- Apply the material to the cavity using the applicator gun (some use their finger, though I feel I have more control with the applicator)
- You can "finger press" the material with your gloved finger for large scale adaptation like sealants, ITR, large occlusals



197

- Working time is SHORT
  - Get into place QUICKLY, setting time can vary depending on heat and humidity
    - EQUIA=1 minute 15 seconds working time
    - With experience, you will SEE and FEEL when it's time to LEAVE IT ALONE!!
- Options to press it into place; condenser, damp Q-tip, finger, or microbrush/instrument dipped in coat
- Remove excess (microbrush, explorer, Hollanback) if time allows, otherwise LEAVE IT ALONE and remove with a finishing bur AFTER it is fully set
- Over manipulating this material beyond the working time will disrupt the glass matrix and the material will not be ideal

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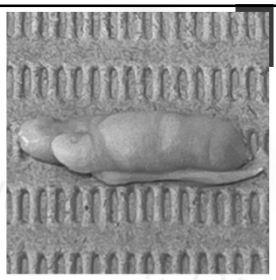
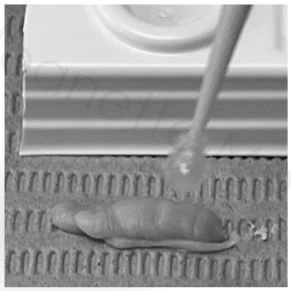
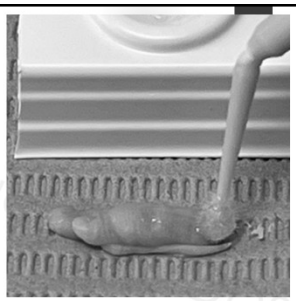
If it starts to look like parmesan cheese, it's going to fail…

199

Work the material while it's still "shiny"
Once it's "dull," leave it alone, apply coat, or varnish, and then just allow it to finish setting/light cure

200

Applying coat to EQUIA

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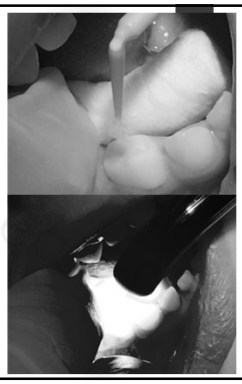
- Apply Fuji Coat and light cure
- Provides a barrier to saliva while the glass achieves/reaches ideal properties
- Light cure 20 seconds



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TO COAT OR NOT TO COAT??

- IDEALLY, YES
  - I ADAPT MY FILLINGS USING A MICROBRUSH DIPPED IN COAT
- IF WIGGLY AND SPITTY, OK TO SKIP IT
- OTHER OPTIONS = VARNISH OR VASELINE
- I DON'T APPLY A 2ND COAT AFTER ADJUSTING

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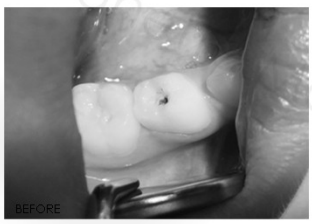
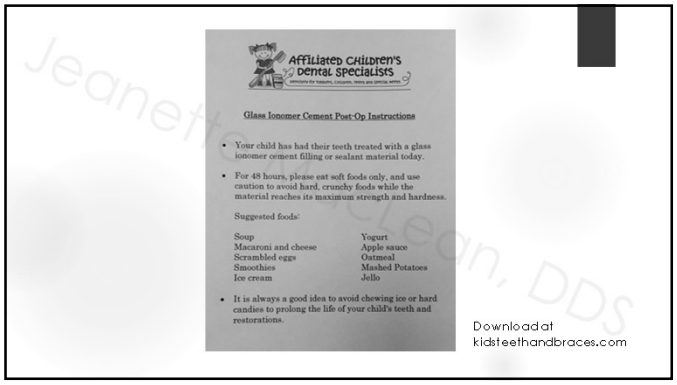
The Finished Product

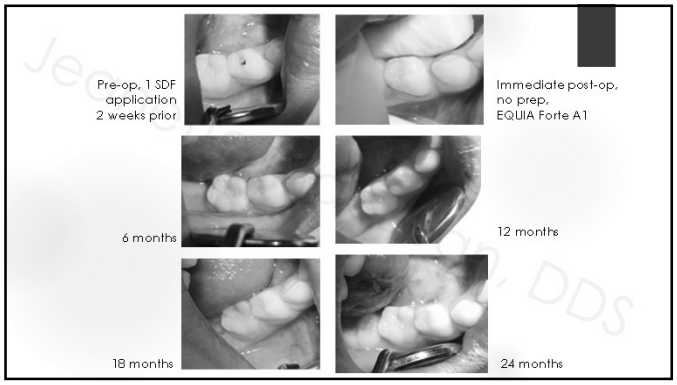


- Instruct the patient to avoid chewing hard foods for 48 hours

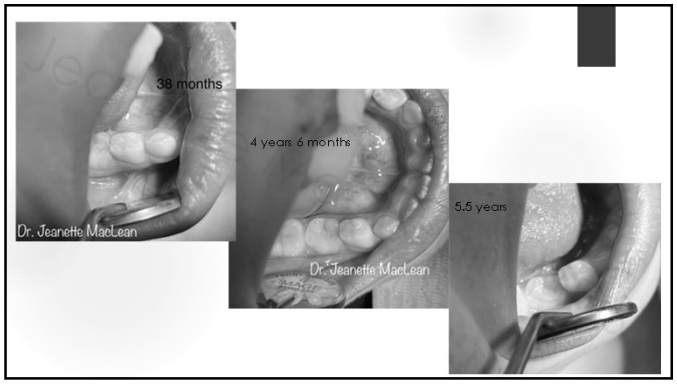
204


Affiliated Children's Dental Specialists
Glass Ionomer Cement Post-Op Instructions
Your child has had their teeth treated with a glass ionomer cement filling or sealant material today.
For 48 hours, please eat soft foods only, and use caution to avoid hard, crunchy foods while the material reaches its maximum strength and hardness.
Suggested foods:
Soup
Macaroni and cheese
Scrambled eggs
Smoothies
Ice cream
Yogurt
Apple sauce
Oatmeal
Mashed Potatoes
Jello
It is always a good idea to avoid chewing ice or hard candies to prolong the life of your child's teeth and restorations.
Download at kidsteethandbraces.com

205

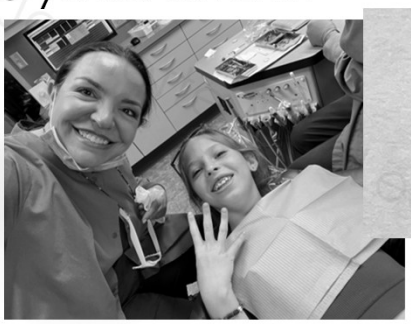

Pre-op, 1 SDF application 2 weeks prior
Immediate post-op, no prep, EQUIA Forte A1
6 months
12 months
18 months
24 months

206


38 months
Dr. Jeanette MacLean
4 years 6 months
Dr. Jeanette MacLean
5.5 years

207

6 years later…



208

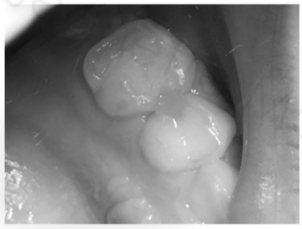
CLASS V

eTable 14. Absolute effects (95% CI) and certainty of the evidence for resin-modified glass ionomer cement compared with hybrid resin composite for Class V restorations on vital anterior and posterior permanent teeth combined.

OUTCOME (FOLLOW-UP, MO)[a]	RESTORATIONS, NO.	STUDIES (PARTICIPANTS), NO.	ABSOLUTE EFFECT, RISK DIFFERENCE (95% CI)	ANTICIPATED ABSOLUTE EFFECTS, 95% CI	CERTAINTY OF THE EVIDENCE (GRADE)	WHAT HAPPENS
Restoration Loss (36)	102	1 randomized controlled trial (30)[a]	−0.08 (−0.20 to 0.05)	20 fewer to 5 more	Low[b,c]	Among participants receiving resin-modified glass ionomer cement restorations, there were 8 fewer events (ranging from 20 fewer to 5 more) of restoration loss per 100 participants compared with those receiving hybrid resin composite restorations. Resin-modified glass ionomer cement may decrease the risk of experiencing restoration loss by an important amount compared with hybrid resin composite
Unacceptable Marginal Adaptation (36)	90	1 randomized controlled trial (30)[a]	−0.05 (−0.17 to 0.07)	17 fewer to 7 more	Low[b,c]	Among participants receiving resin-modified glass ionomer cement restorations, there were 5 fewer events (ranging from 17 fewer to 7 more) of unacceptable marginal adaptation per 100 participants compared with those receiving hybrid resin composite restorations. Resin-modified glass ionomer cement may decrease the risk of experiencing unacceptable marginal adaptation by an important amount compared with hybrid resin composite

209

CLASS II



- For Class II in primary teeth

210

Clinical performance of glass ionomer cement and composite resin in Class II restorations in primary teeth: A systematic review and meta-analysis. Dias AGA et al. J Dent. 2018


Journal of Dentistry
Volume 71, June 2018, Pages 1-11

Review article

Clinical performance of glass ionomer cement and composite resin in Class II restorations in primary teeth: A systematic review and meta-analysis

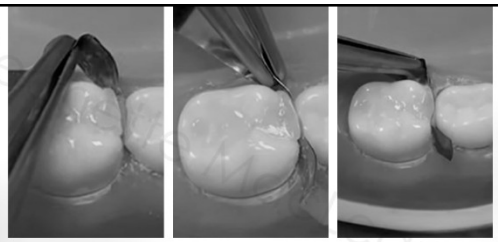
Ana Giselle Aguiar Dias a b, Marcela Baraúna Magno c, Alberto Carlos Botazzo Delbem d, Robson Frederico Cunha b, Lucianne Cople Maia c, Juliana Pelim Pessan a

"GIC and CR presented similar clinical performance for all criteria analyzed, except for secondary carious lesions, in which GIC presented superior performance, especially for the resin-modified GIC and with rubber dam isolation."

211

Gently tease the band away from the EQUIA Forte

212



Slide the band out laterally to the side
(twirl it "like a sardine can")
Do NOT pull up occlusally or you could fracture the marginal ridge or box ("white amalgam")

213

Twirl it 'like a sardine can"

214

215

GARRISON POLISHING STONES
FINISHING BURS

Rally™ Composite Mini Polisher Refills

- USE WATER SPRAY WITH THE SLOW SPEED LATCH STONE
- BE CAUTIOUS ON EQUIA FORTE WITH BURS, HASN'T REACHED MAXIMUM HARDNESS (LIKE WAITING TO POLISH AMALGAM)

216

GIC Restorative Tips

- Isolation suction systems help reduce chair time
- Prep and place restorations in ⅓ of the mouth at the same time (vs. quadrant dentistry)
- Bulk-fill
- Lower suction to prevent dry-out
- Use excess material in the capsule as the sealant for other teeth

217

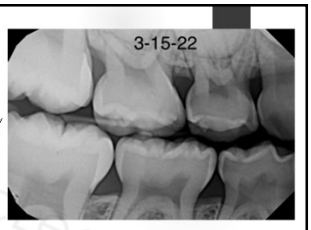
RMGI Appearance Over Time (Fuji II LC)

- Will wear over time, especially in an acidic mouth
- Color can darken
- Still prevents caries and does not have to be replaced!
- You can add glass to glass, but it's not necessary
- Placing with Fuji Coat can help reduce wear
- EQUIA Forte and EQUIA Forte HT are wear resistant and color stable, but initially softer and longer setting time (refer to tips in Class II slide)

218

6-year-old

- 4 quads of kissing proximal lesion
- Mom has extremely high dental anxiety
- SDF applied
- Fuji II LC fillings w/N2O on the larger lesions
- Post-nasal drip
- Mouth breathing
- Dry lips
- Recommended allergist consultation



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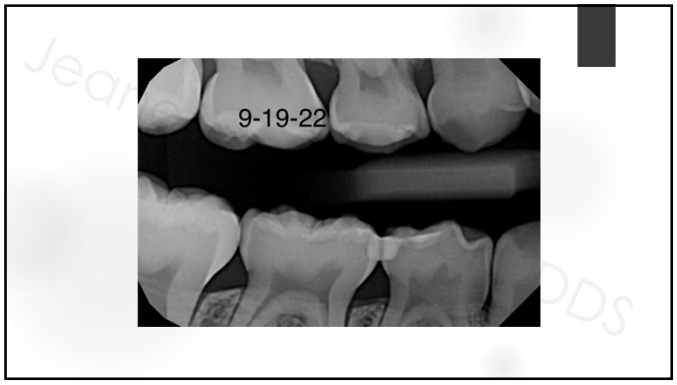

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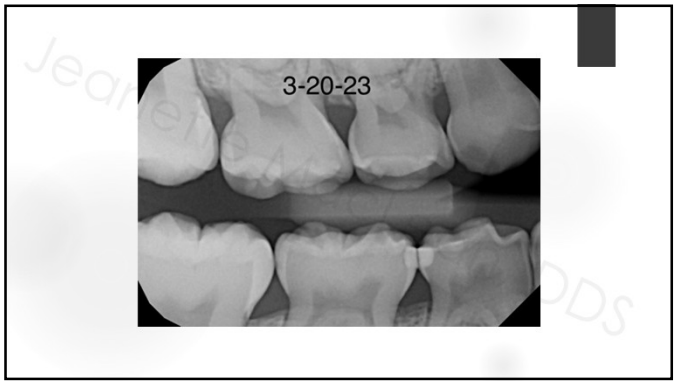

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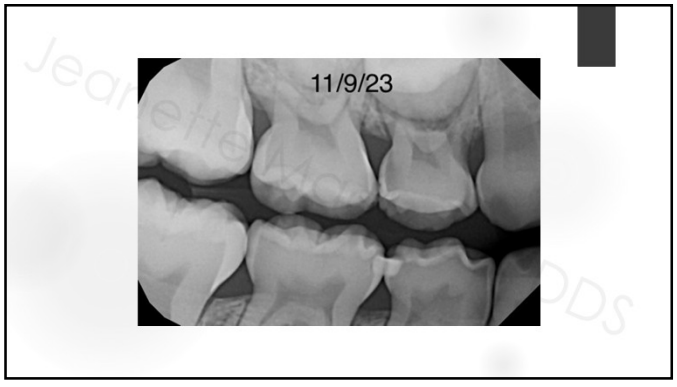


222

223

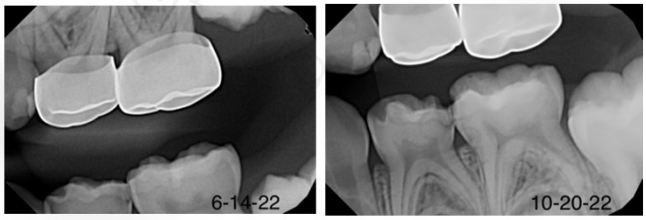
Looks way better to mean than 4 quads of failed Class II resins with recurrent caries!

- Kinder, gentler to the child
- Faster, less invasive than crowns
- Easier isolation
- Less chair time
  - Vs. etch, bond, 2mm increments (seal), curing each step…
- Happier parent (vs. an 8 pack of SSCs and/or IV SED)
- Reduced recurrent caries
- Reduced hypersensitivity

224

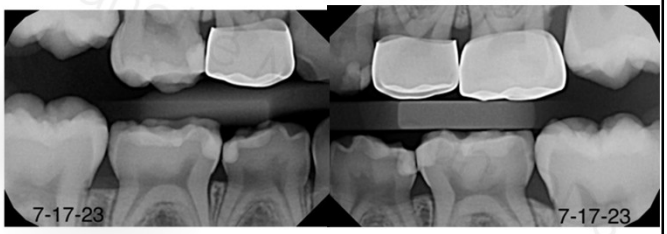
225

Mom opted to have SDF applied to the margins of the existing fillings to buy time



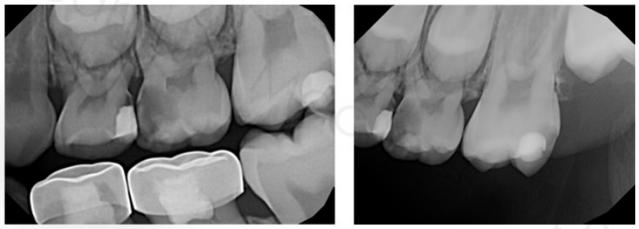
226

I eventually had to replace every class II resin due to fractures and recurrent caries



227

Another new patient with recurrent caries and failed resin restorations

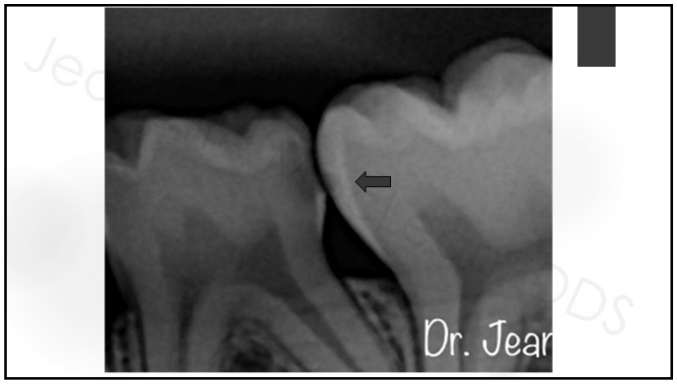


228

Successful "Failures"

229

230



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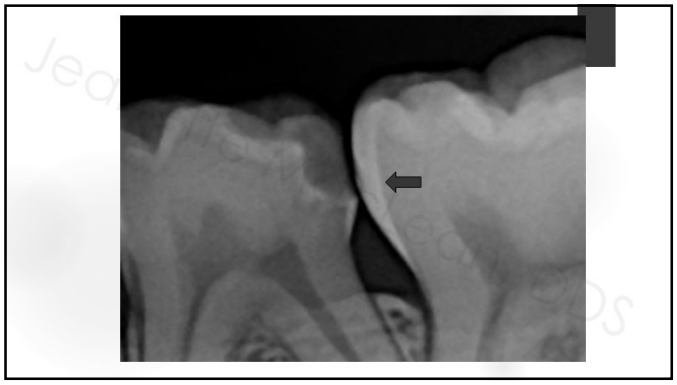


232

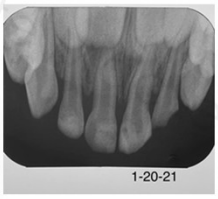

Crown forms were left in place
for removal at a future visit
All Finished!

233


6/24/19

234

Gary 1.5 Year Follow Up



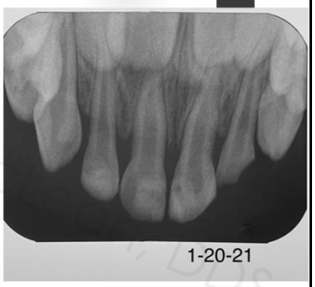
235

Chipped natural tooth too!

Remineralized & hard as a rock!

236

237



238

"Electron probe microanalysis demonstrated that both fluorine and strontium ions had penetrated deep into underlying demineralized dentin. The pattern was consistent with remineralization. The only source of these ions was the glass ionomer restoration."

239

"Bill what you do"

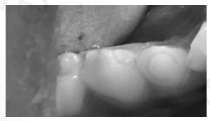
- We do not charge by the hour, it's the procedure accomplished
- Warranty as you would any other conventionally placed restoration
- Clinical trial evidence demonstrates ART, SMART, and HT are equivalent, if not superior, to conventional surgical interventions, so why value it any less?

240

"Interim"

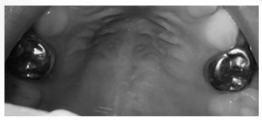
MIH in phobic 7 yo treated with SDF + HVGIC = 2940

"Definitive"



SDF + HVGIC ART = 2391 occlusal comp (2 year post-op)

"Definitive"



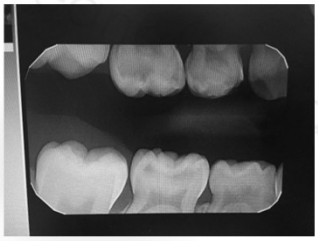
SDF + SSC = 2930 Hall Technique (2 year post-op)

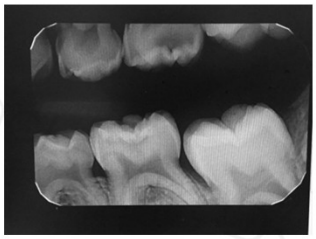
241

Case Studies

242

5/1/18 x-rays from previous provider





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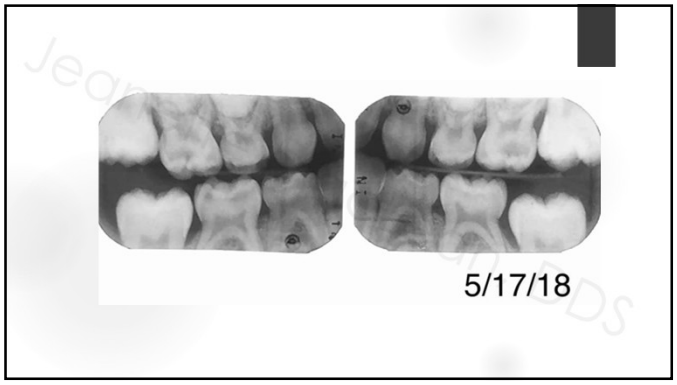
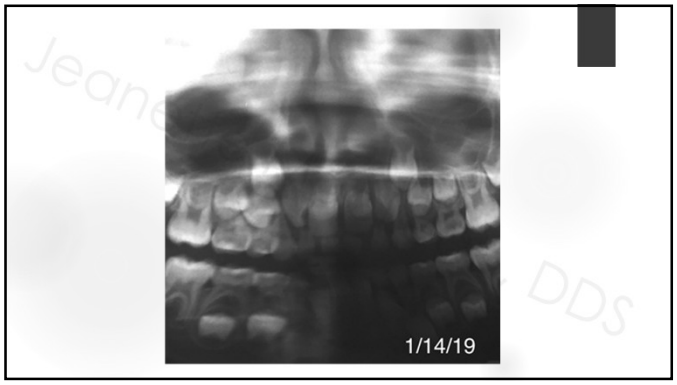

5/17/18

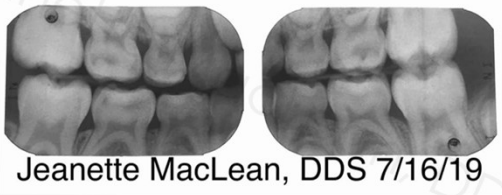
244


1/14/19

245

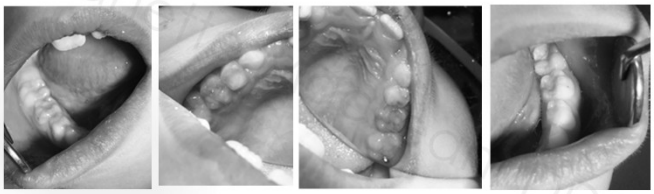

1 year later...
Dr. Jeanette MacLean kidsteethandbraces.com

246



247

Near 2 year follow up



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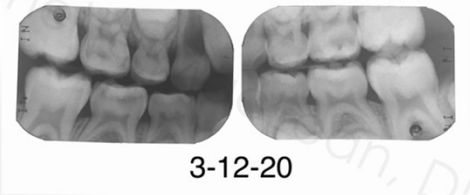
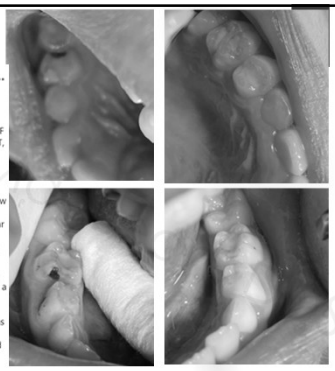


249

3 year follow up



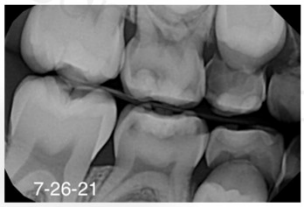
Jeanette MacLean Budd
July 26 ·

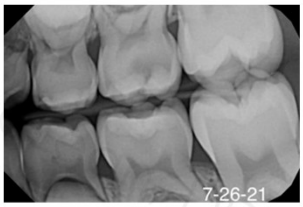
3 YEAR FOLLOW UP

Updated BWs and clinical photos. Patient will be 9 on Saturday. She chipped #B, which is very loose & about to exfoliate so I applied SDF & will let it fall out since it wasn't bothering her, and the mesial of #T, so I added EQUIA since it was bothering her tongue, but otherwise asymptomatic. I had recommended to add GIC to these 2 teeth last September because there was some wear and tear, but she had just been diagnosed with Type I diabetes, so time slipped away. She definitely could have been an 8-pack, with Hall crowns, but given how well she's done, and the esthetics concerns, we mutually agreed to keep it simple with a little more GIC on #T. Nice case to show how far you can get with ART/SMART & sealing carious lesions. Interesting fact, she said she notices she does most of her chewing on the right side.

14 month follow up on SMARTs for all 8 primary molars. Front teeth were caries free. This was a second opinion for GA and pulp/SSC on a 5 (now 6) year old, (GA was the only option given at previous pedo office). Teeth were asymptomatic and clinically had lots of sound enamel, though parents were warned we may need to do Hall crowns if the EQUIA Forte didn't hold up. Still asymptomatic and in good shape more than a year later. We will continue to monitor for sealed margins, radiographic stability of the lesions, and secondary dentin formation.

250





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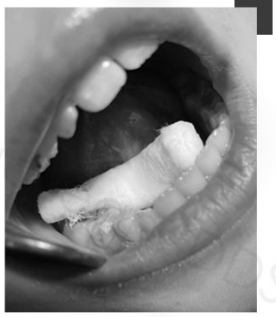

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3.75 year
2-1-22
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4.5 year follow up
4.5 year SMART follow-up
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4.5 year SMART follow-up
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4.5 year SMART follow-up
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4.5 year SMART follow-up
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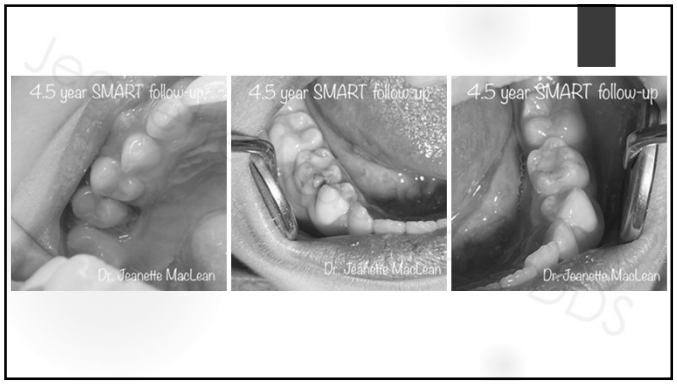
4.5 year SMART follow-up
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4.5 year SMART follow-up
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4.5 year SMART follow-up
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5 year follow up
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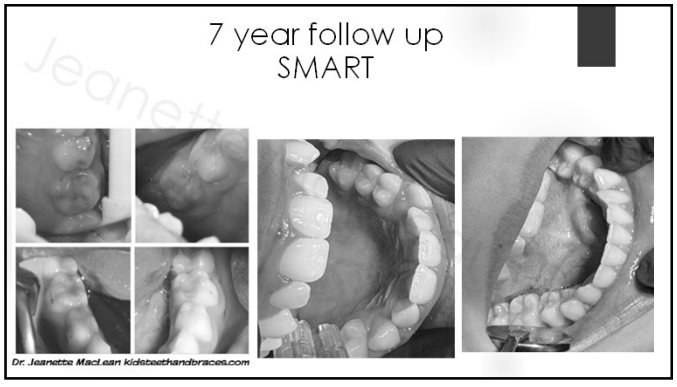
7 year follow up
SMART
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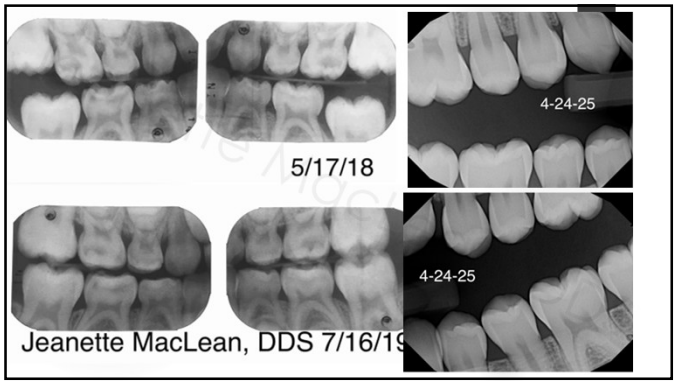

259

From Doug Young

- Partial caries removal will always look the same (radiolucent) in the dentin on a radiograph. That goes for active or arrested, remin or demin, or even infected dentin. Enamel lesions often can appear to regress on a radiograph when remineralized but dentin has less mineral by volume and improvement is difficult or impossible to detect on a radiograph. I teach that a radiolucency under a filling can be three things:
  - 1. Recurrent decay
  - 2. Nonradiopaque dental material
  - 3. Partial caries removal (infected, affected, remin, demin, etc.)
- Only recurrent decay needs a new restoration and you simply tell this by clinical exam of the margins. It needs to have an open margin for bacteria to get in. #2 and #3 still have sealed margins....no treatment needed

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Sealed caries arrest

261

262

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SMART Restorations

- Sealants
- Fillings
- Crowns (Hall Technique)

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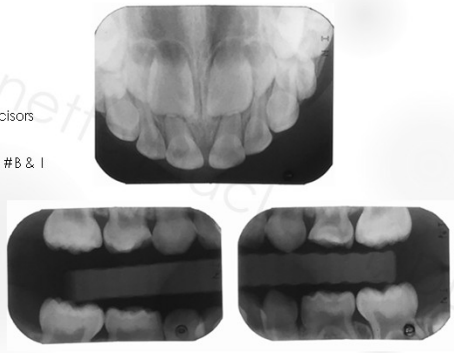
265

Minimally Invasive Combo Platter

266

- SDF only for incisors
- SMART for #L
- SMART Hall for #B & I



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WORKFLOW STRATEGIES

- Offer same-day treatment when possible
  - Team members begin the discussion
  - Show AI, models, brochures, chairside guide, 'get ready'
  - But also offer an "out"
- Depending on patient cooperation
  - If they're wiggly, apprehensive, and/or first-timers, I will do SDF & seals myself with an assistant
    - Learning curve
    - Typically adds +/- 5 minutes to the visit
  - Reasonably cooperative
    - Delegate to team (ex: RDA applies GIC sealant)
    - Or have 2 team members help (ex: assisted RDH)

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Utilize Handouts

Downloads available;
Kidsteethandbraces.com

Icon Smooth Surface
Effective treatment for white spots

270

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272


Dental Sealants
Protecting teeth, preventing decay
Utilize Visual Aids

273

Imagination is often worse than reality

274

BE PREPARED

275

'Kits' and mixers available in the Open Bay in addition to the New Patient and Quiet Rooms/Ops

276

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CARIES IS A CHRONIC DISEASE THAT IS MANAGED IN PARTNERSHIP WITH PATIENTS ACROSS THE LIFE SPAN

278

REMEMBER

- The tooth is connected to a child
- The child is connected to a family
- Each family has a unique story, with their own challenges and goals

279

Why choose to over-complicate something when the evidence has shown us it's not necessary ?

280

Don't Know, Can't Do, Won't Change: Barriers to Moving Knowledge to Action in Managing the Carious Lesion

"The failure to follow new evidence is not limited to dentists who are "out of touch," do not undertake continuing professional development, or have been practicing for many years; in some countries and some schools, new dentists are still taught to remove all infected carious tissue, and it is actually not possible to pass professional examinations without demonstrating this. The reasons underlying this failure to translate evidence into clinical practice are many and complex."

"The "don't know" could be due to general ignorance (perhaps remedied with an appropriate educational intervention) or the more problematic willful ignorance, where the subject chooses not to learn more about a topic (perhaps because it challenges his or her current beliefs)."

Invited Editorial

Don't Know, Can't Do, Won't Change: Barriers to Moving Knowledge to Action in Managing the Carious Lesion

N.P.T. Innes[1], J.E. Frencken[2], and F. Schwendicke[3]

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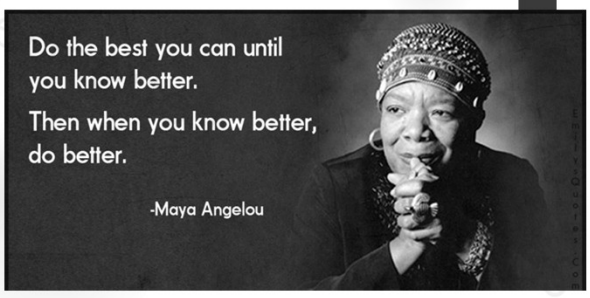
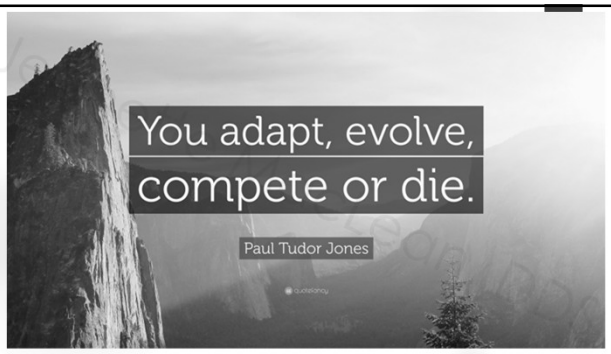


282

What can minimal interventions do for your practice?

283



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➡ CE Certificates can be downloaded from the NDDA website ***Monday, January 19th.***

SAVE THE DATES – NDDA Annual Session
September 17 & 18, 2026

NDDA Mid-Winter Meeting
January 21 & 22, 2027

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YouTube Affiliated Children's Dental Specialists

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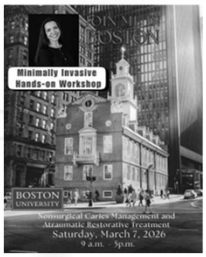
SDF and SMART
Hall Technique and ART Strip Crowns
Icon, MI Paste, Etch Bleach Seal
+ Update with Curodont added



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QUESTIONS

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