

Managing Dental Caries: Evolving Strategies and Proven Techniques

CareQuest Institute Continuing Education Webinar

August 17, 2023

Housekeeping

- We will keep all lines muted to avoid background noise.
- We will send a copy of the slides and a link to the recording via email after the live program.
- We'll also make the slides and recording available on carequest.org.

To receive CE Credits:

- Look for the evaluation form, which we'll send via email within 24 hours.
- Complete the evaluation by **Friday, August 25**.
- Eligible participants will receive a certificate soon after via email.

We appreciate your feedback to help us improve future programs!



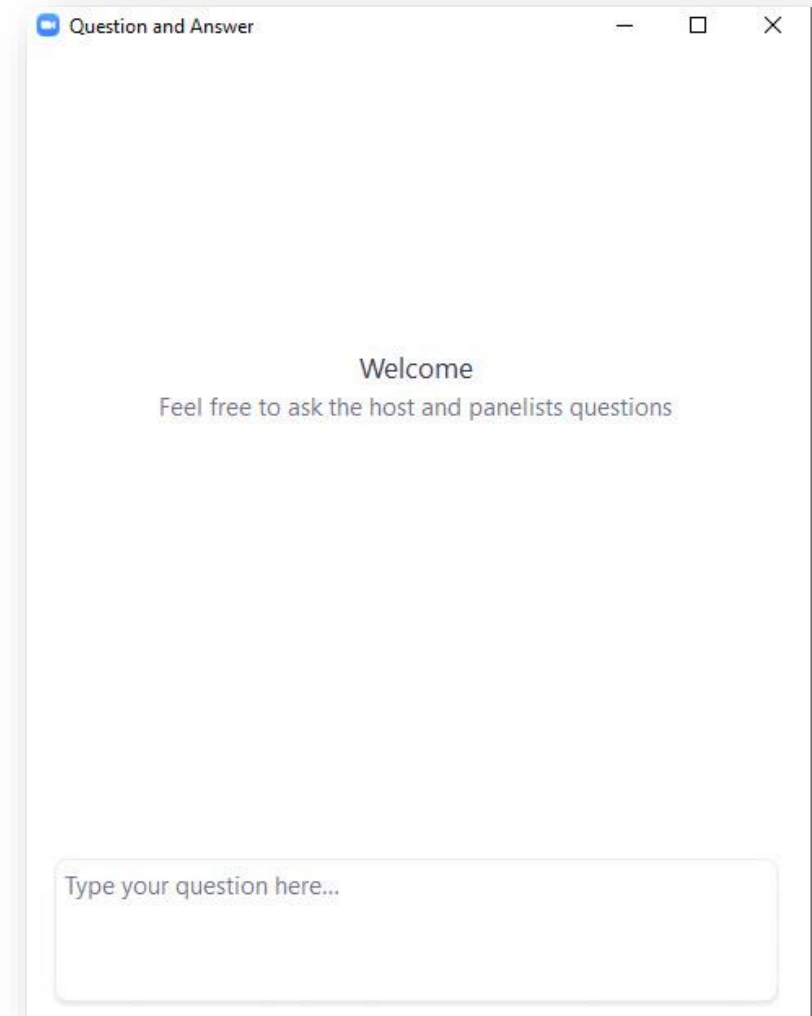
The CareQuest Institute for Oral Health is an ADA CER-P Recognized Provider. This presentation has been planned and implemented in accordance with the standards of the ADA CER-P.

*Full disclosures available upon request



Question & Answer Logistics

- Feel free to enter your questions into the **Question & Answer box** throughout the presentations.
- We will turn to your questions and comments toward the end of the hour.



Thank You!



Learning Objectives

At the end of this webinar, you'll be able to:

- Analyze various strategies for managing caries: screening, prevention, and nonrestorative treatment, including minimally invasive care.
- Identify the risks, benefits, alternatives, and mechanisms of action for current preventive chemotherapeutics used to prevent or treat caries in a nonrestorative way.
- Discuss the practice of personalized prevention recommendations for patients.

Managing Dental Caries: Evolving Strategies and Proven Techniques



WEBINAR | Thursday, August 17, 2023 | 7–8 p.m. ET | ADA CERP Credits: 1

MODERATOR



Erinne Kennedy, DMD, MPH, MMSc
Assistant Dean for Curriculum and
Integrated Learning, College of Dental
Medicine, Kansas City University

PRESENTER



Sandra Guzman-Armstrong, DDS, MS
Clinical Professor & Advanced Education
Program Director, College of Dentistry &
Dental Clinics, University of Iowa

PRESENTER



John Frachella, DMD
Pediatric Dental Consultant

Non-Invasive Management of Caries

John Frachella, DMD
Pediatric Dental Consultant

To Be Clear Before We Start

- The disease of caries can only be stopped by patient behavior changes that address the following three issues:
 - Poor diet (frequent ingestion sugar and over-processed carbohydrates)
 - Bad bacteria (which can produce acid)
 - Absence of healthy saliva (which causes unhealthy pH and chemistry of the mouth)

That said, when we find ourselves managing patients with active caries, not everything we do needs to be drill and fill.

Which requires re-learning, un-learning, and busting myths that continue to remain sacrosanct in our profession.

For that reason, Dr. Jeremy Horst and I, with the help of others at CareQuest Institute, created a free “Non-Invasive Caries Therapy Guide” to coach providers to invade less.



TIPS ON HOW TO

Apply Self-Assembling Peptide P₁₁₋₄ to Initial Caries Lesions (Non-Cavitated)

Note: The manufacturer's instructions state to bleach and etch for 20 seconds each.

1 Clean

Clean the teeth with pumice. Rinse or wipe clean. Isolate with cotton.

2 Ensure lesion porosity

If the lesion is not already porous, etch the white spot lesion(s) for 3–5 seconds. Rinse thoroughly. Removal of decay is not indicated.

3 Activate

4

Plunge together and pull apart

5 Dry

Thoroughly dry the affected areas (desiccate if feasible).

7 Apply

Apply P₁₁₋₄ to dried white spots. Allow to soak in. Re-apply every 5–10 seconds until the area stays wet.

8

Reapply until saturated

9

10 Protect

Keep saturated teeth isolated with cotton for 3–5 minutes. Remove excess with cotton. Do not rinse.

11 Fluoride

For optimal results, apply fluoride varnish.

Help the patient promote a healthy oral environment for the next 3–6 months to optimize enamel regeneration.

IMPORTANT: The P₁₁₋₄ peptide is on the sponge applicator. It is activated by contact with the liquid at the bottom.

IMPORTANT: The sponge applicator must be used.

If treating approximal surfaces, simply apply to the embrasures; the liquid will wrap around the contact point and flow by capillary action into the lesion. Or, use the **Flori technique** cut the sponge into 2–3 pieces and push one into each affected proximal space.

Each of These Has a Page in That Playbook

8 Non-Invasive Ways to Manage Caries:

- 1) SF + FV
- 2) GIC
- 3) Incomplete caries removal
- 4) SMART
- 5) PI + FV
- 6) SM-Hall
- 7) GI Strip Crowns
- 8) GI Sealants

#1 SF + FV to Manage Caries

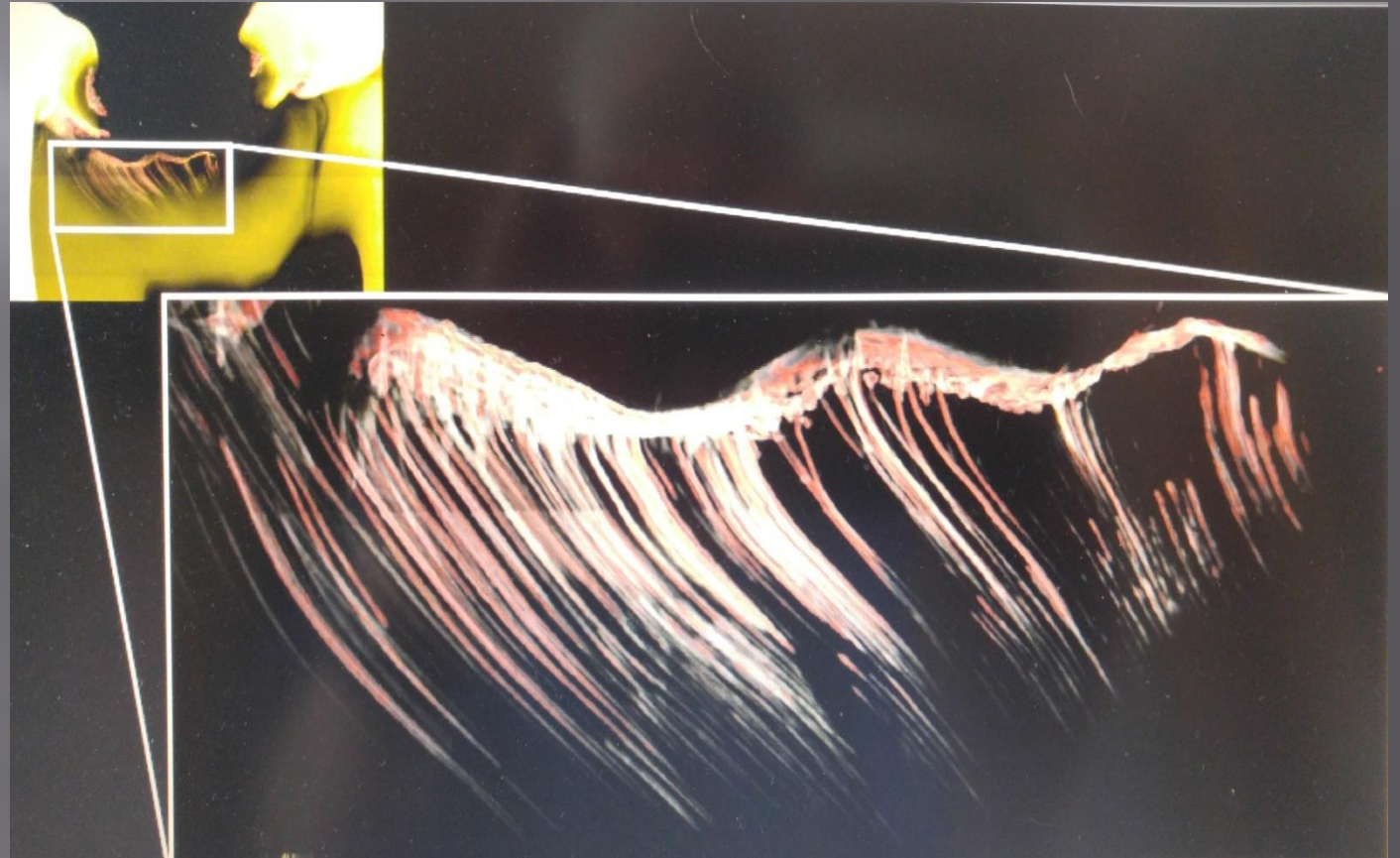
- In 2017 the FDA gave SDF “Breakthrough Status As A Drug To Treat Caries.”
- It’s important to note that prior to 2017, the FDA has never identified ANY substance or protocol as a “treatment for caries,” including fillings.

So, What Makes SF and FDA-Approved Caries Treatment Drug?

1. Detects caries
 2. Arrests caries (CDT Code D1354)
 3. Re-mineralizes decay
 4. De-sensitizes sensitive teeth
 5. Prevents caries(CDT Code D1355)
- SF caries prevention is from Ag+ ions migrating from arrested lesions to other teeth while also remaining inside dead bacteria where the Ag+ ions stop the growth of new bacteria. **Because of this, a CDT code # D1355 for SF prevention now stands despite previous resistance to this from within our profession.**

It's Also Important to Note That Ag⁺ Ions in SF Re-Mineralize

- ▣ This is a SEM image of structurally-supporting silver nanowires penetrating 1mm into sound dentin.



And it's also important to note that SF is a
“Combination-of-ions Medicine”

Ag⁺ and F⁻ ions are both **highly reactive *against* caries-causing bacteria AND highly reactive *with* minerals inside teeth, which can give "structure" to decay.**

2 GIC for Managing Caries

In 1998, the WHO made its first official statement identifying GIC as medicine:

“If the restoration of decayed primary teeth is required, preference should be given to ART with GIC.”

Proof that GIC is medicine for managing caries can be found in a 2014 randomized clinic trial on 2,557 seven-year-olds

- “GIC occlusal sealants provided protection against caries on the distal surfaces of second primary molars.”
- So, GIC provides prevention for teeth and tooth surfaces other than those to which GIC is applied!

F-Release Values for GIC

1) “Early Burst Fluoride” = 60 ppm F- ions



2) First month release = 20 ppm



3) 6 month cumulative release = 200 ppm

- No other restorative material releases even close to 200 ppm F- ions cumulatively inside chemically + hermetically sealed lesions!
- Yes, SDF releases 44,800 ppm, but SDF isn't a "restorative" material and, even in those high concentrations, it's "gone" very quickly.
- That said, **SDF combined with GIC releases 45,000 PPM, not gone, sealed into lesions, not systemic but localized inside decay!**

That's the essence of how caries management has just changed forever!

#3 Incomplete Caries Removal to Manage Caries

- Five important clinical trials support partial vs. complete decay excavation and many more clinical trials show strong advantages to leaving caries partially unexcavated: Thus, incomplete or partial caries removal is also a game changer!

5 Important Clinical Trials on Decay Excavation

1. ***“The removal of infected dentin isn’t fundamental for caries arrest”*** (Chibinski et al, *Pediatr. Den.* 2013)
2. ***“Removing all vestiges of infected dentin is not required for caries management”*** (Thompson, et al, *JADA* 2008)
3. ***“There is a clinical advantage to leaving caries partially unexcavated”*** (Ricketts et al, *Cochrane Review* 2013)
4. ***“Bacterially contaminated or de-mineralized decay close to the pulp does not need to be removed”*** (Schwendicke, et al, *Advances in Dent Res*, 2016)
5. ***“...complete caries removal technique is no longer recommended...”*** (Innes, Frencken et al, *Advances in Dent Res*, 2016)

Therefore, when using GIC (with or without SF) the new question we must ask is this:

Which parts of decay in teeth can be re-mineralized?

VS.

How much decay should be removed?

De-Mineralized Leathery Dentin Should Not be Removed!

De-mineralized leathery dentin (not yet mushy) can be re-mineralized, so it should not be removed!

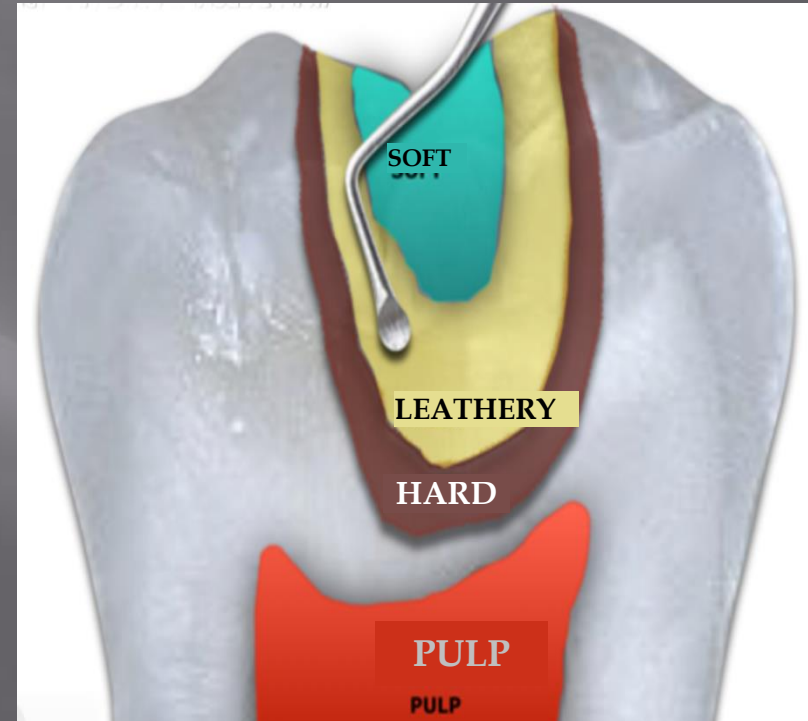


Image courtesy of Dr. Meenakshi Kehr, Mumbai

In Other Words, Please Stop Doing This!



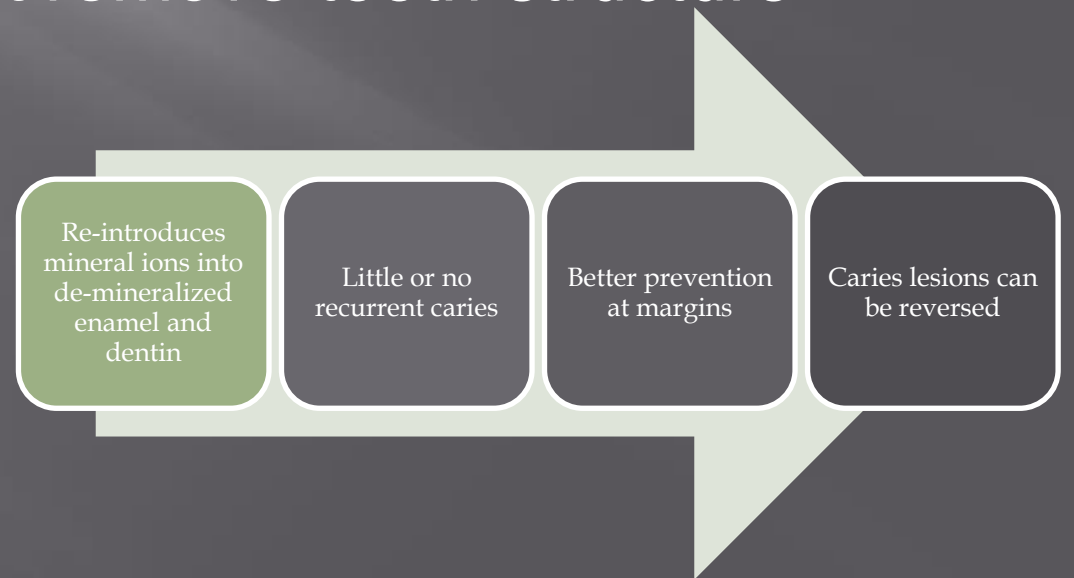
Caries Lesions Can Be Reversed!

That's a hard pill for some dentists to swallow!

GIC re-introduces many mineral ions (not just fluoride) into partially removed and unexcavated de-mineralized enamel and dentin.

Phosphate ions Strontium ions (or calcium, depending on GIC brand) Aluminum ions.

Re-min can happen only if we don't remove tooth structure that's capable of re-mineralizing!



- Don't try to re-mineralize decay with composite resin; it won't work!
- Many composites contain mineral like fluoride but they're "locked up" inside the resin, bio-un-available because re-min requires moisture (H₂O) and composite is anhydrous.
- By contrast, GIC is both hydrous and hydrophilic!

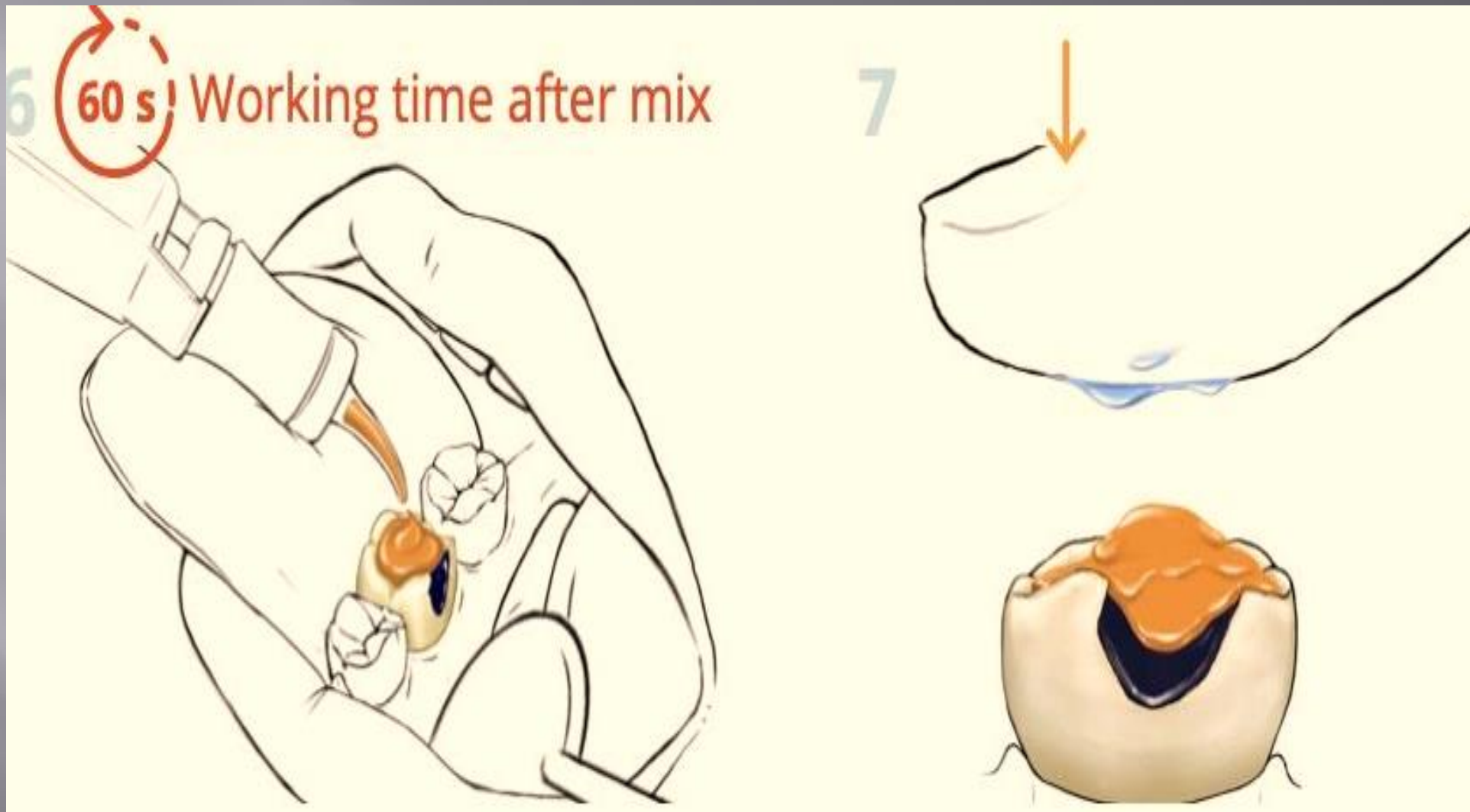
- GIC re-mineralizes decay because a permanent, acid-resistant zone forms where tooth surfaces and GIC become one.
- It's called the Zone of Chemical Fusion, created biochemically in the same way that hydroxyapatite becomes fluoroapatite and in the same way that mineral ions in SF swap places with mineral ions in teeth to re-mineralize and add structure to arrested decay.
- Composites are incapable of doing this!

Thus, with GIC, “retention” as a metric associated with caries management is dead!

That’s a huge game-changer in the field of caries management!

Also, if the bulk of a GIC restoration or sealant is lost...more GIC can be simply, inexpensively, and a-traumatically re-applied without needles or drills.

Another HUGE game-changer!



#4 Silver-Modified A-Traumatic Restorative Treatment (SMART) to Manage Caries

Adding GIC Over SF = SMART

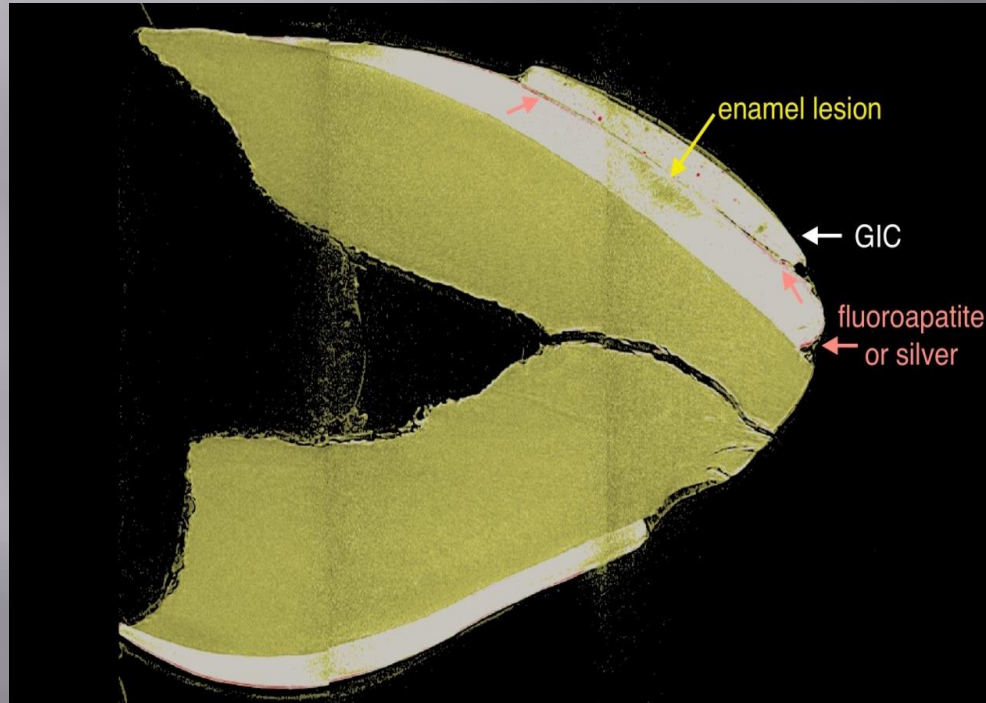
SMART is the most effective of all “combination-therapy” options for managing caries.

Cost-Time-Efficacy Analysis From Dr. Rick Niederman @ NYU

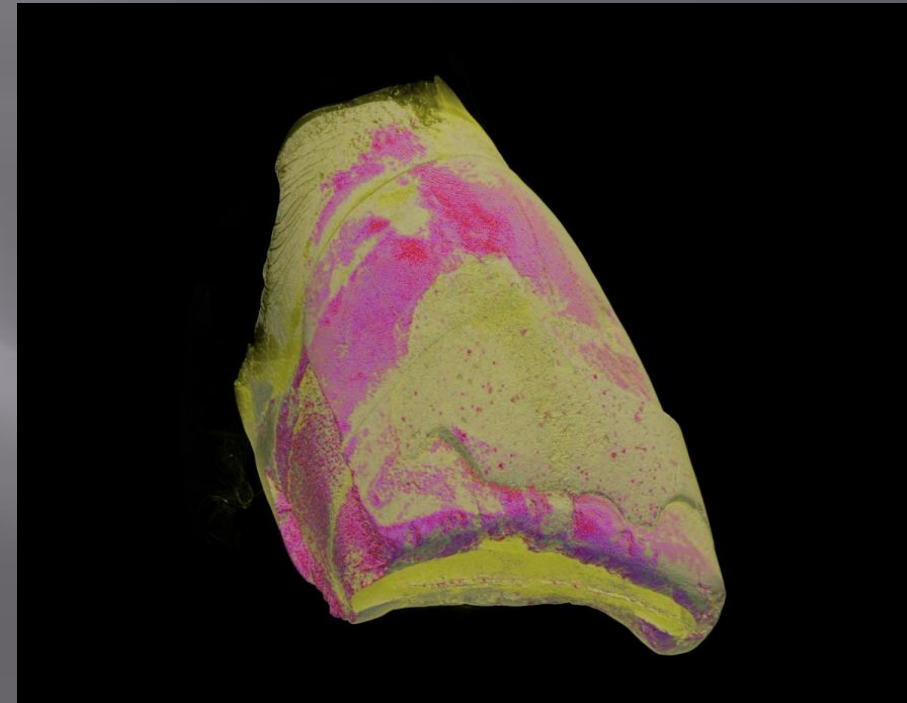
Therapy	Effectiveness	Time	Cost
SDF alone	~80% effective	~5 minutes	~\$5 USD for supplies
GIC alone (ART)	~80% effective	~15 minutes	~\$12 USD for supplies, equipment, electricity
SDF + GIC Combined (SMART)	~96% effective	~20 minutes	~\$15 USD for supplies

Case Example

A combination of SDF + GIC created tooth structures denser and harder than sound enamel in 3 years.



- SEM image of an exfoliated primary incisor showing effectiveness of SMART done 3 yrs earlier with no needles, no drills, no dental chair, no dental unit on a dental phobic 3yo whose mother is an orthomolecular biologist who requested SMART vs. DGA.



- Same tooth, naturally exfoliated 3 years post op.
- Densities greater than the density of enamel are identified in violet. Even higher densities are identified in red.

And SMART /S Pulp Protection

Often with no need for needles or drills.

Singha, et al, Remineralizing efficacy of Silver Diamine
Fluoride and glass ionomer...Part I and II, J. of
Conservative Dent, 2011



This is a naturally exfoliated SMARTed primary molar 1.5 yrs post op



The outcome of SDF + GIC = “Black Diamonds”

Here Are Four Beneficial Outcomes with SMART

1. Covers food traps
2. Avoids needles and drills
3. Arrests caries, disinfects, desensitizes, re-mineralizes
4. Provides a GIC “fluoride reservoir” beneficial to the treated tooth and to adjacent teeth per the Cagetti trial 2014

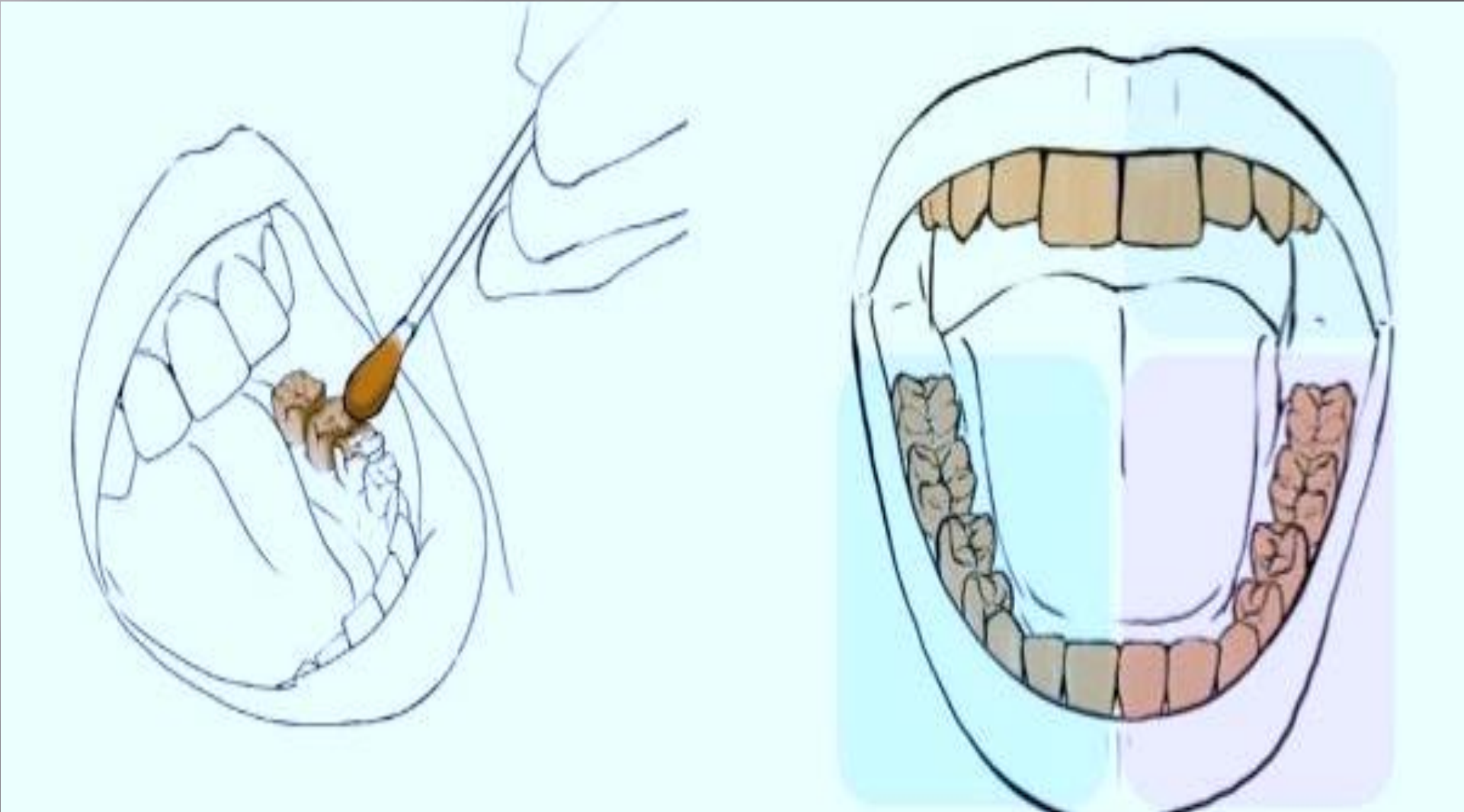


SMART Is Indirect Pulp Treatment

- **SF + GIC kill decay-causing microbes, attacks biofilms and builds re-mineralized structural support inside tubules.**
- **They re-mineralize remaining affected dentin** when infected dentin is removed so that odontoblasts can form reparative dentin **which avoids pulp exposures.**
- They seal chemically, are structurally strong and supportive of overlying restorations and both are resistant to recurrent decay.
- **SF under GIC restorations helps create a solid foundation.**



Image by rawpixel.com



#5 Povidone Iodine to Manage Caries

Evidence for PI + FV Effectiveness

- **12-to-19-month** toddlers, positive for mutans
- PI + FV applied **2X/month for a year**
- Resulted in a **91% caries-free** treatment group
- Only **54%** of the control group was caries – free

PI + FV in Children Who Received Extensive Restorative Care Under GA

- PI + FV applied **3X/ 6 months**
- **18%** recurrent caries at 6 months in treatment group
- **63%** recurrent caries in control group

Children who received PI + FV in combination were 210% more likely to have caries-free permanent molars than children who received FV alone.

PI + FV = SDF for Prevention of Root Caries in Older Adults

- RCT in 353 60+ year olds
- PI+FV q 4 mos
- Conclusion: There was no significant difference between SDF + FV vs. PI + FV in prevention of adult root caries

PI Myths

PI stains teeth:

- PI colors teeth orange for a few seconds then **color disappears almost immediately** after saliva bathes teeth

PI tastes bad:

- PI has **no taste whatsoever** in the dose recommended

If allergic to shellfish, PI will cause allergic reaction

- There is **no crossover between shellfish allergy and PI ingestion**
- Shellfish allergy is caused by proteins in fish, not by iodine in fish

#5 SM-Hall Crowns to Manage Caries



Hall = No LA, No Caries Removal, No Tooth Prep

How it works:

1. An appropriate size SSC is chosen and filled with GIC.
2. Then, the SSC is fitted over a carious primary molar by either a clinician's finger pressure or a child's biting force where it's permanently sealed in place via a GI- chemical reaction with the tooth.



1) Innes N.P., Evans D.J., Stirrups D.R. Sealing caries in primary molars: Randomized controlled trial –5-year results. J. Dent. Res. 2011

2) Innes N.P., Stirrups D.R., Evans D.J., Hall N., Leggate M. A novel technique using preformed metal crowns for managing carious primary molars

3) in general practice: A retrospective analysis. Br. Dent. J. 2006

The Science Behind Hall

- **Hall is IPT**
 - High-fluoride-releasing GIC does not induce inflammation or necrosis in the pulp.
 - GIC combined with SF under a hall crown has good tertiary dentin inducing ability.
 - **GIC under Halls leaves a layer of carious dentine near the pulp that preserves pulp vitality.**
- **Hall increases child compliance and operator comfort because local anesthesia isn't used.**



Hall Meta Analysis

- “97% of SSCs treated with the Hall (without needles and drills) were successful compared to 94% of SSCs placed conventionally (with needles and drills).”
- “Of the SSCs studied with Hall none resulted in harmful symptoms, whereas 5 of the SSCs placed by conventional means failed due to infection.”
- “Hall technique is not only a predictable restorative option but also significantly outperforms conventional methods of treatment for carious primary molars.”

Hall 9 Years Post-Op

At age five, patient had eight Hall Crowns, no needles, no drills, no hospital OR



Outcome: Normal exfoliation of primary teeth, healthy and proper eruption of permanent successors 9 yrs later with no ortho necessary



Now, **THAT's** caries management!

Permanent Tooth Hall Over RC Three Years Post Op



Please consider that not all adults want needles + drills and many can't afford gold or Zirconium.

Hall 20 Years Post-Op



Hall's on permanent teeth can last a lifetime!



= Lifetime Caries Management!

#7 GI Strip Crowns to Manage Caries



GIC Strip Crowns

- ...equal full crown coverage, single-agent therapy with GIC essential medicine.
- ...work over partially or unexcavated decay via chemical sealing against substrate, oxygen and other caries-causing bacteria.
- ...are antibacterial, de-sensitizing and re-mineralizing.
- ...provide indirect pulp treatment (IPT).
- ...adhere tenaciously and chemically in a permanent way to enamel and dentin and to stainless steel.
- ...don't require needles, drills or aerosol.
- ...are child-friendly.

GI Strip Crowns, cont.

1. Arrest, desensitize and re-mineralize, protecting primary teeth until normal exfoliation.
2. Chemically seal the superficial plaque layer, which is the most essential layer of the biofilm for caries progression.
3. Change biofilm composition into one with much less cariogenic flora.

GI Strip Crowns Are IPT

GIC and RMGI used in strip crowns act the same way as in Hall by leaving a layer of carious dentine near the pulp that preserves pulp vitality.

-Innes N.P., Evans D.J., Stirrups D.R. Sealing caries in primary molars: Randomized controlled trial – 5-year results. J. Dent. Res. 2011; Torabzadeh H., Asgary S. Indirect pulp therapy in a symptomatic mature molar using calcium enriched mixture cement. J. Conserv. Dent. 2013;

- Ricketts D., Lamont T., Innes N.P., Kidd E., Clarkson J.E. Operative caries management in adults and children. Cochrane Database Syst. Rev. 2013

Lastly, #8 GI Sealants to Manage Caries

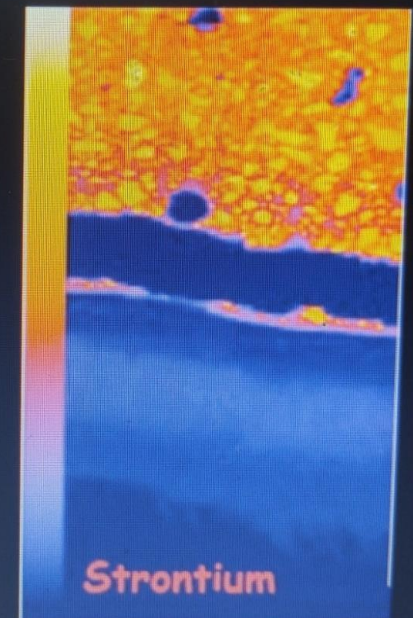
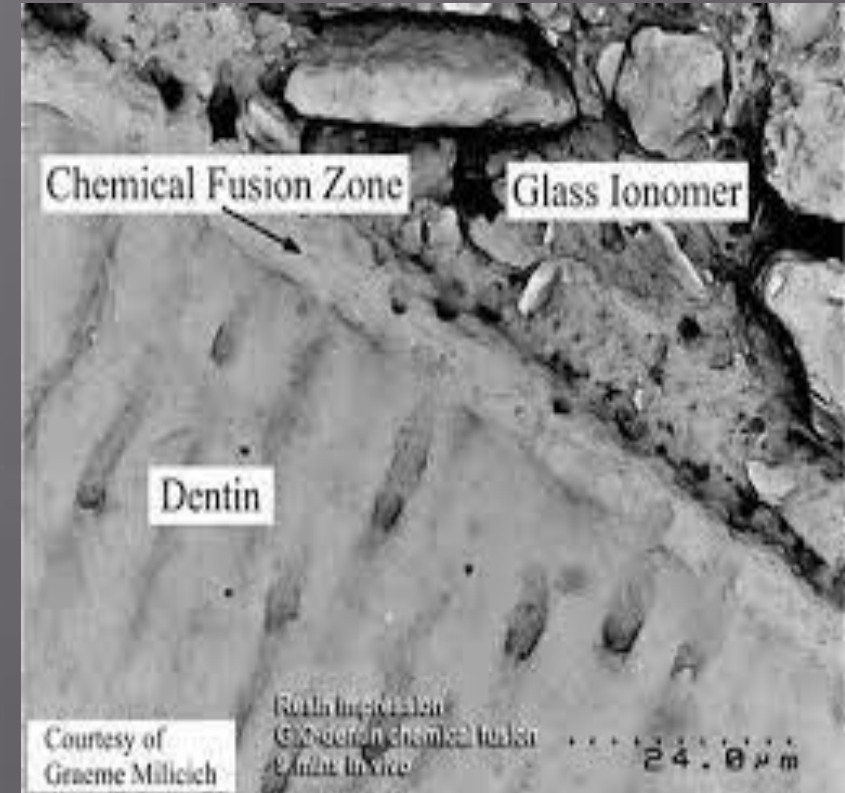


Supposedly, Resin and GIC Sealants Are Equal for Decay Prevention, But . . .

- *“The profession is at risk of misdirecting care by maintaining reliance on sealant retention as a viable metric”*
- **Sealant retention does not = decay-free teeth**
- With opercula @ 6+12-year-olds occurring in almost every child, resin sealants hinge off distal occl surfaces creating a “trampoline effect” that traps substrate and microbes
- **Non-hinging GI sealants** are most needed just as perm molars erupt because that’s when occl surfaces are most acid sensitive!
- GI sealants don’t hinge, are chemically bonded permanently, and are not micromechanically bonded temporarily.

With GIC, “Sealant Retention” Is a Flawed Metric Because . . .

Even if GIC over enamel or dentin is lost, the ZCF remains as a permanent protective layer against future decay.

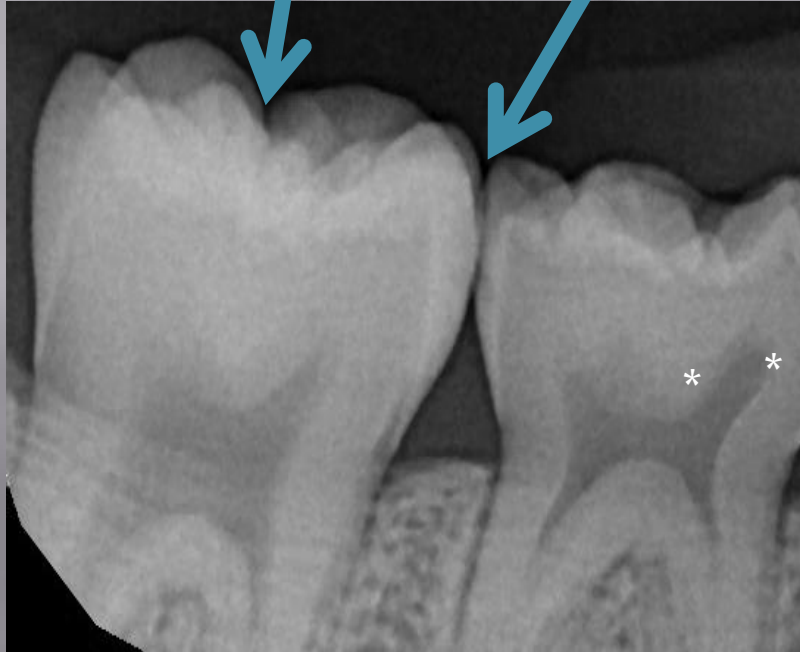


GI Sealants vs. Resin Sealants

1. Release fluoride
2. Have lower technique sensitivity, are moisture-forgiving, and set under saliva.
3. Can be applied at rate of one sealant every four minutes.
4. Can be re-applied in mere seconds.
5. Seal chemically (not micromechanically) and permanently (not temporarily).

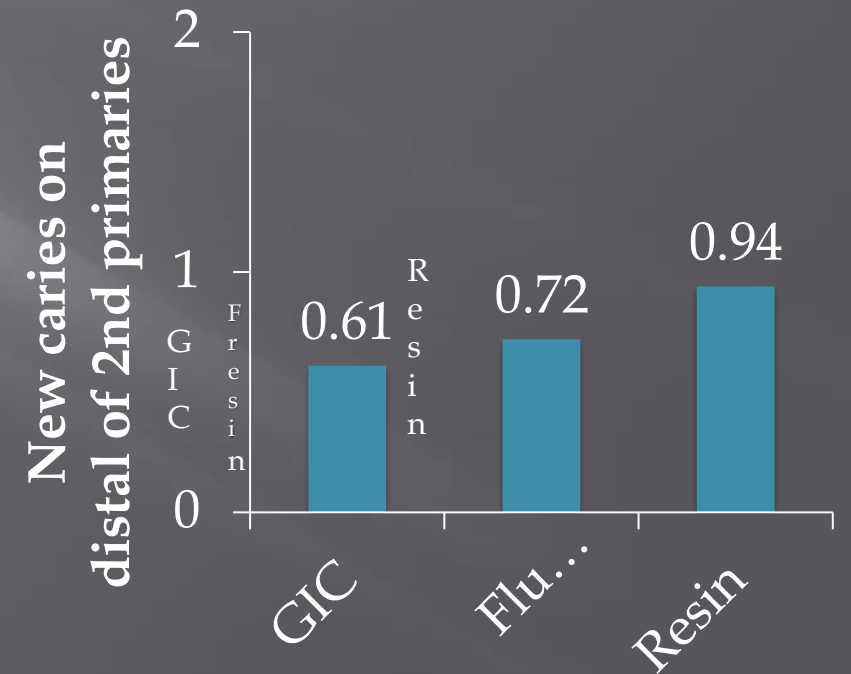
And GI Sealants Provide This, Which Composite Resin Sealants Cannot

GIC here actually prevents
carries here



Cagetti et al., *J Dent Res* 2014

2,557 7-year old's,
studied for 2.5 years in Italy



“The caries-preventive effect of HVGIC sealants, was between 3.1 and 4.5 times higher than that of composite resin sealants after 3–5 years.”

“HVGIC has a 4X higher chance of preventing caries than light-cured composite resin sealants”

(Frencken, et al, Caries res, May 6 2004)

How About Fissureotomy Before Sealants?

- 2008 ADA clinical practice guidelines say “...*evidence for fissurotomy is unclear.*”
- 2014 AAPD “*mechanical preparation*” prior to sealant placement is not recommended.
- 2018 ADA Clinical Practice Guidelines (page 841) say: “*Enamel removal is unnecessary before sealant application.*”

So, to better manage caries, please consider shifting from
low-volume surgery to high-volume prevention:
Seal and heal!

Thanks for hearing me out.



John Frachella, DMD
Pediatric Dental Consultant
johncf@bendnet.com

Question & Answer



Erinne Kennedy, DMD, MPH, MMSc

Assistant Dean for Curriculum and Integrated Learning
College of Dental Medicine, Kansas City University

ErKennedy@kansascity.edu

Webinar Evaluation

Complete the **evaluation by Friday, August 25** to receive CE credit. You will receive a link to the survey within 24 hours.

Next Webinar:

How Policies Influence (and Can Help) Hispanics' Oral Health
September 14 at 1 p.m. ET

And sign up to receive our newsletter to get more information on future webinars!

Sign up for News and Updates

Email*

CareQuest Institute for Oral Health uses the information you provide to share updates on work and offerings to improve the oral health of all. You may unsubscribe at any time (See [Privacy Policy](#)).

Submit



To Explore More Industry-Leading Research

Resource Library

We publish white papers, research reports, briefs, articles, posters, infographics, and tools on topics ranging from adult dental benefits to teledentistry. Use the filters below to find resources by type or topic.

Search by Keyword: Filter by Topic: - Any - Filter by Type: - Any -

Title	Topic	Type
Improving Care Coordination Between Oral and Medical Providers	Care Coordination	Video
Veteran Oral Health: Expanding Access and Equity	Expanding Access	White Paper
2021 Oral Health Information Technology Virtual Convening	Care Coordination	Presentation
Dental Fear Is Real. Providers Can Help.	Expanding Access, Health Equity	Visual Report
Why We (Still) Need to Add Dental to Medicare	Adult Dental Benefit, Expanding Access, Health Equity	Report
A Cross-Sectional Analysis of Oral Health Care Spending over the Life Span in Commercial- and Medicaid-Insured Populations	Expanding Access, Health Equity	Article
Time Is on the Side of Change in Dentistry	COVID-19 and Oral Health, Health	Article

www.carequest.org/resource-library

Missed Connections
Providers and Consumers Want More Medical-Dental Integration

Oral health and overall health are inextricably linked. There is mounting evidence to suggest that poor oral health is related to a variety of chronic health conditions, such as high blood pressure, dementia, diabetes, and obesity. Despite this known connection, dental care is still largely siloed from medical care. The Centers for Disease Control and Prevention (CDC) estimates that integrating basic health screenings into a dental setting could save the health care system up to \$100 million every year.¹

CareQuest Institute for Oral Health conducted a nationally representative survey in January and February 2021 to assess consumers' perspectives on oral and overall health (n=5,320). CareQuest Institute also conducted a nationwide survey of oral health providers to assess perspectives and current behaviors related to interprofessional practice (n=377). Consumers and oral health providers described a lack of integration between medical and oral health care, and a desire for increased interprofessional collaboration.

Key Findings:
Medical-dental collaboration is currently uncommon.

- 63% of consumers report that their primary medical doctor "rarely" or "never" asks about their oral health.
- 33% of consumers report that their oral health provider "rarely" or "never" asks about their overall health.
- 45% of responding oral health providers report "rarely" integrating their care with clinicians outside of dentistry, with only 14% reporting it is part of their "daily" practice.
- Less than a third of consumers report receiving general health screenings from their oral health provider.
- A majority (89%) of adults report never receiving a referral from their oral health provider to a non-oral health professional.
- Almost a fourth (24%) of participating oral health providers report currently implementing interprofessional practice.

Stay Connected

Follow us on social media



@CareQuestInstitute



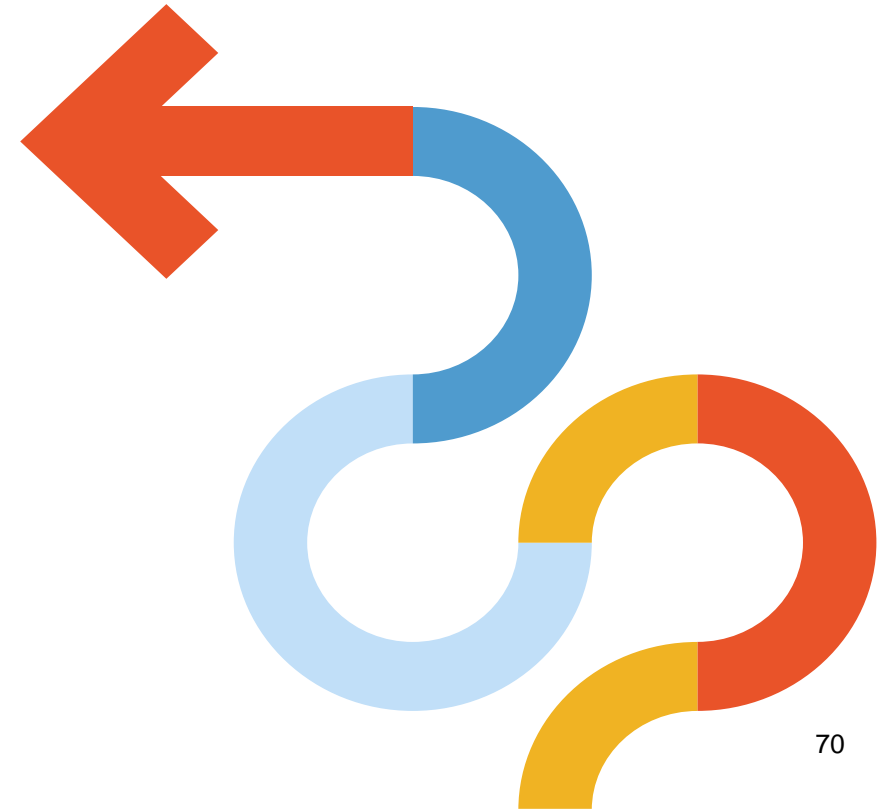
@CareQuestInstitute



@CareQuestInst



CareQuest Institute



CareQuest 
Institute for Oral Health®