

Dental Sealants

Guidance for Parents and Community Members

Dental health is an important part of a healthy childhood. Many parents asked our PEHSU about health risks from chemicals in dental sealants. This factsheet provides the answers to the most frequently asked questions about this issue.

What are dental sealants?

Dental sealants are a coating applied to the outer surface of teeth (usually molars) to prevent dental decay.¹ The coating is applied as a liquid that hardens by itself or with application of a special light. The material used to create the dental sealant is called a *composite resin*, which is a thin, durable plastic.

Sealants are typically recommended to prevent cavities in pits and fissures of permanent molars for children and adolescents at high risk for tooth decay. Cavity risk is based on many factors including diet, fluoride exposure, tooth decay in parents, the presence and levels of bacteria called *Streptococcus mutans* and other cavity-causing bacteria in the mouth, and other factors.²

FAQs about Dental Sealants

- ***Is there bisphenol-A (BPA) in dental sealants?***
 - BPA is a synthetic chemical used in the production of many plastic products, including but not limited to polycarbonate plastic storage containers, some plastic bottles and bottle tops, the lining of certain metal food cans, as well as thermal cash register receipt paper.³ BPA exposure in humans has been associated with alterations in hormone levels⁴ and increased risk of chronic diseases like obesity⁵ and asthma⁶ as well as changes in cognition and behavior.⁷ Exposure of the fetus *in-utero* might represent a particularly sensitive time.⁸
 - The chemical BPA is not typically an ingredient in dental sealants. However, the *composite resin* used in dental sealants usually includes a BPA-related chemical that is made from BPA. BPA can be present in small amounts as a byproduct of manufacturing the BPA-related chemicals in dental sealants.⁹ BPA may be present when the dental sealant is placed, or leach directly from dental sealants after placement. It is not known if BPA-related chemicals in dental sealants transform into BPA in the body.
- ***Is the BPA exposure from dental sealants enough to be a health risk?***
 - The amount of BPA in saliva and urine increases shortly after placing the sealant.¹⁰ In the longer term, children with more sealants do not have statistically higher levels of

BPA in their urine.¹¹ The extent of absorption into the body is likely low but unknown. The risk of health effects from BPA in dental sealants is thought to be low.

- The research, thus far, showed there were no psychosocial or neurocognitive effects related to sealants made of the *composite resin* materials.¹² However, a similar study that looked at *composite resin* material (specifically bisGMA-based material) when used for fillings instead of sealants found a slightly increased risk of neuropsychological effects, especially when fillings were on chewing surfaces.¹³ This finding emphasizes the importance of measures that prevent dental decay in order to reduce the need for fillings.
- The American Dental Association encourages further study into the effects of BPA on human health but does not believe that there is currently any foundation for health concerns related to dental sealants and BPA.⁵

- ***My child is going to get dental sealants. Is there anything we can do to minimize BPA exposure?***

These routine techniques could reduce BPA exposure from dental sealants:¹⁴

During the application and finishing of the sealant, dentists can...	Use a mild abrasive such as pumice to wipe off the uncured surface layer of the sealant.
Immediately after the application of sealant, patients can...	Gargle with tepid water for 30 seconds and spit. Or for younger children, dentist can rinse with an air-water syringe and suction saliva.

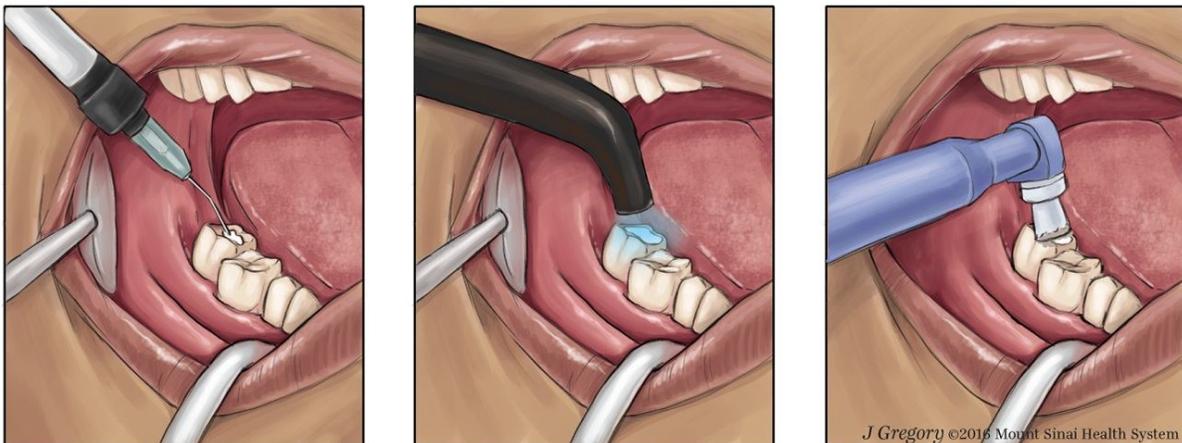


Figure: First, the composite is typically applied with a syringe as a liquid. Second, a light transforms the material into a hard surface. Third, a prophy cup with pumice can be used to remove any residual material and suction it out of the mouth to minimize exposure.

Recommendations

- The benefits of using dental sealants to prevent dental decay outweigh the health risks of BPA, based on available data.
- Talk to your dentist. Techniques used by dentists can minimize risk of BPA exposure when sealants are applied.
- Schedule routine visits with your child's dentist. Engage in regular toothbrushing and flossing, as directed by your dentist.
- Avoid application of sealants in pregnant women if possible.
- Take steps to minimize BPA exposure from other sources. For more information, see the PEHSU factsheet on BPA and Phthalates:
<http://www.pehsu.net/documents/bpapatients%20factsheet03-2014.pdf>

Last updated 8/2016. Acknowledgment: P. Sheffield, MD, MPH, M. Galvez, MD, MPH, S. Evans, PhD, B. Fisher, LCSW, R. Manning, K. Timmireddy, and M. Maher, of Region 2 PEHSU, J. Gregory, MFA, Academic Medical Illustration, L. Hyacinthe, DMD, Icahn School of Medicine at Mount Sinai, C. McKinney, PhD, MPH, and S. Sathyanarayana, MD, MPH, of Region 10 PEHSU at the University of Washington.

This material was supported by the American Academy of Pediatrics (AAP) and the American College of Medical Toxicology (ACMT) and funded (in part) by the Agency Funding Opportunity Number CDC-RFA-TS14-1402 from the Agency for Toxic Substances and Disease Registry (ATSDR). PS was supported by NIH K23ES024127. CM and SS were supported by NIH R01DE025229.

Acknowledgement: The U.S. Environmental Protection Agency (EPA) supports the PEHSU by providing partial funding to ATSDR under Inter-Agency Agreement number DW-75-92301301. Neither EPA nor ATSDR endorse the purchase of any commercial products or services mentioned in PEHSU publications.

¹ National Institute of Dental and Craniofacial Research/National Institutes of Health. Seal Out Tooth Decay. <http://www.nidcr.nih.gov/oralhealth/Topics/ToothDecay/SealOutToothDecay.htm> July 2014. Accessed September 2, 2015.

² American Academy of Pediatric Dentistry. Revised 2014. Guideline on Caries-risk Assessment and Management for Infants, Children, and Adolescents. http://www.aapd.org/media/policies_guidelines/g_cariesriskassessment.pdf. Accessed 10/21/15.

³ National Toxicology Program. NTP-CERHR monograph on the potential human reproductive and developmental effects of bisphenol A. NTP CERHR MON. 2008;(22):i-III1.

⁴ Rochester JR. Bisphenol A and human health: a review of the literature. *Reprod Toxicol*. 2013 Dec;42:132-55. doi: 10.1016/j.reprotox.2013.08.008.

⁵ Harley KG, Aguilar Schall R, Chevrier J, Tyler K, Aguirre H, Bradman A, Holland NT, Lustig RH, Calafat AM, Eskenazi B. Prenatal and postnatal bisphenol A exposure and body mass index in childhood in the CHAMACOS cohort. *Environ Health Perspect*. 2013 Apr;121(4):514-20; L. Trasande, T.M. Attina, J. Blustein Association between urinary bisphenol A concentration and obesity prevalence in children and adolescents *JAMA*, 308 (2012), pp. 1113–1121

⁶ A.J. Spanier, R.S. Kahn, A.R. Kunselman, R. Hornung, Y. Xu, A.M. Calafat, et al. Prenatal exposure to bisphenol A and child wheeze from birth to 3 years of age *Environ Health Perspect*, 120 (2012), pp. 916–920; K.M. Donohue, R.L. Miller, M.S. Perzanowski, A.C. Just, L.A. Hoepner, S. Arunajadai, et al. Prenatal and postnatal bisphenol A exposure and asthma development among inner-city children. *J Allergy Clin Immunol*, 131 (2013) 736.e6–742.e6

-
- ⁷Evans SF, Kobrosly RW, Barrett ES, Thurston SW, Calafat AM, Weiss B, Stahlhut R, Yolton K, Swan SH. Prenatal bisphenol A exposure and maternally reported behavior in boys and girls. *Neurotoxicology*. 2014 Dec;45:91-9.
- ⁸Braun JM, Yolton K, Dietrich KN, et al. Prenatal bisphenol A exposure and early childhood behavior. *Environ Health Perspect*. 2009;117(12):1945–1952.
- ⁹American Dental Association. ADA Statement on Bisphenol A and Dental Materials. ADA Website. <http://www.ada.org/en/member-center/oral-health-topics/bisphenol-a>. Published April 2013. Accessed: August 27, 2015
- ¹⁰Kingman A, Hyman J, Masten SA, Jayaram B, Smith C, Eichmiller F, Arnold MC, Wong PA, Schaeffer JM, Solanki S, Dunn WJ. Bisphenol A and other compounds in human saliva and urine associated with the placement of composite restorations. *J Am Dent Assoc*. 2012 Dec;143(12):1292-302; Martin MD. Exposure to Bisphenol A (BPA) from dental sealants is detectable in saliva and urine, and varies significantly between sealant formulations. *J Evid Based Dent Pract*. 2007 Jun;7(2):79-80. PubMed PMID: 17599659; Martin MD, Woods JS, Dills RL, Poulton EJ. 2005. Detection of dental composite and sealant resin components in urine. *Oral Surgery Oral Medicine Oral Pathology Oral Radiology* 99:429; Arenholt-Bindslev D, Breinholt V, Preiss A, Schmalz G. Time-related bisphenol-A content and estrogenic activity in saliva samples collected in relation to placement of fissure sealants. *Clin Oral Investig*. 1999; 3(3):120 –125; Fung EY, Ewoldsen NO, St Germain HA Jr, et al. Pharmacokinetics of bisphenol A released from a dental sealant. *J Am Dent Assoc*. 2000;131(1):51–58.; Joskow R, Barr DB, Barr JR, Calafat AM, Needham LL, Rubin C. Exposure to bisphenol A from bis-glycidyl dimethacrylate-based dental sealants. *J Am Dent Assoc*. 2006; 137(3):353–362.;
- ¹¹McKinney C, Rue T, Sathyanarayana S, Martin M, Seminario AL, DeRouen T. Dental sealants and restorations and urinary bisphenol A concentrations in children in the 2003-2004 Nat. Health and Nutrition Exam. Survey. *J Am Dent Assoc*. 2014 Jul;145(7):745-50.
- ¹²Maserejian NN, Shrader P, Trachtenberg FL, Hauser R, Bellinger DC, Tavares M. "Dental sealants and flowable composite restorations and psychosocial, neuropsychological, and physical development in children." *Pediatr Dent*. (2014) Jan-Feb;36(1):68-75
- ¹³Maserejian NN, Trachtenberg FL, Hauser R, McKinlay S, Shrader P, Tavares M, Bellinger DC. "Dental composite restorations and psychosocial function in children." *Pediatrics*. (2012) Aug;130(2):e328-38.
- ¹⁴Fleisch AF, Sheffield PE, Chinn C, Edelstein BL, Landrigan PJ. "Bisphenol A and related compounds in dental materials." *Pediatrics*. (2010) Oct;126(4):760-8.