Bisphenol A and Dental Materials

- ADA Principles of Ethics and Code of Professional Conduct
- ADA Current Policies
- Research Agenda

Council on Scientific Affairs Statement

CHICAGO (July 2010)—Bisphenol A (BPA) is widely used in the manufacture of many consumer plastic products. Some laboratory testing has suggested that BPA may affect reproduction and development in animals by mimicking the effects of the female hormone estrogen, thereby raising concerns about its safety. To date, these effects have not been observed in humans and are questionable at the exposure levels resulting from consumer products.

The food industry uses BPA when manufacturing the epoxy resins that coat cans and polycarbonate bottles intended to hold foods and beverages. Bisphenol A also is found in some children's toys, plastic tableware and infant bottles. The release of industrial and household wastes into the environment also exposes humans to BPA. There is also evidence that some dental sealants, and to a lesser extent dental composites, may contribute to very low-level BPA exposure.

BPA can become part of dental composites or sealants in three ways: as a direct ingredient, as a by-product of other ingredients in dental composites or sealants that may have degraded, and as a trace material left-over from the manufacture of other ingredients used in dental composites or sealants.

As a direct ingredient: ADA research, confirmed by direct communications from dental manufacturers, indicates that BPA is rarely used as a formula ingredient in dental products.

As a product of the degradation of the material in the oral cavity: Composite resins are formulated from a mixture of monomers that are commonly based on bisphenol A glycidyl methacrylate (bis-GMA). Some composite resins may contain other monomers, in addition to bis-GMA, that are added to modify the properties of the resin. An example is bisphenol A dimethacrylate (bis-DMA). Bis-DMA-containing materials can release very small quantities of BPA because bis-DMA is subject to degradation by salivary enzymes.

As a trace material: BPA may be used in the production of other ingredients found in some dental composites and sealants. Bis-DMA and bis-GMA are both produced using BPA as a starting ingredient, so residual trace amounts of BPA may be present in the final product.

To put the exposure from dental materials into perspective, consider the exposure that occurs from the placement of six dental sealants containing bis-GMA in a child (7 to 14 years of age). The estimated one time exposure (upon sealant placement) for a male child of median body weight (51 to 112 pounds)[1] is approximately 5.5 micrograms,[2] which is two to five times lower than the estimated daily exposure from food and environmental sources.[3]

According to the CDC, dental caries remains the most common chronic disease of children aged 5 to 17 years—5 times more common than asthma (59% versus 11%).[4] Untreated cavities can cause pain, dysfunction, absence from school, and poor appearance—problems that can greatly affect a child's quality of life. The utility of composite resin materials for both restoring dental health and preventing caries is well established, while any health risks from their use are not. The ADA fully supports continued research into the safety of BPA; but, based on current evidence, the ADA does not believe there is a basis for health concerns relative to BPA exposure from any dental material.

The ADA looks to the U.S. Department of Health and Human Services (HHS) to provide scientific guidance on issues that affect the health of Americans. The Association also looks to the U.S. Food and Drug Administration (FDA) for advice and recommendations on dental product safety. In 2007, HHS stated that, "Dental sealant exposure to bisphenol A occurs primarily with use of dental sealants [containing] bisphenol A dimethacrylate. This exposure is considered an acute and infrequent event with little relevance to estimating general population exposures."[1]

This year the FDA stated that "recent studies provide reason for some concern about the potential effects of BPA on the brain, behavior, and prostate gland of fetuses, infants and children." However, the FDA "recognizes substantial uncertainties with respect to the overall interpretation of these studies and their potential implications for human health effects of BPA exposure. These uncertainties relate to issues such as the routes of exposure employed, the lack of consistency among some of the measured endpoints or results between studies, the relevance of some animal models to human health, differences in the metabolism (and detoxification) of and responses to BPA both at different ages and in different species, and limited or absent dose response information for some studies."5 Based on this

conclusion, the FDA does not require testing of dental materials, medical devices or food packaging for BPA at this time.

The ADA is a professional association of dentists committed to the public's oral health. As such, the ADA supports ongoing research on the safety of existing dental materials and in the development of new materials. Based on current research the Association agrees with the authoritative government agencies that the low-level of BPA exposure that may result from dental sealants and composites poses no known health threat.

Footnotes

1. Centers for Disease Control and Prevention. Growth Charts 2 to 20 years: Boys (http://www.cdc.gov/growthcharts/data/set1clinical/cj41c021.pdf accessed April 2, 2010)
2. Joskow R, Boyd Barr D, Barr JR, Calafat AM, Needham LL, Rubin C. Exposure to bisphenol A from bis-glycidyl dimethacrylate-based dental sealants. J Am Dent Assoc. 2006;137:353-62.
3. Center for the Evaluation of Risks to Human Reproduction. National Toxicology Program U.S. Department of Health and Human Services. NTP-CERHR Expert Panel Report on the Reproductive and Developmental Toxicity of Bisphenol A. November 26, 2007.(http://cerhr.niehs.nih.gov/evals/bisphenol/bisphenol.pdf accessed November 30, 2007)
4. Centers for Disease Control and Prevention. Chronic Disease Prevention and Health Promotion: Preventing Dental Caries. (http://www.cdc.gov/chronicdisease/resources/publications/fact_sheets/oh.htm accessed November 17, 2008)
5. U.S. Food and Drug Administration. Bisphenol A (BPA). (http://www.fda.gov/NewsEvents/PublicHealthFocus/ucm197739.htm#current accessed June 15, 2010)

About the American Dental Association

The not-for-profit ADA is the nation's largest dental association, representing more than 155,000 dentist members. The premier source of oral health information, the ADA has advocated for the public's health and promoted the art and science of dentistry since 1859. The ADA's state-of-the-art research facilities develop and test dental products and materials that have advanced the practice of dentistry and made the patient experience more positive. The ADA Seal of Acceptance long has been a valuable and respected guide to consumer and professional products.

Contact Information

Telephone: 312-440-2806

E-mail: mediarelations@ada.org (Journalists) or Contact ADA (All Others)

Return to Top

Page Updated: July 13, 2010