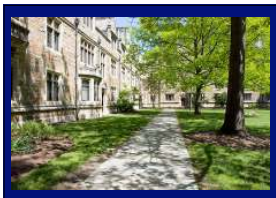
# The Science of Sealants

## NCIOM Task Force on Children's Preventive Oral Health Services

**Michael A. Ignelzi, Jr., D.D.S., Ph.D.**
Lake Jeanette Orthodontics & Pediatric Dentistry
Greensboro, North Carolina



University of Michigan
School of Dentistry
Ann Arbor, Michigan

Lake Jeanette Orthodontics
& Pediatric Dentistry
Greensboro, North Carolina

PEDIATRIC DENTISTRY

Vol. 28 • No. 2 • March/April 2006

SYMPOSIUM ON THE PREVENTION OF ORAL DISEASE IN CHILDREN AND ADOLESCENTS

CONFERENCE PAPERS

96 Rethinking Prevention
Jerome Osuna

102 Examining the Cost-effectiveness of Early Dental Visits
Jessica Y. Lee; Thomas J. Boucrotte, Matthew F. Savage, William F. Vann, Jr

106 Mutans Streptococci: Acquisition and Transmission
Robert J. Berkowitz

110 In Defense of the Oral Cavity: The Protective Role of the Salivary Secretions
Lawrence A. Tabak

118 The Impact of Research and Development on the Prevention of Oral Diseases in Children and Adolescents: An Industry Perspective
Diane Cummins

128 Caries Prevention and Reversal Based on the Caries Balance
John D.B. Featherstone

135 Evidence-based Use of Fluoride in Contemporary Pediatric Dental Practice
Steven M. Adair

143 The Use of Pit and Fissure Sealants
Robert J. Feigal, Kevin J. Donly

150 A Prudentic Approach to Caries Management
M.H. Anderson, W. Shi

154 Xylitol, Sweeteners, and Dental Caries
Kim A. Le; Peter Milgrom

164 Diet Quality, Added Sugar, and Dietary Fiber Intakes in American Preschoolers
Sibylle Kranz, Helen Smiciklas-Wright, Lori A. Francis

172 Provider Versus Patient-centered Approaches to Health Promotion With Parents of Young Children: What Works/Does Not Work and Why
Philip Weinstein

177 Tobacco Use by Adolescents: The Role of the Oral Health Professional in Evidence-based Cessation Programs
David A. Albert, Herbert H. Severson, Judy A. Andrews

180 Medical Approach to Dental Caries: Fight the Disease, Not the Lesion
Hyeebe Tsang, Fengxia Qi, Weiwan Shi

192 Clinical, Research, and Policy Implications of the Symposium on the Prevention of Oral Diseases in Children and Adolescents
Paul A. Fuggardo, Robert J. Feigal, Paul S. Casamassimo, Steven D. Chase, Mun Wai Ng, Michael A. Ignelzi, Jr

ABSTRACTS

101, 105, 117, 127, 132, 142, 170

95 Guest Editorial, Michael A. Ignelzi, Jr
199 2006 Annual Session Abstracts
200 Checklists

DUKE

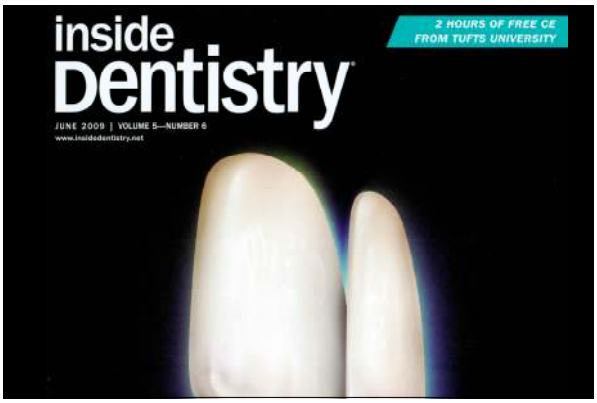
Call 336.286.0200
Lake Jeanette
ORTHODONTICS &
PEDIATRIC DENTISTRY
A great place to grow a smile.
Comprehensive dental care for ages 1 to 18 • Orthodontics for children, teens and adults
2901 North Elm Street • Greensboro, NC 27408
Take an Office Tour
View Testimonials
Read Parent Reviews
Connect to our Facebook Page
• Open at 7 AM two days a week
• Open until 6 PM two days a week
• Open on Fridays
• We file insurance for you
• Payment plans, including no down payment, for qualified applicants
Voted Best in Triad by Moms

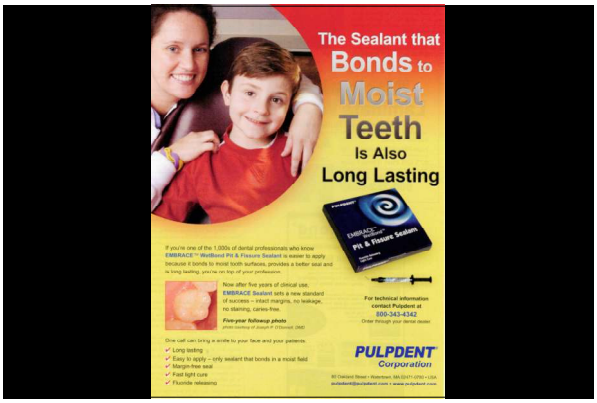
OF THE CALIFORNIA DENTAL ASSOCIATION
Journal
OCTOBER 2010
Pit and Fissure Sealants
Review and Use
Public Health View
sealants
EVIDENCE-BASED
RECOMMENDATIONS

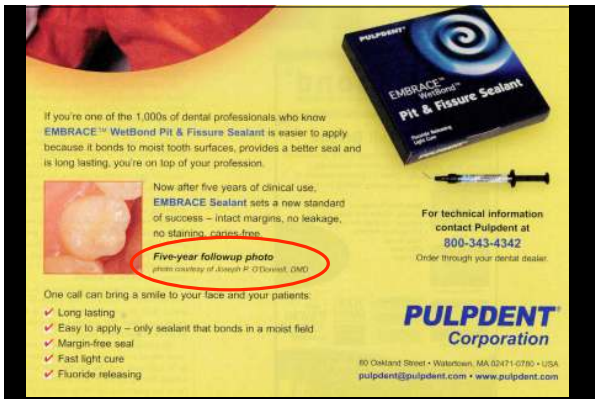
Pit and Fissure
Sealants — An
Ongoing Commitment

**Avoid the hype**

**Use good science**






**Avoid the hype**

**Use good science**

CDC

MMWR

Morbidity and Mortality Weekly Report

Surveillance Summaries — August 26, 2005 / Vol. 54 / No. SS-3

**Surveillance for Dental Caries, Dental Sealants, Tooth Retention, Edentulism, and Enamel Fluorosis — United States, 1988–1994 and 1999–2002**

---

**Surveillance for Dental Caries, Dental Sealants, Tooth Retention, Edentulism, and Enamel Fluorosis — United States, 1988–1994 and 1999–2002**



TABLE 2. Prevalence of dental caries in primary teeth* among children aged 2–11 years, by selected characteristics — United States, National Health and Nutrition Examination Survey, 1988–1994 and 1999–2002

| | 1988–1994 | | 1999–2002 | | | |
|---|---|---|---|---|---|---|
| Characteristic | %† | SE§ | % | SE | Difference in %¶ | % Change¶ |
| Age group (yrs) | | | | | | |
| 2–5 | 24.23 | 1.32 | 27.91 | 1.68 | 3.68 | 15.19 |
| 6–11 | 49.74 | 1.77 | 49.00 | 2.43 | -0.74 | -1.49 |
| Sex | | | | | | |
| Male | 39.50 | 1.73 | 43.16 | 2.53 | 3.66 | 9.27 |

---

**15.2% increase in primary tooth caries in 2-5 year olds**

---

## Dental Caries- Primary Teeth

- 40% of children ages 2 - 8 have experienced caries
- 44% of caries found in pits and fissures

CDC, NHANES 1999-2002

---

## Dental Caries- Permanent Teeth

- 21% of children ages 6 - 11 have dental caries
- 67% of children ages 16 - 19 have dental caries
- 90% of caries in permanent teeth is found in pits and fissures

CDC, NHANES 1999-2002

---

Protect your child's teeth: 5 smart moves

The candy your child really must skip, the toothbrush that works best, and other wise advice to keep your little one's smile shining. BY PHIL GALEWITZ

**5 CONSIDER DENTAL SEALANTS.**

"Sealants are the best-kept secret in dental offices," says Michael Ignelzi, an Ann Arbor, Michigan, dentist and chairman of the American Academy of Pediatric Dentistry's Council on Scientific Affairs. A sealant is a liquid that is brushed onto the chewing surfaces of the back teeth and

**Only 30.5% of permanent molars in children aged 6-11 years have been sealed**

Beltran-Aguilar ED, Barker LK, et al. Surveillance for dental caries, dental sealants, tooth retention, edentulism, and enamel fluorosis - United States, 1988-1994 and 1999-2002. MMWR Surveill Summ 54(3):1-43, 2005.

**Less than 40% of dentists indicated they sealed non-cavitated carious lesions**

Tellez, et al., Sealants and dental caries: Dentists' perspectives on evidence-based recommendations. JADA (2011) 142:1033-1040

**Dentists are concerned that they will inadvertently seal over caries and that the caries will progress**

**The median annualized probability of progression for non-cavitated carious lesions that have been sealed was very low - 2.6%**

Griffin SO, Oong E, et al. The effectiveness of sealants in managing caries lesions. J Dent Res 87(2):169-174, 2008.

Sealant will be lost and the loss of sealant will place the tooth at greater risk than if it had never been sealed

The caries rate in formerly sealed teeth, with partial or complete loss of sealant, is less than or equal to the caries rate in non-sealed teeth

Griffin SO, Kolavic-Gray S, et al. Caries risk in formerly sealed teeth. JADA 140(4):415-423, 2009.

## Lessons to be learned…

- We should restore cavitated lesions, but seal the vast majority of non-cavitated lesions
- Sealants must remain intact to confer protection

Sealants do not last forever

Retention = Prevention

Sealants prevent:
86% of caries after one year
79% of caries after two years
59% of caries after three years

Llodra JC, Bravo M, et al. Community Dent Oral Epidemiol 21(5):261-268, 1993.

Ahovuo-Saloranta A, Hiri A, et al. Cochrane Database Sys Rev (3):CD001830, 2004.

**A change in attitudes and behavior is required**

COVER STORY

Executive summary follows page 356

## Evidence-based clinical recommendations for the use of pit-and-fissure sealants

A report of the American Dental Association Council on Scientific Affairs

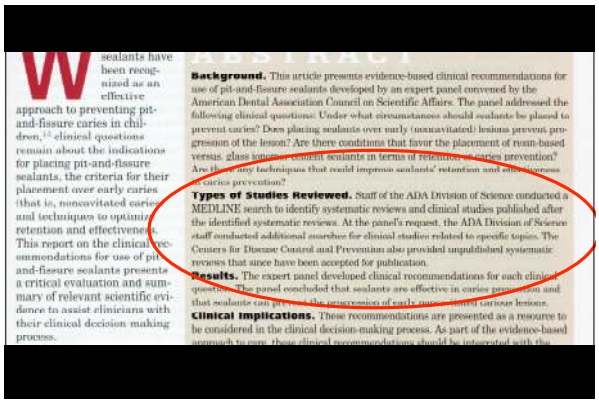
Jean Beauchamp, DDS; Page W. Caufield, DDS, PhD; James J. Crall, DDS, ScD; Kevin Donly, DDS, MS; Robert Feigal, DDS, PhD; Barbara Gooch, DMD, MPH; Amid Ismail, BDS, MPH, MBA, DrPH; William Kohn, DDS; Mark Siegal, DDS, MPH; Richard Simonsen, DDS, MS

While dental sealants have been recognized as an effective approach to preventing pit-and-fissure caries in chil-

ABSTRACT

**Background.** This article presents evidence-based clinical recommendations for use of pit-and-fissure sealants developed by an expert panel convened by the American Dental Association Council on Scientific Affairs. The panel addressed the following clinical questions: Under what circumstances should sealants be placed to

**JADA (2008) 139:257-268**



While dental sealants have been recognized as an effective approach to preventing pit-and-fissure caries in children,[16] clinical questions remain about the indications for placing pit-and-fissure sealants, the criteria for their placement over early caries (that is, noncavitated caries) and techniques to optimize retention and effectiveness. This report on the clinical recommendations for use of pit-and-fissure sealants presents a critical evaluation and summary of relevant scientific evidence to assist clinicians with their clinical decision-making process.

ABSTRACT

**Background.** This article presents evidence-based clinical recommendations for use of pit-and-fissure sealants developed by an expert panel convened by the American Dental Association Council on Scientific Affairs. The panel addressed the following clinical questions: Under what circumstances should sealants be placed to prevent caries? Does placing sealants over early (noncavitated) lesions prevent progression of the lesion? Are there conditions that favor the placement of resin-based versus glass ionomer-cement sealants in terms of retention or caries prevention? Are there any techniques that could improve sealants' retention and effectiveness in caries prevention?

**Types of Studies Reviewed.** Staff of the ADA Division of Science conducted a MEDLINE search to identify systematic reviews and clinical studies published after the identified systematic reviews. At the panel's request, the ADA Division of Science staff conducted additional searches for clinical studies related to specific topics. The Centers for Disease Control and Prevention also provided unpublished systematic reviews that since have been accepted for publication.

**Results.** The expert panel developed clinical recommendations for each clinical question. The panel concluded that sealants are effective in caries prevention and that sealants can prevent the progression of early noncavitated carious lesions.

**Clinical Implications.** These recommendations are presented as a resource to be considered in the clinical decision-making process. As part of the evidence-based approach to care, these clinical recommendations should be integrated with the

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 |
| IIa | Evidence from at least one controlled study without randomization |
| IIb | Evidence from at least one other type of quasi-experimental study |
| III | Evidence from nonexperimental descriptive studies, such as comparative studies, correlation studies, cohort studies and 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]

COVER STORY

Executive summary follows page 356

**Evidence-based clinical recommendations for the use of pit-and-fissure sealants**

A report of the American Dental Association Council on Scientific Affairs

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

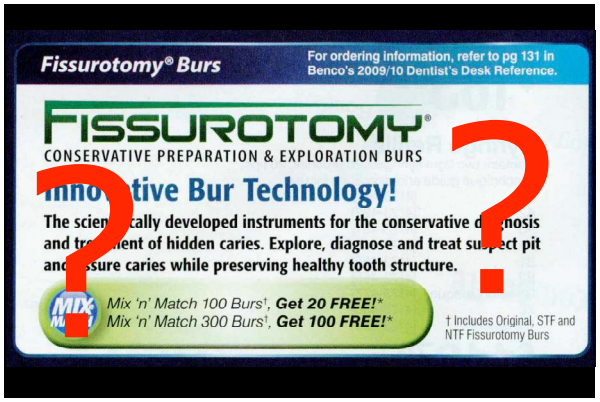
COVER STORY

Executive summary follows page 356

**Evidence-based clinical recommendations for the use of pit-and-fissure sealants**

A report of the American Dental Association Council on Scientific Affairs

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



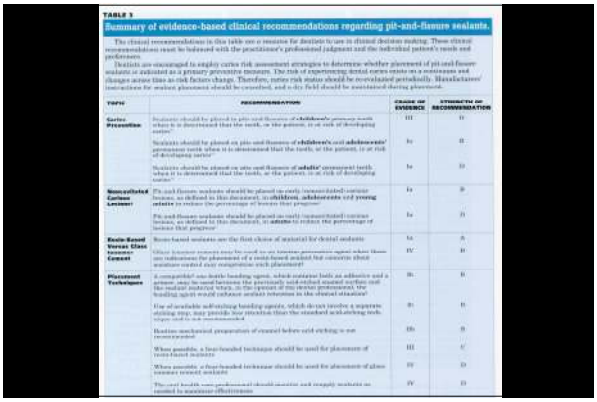



TABLE 3

**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 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.

| 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[a] | 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[a] | 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[a] | Ia | D |
| Noncavitated Carious Lesions[b] | 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[c] | 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[c] | Ia | D |
| Resin-Based Versus Glass Ionomer Cement | Resin-based sealants are the first choice of material for dental sealants | Ia | A |
| | Glass ionomer sealants may be used as an interim preventive agent when there are indications for the placement of a resin-based sealant but concerns about sealant control may compromise such placement[d] | IV | B |
| Placement Techniques | A conditioner[e] and 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[f] | Ib | B |
| | Use of a bonding agent, which does not involve a separate etching step, may provide less retention than the standard acid-etching technique and is not recommended | Ib | 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-based sealants | IV | D |
| | The oral health care professional should monitor and reapply sealants as needed to maintain effectiveness | IV | D |

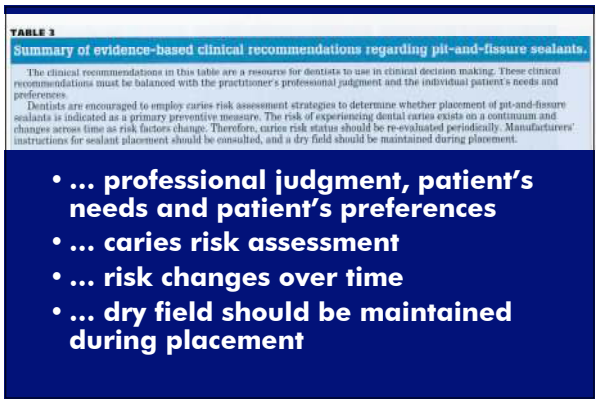


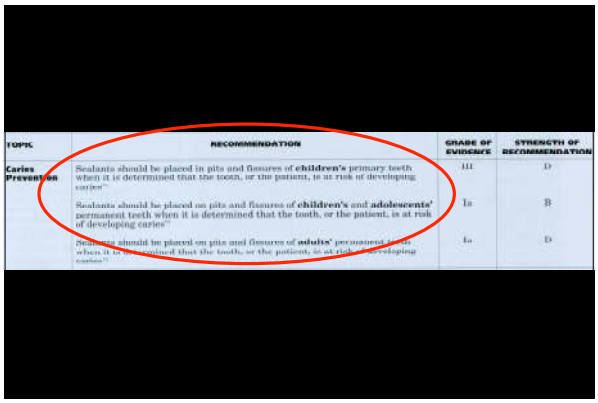
TABLE 3

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

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 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[a] | 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[a] | 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[a] | 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.

COVER STORY

### The effect of dental sealants on bacteria levels in caries lesions

A review of the evidence

Ella M. Oong, DMD, MPH; Susan O. Griffin, PhD; William G. Kohn, DDS; Barbara F. Gooch, DMD, MPH; Page W. Caufield, DDS, PhD

Strong evidence shows that sealants are effective in preventing caries in children at varying degrees of risk.[1,2] Despite this evidence of effectiveness, sealant prevalence among lower-income children (who are at higher risk of experiencing dental caries) remains at around 30 percent,[3] well below the Healthy People 2010 objective of 50 percent.[4] Survey data of dentists suggest that one of the major barriers to their providing sealants is concern about inadvertently sealing over caries.[5,6] This concern has become an obstacle to implementa-

ABSTRACT

**Background.** Concern about inadvertently sealing over caries often prevents dentists from providing dental sealants. The objective of the authors' review was to examine the effects of sealants on bacteria levels within caries lesions under dental sealants.

**Methods.** The authors searched electronic databases for comparative studies examining bacteria levels in sealed permanent teeth. To measure the effect of sealants on bacteria levels, they used the $\log_{10}$ reduction in mean total viable bacteria counts (VBC) between sealed and not-sealed caries and the percentage reduction in the proportion of samples with viable bacteria.

**Results.** Six studies—three randomized controlled trials, two controlled trials and one before-and-after study—were included in the analysis.

ARTICLE 1

RESEARCH REPORTS
Clinical

S.O. Griffin[1*], E. Oong[1], W. Kohn[1], B. Vidakovic[2], B.F. Gooch[1], and CDC Dental Sealant Systematic Review Work Group: J. Bader[3], J. Clarkson[4], M.R. Fontana[5], D.M. Meyer[6], R.G. Razier[7], J.A. Weintraub[8], and D.T. Zero[9]

[1]Centers for Disease Control and Prevention/Division of Oral Health/Surveillance, Investigations, and Research Branch, 4770 Buford Highway, MSF10, Chamblee, GA 30341, USA; [2]Wallace H. Coulter School of Biomedical Engineering, 2101 Whitaker Building, 313 First Dr., Georgia Tech, Atlanta, GA 30332-0535, USA; [3]School of Dentistry, University of North Carolina, Chapel Hill, NC 27599-7450, USA; [4]Dental Health Services Research Unit, Dundee DD24BF, Scotland, UK; [5]Oral Health Research Institute, Indiana University School of Dentistry, 415 Lansing Street, Indianapolis, IN 46202, USA; [6]American Dental Association, 211 E. Chicago Ave., Chicago, IL 60611, USA; [7]Department of Health Policy and Administration, The University of North Carolina at Chapel Hill, 1105F McGavran-Greenberg Hall, CB#7411, Chapel Hill, NC 27599-7411, USA; and [8]Center to Address Disparities in Children's Oral Health, University of California, San Francisco School of Dentistry, 3333 California Street, Suite 495, San Francisco, CA 94143-1361

### The Effectiveness of Sealants in Managing Caries Lesions

#### INTRODUCTION

There is strong evidence that sealants are effective in both clinical and school settings for preventing caries in children at various levels of risk (Truman *et al.*, 2002; Ahovuo-Saloranta *et al.*, 2004). The evidence for sealant effectiveness in the management of dental caries is limited, however. One review that examined the effectiveness of interventions to manage caries for the National Institutes of Health (NIH) Caries Consensus Development Conference included only 1 study on sealants (Bader *et al.*, 2001). Despite the strong evidence of primary effectiveness, sealant prevalence among lower-income children (who are at higher risk for dental caries) is about 30% (Dye *et al.*, 2007), well below

**J Dent Res (2008) 87:169-174**

## Mertz-Fairhurst et al.

### ULTRACONSERVATIVE AND CARIOSTATIC SEALED RESTORATIONS: RESULTS AT YEAR 10

EVA J. MERTZ-FAIRHURST, D.D.S.; JAMES W. CURTIS JR., D.M.D.; JANET W. ERGLE, C.D.A.; FRED A. RUEGGEBERG, D.D.S., M.S.; STEVEN M. ADAIR, D.D.S., M.S.

The traditional treatment for carious lesions was outlined nearly a century ago by G.V. Black.[1] This treatment consists

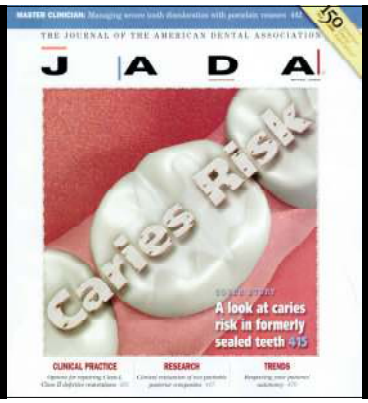
ABSTRACT

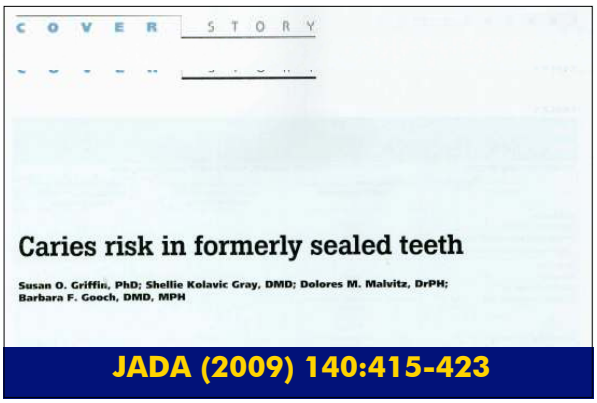
Changes in restorative techniques and the development of

the sugars in the host's diet).

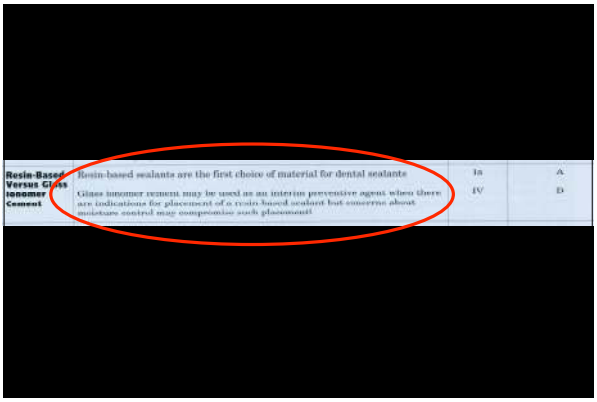
All three groups of causative factors must interact simultaneously for caries to occur or

**JADA (1998) 129:55-66**




**Teeth with fully or partially lost sealant were not at a higher risk of developing caries than were teeth that had never been sealed**



| | | | |
|---|---|---|---|
| Resin-Based Versus Glass Ionomer Cement | Resin-based sealants are the first choice of material for dental sealants<br>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 | Ia<br>IV | A<br>B |

## Hypoplastic Erupting Molar

| | | | |
|---|---|---|---|
| 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 enhance sealant retention in the clinical situation? | IIb | B |
| | Use of available self-etching bonding agents, which do not involve a separate etching step, may provide bond strength than the conventional acid-etching technique and is not recommended. | IIb | 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. Musherure[4], B. Gillespie[2], M. Levy-Polack[3], I. Quelhas[1], and J. Hebling[1]

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

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

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

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

Treating 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 enumerate the target numbers for sealant application to US 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; Selwitz *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 |

### WHICH ADHESIVE GENERATION AM I USING?

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

**3M ESPE Adper Single Bond Plus**

| | | | |
|---|---|---|---|
| **Placement Techniques** | A compatible[7] 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[7] | 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 | IIIb | 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. Morita |
| **Single-Step Self-Etch No-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 |

6th

7th


| | | | |
|---|---|---|---|
| **Placement Techniques** | A compatible[7] 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[7] | 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 | IIIb | 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 |



Fissurotomy® Burs

For ordering information, refer to pg 131 in Benco's 2009/10 Dentist's Desk Reference.

FISSUROTOMY®

CONSERVATIVE PREPARATION & EXPLORATION BURS

Innovative Bur Technology!

The scientifically developed instruments for the conservative diagnosis and treatment of hidden caries. Explore, diagnose and treat suspect pit and fissure caries while preserving healthy tooth structure.

MIX MATCH

Mix 'n' Match 100 Burs†, Get 20 FREE!*

Mix 'n' Match 300 Burs†, Get 100 FREE!*

† Includes Original, STF and NTF Fissurotomy Burs


COVER STORY

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


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


Expert panels assembled by the American Dental Association (ADA) and the Centers for Disease Con-

ABSTRACT


**Background.** To date, no trials have been pub-



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/U.S. Food and Drug Administration** 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 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 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

- Caries susceptibility changes
- Use radiographs if available
- Non-cavitated lesions…
- Glass ionomer sealants when 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

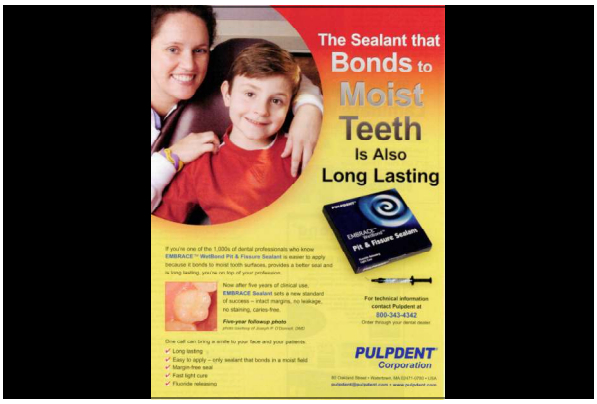
- Clean teeth
- Total etch with 37% H3PO4 for 30 seconds
- Apply bonding agent (one bottle that contains an adhesive and primer)
- Apply sealant (Clinpro - 3M ESPE)

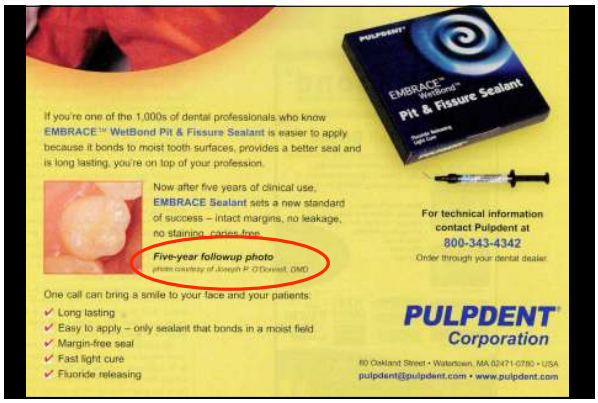
## 1st & Final Pumice

Reliance Orthodontics 1 800 323 4348

## No Prophy Cup

## Bristle Brush




PULPDENT
EMBRACE™ WetBond™
Pit & Fissure Sealant
If you're one of the 1,000s of dental professionals who know EMBRACE™ WetBond Pit & Fissure Sealant is easier to apply because it bonds to moist tooth surfaces, provides a better seal and is long lasting, you're on top of your profession.
Now after five years of clinical use, EMBRACE Sealant sets a new standard of success – intact margins, no leakage, no staining, caries-free.
Five-year followup photo
photo courtesy of Joseph P. O'Donnell, DMD
For technical information contact Pulpdent at
800-343-4342
Order through your dental dealer.
One call can bring a smile to your face and your patients:
✔ Long lasting
✔ Easy to apply – only sealant that bonds in a moist field
✔ Margin-free seal
✔ Fast light cure
✔ Fluoride releasing
PULPDENT Corporation
80 Oakland Street • Watertown, MA 02471-0780 • USA
pulpdent@pulpdent.com • www.pulpdent.com

# SUMMARY

THANK YOU!