

How to Prevent Caries in Primary and Young Permanent Teeth



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Michigan Dental Association
April 28, 2017

Overview

- The Real World
- Topical Fluoride
 - Gels, Foams and Varnishes
 - Silver Diamine Fluoride
- Systemic Fluoride
- Sealants
- DIAGNOdent
- Radiation Burden of Radiographs

COMMENTARIES

Editorials represent the opinions of the authors and not necessarily those of the American Dental Association.

GuestMark

GUEST EDITORIAL

Continuing education
Caveat emptor

Gary M. Heir, DMD

"The saddest aspect of life right now is that science gathers knowledge faster than society gathers wisdom."
Isaac Asimov, 1920-1992

Destiny attracts people with high levels of technical savvy as well as those who enjoy blending their artistic skills with the science behind procedures. As the technical aspects of dentistry advance, the importance of knowing how to perform a procedure should not supersede the process of clinical decision making, which determines why we are doing the procedure. Approaching near perfection for an unnecessary procedure may elevate the practitioner to the level of an exceptional clinician but may raise questions about the clinician's diagnostic acumen.

Long ago at my graduation from dental school, our former clinical director and associate dean came out from his recent retirement to launch my class into our dental careers. On that momentous day of great accomplishment and anticipation, he greeted us quickly with the admonishment, "We have taught you how to do 35% of the procedures you need to know and only 1 way to do such. Now that you are graduating, now is the time to really start learning!" Of course, we were convinced that

Caveat Emptor

- Latin
- Caveat – "may he beware"
- Emptor – "a person who purchases or contracts to purchase"
- May the Buyer Beware
- Legal Definition
 - Without a warranty the buyer takes the risk as to the condition of the property or goods

Clinical Pearls

- What type of topical fluoride is best?
- How can I maximize sealant retention?
- How do I treat a white spot lesion?
- What should I do if my patient drinks well water?
- What advice can I give parents to reduce caries in their children?

Clinical Pearls

- How can I prevent 90% of caries in permanent teeth?
- Should I buy a DIAGNOdent?
- What should I say to a parent that says: "I don't want xrays taken on my child"?

Avoid the hype

Use good science

Topical fluoride for caries prevention
Executive summary of the updated clinical recommendations and supporting systematic review

JADA (2013) 144:1279-1291

[ASSOCIATION REPORTS]

Fluoride toothpaste efficacy and safety in children younger than 6 years
A systematic review

JADA (2014) 145:182-189

The New York Times

Dental Group Advises Fluoride Toothpaste Before Age 2

By CATHERINE SAINT LOUIS FEBRUARY 12, 2014 6:59 PM 154 Comments



JADA (2014) 145:182-189

[ORIGINAL CONTRIBUTIONS]

CrossMark

Sealants for preventing and arresting pit-and-fissure occlusal caries in primary and permanent molars

A systematic review of randomized controlled trials—a report of the American Dental Association and the American Academy of Pediatric Dentistry

JADA (2016) 147:631-645

NCHS Data Brief • No. 191 • March 2015

Dental Caries and Sealant Prevalence in Children and Adolescents in the United States, 2011–2012

Bruce A. Dye, D.D.S., M.P.H.; Gina Thornton-Evans, D.D.S., M.P.H.; Xianfen Li, M.S.; and Timothy J. Iafolla, D.M.D., M.P.H.

Key findings

- Although dental caries has been declining in permanent teeth for many children since the 1960s, previous findings showed caries in primary teeth for preschool children increasing from 24% to 28% between 1988 and 2004. Disparities in caries continue to persist for some race and ethnic groups in the United States. Prevalence of dental sealants—applied to the tooth chewing surfaces to help prevent caries—has also varied among sociodemographic groups (1–4). This report describes U.S. youth dental caries and sealant prevalence by race and Hispanic origin for 2011–2012.
- **Keywords:** tooth decay • caries • disparities • National Health and Nutrition Examination Survey

How prevalent was any caries in children's primary teeth?

Approximately 37% of children aged 2–8 years had experienced dental caries in primary teeth in 2011–2012 (Figure 1). Dental caries among children aged 2–8 years is shown by age and race and Hispanic origin among children aged 2–8 years in earlier studies, 2011–2012.



Age Group	Prevalence (%)
2-4 years	56.7
5-7 years	45.7
6-8 years	25.7

Race and Hispanic Origin	Prevalence (%)
Non-Hispanic white	55.7
Hispanic	45.9
Non-Hispanic Asian	15.9

Caries in Primary Teeth

**23% of children
aged 2 – 5 years**

**56% of children
aged 6 – 8 years**

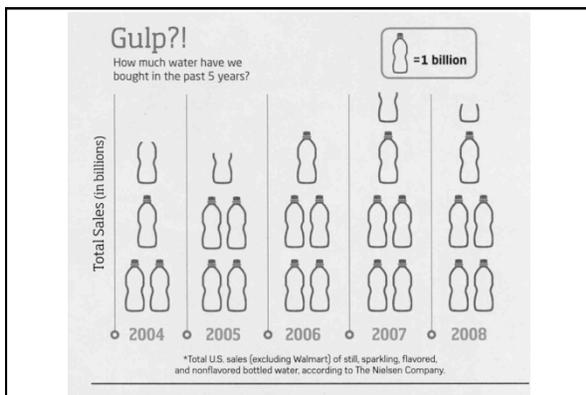
44% pit and fissure

Caries in Permanent Teeth

**29% of children
aged 9 – 11 years**

**67% of children
aged 16 – 19 years**

90% pit and fissure

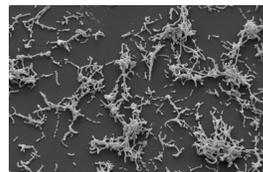


Strategies to Reduce Dental Caries

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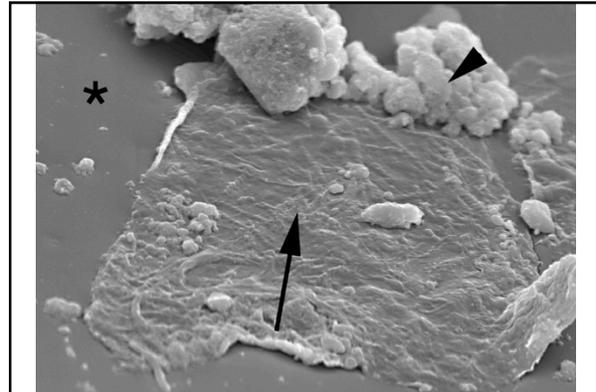
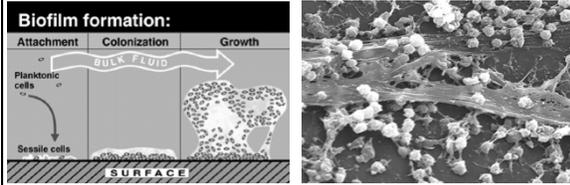
Plaque is a biofilm

What is a biofilm?

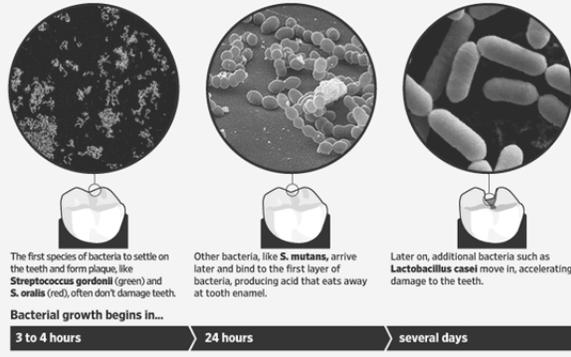


- **Complex aggregation of microorganisms**
- **Excretion of protective and adhesive matrix**

How does a biofilm form?



Tiny Armies | How bacteria work in sequence to cause tooth decay



Fluoride

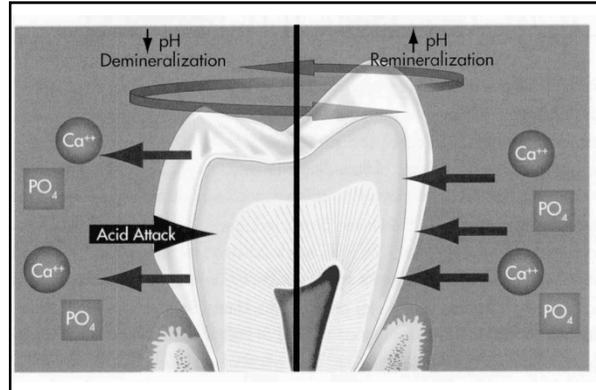
Fluoride

- **Topical**
- **Systemic**

The Route and Benefit of Fluoride

- **Topical**
 - coats erupted teeth
 - promotes remineralization
 - enamel more resistant to acid attack
- **Systemic**
 - ingested
 - incorporated into developing enamel
 - enamel more resistant to acid attack

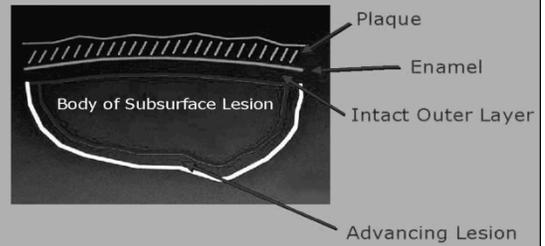
Topical Fluoride



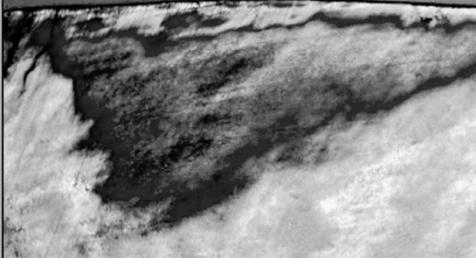
“Dental cavities are a fight between good and evil.”

Remineralization vs. Demineralization

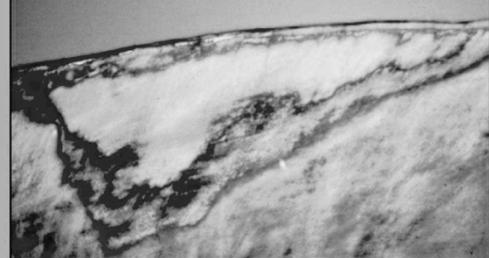
Subsurface Lesion

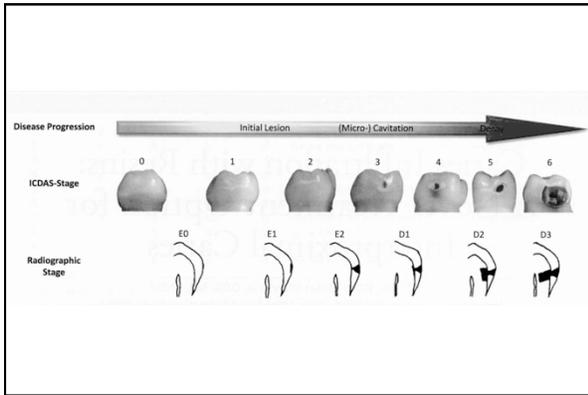


Demineralized Enamel



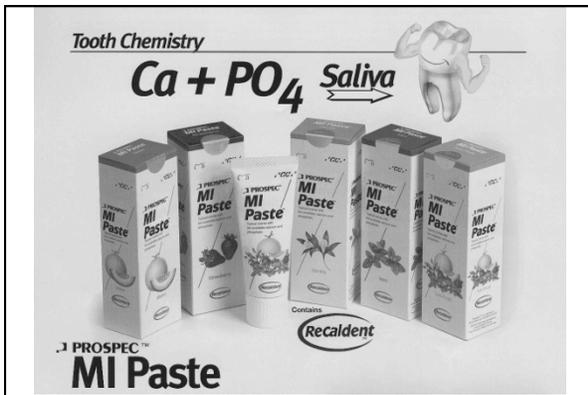
Remineralized Enamel





Main Sources of Topical Fluoride

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CLINICAL PRACTICE CRITICAL REVIEW

Clinical efficacy of casein derivatives

A systematic review of the literature

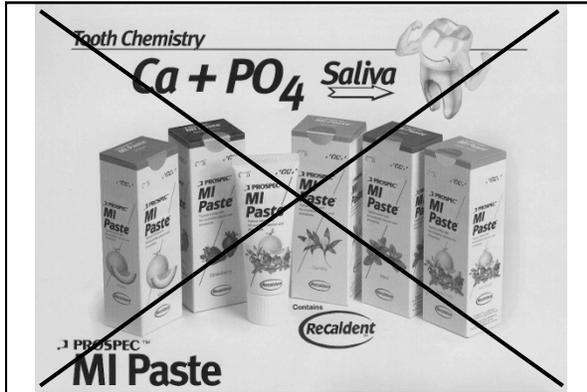
Amir Azarpazhooh, DDS, MSc; Hardy Limeback, BSc, PhD, DDS

ABSTRACT

Casein is the predominant phosphoprotein in bovine milk and accounts for almost 80 percent of its total protein, primarily as calcium phosphate stabilized micelles.

Background. The objective of this article was to review systematically the clinical trials of casein derivatives.

JADA (2008) 139:915-924



Topical fluoride for caries prevention

Executive summary of the updated clinical recommendations and supporting systematic review

Robert J. Weyant, DMD, DPH; Sharon L. Tracy, PhD; Theresa (Tracy) Anselmo, MPH, BSDH; Rodrigo Espinoza D. Barrios-Aguilar, DMD, MPH, MS, DPH; Kevin J. Dunst, DDS, MS; Willian A. Fraga, MD; Philippe G. Hugob, DDS, PhD; Timothy Isakoff, DMD, MPH; William Koehn, DSD; Joseph Kester, DDS, MPH; Steven H. Levy, DDS, MPH; Stephen Lissman, DDS, MS; Timothy Wright, DDS, MS; Dominick Zera, DDS, MS; Krishna Anandachand, BDS, MS; Julia Francisco-Koenig, PhD; David M. Meyer, DDS for the American Dental Association Council on Scientific Affairs Expert Panel on Topical Fluoride Caries Preventive Agents

In 2006, the Council on Scientific Affairs (CSA) of the American Dental Association (ADA) published recommendations for the use of professionally applied topical fluoride for caries prevention. It is ADA policy to start updating the evidence and clinical recommendations at five-year intervals. The objective of this report is to provide an update on professionally applied topical fluorides and address additional questions related to the use of prescription-strength, home-use topical fluorides for caries prevention. The panel evaluated sodium, stannous and acidulated phosphate fluoride (APF) for professional and prescription-strength home-use, including varnishes, gels, foams, mousses and prophylaxis pastes. The panel did not include over-the-counter products, slow-release delivery devices, dental materials that release fluorides and

ABSTRACT

Background. A panel of experts convened by the American Dental Association (ADA) Council on Scientific Affairs presents evidence-based clinical recommendations regarding professionally applied and prescription-strength, home-use topical fluoride agents for caries prevention. These recommendations are an update of the 2006 ADA recommendations regarding professionally applied topical fluorides and were developed by using a new process that includes conducting a systematic review of primary studies.

Types of Studies Reviewed. The authors conducted a search of MEDLINE and the Cochrane Library for clinical trials of professionally applied and prescription-strength topical fluoride agents—acidulated phosphoric, stannous, safe, foam and paste—with caries prevention outcomes published in English through October 2012.

Results. The panel included 17 trials from 62 studies in its review and assessed the efficacy of various topical fluoride caries-prevention agents. The panel makes recommendations for further research.

Practical implications. The panel recommends the following for people at risk of developing dental caries: 2.26 percent fluoride varnish on 3.25 percent fluoride ion-releasing phosphate fluoride and varnish on 1.23 percent APF.

JADA (2013) 144:1279-1291

Types of Topical Fluoride

- Gels
 - 1.23% APF, 12,300 ppm
 - 2% NaF (0.90% F) 9,050 ppm
- Foams
- Varnish
 - 5% NaF (2.26% F) 22,600 ppm

TABLE 1
System used for grading the evidence.

GRADE	CATEGORY OF EVIDENCE
Ia	Evidence from systematic reviews of randomized controlled trials
Ib	Evidence from at least one randomized controlled trial
Ila	Evidence from at least one controlled study without randomization
Ilb	Evidence from at least one other type of quasi-experimental study
III	Evidence from nonexperimental descriptive studies, such as comparative studies, cohort studies, case-control studies
IV	Evidence from expert committee reports or opinions or clinical experience of respected authorities

* Amended with permission of the BMJ Publishing Group from Shekelle and colleagues.²⁷

TABLE 2
System used for classifying the strength of recommendations.

CLASSIFICATION	STRENGTH OF RECOMMENDATIONS
A	Directly based on category I evidence
B	Directly based on category II evidence or extrapolated recommendation from category I evidence
C	Directly based on category III evidence or extrapolated recommendation from category I or II evidence
D	Directly based on category IV evidence or extrapolated recommendation from category I, II or III evidence

* Amended with permission of the BMJ Publishing Group from Shekelle and colleagues.²⁷

Professionally Applied Topical Fluoride: Evidence-based Clinical Recommendations¹

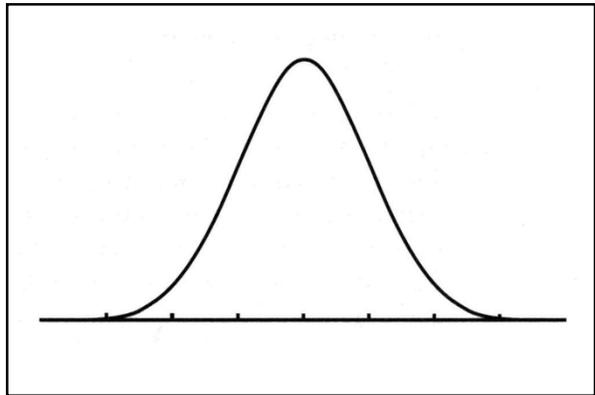
Assess	Advise			Decide
	Risk group (Age)	<8 years	6-18 years	
Caries Risk (see box for new boxes) • Low • Moderate • High & Patient Age	Low	Patient may not receive any additional benefit*	Patient may not receive any additional benefit*	Patient may not receive any additional benefit*
	Moderate	Varnish every 6 months	Varnish or Fluoride gel every 6 months	Varnish or Fluoride gel every 6 months
	High	Varnish every 6 or 3 months	Varnish every 6 or 3 months or Fluoride gel every 6 or 3 months	Varnish or Fluoride gel every 6 or 3 months

*Unflavored water and fluoride toothpaste may provide adequate caries prevention in this risk category.
 * Application time for fluoride gel and foam should be 4 minutes.
 * Due to limited evidence these recommendations have not been extrapolated to home.
 * There is limited evidence differentiating NaF and APF gels.

Based substantially on clinical evidence. Each recommendation is based on the best available evidence. The level of evidence available to support each recommendation may differ. Lower levels of evidence do not mean the recommendation should not be applied for patient treatment.

Based substantially on extrapolations or subjective opinions.

ADA Council on Scientific Affairs. Professionally applied topical fluoride: Evidence-based clinical recommendations. JADA 2006; 137(8):1151-59. Copyright © 2006 American Dental Association. All rights reserved. Adapted 2008 with permission. To see the full text of this article, please go to <http://ada.org/ada/adacontent/137/1151>. This page may be used, copied, and distributed for noncommercial purposes without seeking prior approval from the ADA. Any other use, copying, or distribution, whether printed or electronic form, is strictly prohibited without the prior written consent of the ADA.



Professionally Applied Topical Fluoride: Evidence-based Clinical Recommendations*

Determination of Caries Risk

There are many systems to determine caries risk. One such system is offered below that can be used for caries risk assessment.

Individuals' risk factors increasing risk for developing caries may also include, but are not limited to:

<ul style="list-style-type: none"> • High titer of cariogenic bacteria • Poor oral hygiene • Prolonged nursing (bottle or breast) • Poor family dental health • Developmental or acquired enamel defects • Genetic abnormality of teeth • Many multifurface restorations • Chemoradiation therapy 	<ul style="list-style-type: none"> • Eating disorders • Drug/alcohol abuse • Inappropriate dental care • Cariogenic diet • Active orthodontic treatment • Presence of exposed root surfaces • Restoration overhangs and open margins • Physical or mental disability with inability or unavailability of performing proper oral health care
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Risk group	Age	Primary or Secondary Carious lesions in the past 12 months	Risk factors listed above
Low	All age groups	None	and None
Moderate	< 6 years	None	and At least one risk factor
	> 6 years	One or two	or At least one risk factor
High	< 6 years	Any	or Multiple risk factors or Low Socioeconomic Status or Xeroderma [†] or suboptimal fluoride exposure
	> 6 years	Three or more	or Multiple risk factors or Xeroderma [†] or suboptimal fluoride exposure

*Medication, radiation or disease induced xeroderma.

*ADA Council on Scientific Affairs. Professionally applied topical fluoride: Evidence-based clinical recommendations. JADA 2006;137(3):151-59. Copyright © 2006 American Dental Association. All rights reserved. Adapted 2008 with permission. To see the full text of this article, please go to <http://dx.doi.org/10.1016/j.jada.2008.03.011>.

REFERENCE MANUAL V 34 | NO 6 | 12 | 13

Guideline on Caries-risk Assessment and Management for Infants, Children, and Adolescents

Originating Council
Council on Clinical Affairs

Review Council
Council on Clinical Affairs

Adopted
2002

Revised
2006, 2008, 2013

Purpose
The American Academy of Pediatric Dentistry (AAPD) recognizes that caries-risk assessment and management protocols can assist clinicians with decisions regarding treatment based upon caries risk and patient compliance and are essential elements of contemporary clinical care for infants, children, and adolescents. This guideline is intended to educate healthcare providers and other interested parties on the assessment of caries risk in contemporary pediatric dentistry and aid in clinical decision making regarding diagnostic, fluoride, dietary, and restorative

- gives an understanding of the disease factors for a specific patient and aids in individualizing preventive discussions;
- individualizes, selects, and determines frequency of preventive and restorative treatment for a patient; and
- anticipates caries progression or stabilization.

Caries-risk assessment models currently involve a combination of factors including diet, fluoride exposure, a susceptible host, and microflora that interplay with a variety of social, cultural, and behavioral factors.¹⁴ Caries risk assessment is the

Table 2. Caries-risk Assessment Form for 0-5 Year Olds^{66,68}
(For Dental Providers)

Factors	High Risk	Moderate Risk	Protective
Biological			
Mother/primary caregiver has active caries	Yes		
Parent/caregiver has low socioeconomic status	Yes		
Child has >3 between meal sugar-containing snacks or beverages per day	Yes		
Child is put to bed with a bottle containing natural or added sugar		Yes	
Child has special health care needs		Yes	
Child is a recent immigrant		Yes	
Protective			
Child receives optimally-fluoridated drinking water or fluoride supplements			Yes
Child has teeth brushed daily with fluoridated toothpaste			Yes
Child receives topical fluoride from health professional			Yes
Child has dental home/regular dental care			Yes
Clinical Findings			
Child has ≥1 decayed/missing/filled surfaces	Yes		
Child has active white spot lesions or enamel defects	Yes		
Child has elevated mutans streptococci levels	Yes		
Child has plaque on teeth		Yes	

Circling these conditions that apply to a specific patient helps the practitioner and parent understand the factors that contribute to or protect from caries. Risk assessment categorization of low, moderate, or high is based on preponderance of factors for the individual. However, clinical judgment may justify the use of one factor (eg, frequent exposure to sugar-containing snacks or beverages, more than one daily) in determining overall risk.

Overall assessment of the child's dental caries risk: High Moderate Low

Table 3. Caries-risk Assessment Form for >6 Year Olds^{68,62}
(For Dental Providers)

Factors	High Risk	Moderate Risk	Protective
Biological			
Patient is of low socioeconomic status	Yes		
Patient has >3 between meal sugar-containing snacks or beverages per day	Yes		
Patient has special health care needs		Yes	
Patient is a recent immigrant		Yes	
Protective			
Patient receives optimally-fluoridated drinking water			Yes
Patient brushes teeth daily with fluoridated toothpaste			Yes
Patient receives topical fluoride from health professional			Yes
Additional home measures (eg, xylitol, MI paste, antimicrobial)			Yes
Patient has dental home/regular dental care			Yes
Clinical Findings			
Patient has ≥1 interproximal lesions	Yes		
Patient has active white spot lesions or enamel defects	Yes		
Patient has low salivary flow	Yes		
Patient has defective restorations		Yes	
Patient wearing an intraoral appliance		Yes	

Circling these conditions that apply to a specific patient helps the practitioner and patient/parent understand the factors that contribute to or protect from caries. Risk assessment categorization of low, moderate, or high is based on preponderance of factors for the individual. However, clinical judgment may justify the use of one factor (eg, >1 interproximal lesions, low salivary flow) in determining overall risk.

Overall assessment of the dental caries risk: High Moderate Low

Table 4. Example of a Caries Management Protocol for 1-2 Year Olds

Risk Category	Diagnostics	Interventions Fluoride	Diet	Restorative
Low risk	– Recall every 6-12 months – Baseline MS ^a	– Twice daily brushing	Counseling	– Surveillance ^b
Moderate risk parent engaged	– Recall every 6 months – Baseline MS ^a	– Twice daily brushing with fluoridated toothpaste ^c – Fluoride supplements ^d – Professional topical treatment every 6 months	Counseling	– Active surveillance ^e of incipient lesions
Moderate risk parent not engaged	– Recall every 6 months – Baseline MS ^a	– Twice daily brushing with fluoridated toothpaste ^c – Professional topical treatment every 6 months	Counseling, with limited expectations	– Active surveillance ^e of incipient lesions
High risk parent engaged	– Recall every 3 months – Baseline and follow up MS ^a	– Twice daily brushing with fluoridated toothpaste ^c – Fluoride supplements ^d – Professional topical treatment every 3 months	Counseling	– Active surveillance ^e of incipient lesions – Restore cavitated lesions with ITR ^g or definitive restorations
High risk parent not engaged	– Recall every 3 months – Baseline and follow up MS ^a	– Twice daily brushing with fluoridated toothpaste ^c – Professional topical treatment every 3 months	Counseling, with limited expectations	– Active surveillance ^e of incipient lesions – Restore cavitated lesions with ITR ^g or definitive restorations

Table 5. Example of a Caries Management Protocol for 3-5 Year Olds

Risk Category	Diagnostics	Interventions Fluoride	Diet	Sealants ^h	Restorative
Low risk	– Recall every 6-12 months – Radiographs every 12-24 months – Baseline MS ^a	– Twice daily brushing with fluoridated toothpaste ^c	No	Yes	– Surveillance ^b
Moderate risk parent engaged	– Recall every 6 months – Radiographs every 6-12 months – Baseline MS ^a	– Twice daily brushing with fluoridated toothpaste ^c – Fluoride supplements ^d – Professional topical treatment every 6 months	Counseling	Yes	– Active surveillance ^e of incipient lesions – Restoration of cavitated or enlarging lesions
Moderate risk parent not engaged	– Recall every 6 months – Radiographs every 6-12 months – Baseline MS ^a	– Twice daily brushing with fluoridated toothpaste ^c – Professional topical treatment every 6 months	Counseling, with limited expectations	Yes	– Active surveillance ^e of incipient lesions – Restoration of cavitated or enlarging lesions
High risk parent engaged	– Recall every 3 months – Radiographs every 6 months – Baseline and follow up MS ^a	– Brushing with 0.5% fluoride (with caution) – Fluoride supplements ^d – Professional topical treatment every 3 months	Counseling	Yes	– Active surveillance ^e of incipient lesions – Restoration of cavitated or enlarging lesions
High risk parent not engaged	– Recall every 3 months – Radiographs every 6 months – Baseline and follow up MS ^a	– Brushing with 0.5% fluoride (with caution) – Professional topical treatment every 3 months	Counseling, with limited expectations	Yes	– Restore incipient, cavitated, or enlarging lesions

Table 6. Example of a Caries Management Protocol for >6 Year-Olds

Risk Category	Diagnostics	Interventions Fluoride	Diet	Sealants ^h	Restorative
Low risk	– Recall every 6-12 months – Radiographs every 12-24 months	– Twice daily brushing with fluoridated toothpaste ^c	No	Yes	– Surveillance ^b
Moderate risk patient/parent engaged	– Recall every 6 months – Radiographs every 6-12 months	– Twice daily brushing with fluoridated toothpaste ^c – Fluoride supplements ^d – Professional topical treatment every 6 months	Counseling	Yes	– Active surveillance ^e of incipient lesions – Restoration of cavitated or enlarging lesions
Moderate risk patient/parent not engaged	– Recall every 6 months – Radiographs every 6-12 months	– Twice daily brushing with fluoridated toothpaste ^c – Professional topical treatment every 6 months	Counseling, with limited expectations	Yes	– Active surveillance ^e of incipient lesions – Restoration of cavitated or enlarging lesions
High risk patient/parent engaged	– Recall every 3 months – Radiographs every 6 months	– Brushing with 0.5% fluoride – Fluoride supplements ^d – Professional topical treatment every 3 months	Counseling – Xylitol	Yes	– Active surveillance ^e of incipient lesions – Restoration of cavitated or enlarging lesions
High risk patient/parent not engaged	– Recall every 3 months – Radiographs every 6 months	– Brushing with 0.5% fluoride – Professional topical treatment every 3 months	Counseling, with limited expectations – Xylitol	Yes	– Restore incipient, cavitated, or enlarging lesions

Professionally Applied Topical Fluoride: Evidence-based Clinical Recommendations¹

Assess	Advise			Decide
	Risk group (Age)	<8 years	6-18 years	
Caries Risk (see box for new boxes) • Low • Moderate • High & Patient Age	Low	Patient may not receive any additional benefit ^f	Patient may not receive any additional benefit ^f	Patient may not receive any additional benefit ^f
	Moderate	Varnish every 6 months	Varnish or Fluoride gel every 6 months	Varnish or Fluoride gel every 6 months
	High	Varnish every 6 or 3 months	Varnish every 6 or 3 months or Fluoride gel every 6 or 3 months	Varnish or Fluoride gel every 6 or 3 months

^aFluoridated water and fluoride toothpaste may provide adequate caries prevention in this risk category.
^bApplication time for fluoride gel and foam should be 4 minutes.
^cDue to limited evidence these recommendations have not been extrapolated to foam.
^dThere is limited evidence differentiating NaF and APF gels.

Based substantially on clinical evidence. Based substantially on extrapolations or subjective opinions.

Levels of evidence and strength of recommendations:
 Each recommendation is based on the best available evidence. The level of evidence available to support each recommendation may differ. Lower levels of evidence do not mean the recommendation should not be applied for patient treatment.

ADA Council on Scientific Affairs. Professionally applied topical fluoride. Evidence-based clinical recommendations. JADA 2006; 137(8):1151-59. Copyright © 2006 American Dental Association. All rights reserved. Adapted 2008 with permission. To see the full text of this article, please go to <http://ada.org/sections/177/151>. This page may be used, copied, and distributed for noncommercial purposes without seeking prior approval from the ADA. Any other use, copying, or distribution, whether printed or electronic format, is strictly prohibited without the prior written consent of the ADA.

FOR THE DENTAL PATIENT: A look at periodontal disease 1339

THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION

J A D A SEPTEMBER 2001

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Assessing the effect of fluoride varnish on early enamel carious lesions in the primary dentition

JANA T. AUTO-GOLD, D.D.S.; FRANK COURTS, Ph.D., D.D.S.

Despite the decline in the incidence of dental caries in the United States, the disease remains a significant problem for the nation's

JADA (2001) 85:172-176

Background. The aim of this study was to evaluate the effect of fluoride varnish on enamel caries progression in the primary dentition.

Methods. One hundred forty-two children in Head Start schools (3 to 5 years old) were randomized into the varnish and control groups. Children in the varnish group received fluoride varnish (Duraphat, Colgate-Palmolive Co.) at baseline and after four months, and children in the control group received no professional fluoride applications. Two calibrated examiners performed the examinations at baseline and at nine months.

Results. At nine months, the authors found that in the control group, 37.8 percent of active enamel lesions on occlusal, buccal and lingual surfaces became inactive, 3.6 percent progressed and 36.9 percent did not change. In the varnish group,



TABLE 3

DISTRIBUTION OF ACTIVE ENAMEL LESIONS AT NINE MONTHS.

TOOTH SURFACE	GROUP	NUMBER (%) OF ACTIVE LESIONS				TOTAL
		No Change	Inactive	Progressed	Filled	
Occlusal	Varnish	10 (6.5)*	119 (77.8)*	6 (3.9)	18 (11.8)*	153 (60.0)
	Control	63 (35.6)	67 (37.9)	8 (4.5)	39 (22.0)	177 (78.7)
Buccal	Varnish	7 (9.9)	62 (87.3)*	0	2 (2.8)	71 (27.8)
	Control	10 (41.7)	9 (37.5)	0	5 (20.8)	24 (10.9)
Lingual	Varnish	4 (12.9)	26 (83.9)*	0	1 (3.2)	31 (12.2)
	Control	10 (41.7)	9 (37.5)	0	5 (20.8)	24 (10.9)
TOTAL	Varnish	21 (8.2)	207 (81.2)*	6 (2.4)	21 (8.2)	255 (100)
	Control	83 (36.9)*	85 (37.8)	8 (3.6)	49 (21.8)	225 (100)

* P < .0001.

10 ADA News May 1, 2006

Health & Science

Fluoride varnish may help prevent early childhood caries

Study results 'support bringing children for the first dental visit at age one'

BY JENNIFER EASTON

Researchers who reviewed nearly 300 studies found that three groups that received varnish once a year, three receiving it once and those who did not receive it at all in order to determine the efficacy of fluoride fluoride varnish application frequency. By the 12-month follow-up exam, 11 children were diagnosed due to caries.

In the study, 200 children completed the 24-month study, which concluded that children who didn't receive fluoride varnish were four times more likely to develop tooth decay than those children receiving more tooth treatments and twice as many likely than those receiving annual applications.

"There are two important points that parents should be aware of as a result of this study," said Dr. Jane Weinstaub, the study's principal investigator and a UCSF professor. "First, the results support the use of fluoride varnish to prevent tooth decay in very young children. Second, the results support bringing children for the first dental visit at age 1 so that they are getting their first tooth."

Most of the children who participated were of Chinese or Hispanic origin and from low-income, densely underserved backgrounds in San Francisco. According to UCSF, this was the first randomized study of children as young as 6 months.

Researchers earlier have shown that children from low-income and Hispanic and Asian populations are at high risk for tooth decay. Dr. Weinstaub said.

The study results are published in the February issue of the Journal of Dental Research, the journal of the International Association of Dental Research.

"Fluoride varnish is relatively inexpensive, easy to brush onto a child's teeth and can be part of a positive first dental visit to help prevent tooth decay."

"Fluoride varnish is relatively inexpensive, easy to brush onto a child's teeth and can be part of a positive first dental visit to help prevent tooth decay." Dr. Weinstaub said. "In contrast, when you receive dental care, it is a difficult task

Make a Splash With Dry Mouth Sufferers

NEW Oasis Mouthwash and Mouth Spray from the makers of Sensodyne

- Helps manage symptoms for up to 2 hours*
- Works 3 ways to provide and lock in moisture*

TRI HYDRA™

- Moisturizes the mouth
- Locks in moisture
- Helps protect from dryness

RESEARCH REPORTS

Clinical

J.A. Weinstaub*, F. Ramos-Gomez, B. Jiao, S. Shein, C.I. Hoover, J.D.B. Featherstone, and S.A. Gansky

Fluoride Varnish Efficacy in Preventing Early Childhood Caries

Center to Address Disparities in Children's Oral Health and Comprehensive Oral Health Research Center of Dentistry, University of California, San Francisco School of Dentistry, 3333 California Street, Suite 495, San Francisco, CA 94143-1361, USA; *corresponding author, Jane.Weinstaub@ucsf.edu

J Dent Res 85(2):172-176, 2006

ABSTRACT

To determine the efficacy of fluoride varnish (5% NaF, Duraphat®, Colgate) added to caregiver counseling to prevent early childhood caries, we conducted a two-year randomized, dental-examiner-masked clinical trial. Initially, 376 caries-free children, from low-income Chinese or Hispanic San Francisco families, were enrolled (mean age a standard deviation, 1.8 ± 0.6 yrs). All

INTRODUCTION

Early childhood caries is a public health problem sometimes affecting young children almost as soon as their teeth erupt. In severe cases, pediatric dental services may require anesthesia in the operating room, services often unavailable, especially for low-income, underserved groups. In California, the early childhood caries prevalence is particularly high in some low-income racial/ethnic populations. Findings from the 1993-94 statewide oral health needs assessment (Pollack et al., 1999; Shibuski et al., 2003) showed early childhood caries prevalence (≥ 1 decayed, extracted, or

J Dent Res (2006) 85:172-176

GORDON J. CHRISTENSEN *Dental Hygiene*
CLINICIANS REPORT
 SEPTEMBER/OCTOBER 2008, VOLUME 1, ISSUE 5

OTRAC RESEARCH **Fluoride Varnish—
 Dental Caries Prevention 2008**

A "First Look" report by TRAC Research Laboratory, CR's in-depth clinical studies division. Dental hygienists are aware of the movement to shift from in-office use of 1.23% APF gels and foams to 5% NaF varnish. Most have now used F varnishes for numerous patients. However, few clinicians are aware of the number and variety of 5% NaF varnishes now available—and only a handful have actually experienced personally more than one or two of the brands. Although chemically similar, their clinical characteristics differ in significant areas. For example, some irritate soft tissues, others have prolonged bitter taste, and most have an unappealing appearance that causes patients to remove them once they leave the dental offices, thereby forgoing the benefits of longer tooth contact. **This report gives a candid clinical characterization of 19 current F varnish brands after more than 160 applications on adults.**

Is 5% NaF varnish really superior to 1.23% APF gels and foams?
 YES. Although relatively new to the U.S., 5% NaF varnish has been used clinically and investigated scientifically worldwide for over 40 years. Numerous studies report improved anti-caries benefits and reduced inadvertent ingestion with F varnish vs. various gels and rinses.

Do all F varnish brands have similar F content and release?
 YES. Assays of fresh material from new packaging showed all brands tested met label claims of 5% NaF. The biggest variable is the patient. Some patients do not comply with directions to refrain from brushing, flossing, and restriction of diet to soft foods for four to six hours post application. Ideally, the longer the varnish is in place, the better the uptake in enamel. However, most F was assayed in saliva in the first four hours after application.

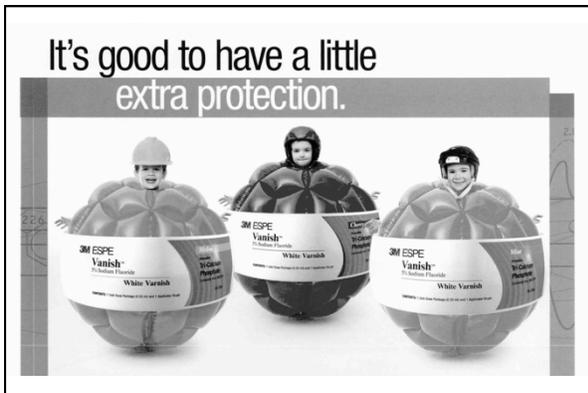
OTRAC RESEARCH
 All Solutions
 CarFree
 CavityShield
 Duraphat DS
 Duraphat Plus
 Duraphat
 Duraphat

A "First Look" report by TRAC Research Laboratory, CR's in-depth clinical studies division.
 Dental hygienists are aware of the movement to shift from in-office use of 1.23% APF gels and foams to 5% NaF varnish. Most have now used F varnishes for numerous patients. However, few clinicians are aware of the number and variety of 5% NaF varnishes now available—and only a handful have actually experienced personally more than one or two of the brands. Although chemically similar, their clinical characteristics differ in significant areas. For example, some irritate soft tissues, others have prolonged bitter taste, and most have an unappealing appearance that causes patients to remove them once they leave the dental offices, thereby forgoing the benefits of longer tooth contact. **This report gives a candid clinical characterization of 19 current F varnish brands after more than 160 applications on adults.**

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Were clinical characteristics of different F varnish brands similar?





Peak plasma fluoride concentration less than trays

- Plasma fluoride concentration and urinary fluoride excretion in children following application of the fluoride-containing varnish Duraphat. *Caries Res* 14:185-189.
- Ekstrand J, Koch G, Lindgren LE, Petersson LG (1981) Pharmacokinetics of fluoride gels in children and adults. *Caries Res* 15:213-220.



**Shen and Autio-Gold 2002
JADA 133:176-182**

**Hazelrigg et al. 2003
Pediatric Dentistry 25:119-126**

**Shen and Autio-Gold 2002
JADA 133:176-182**



The varnish, as squeezed out of the tube, did not always look uniform.

TABLE 1
FLUORIDE CONTENT OF VARNISHES IN SIX TEST GROUPS.

VARNISH*	NUMBER OF DOSES	FLUORIDE CONCENTRATION RANGE (PARTS PER MILLION)	MEAN (95% CONFIDENCE INTERVAL) FLUORIDE CONCENTRATION (PARTS PER MILLION)	TUKEY'S HSD† GROUPING‡
Duraphat I	20	19,478-24,437	22,634 (22,024 to 23,244)	A
Duraphat II	20	14,116-25,074	23,866 (22,755 to 24,977)	A
Duraflo I	20	506-74,030	13,830 (6,595 to 21,065)	B
Duraflo II	20	390-47,014	20,120 (13,471 to 26,769)	A
CavityShield (0.25 milliliters)	20	16,859-23,593	20,765 (19,864 to 21,666)	A, B
CavityShield (0.40 mL)	20	13,762-19,730	18,223 (17,593 to 18,853)	A, B

* Duraphat is manufactured by Colgate-Palmolive Co., New York; Duraflo, Pharmascience Inc., Montreal; and CavityShield, OMNII Oral Pharmaceuticals, West Palm Beach, Fla.
† HSD: Honestly Significant Difference.
‡ The mean fluoride content of the groups with the same letter is not statistically significantly different at $\alpha = .05$.

Duraflor I	20	506-74,030
Duraflor II	20	390-47,014

Hazlerigg et al. 2003 Pediatric Dentistry 25:119-126

Table 1. Fluoride $\mu\text{g/gm}$ (ppm) Measured by Direct Fluoride Analysis

Product	n	Mean	Min	Max
Duraphat vertical*	20	21,838 \pm 2,908	15,346	25,399
Duraflor horizontal*	20	19,331 \pm 32,588	88	124,174
Duraphat horizontal*	20	18,387 \pm 3,096	11,439	24,488
Duraflor vertical*	20	15,333 \pm 27,990	113	99,223
CavityShield*	10	4,992 \pm 968	3,251	6,616

*Not significantly different ($P > .05$).



Professionally Applied Topical Fluoride: Evidence-based Clinical Recommendations¹

Determination of Caries Risk

There are many systems to determine caries risk. One such system is offered below that can be used for caries risk assessment.

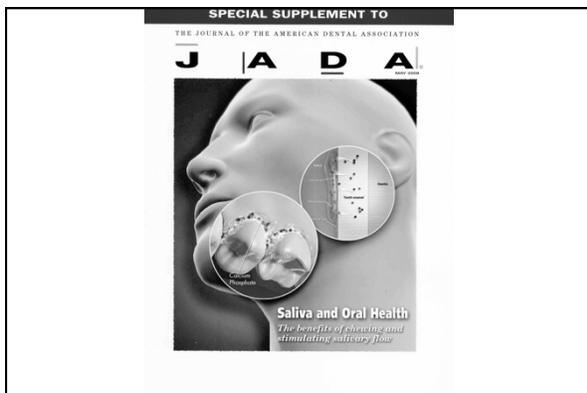
Individuals' risk factors increasing risk for developing caries may also include, but are not limited to:

- High levels of cariogenic bacteria
- Poor oral hygiene
- Prolonged nursing (bottle or breast)
- Poor family dental health
- Developmental or acquired enamel defects
- Genetic abnormality of teeth
- Many multiresin restorations
- Chemoradiation therapy
- Eating disorders
- Drug/alcohol abuse
- Irregular dental care
- Carotigenic diet
- Active orthodontic treatment
- Presence of exposed root surfaces
- Restoration overhangs and open margins
- Physical or mental disability with inability or unavailability of performing proper oral health care

Risk group	Age	Primary or Secondary Carious lesions in the past three years	Risk factors listed above
Low	All age groups	None	None
	< 6 years	None	and At least one risk factor
Moderate	> 6 years	One or two	or Multiple risk factors or Low Socioeconomic status or "Xerostomia" or suboptimal fluoride exposure
	< 6 years	Any	or Multiple risk factors or "Xerostomia" or suboptimal fluoride exposure
High	> 6 years	Three or more	

*Medication, radiation or disease induced xerostomia

¹JADA Council on Scientific Affairs. Professionally applied topical fluoride: Evidence-based clinical recommendations. JADA 2006;137(8):1151-59. Copyright © 2006 American Dental Association. All rights reserved. Adapted 2008 with permission. To see the full text of this article, please go to http://ada.org/ADA_CONTENT/137381151.



Protective Role of Saliva

- Acts as a buffer to neutralize acid
- Acts as an ion reservoir to help remineralize enamel
- Antimicrobial activity
- Clears bacteria by agglutination
- Helps to form enamel pellicle

Orbit and Extra have been shown to help fight tooth decay and strengthen teeth. The use of Orbit or Extra after eating helps to reduce plaque acid.

ADA
American Dental Association

Announcing acceptance of the COUNCIL ON SCIENTIFIC AFFAIRS, AMERICAN DENTAL ASSOCIATION

SUGARFREE GUM

WRIGLEY'S

Orbit

JUST BRUSHED CLEAN FEELING™

ARTIFICIALLY FLAVORED PEPPERMINT 14 PIECES

NEW

WRIGLEY'S

Extra

SUGARFREE GUM naturally and artificially flavored

15 Sticks

Supermint™
Smooth Refreshing Mint

Pharmacology Report

Medication-Induced Hyposalivation: Etiology, Diagnosis, and Treatment

Paul A. Moore DMD, PhD, MPH,¹ and James Guggenheimer, DDS²

Abstract: Polypharmacy in the nation's growing geriatric population will require increasingly complex pharmacologic management of multiple disease states. This brief review describes normal salivary function, potential causes of salivary dysfunction, oral health concerns associated with hyposalivation, diagnostic tests, and options for patient care. Medications can reduce salivary flow, creating the condition known as xerostomia. A major complication of xerostomia is the promotion of dental caries.

flow decreases by 50%.³ Complaints of dry mouth are generally more prevalent in women and occur more frequently when patients are taking multiple drugs.³

This brief review describes normal salivary function, potential causes of salivary dysfunction, oral health concerns associated with hyposalivation, diagnostic tests, and options for patient care.

NORMAL SALIVARY FUNCTION

Compendium (2008) 29:50-55

Table 1: Medications Associated with Xerostomia

Anticholinergic/antispasmodic agents	atropine, scopolamine, oxybutynin
Antidepressant and antipsychotic agents	imipramine, fluoxetine, bupropion, pimoizide, haloperidol
Diuretic agents	chlorothiazide, furosemide
Antihypertensive agents	captopril, clonidine, methyl dopa
Sedative and anxiolytic agents	alprazolam, triazolam
Muscle relaxant agents	cyclobenzaprine, orphenadrine
CNS analgesic agents	tramadol, codeine, methadone
NSAID and analgesic agents	naproxen, ibuprofen
Antihistamines	astemizole, diphenhydramine, meclizine
Miscellaneous	isotretinoin, disopyramide, carbamazepine, carbidopa/levodopa, ipratropium, tolterodine

ADA News September 19, 2011 31

Dentists, pharmacists announce dry mouth awareness collaboration

The American Dental Association, Academy of General Dentistry, American Academy of Periodontology and American Pharmacists Association announced a collaborative effort to expand awareness of the impact of medications on dry mouth, a condition known to health professionals as xerostomia. More than 500 medications can contribute to oral dryness, said ADA's Aug. 11 announcement, which is posted online at "www.ada.org/6114.aspx". ■

Types of Topical Fluoride

- **Gels**
 - 1.23% APF, 12,300 ppm
 - 2% NaF (0.90% F) 9,050 ppm
- **Foams**
- **Varnish**
 - 5% NaF (2.26% F) 22,600 ppm



Fluoride Foams

- “... only two clinical trials have been published evaluating its effectiveness. Because of this, the recommendations for use of fluoride varnish and gel have not been extrapolated to foams.”

RESEARCH REPORTS

Clinical

H. Jiang¹, Z. Bian², B.J. Tai¹, M.Q. Du¹, and B. Peng^{2*}

¹Department of Preventive Dentistry, School of Stomatology, Wuhan University, China; and ²Key Lab for Oral Biomedical Engineering of Ministry of Education, School of Stomatology, Wuhan University, Luyou Road 237, Wuhan City, China 430079; *corresponding author, pb301@vip.163.com

J Dent Res 84(3):265-268, 2005

The Effect of a Bi-annual Professional Application of APF Foam on Dental Caries Increment in Primary Teeth: 24-month Clinical Trial

ABSTRACT

The purpose of this study was to evaluate the effect of a bi-annual professional application of acidulated phosphate fluoride (APF) foam on caries increment in the primary dentition over a two-year period in the People's Republic of China. In a double-blind, cluster-randomized, placebo-controlled trial, 392 children aged 3-4 years from

INTRODUCTION

Acidulated phosphate fluoride (APF) is an effective cariostatic agent that has been widely investigated in the last half-century. In recent decades, APF gels have been frequently used in dental clinics and prevention programs in schools in many countries (Hawkins *et al.*, 2003; Marinho *et al.*, 2003). The effects of APF gel in caries prevention were recently confirmed by 2 review articles (van Rijkom *et al.*, 1998; Marinho *et al.*, 2003). The meta-analysis of clinical studies showed that the overall caries-inhibiting effect of APF gel

J Dent Res (2005) 84:265-268

Effect of professional application of APF foam on caries reduction in permanent first molars in 6-7-year-old children: 24-month clinical trial

Han Jiang^a, BaoJun Tai^a, MinQuan Du^a, Bin Peng^{b,*}

J Dent (2005) 33:469-473

Fluoride Foams

- “... A one minute fluoride application is not endorsed.”

Provides effective fluoride therapy for children and adults—low pH (3.5) ensures fast, effective fluoride uptake: 29,284 ppm fluoride uptake after 4 minutes (recommended usage: 4 minutes).[†]



TABLE 3
Evidence-based clinical recommendations for professionally applied topical fluoride.

The following table summarizes the evidence-based clinical recommendations for the use of professionally applied topical fluoride. The clinical recommendations are based on the best available evidence and professional judgment and are subject to change as new evidence becomes available.

It is recommended that all age and risk groups use an appropriate amount of fluoride toothpaste when brushing twice a day, and that the amount of toothpaste used for children younger than 6 years not exceed the size of a pea. For patients at moderate and high risk of caries, additional preventive interventions should be considered, including use of additional fluoride products at home, pit-and-fissure sealants and antibacterial therapy.

ASSOCIATION REPORTS |

CE Program ARTICLE 4

Fluoride toothpaste efficacy and safety in children younger than 6 years

A systematic review

J. Flannery Wright, MD, MS, Nicholas Johnson, MPH, Robert Smith, PhD, Clifford A. Bruce, PhD, Catherine S. Kitchin, MPH, Ronald A. Davis, MPH, DDD

ABSTRACT

Background: The authors conducted a systematic review to assess the efficacy and safety of fluoride toothpaste for children younger than 6 years. **Methods:** To address defined research questions, a literature search strategy was developed and implemented. The search strategy was designed to identify the efficacy and safety of fluoride toothpaste. **Results:** Use of fluoride toothpaste had a statistically significant effect on mean dental caries and gingivitis. Fluoride toothpaste had a statistically significant effect on mean dental caries and gingivitis. Fluoride toothpaste had a statistically significant effect on mean dental caries and gingivitis. **Conclusion:** Use of fluoride toothpaste had a statistically significant effect on mean dental caries and gingivitis.

JADA (2014) 145:182-189

Fluoride Brushing Urged For Children Under 2

By CATHERINE SAINT LOUIS

Parents should use a tiny smear of fluoride toothpaste to brush baby teeth twice daily as soon as they erupt, instead of waiting until children are older, according to new guidelines by the American Dental Association. That advice overturns the ADA's decades-old recommendation to start using a pea-size amount at 24 months. Once children are 3 to 6 years old, then the amount should be increased to a pea-size dollop, the updated guidelines say.

To fight the rising number of cavities in the very young, the dental group now advises getting a jump-start on prevention. How-

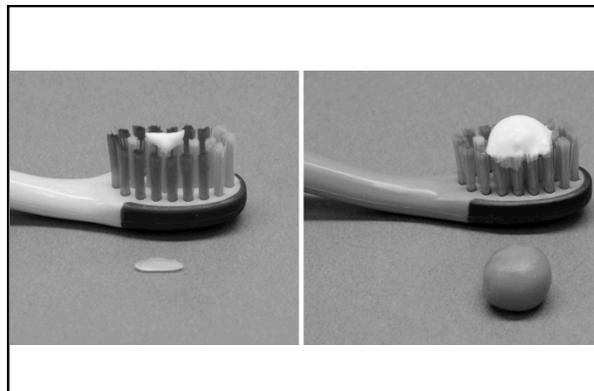
ever, it is a good idea to get a tiny amount of fluoride, and brush two times a day to counter the effects of frequent snacking."

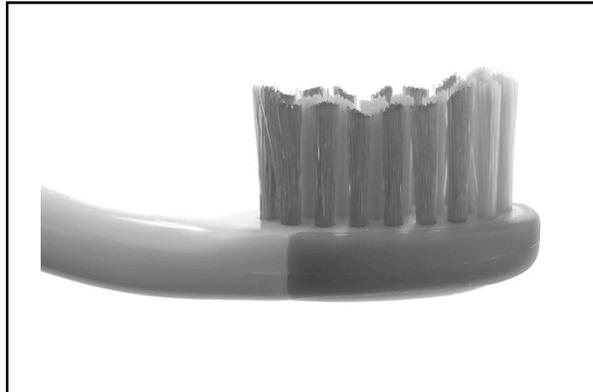
Most of the children she sees with tooth decay are using "a training toothpaste without fluoride," she said.

The new A.D.A. guidelines stress that children should spit out toothpaste as soon as they are able, but not being able to spit does not preclude the use of a rice-grain-size bit of fluoride toothpaste.

Dr. Shenkin has had some 5-year-old patients "still not using a fluoride toothpaste because parents don't think they can spit it out yet." The goal is to have

New York Times Feb 13, 2014

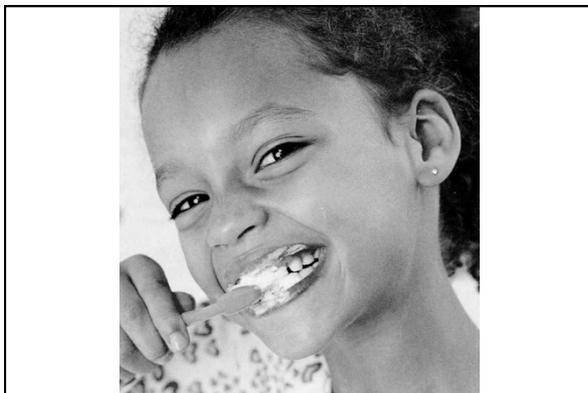
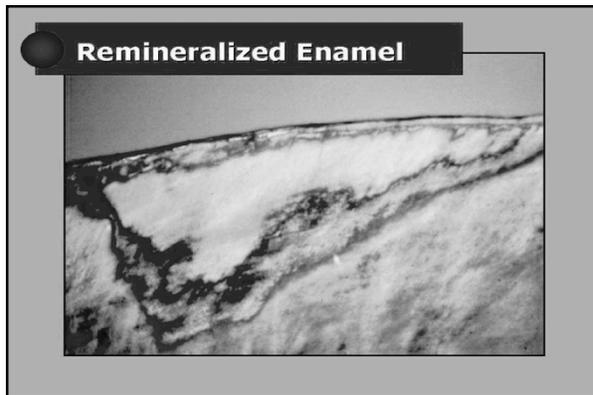


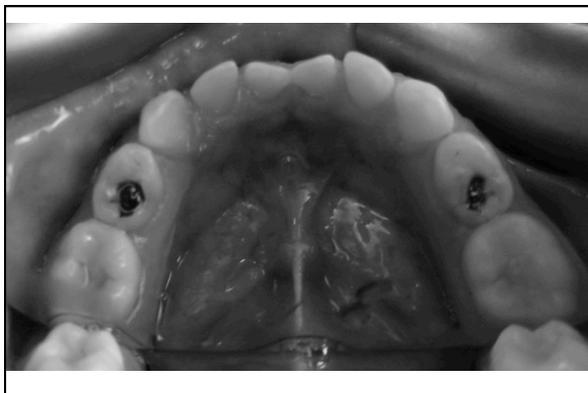
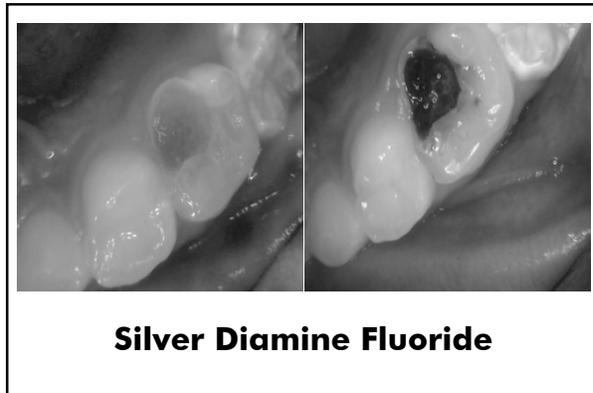
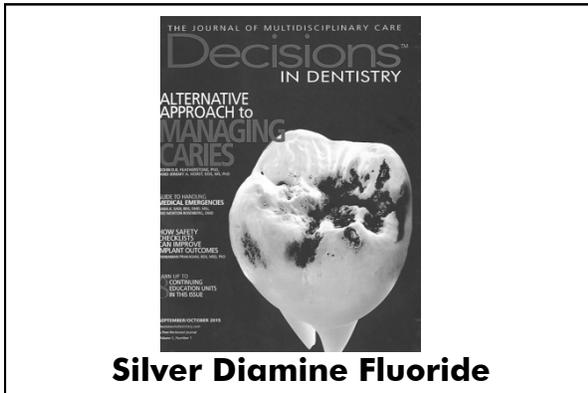


ACTA
ODONTOLOGICA
SCANDINAVICA

**Combination of high-fluoride
toothpaste and no post-brushing
water rinsing on enamel
demineralization using and *in-situ*
caries model with orthodontic bands**

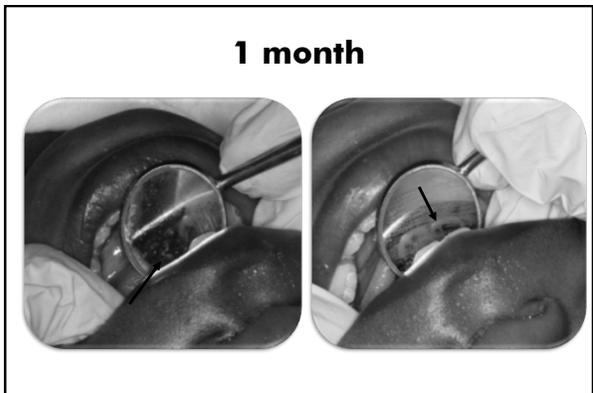
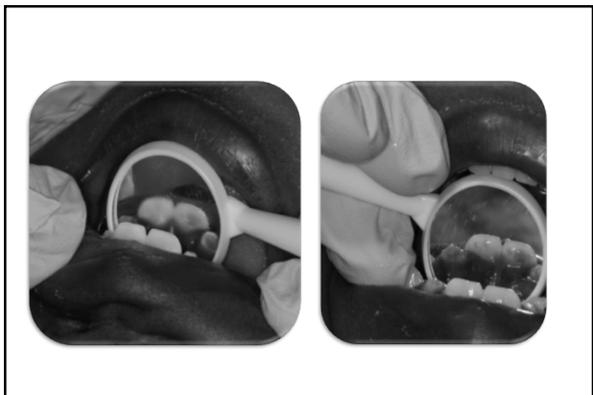
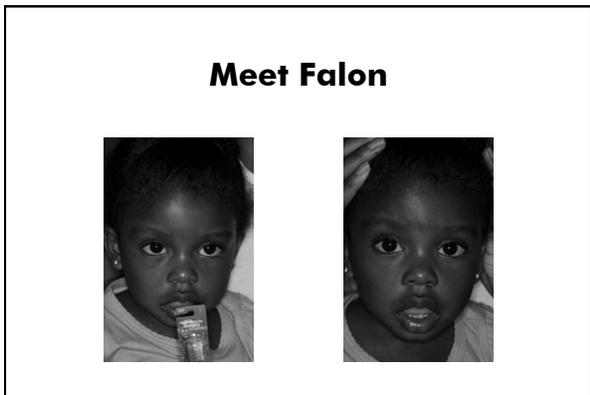
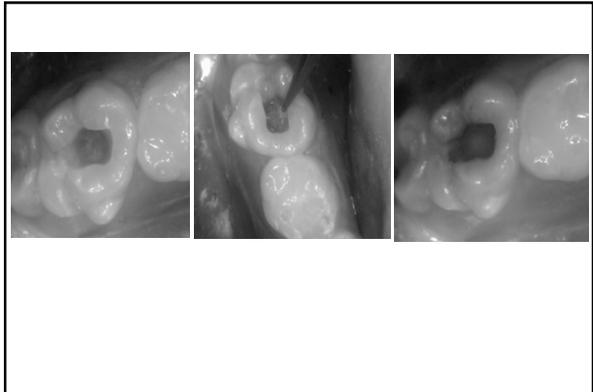
Acta Odontol Scan (2010) 68:323-328





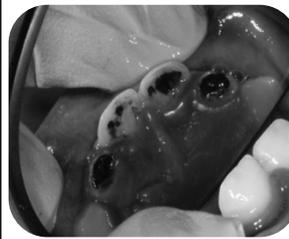
Silver Diamine Fluoride...

- is used to treat cavities
- is an alternative to fillings
- arrests, or stops, cavities 70% of the time (fluoride varnish stops cavities 50% of the time)
- has been used for over 100 years
- has been approved by the FDA
- permanently stains cavities black

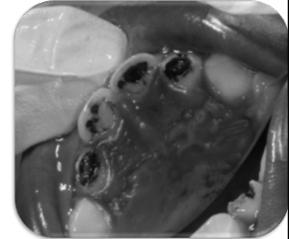




2 months

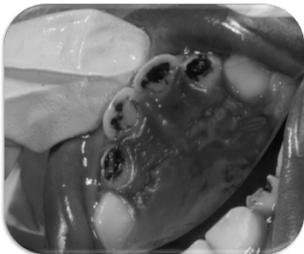


2 months



5 months

6 months



8 months



Technique

- **Obtain Consent**
- **Set Up – Advantage Arrest, A/B well, microbrush, cotton rolls, 2x2 gauze, mouth prop**
- **Squeeze 1 drop from bottle into well**
- **Seat patient (dental chair or parent's lap)**
- **Isolate teeth to be treated**
- **Keep cavity moist for 3 minutes**

Technique

- Soak up excess liquid – do not rinse
- Apply Fluoride Varnish to all other surfaces
- Treatment Plan using “SDF” Hot Button (ADA Code D1354)
- Fee = \$68
- Repeat in 2 months (\$68)
- Not to be used for cavities that are close to pulp or have entered pulp



Precautions

- Does not stain healthy enamel or dentin
- Stains cavities black
- Stains soft tissue red or dark brown – takes days to weeks to return to normal
- Stains countertops

Systemic Fluoride



Main Sources of Systemic Fluoride

- Optimally fluoridated water
- Fluoride supplements

FLUORIDE IN U.S. WATER SUPPLY
 Water fluoridation began in the USA in 1945. Both the American Dental Association and the Centers for Disease Control and Prevention say fluoridated water is a safe and cost-effective way to prevent tooth decay.

1945
 Grand Rapids, Mich., is the first U.S. city to treat its water supply with fluoride.

1956
 Crest, the first toothpaste with fluoride, is introduced.

TODAY
 More than 195 million Americans are on fluoridated water systems, according to the Centers for Disease Control.

RECOMMENDED CONCENTRATION TO FIGHT CAVITIES:
1 PART FLUORIDE PER MILLION PARTS WATER

MORE THAN 72 PERCENT of Americans have access to fluoridated water.

IT COSTS ABOUT 50 CENTS per person per year to add fluoride in larger cities.

REDUCES TOOTH DECAY 20-40 PERCENT

Sources: American Dental Association, Centers for Disease Control and Prevention
 Graphic by Nivon A. Koppa, Anne Carney
 © 2009

U.S. Department of Health & Human Services
HHS.gov

HHS and EPA announce new scientific assessments and actions on fluoride
Agencies working together to maintain benefits of preventing tooth decay while preventing excessive exposure

WASHINGTON - The U.S. Department of Health and Human Services (HHS) and the U.S. Environmental Protection Agency (EPA) today are announcing important steps to ensure that standards and guidelines on fluoride in drinking water continue to provide the maximum protection to the American people to support good dental health, especially in children. HHS is proposing that the recommended level of fluoride in drinking water can be set at the lowest end of the current optimal range to prevent tooth decay, and EPA is initiating review of the maximum amount of fluoride allowed in drinking water.

These actions will maximize the health benefits of water fluoridation, an important tool in the prevention of tooth decay while reducing the possibility of children receiving too much fluoride. The Centers for Disease Control and Prevention named the fluoridation of drinking water one of the ten great public health achievements of the 20th century.

"One of water fluoridation's biggest advantages is that it benefits all residents of a community—at home, work, school, or play," said HHS Assistant Secretary for Health Howard K. Koh, MD, MPH. "Today's announcement is part of our ongoing support of appropriate fluoridation for community water systems, and its effectiveness in preventing tooth decay throughout one's lifetime."

"Today both HHS and EPA are making announcements on fluoride based on the most up to date scientific data," said EPA Assistant Administrator for the Office of Water, Peter Silva. "EPA's new analysis will help us make sure that people benefit from tooth decay prevention while at the same time avoiding the unwanted health effects from too much fluoride."

HHS and EPA reached an understanding of the latest science on fluoride and its effect on tooth decay prevention and the development of dental fluorosis that may occur with excess fluoride consumption during the tooth forming years, age 8 and younger. Dental fluorosis in the United States appears mostly in the very mild or mild form – as barely visible lacy white markings or spots on the enamel. The severe form of dental fluorosis, with staining and pitting of the tooth surface, is rare in the United States.

There are several reasons for the changes seen over time, including that Americans have access to more sources of fluoride than they did when water fluoridation was first introduced in the United States in the 1940s. Water is now one of several

2 options if your patient drinks well water

- 1. Test well water, if well water contains little to no fluoride, then prescribe fluoride supplements**
- 2. Ask patient to drink bottled water that contains fluoride**



SYSTEMIC FLUORIDE SUPPLEMENTS: RECOMMENDED DOSAGE

Age	Fluoride Ion Level in Drinking Water ^a		
	< 0.3 ppm	0.3–0.6 ppm	> 0.6 ppm
Newborn–6 months	None	None	None
6 months–3 years	0.25 mg/day ^b	None	None
3–6 years	0.50 mg/day	0.25 mg/day	None
6–16 years	1.0 mg/day	0.50 mg/day	None

^a1.0 ppm = 1 mg/L.
^b2.2 mg sodium fluoride contains 1 mg fluoride ion.
 Reproduced with permission from the American Dental Association from *ADA Guide to Dental Therapeutics* (2nd ed.).



North Carolina State Laboratory of Public Health
N. C. Department of Health and Human Services
P.O. Box 28047 - 306 N. Wilmington St - Raleigh, NC 27611-8047

Fluoride Analysis--PATIENT'S WATER

County: GUILFORD	Lab. No. AB90452	RESULTS
Patient: [REDACTED] DOB: 6/17/2003	Date Collected: 6/1/2009	<0.2 mg/l
Address: [REDACTED]	Received / Analyzed: 6/5/2009	Note: mg/l = ppm
Parent's Name: [REDACTED]	Water Supply: [REDACTED]	
Report TO Lake Jeanette Orthodontics & Ped Dent.	Phone: 336 [REDACTED] Other Children: [REDACTED]	
3901 N. Elm St. Greensboro, NC 27455	Title: Dentist	
	Remarks	
	Login Batch 09060025	
	Reported: 6/17/2009	Ref: 7899

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Report To: MICHAEL IGNILZI, DDS, PHD, PA
LAKE JEANETTE ORTHODONTICS AND PEDIATRIC
3901 N ELM ST
GREENSBORO, NC 27455

PATIENT NAME: EVA GRACE [REDACTED]
PARENT NAME: DOUG [REDACTED]
PHONE NO. 336 [REDACTED]

StarLMS ID: ES120109-0136001 Date Collected: 11/19/09 Time Collected: [REDACTED]
Inorganic ID: [REDACTED] Date Received: 12/01/09 Collected By: [REDACTED]

Sample Type: [REDACTED] Sampling Point: KITCHEN Date of Birth: 4-14-08
Sample Source: Well Temp. at Receipt: [REDACTED] GPS #: [REDACTED]

Sample Description: [REDACTED]
Comment: [REDACTED]

Fluoride (Profile)				
Analyte	Result	Allowable Limit	Unit	Qualifier(s)
Fluoride	0.62	2.00	mg/L	

Report Date: 12/29/2009 Reported By: Mike King

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Fax: 919-733-8695

Report To: LAKE JEANETTE ORTHODONTICS AND PEDIATRIC
3901 N ELM ST
GREENSBORO, NC 27455

PATIENT NAME: SARAH [REDACTED]
PARENT NAME: HEATHER [REDACTED]
PHONE NO. 336 [REDACTED]

StarLMS ID: ES122109-0653001 Date Collected: 12/09/09 Time Collected: [REDACTED]
Inorganic ID: [REDACTED] Date Received: 12/12/09 Collected By: [REDACTED]

Sample Type: [REDACTED] Sampling Point: KITCHEN SINK Date of Birth: 07/26/06
Sample Source: Well Temp. at Receipt: [REDACTED] GPS #: [REDACTED]

Sample Description: [REDACTED]
Comment: [REDACTED]

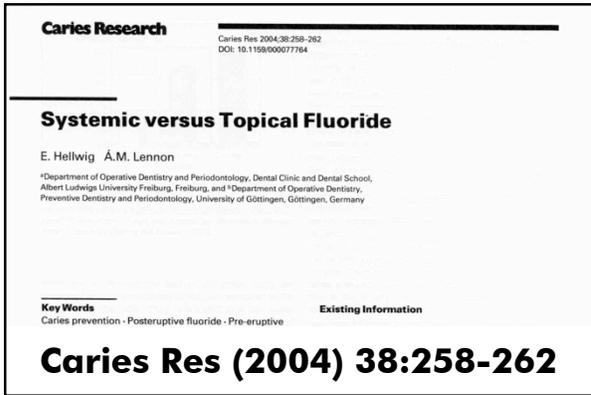
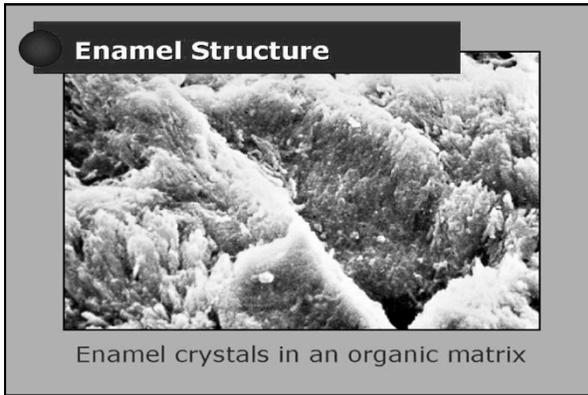
Fluoride (Profile)				
Analyte	Result	Allowable Limit	Unit	Qualifier(s)
Fluoride	2.20	2.00	mg/L	

Report Date: 01/21/2010 Reported By: Mike King

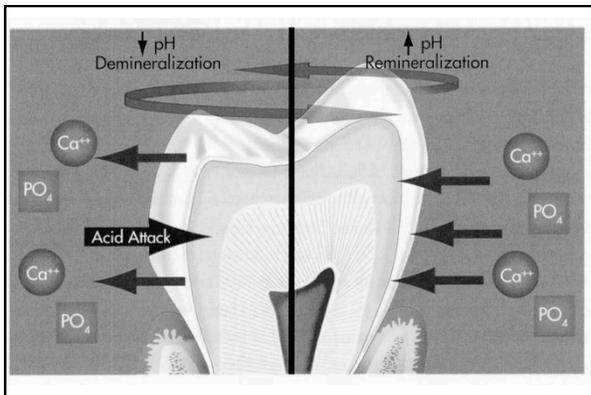
2 options if your patient drinks well water

- 1. Test well water, if well water contains little to no fluoride, then prescribe fluoride supplements**
- 2. Ask patient to drink bottled water that contains fluoride**





“... caries protective effect of fluoride is almost exclusively post-eruptive.”



Sealants




Pit and Fissure Sealants — An Ongoing Commitment

MICHAEL A. HONOLD, JR., DMD, PhD

ABSTRACT The purpose of this article is to provide the dental health professional with sound science related to sealants so that he/she can provide the best care to his/her patients. This article will synthesize the recommendations made by the American Academy of Pediatric Dentistry and the American Dental Association, review the rationale as to why sealants should be placed on a routine basis, and provide practical suggestions on how to optimize sealant placement.

AUTHOR
MICHAEL A. HONOLD, JR., DMD, PhD, is a 2005, the American Academy of Pediatric Dentistry endorsed the Symposium on the Prevention of Oral Disease in Children and Adolescents. Experts with diverse expertise, including dental sealants, were asked to review the literature and make recommendations that would lead to improved oral health for children and adolescents. In 2008, the state of the art and should be adopted by anyone who places dental sealants. Approximately 90 percent of caries in permanent teeth occur in the pit and fissure and caries in pit and fissure increase dramatically in permanent teeth between the age of 12 and 14. Twenty-one percent of 12-year-olds have caries in their permanent teeth, whereas 40-



TOOTH GROOVE
TOOTHBRUSH BRISTLE
FISSURE
SEALANT

A single toothbrush bristle is too large to reach inside and clean the groove on this tooth.

A molar's chewing surface before the sealant.

A sealant protects the chewing surfaces of a molar.

WHAT ARE SEALANTS?

It is a plastic material (resin) applied to the chewing surfaces of the back teeth — the premolars and molars. The resin bonds to the deep grooves and grooves (called pits and fissures) in the back teeth. A sealant is a barrier that protects teeth exposed from plaque and acids.

WHY ARE SEALANTS NECESSARY?
 The back teeth have uneven pits and fissures that are difficult to keep clean because toothbrush bristles cannot reach into them. The pits and fissures hold plaque and food particles. Most tooth decay occurs in these hard-to-clean grooves. Sealants form a film covering the tooth to keep out plaque and decay and decrease the risk of decay.

WHY ARE SEALANTS APPLIED?
 It takes only a few minutes to seal each tooth. The procedure, which is usually painless, rarely involves drilling or anesthesia. The teeth are cleaned and drying surfaces are conditioned to help the sealant adhere to the tooth. The sealant is "cured" with the curing surface, where it flows into the pits and fissures, bonds to the tooth and hardens. A special curing light can be used to help the sealant harden.

HOW LONG DO SEALANTS LAST?
 As long as the sealant remains intact on the chewing surface it is protected from decay. Sealants hold up well under the forces of normal chewing. The sealant last several years before replacement is needed. The dentist checks the condition of the sealants during a check-up.

CAN SEALANTS PROTECT AGAINST ALL DECAY?
 Sealants protect the chewing surfaces. Good oral hygiene at home and regular dental check-ups and professional teeth cleaning are important to prevent tooth decay on the tooth's "smooth" surfaces. The sealant "shield" that seals the "grooves" to prevent cavities from forming between teeth called interdental decay. Rinse or use an interdental cleaner once a day and brush twice a day. Use floss to products that display the ADA Seal of Acceptance, your assurance that the product has met the ADA's criteria for safety and effectiveness.

WHO IS A CANDIDATE FOR SEALANTS?
 Children and teenagers are prime candidates for sealants because the likelihood of developing decay begins as soon as the back teeth appear. Sealants are usually placed on the surfaces of teeth that have not been previously filed and show no signs of decay. Adults can benefit from sealants too. Prevention is always better than treatment. Sealants are extremely effective in preventing tooth decay on the back teeth and can save patients' money in the long run.

A single toothbrush bristle is too large to reach inside and clean the groove on this tooth.

A molar's chewing surface before the sealant.

A sealant protects the chewing surfaces of a molar.



ORIGINAL CONTRIBUTIONS

CrossMark

Sealants for preventing and arresting pit-and-fissure occlusal caries in primary and permanent molars

A systematic review of randomized controlled trials—a report of the American Dental Association and the American Academy of Pediatric Dentistry

John T. Wright, DDS, MS; Malavika P. Tampi, MPH; Laurel Graham, MLS; Cameron Estrich, MPH; James J. Crall, DDS, MS, SCD; Margherita Fontana, DDS, PhD; E. Jane Gillette, DDS; Brian B. Novy, DDS; Vineet

ABSTRACT
 Background: National Health and Nutrition Examination Survey 2011–2012 data indicated that, in the United States, nearly one-fourth of children and over one-half of adolescents experienced dental caries in their permanent teeth. The purpose of this review was to summarize the available clinical evidence regarding the effect of

JADA (2016) 147:631–645

- Should sealants be placed on primary teeth?
- How should we manage non-cavitated lesions?

- Should we stop using resin-based sealants and switch to glass ionomer cement sealants?
- Are there any techniques that improve retention and effectiveness?

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† Includes Original, STF and NTF Fissurotomy Burs

TABLE 3
Summary of evidence-based clinical recommendations regarding pit-and-fissure sealants.

The clinical recommendations in this table are a resource for dentists to use in clinical decision making. These clinical recommendations must be balanced with the practitioner's professional judgment and the individual patient's needs and preferences.

Dentists are encouraged to employ caries risk assessment strategies to determine whether placement of pit-and-fissure sealants is indicated as a primary preventive measure. The risk of experiencing dental caries exists on a continuum and changes across time and risk factors change. Therefore, caries risk status should be re-evaluated periodically. Manufacturers' instructions for sealant placement should be consulted, and a dry field should be maintained during placement.

TOPIC	RECOMMENDATION	GRADE OF EVIDENCE	STRENGTH OF RECOMMENDATION
Caries Prevention	Sealants should be placed in pits and fissures of children's primary teeth when it is determined that the tooth, or the patient, is at risk of developing caries?	III	D
	Sealants should be placed on pits and fissures of children's and adolescents' permanent teeth when it is determined that the tooth, or the patient, is at risk of developing caries?	Ia	B
	Sealants should be placed on pits and fissures of adults' permanent teeth when it is determined that the tooth, or the patient, is at risk of developing caries?	Ia	D
Noncavitated Carious Lesions	Pit-and-fissure sealants should be placed on early (noncavitated) carious lesions, as defined in this document, in children, adolescents and young adults to reduce the percentage of lesions that progress?	Ia	B
	Pit-and-fissure sealants should be placed on early (noncavitated) carious lesions, as defined in this document, in adults to reduce the percentage of lesions that progress?	Ia	D
Resin Based Versus Glass Ionomer Cement	Resin-based sealants are the first choice of material for dental sealants.	Ia	A
	Glass ionomer cement may be used as an interim restorative agent when there are indications for placement of a resin-based sealant but concerns about moisture control may compromise resin placement?	IV	D
Placement Techniques	A computerized one-bottle bonding agent, which contains both an adhesive and a primer, may be used to wet the previously acid-etched enamel surface and the enamel matrix resin, in the opinion of the dental professional, the bonding agent would create similar retention in the clinical situation.	IIb	B
	Use of available self-etching bonding agents, which do not involve a separate etching step, may provide less retention than the standard acid-etching technique and is not recommended.	IIb	B
	Routine mechanical preparation of enamel before acid etching is not recommended.	III	C
	When possible, a four-handed technique should be used for placement of resin-based sealants.	IV	D
	When possible, a four-handed technique should be used for placement of glass ionomer cement sealants.	IV	D
	The oral health care professional should monitor and reapply sealants as needed to maintain effectiveness.	IV	D

TABLE 3
Summary of evidence-based clinical recommendations regarding pit-and-fissure sealants.

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Dentists are encouraged to employ caries risk assessment strategies to determine whether placement of pit-and-fissure sealants is indicated as a primary preventive measure. The risk of experiencing dental caries exists on a continuum and changes across time as risk factors change. Therefore, caries risk status should be re-evaluated periodically. Manufacturers' instructions for sealant placement should be consulted, and a dry field should be maintained during placement.

- ... professional judgment, patient's needs and patient's preferences
- ... caries risk assessment
- ... risk changes over time
- ... dry field should be maintained during placement

TOPIC	RECOMMENDATION	GRADE OF EVIDENCE	STRENGTH OF RECOMMENDATION
Caries Prevention	Sealants should be placed in pits and fissures of children's primary teeth when it is determined that the tooth, or the patient, is at risk of developing caries?	III	D
	Sealants should be placed on pits and fissures of children's and adolescents' permanent teeth when it is determined that the tooth, or the patient, is at risk of developing caries?	Ia	B
	Sealants should be placed on pits and fissures of adults' permanent teeth when it is determined that the tooth, or the patient, is at risk of developing caries?	Ia	D



Noncavitated Carious Lesions	Pit-and-fissure sealants should be placed on early (noncavitated) carious lesions, as defined in this document, in children, adolescents and young adults to reduce the percentage of lesions that progress?	Ia	B
	Pit-and-fissure sealants should be placed on early (noncavitated) carious lesions, as defined in this document, in adults to reduce the percentage of lesions that progress?	Ia	D

Noncavitated Carious Lesions

teria for dental radiographs.

‡ “Noncavitated carious lesion” refers to pits and fissures in fully erupted teeth that may display discoloration not due to extrinsic staining, developmental opacities or fluorosis. The discoloration may be confined to the size of a pit or fissure or may extend to the cusp inclines surrounding a pit or fissure. The tooth surface should have no evidence of a shadow indicating dentinal caries, and, if radiographs are available, they should be evaluated to determine that neither the occlusal nor proximal surfaces have signs of dentinal caries.

§ These clinical recommendations offer two

Resin-Based Versus Glass Ionomer Cement	Resin-based sealants are the first choice of material for dental sealants	Ia	A
	Glass ionomer cement may be used as an interim preventive agent when there are indications for placement of a resin-based sealant but concerns about moisture control may compromise such placement ¹	IV	D



Placement Techniques	A compatible ¹ one-bottle bonding agent, which contains both an adhesive and a primer, may be used between the previously acid-etched enamel surface and the sealant material when, in the opinion of the dental professional, the bonding agent would enhance sealant retention in the clinical situation ¹	Ib	B
	Use of available self-etching bonding agents, which do not involve a separate etching step, may improve sealant retention. However, the use of self-etching technique and is not recommended	Ib	B
	Routine mechanical preparation of enamel before acid etching is not recommended	IIB	B
	When possible, a four-handed technique should be used for placement of resin-based sealants	III	C
	When possible, a four-handed technique should be used for placement of glass ionomer cement sealants	IV	D
The oral health care professional should monitor and reapply sealants as needed to maximize effectiveness		IV	D

RESEARCH REPORTS
Biomaterials & Bioengineering

R.J. Feigal^{1*}, P. Muthanure², B. Gillespie², M. Levy-Polack³, I. Quelhas⁴, and J. Hobling⁵

Improved Sealant Retention with Bonding Agents: A Clinical Study of Two-bottle and Single-bottle Systems

¹Department of Orthodontics and Pediatric Dentistry, 1228 School of Dentistry, University of Michigan, Ann Arbor, MI 48109-1078; ²Center for Statistical Consultation and Research, University of Michigan; ³Pediatric Dentistry Practice, Annapolis, MD; and ⁴Pediatric Dentistry Practice, Minneapolis, MN; *Corresponding author: feigal@umich.edu

J Dent Res 79(11): 1850-1856, 2000

ABSTRACT
Recent *in vitro* work and a short clinical study suggest that adding a bonding agent layer between sealant and saliva-contaminated enamel allows for adequate bond strength and retention of resin sealants and may improve success of all sealant applications. This five-year clinical study scored 617 occlusal and 441 buccal/lingual molar sealants, with use of a split-mouth design, with half

INTRODUCTION
Toosing caries-susceptible pits and fissures with resin sealants enjoys wide acceptance as a preventive strategy. Dental scientists and policy-makers have endorsed the use of sealants (ADA, 1997), and health goals concentrate the target numbers for sealant application to 12% children at 50% by the year 2000 (US Public Health Service, 1991). In spite of the enthusiasm of many in the dental community, however, sealant treatment is far from universal. In fact, analysis of national data suggests that sealants are applied to less than 20% of children (Brown *et al.*, 1996; Scholz *et al.*, 1996).

J Dent Res (2000) 79:1850-1856

**After etch, before sealant...
place bonding agent
that contains an
adhesive and a primer**

Feigal et al.
J Dent Res (2000) 79:1850-1856

WHICH ADHESIVE GENERATION AM I USING?

While adhesives' generational nomenclature developed arbitrarily over the last 20 years, it serves as an excellent classification tool for the clinical dentist. Since more than 200 adhesive systems are available worldwide, learning the properties and procedures of every material is daunting if not impossible. It makes much more sense to group these adhesives into family groups based upon chemistry, functionality, and ease of use.

All too often, we may not even be certain which adhesive material generation we are using in our own practice. Advertising and company promotion may be confusing. Lectures and articles offer detailed and comprehensive information that may be difficult to digest. Two simple questions can quickly ascertain a bonding agent's generational status:

- Do I need to etch separately?
- How many bottles (components)?

The separate etching step is characteristic of fourth- and fifth-generation adhesives. The single bottle is characteristic of fifth- and seventh-generation adhesives. These paradigms are utilized to sort the generations.

The following table can easily determine the status of any current adhesive material:

	SEPARATE ETCH STEP	NO SEPARATE ETCH
Single component	Fifth generation	Seventh generation
Multiple component	Fourth generation	Sixth generation



3M ESPE Scotchbond Universal

Placement Techniques				
A compatible one-bottle bonding agent, which contains both an adhesive and a primer, may be used between the previously acid-etched enamel surface and the sealant material when, in the opinion of the dental professional, the bonding agent would be most appropriate for the clinical situation ¹	Ib			B
Use of available self-etching bonding agents, which do not involve a separate etching step, may provide less retention than the standard acid-etching technique and is not recommended	Ib			B
Routine use of a preparation of enamel before acid etching is not recommended	IIb			B
When possible, a four-handed technique should be used for placement of resin-based sealants	III			C
When possible, a four-handed technique should be used for placement of glass ionomer cement sealants	IV			D
The oral health care professional should monitor and reapply sealants as needed to maximize effectiveness	IV			D

WHICH ADHESIVE GENERATION AM I USING?

	SEPARATE ETCH STEP	NO SEPARATE ETCH
Single component	Fifth generation	Seventh generation
Multiple component	Fourth generation	Sixth generation

Table 4. Self-etching adhesives	
Two-Step Self-Etch (2-SEA)	
Adper ScotchBond SE	3M-ESPE
Clearfil Liner Bond 2V	Kuraray
Clearfil SE Bond	Kuraray
Apex Dental	Kuraray
Tyrian SPE	Bisco
Simplicity	Apex Dental
Single-Step Self-Etch Mix systems (1-SEA)	
Den-Mat	Ivoclar/Vivadent
Prompt-L-Pop	3M-ESPE
Touch and Bond	Parkell
One-Up Bond F Plus	J. Morris
Single-Step Self-Etch Mix system (1-SEA)	
IBOND Self Etch	Heraeus
OptiBOND All-in-One	Kerr
G-Bond	GC America
Xeno IV	Dentsply
Clearfil S3	Kuraray
Adper Easy Bond SE	3M-ESPE

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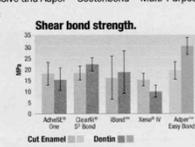
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Placement Techniques		Ib	B
A compatible ¹ one-bottle bonding agent, which contains both an adhesive and a primer, may be used between the previously acid-etched enamel surface and the sealant material when, in the opinion of the dental professional, the bonding agent would enhance sealant retention in the clinical situation ²		Ib	B
Use of available self-etching bonding agents, which do not involve a separate etching step, provide less retention than the traditional acid-etching technique and is not recommended		Ib	B
Routine mechanical preparation of enamel before acid etching is not recommended		Iib	B
When possible, a four-handed technique should be used for placement of resin-based sealants		III	C
When possible, a four-handed technique should be used for placement of glass ionomer cement sealants		IV	D
The oral health care professional should monitor and reapply sealants as needed to maximize effectiveness		IV	D

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C O V E R S T O R Y

Exploring four-handed delivery and retention of resin-based sealants

Susan O. Griffin, PhD; Karl Jones, PhD; Shellie Kolavic Gray, DMD, MPH;
Dolores M. Malvitz, DrPH; Barbara F. Gooch, DMD, MPH

ABSTRACT

Expert panels assembled by the American Dental Association (ADA) and the Centers for Disease Control and Prevention (CDC) have published a background paper on sealant placement techniques. To date, no trials have been published.

JADA (2008) 139:281-289

BOX 1

Qualifying notes on clinical recommendations.

* Change in caries susceptibility can occur. It is important to consider that the risk of developing dental caries exists on a continuum and changes across time as risk factors change. Therefore, clinicians should re-evaluate each patient's caries risk status periodically.

† Clinicians should use recent radiographs, if available, in the decision-making process, but should not obtain radiographs for the sole purpose of placing sealants. Clinicians should consult the American Dental Association's U.S. Food and Drug Administration's guidelines regarding selection criteria for dental radiographs.

‡ "Noncavitated carious lesion" refers to pits and fissures in fully erupted teeth that may display discoloration not due to extrinsic staining, developmental opacities or fluorosis. The discoloration may be confined to the size of a pit or fissure or may extend to the cuspal incline surrounding a pit or fissure. The tooth surface should have no evidence of a shadow indicating dental caries, and, if radiographs are available, they should be evaluated to determine that neither the occlusal nor proximal surfaces have signs of dental caries.

§ These clinical recommendations offer two options for situations in which moisture control, such as with a newly erupted tooth at risk of developing caries, patient compliance or both are a concern. These options include use of a glass ionomer cement material or use of a compatible one-bottle bonding agent, which contains both an adhesive and a primer. Clinicians should use their expertise to determine which technique is most appropriate for an individual patient.

¶ Clinicians should consult with the manufacturer of the adhesive and/or sealant to determine material compatibility.

Qualifying Notes

-
-
-
-

moisture control is a concern

Take Home Messages

- Sealants should be placed on primary and permanent teeth
- Resin-based sealants better than glass ionomer cement sealants
- Moisture control is essential
- Use one bottle bonding agent (adhesive and primer) after total etch with 37% H3PO4

Take Home Messages

- Self-etching bonding agents are "not recommended"
- Routine mechanical preparation of enamel NOT indicated
- 4 hands are better than 2
- Re-apply when needed

Best Practices

- Clean teeth
- Total etch with 37% H3PO4 for 30 seconds
- Apply bonding agent (one bottle that contains an adhesive and primer)
- Apply sealant (Ultradent, UltraSeal XT Hydro)



UltraSeal XT Hydro

- **Light cured**
- **Radiopaque**
- **Fluoride Releasing**
- **53% filled Resin Sealant**
- **Hydrophillic – chases water**
- **Thixotropic – does not run**
- **BPA-free**

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5800 ng
Food and
Drink



2%
138 ng
Receipts



1%
58 ng
Dust



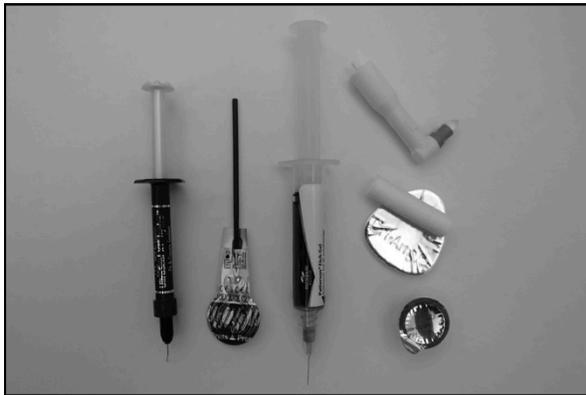
1%
22 ng
Cosmetics



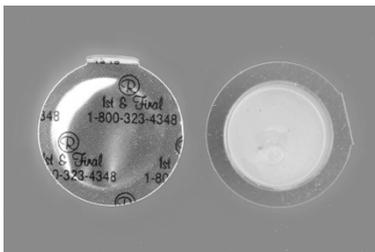
0.13%
8 ng
Air



0.001%
0.09 ng
Dental
Sealants

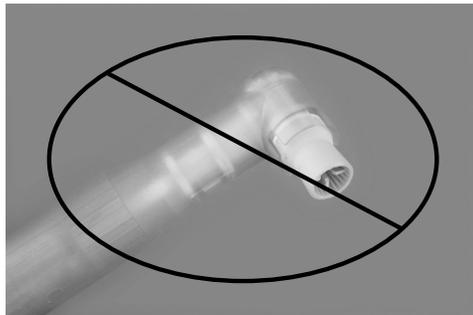


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HEALTH SECTION

Posted at 12:01 AM ET, 04/10/2012

Study links dental X-rays to brain tumor risk

By Jennifer Leffler Asadi

A study published Tuesday in the American Cancer Society journal *Cancer* reported a link between certain kinds of dental X-rays and the most common brain tumor, one that is almost always benign but can add to debilitating.

The study found at a general level that people with **panoramas** were more than twice as likely as people without the brain tumor to have had a **bitewing X-ray** sometime in their life. For a bitewing X-ray, the patient holds the film in place by biting down on a tab.

The exposures to dental X-rays in the study took place in the 1960s, when dental X-rays delivered higher doses of radiation than today's do.

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By JANE E. ALLEN (@JaneEAllenABC) | ABC News Medical Unit | April 10, 2012

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Original Article

Dental X-Rays and Risk of Meningioma

Blanton R. Glaser, PhD, MPH, Lisa Cummings, PhD, Melissa B. King, PhD, James D. Scully, PhD, Jennifer Leffler Asadi

BACKGROUND: Emerging evidence of a potentially elevated and potentially avoidable risk factor for meningioma, a type of brain tumor, has led to increased concern among patients and the public. The objective of this study was to evaluate the association between dental X-rays and the risk of meningioma.

METHODS: The epidemiologic case-control study included 1,435 patients with histologically confirmed intracranial meningiomas and 1,435 controls. Data on dental X-ray use were obtained from self-reported questionnaires administered to patients and controls. The study included 1,435 patients with histologically confirmed intracranial meningiomas and 1,435 controls. Data on dental X-ray use were obtained from self-reported questionnaires administered to patients and controls. The study included 1,435 patients with histologically confirmed intracranial meningiomas and 1,435 controls. Data on dental X-ray use were obtained from self-reported questionnaires administered to patients and controls.

RESULTS: The association between dental X-ray use and meningioma risk was statistically significant for panoramic radiographs (OR, 2.1; 95% CI, 1.3-3.4) and bitewing radiographs (OR, 2.1; 95% CI, 1.3-3.4). The association between dental X-ray use and meningioma risk was statistically significant for panoramic radiographs (OR, 2.1; 95% CI, 1.3-3.4) and bitewing radiographs (OR, 2.1; 95% CI, 1.3-3.4).

CONCLUSIONS: The association between dental X-ray use and meningioma risk was statistically significant for panoramic radiographs (OR, 2.1; 95% CI, 1.3-3.4) and bitewing radiographs (OR, 2.1; 95% CI, 1.3-3.4).

INTRODUCTION

Meningiomas account for 21.4% of all primary brain and central nervous system (CNS) tumors reported in the United States between 1988 and 2004 and the most common type of meningioma. Meningiomas are benign tumors that arise from the meninges, the protective layers of the brain and spinal cord. The most common type of meningioma is the meningioma of the falx, which is located in the upper part of the brain. Meningiomas are typically slow-growing and are often found incidentally during imaging for other reasons. However, some meningiomas can cause symptoms if they grow large enough to compress nearby brain tissue or nerves. The most common symptoms of meningiomas are headaches, seizures, and changes in vision or hearing. Meningiomas are typically treated with surgery, but some may be treated with radiation therapy or observation.

associated with increased risk (odds ratio [OR], 2.06; 95% confidence interval [CI], 1.03-4.17) but found no evidence for a dose-response relation (P for trend = .33).¹² No recent large-scale studies of meningioma risk relative to common IR exposure exist, when doses for dental and other procedures have decreased but during which time new radiographic procedures have been introduced, including CT. In this report, we compare dental and therapeutic radiation histories in 1435 patients with those from a group of 1350 controls. The large sample size afforded by this population-based study will help to provide a more precise estimate of any association, particularly for the lower exposure levels experienced by more recently diagnosed cases.

MATERIALS AND METHODS

Study Design

Eligible patients included all individuals who were diagnosed from May 1, 2006 to April 28, 2011 who had histologically confirmed intracranial meningiomas among residents of the states of Connecticut, Massachusetts, and North Carolina as well as 6 counties in the state of California (Alameda, San Francisco, Contra Costa, Marin, San Mateo, and Santa Clara) and 8 counties in the state of Texas (Beaumont, Fort Bend, Harris, Montgomery, Chambers, Galveston, Liberty, and Waller). These patients (the case group) were identified through the Rapid Case Ascertainment (RCA) system and state cancer registries of the respective sites and were between ages 20 and 79 years at the time of diagnosis. The control group was selected with

Data Collection

The physicians of each eligible case were contacted to request permission to approach the patient. Cases who were approved for contact by their physicians and the controls identified by Kricker Research were sent an introductory letter. Approximately 1 to 2 weeks later, a trained interviewer contacted the potential study participant by telephone to administer the interview. Interview took an average of 52 minutes. Proxies provided information for 9 cases and no controls. The questionnaire included detailed questions on demographics, family history of cancer, pregnancy and menstrual history, exogenous hormone history, and medical history, including therapeutic and diagnostic radiation procedures. Participants were questioned about the onset, frequency, and type of dental care received over their lifetime, including orthodontic work, endodontic (root canal) work, dental implants, and dentures. Participants were asked to report the number of times they had received bitewing, full-mouth, or panoramic (panorax) films during 4 periods when aged <10 years, ages 10 to 19 years, ages 20 to 49 years, and aged ≥50 years. Information also was gathered on the occurrence and timing of therapeutic radiation treatments, specifically radiation or radium treatments to the face, head, neck, or chest for both benign and malignant lesions or conditions. Risk factor and screening information was tracked at the date of diagnosis for cases and at the date of interview for controls (hereafter referred to as the *reference date*).

To date, 2238 eligible cases and 2684 eligible controls have been identified. Ninety-eight percent of eligible

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- - 14 micro Sieverts
- speed film with rectangular collimation)
 - 4 micro Sieverts
- Flying in an airplane at 30,000 feet
 - 5 micro Sieverts/hour
- Living in Denver
 - 900 micro Sieverts/year
- Living in a brick or stone house
 - 700 micro Sieverts/year



Panoramic and 2 Bitewings is about the same radiation as...

- York to San Francisco
- Living in Denver for 8 days
- Living in a stone or brick house for 10 days

Summary

- **Prevention**
 - Fluoride
 - Sealants
 - Caries Risk Assessment
- **Chairside Diagnostic Tool – DIAGNOdent**
- **Resin Infiltration**
- **Radiation Burden of Radiographs**

Clinical Pearls

- What type of topical fluoride is best?
- How can I maximize sealant retention?
- How do I treat a white spot lesion?
- What should I do if my patient drinks well water?
- What advice can I give parents to reduce caries in their children?

Clinical Pearls

- How can I prevent 90% of caries in permanent teeth?
- Should I buy a DIAGNOdent?
- Should I perform Resin Infiltration?
- What should I say to a parent that says: "I don't want xrays taken on my child"?



THANK YOU!

