



CANADIAN DENTAL ASSOCIATION  
L'ASSOCIATION DENTAIRE CANADIENNE



## **Bisphenol A: Facts and Arguments**

### **BACKGROUND:**

Safety concerns about bisphenol A (BPA) are based on research performed on animals that suggest BPA might affect reproduction and development in humans by acting like estrogen.

Health Canada conducted a risk assessment on BPA and announced its results on April 18. The focus of the report's recommendations was on polycarbonate baby bottles and infant formula containers, not dental materials.

The report concluded that BPA exposure from dental sealants and composites is extremely small in comparison to other sources and that no further regulations on BPA derived from these materials is required.

Media coverage leading up to the report confused the issue by listing "dental sealants" along with other household products that may release BPA. Despite the report's findings, negative public opinion may outweigh science and prompt questions or concerns from patients.

### **MAIN MESSAGES:**

Dental sealants are an excellent method of protecting against cavities and the need for future restorations – particularly in the young patient.

Based on the current evidence, there is no cause for concern regarding BPA released from dental composites or sealants. Exposure from these materials is significantly lower than from other sources of exposure.

The amount of BPA released from dental sealants or composites is extremely small and limited to a small number of products. The minimal exposure generally occurs within the first few hours after placement and then quickly reduces to virtually nothing. Once the material is placed and hardened, it becomes very stable.

Health Canada's provisional standard on BPA levels in humans is 25 micrograms daily per kilo of body weight. No restrictions are planned for dental composites or sealants as potential exposures of BPA from these materials fall well within Health Canada's safety margins.

### **SUPPORTING ARGUMENTS:**

While the term 'bisphenol' is found in the name of a large number of chemical compounds, the only compound reviewed by Health Canada was bisphenol A (BPA). Other bisphenols in general, and bis-GMA in particular, are not a concern.

Some of the most effective, proven materials for dental sealants are resin-based. BPA is not used as an ingredient in the manufacture of resin-based dental sealants. Dental sealants may contain monomers that are derived from BPA, such as bis-GMA and bis-DMA, but BPA itself is not an ingredient in dental sealants.

Some research has found that bis-DMA (Bisphenol A Dimethacrylate, also known by the acronym 'BAD') is hydrolyzed to BPA. (Schmalz et al, 1999). Other derivatives of BPA, such as bis-GMA and bisHPPP, show no capacity to be hydrolyzed back into BPA under normal conditions in the mouth (Santerre, 2007).

Recent studies have indicated that the exact resin formulation of the sealant may affect the potential for release of BPA. "No BPA-release is expected under physiologic conditions from fissure sealants based on bis-GMA if pure base monomers are used." (Schmalz et al 1999).

Other research has detected low levels of BPA in the saliva of individuals treated with certain dental sealants immediately following its application. (Joskow et al 2006, Sasaki et al 2005). However, no studies to date have detected BPA in the blood stream of individuals.

BPA found in saliva, potentially derived from dental sealants, could come from 3 sources.

1. Residual Monomer: within minutes of the material being placed in the mouth, unreacted BPA-derived monomer starts to diffuse out of the material.
2. Hydrolysis: hydrolysis of polymerized BPA-derived monomers is catalyzed by salivary enzymes that can break down hydrolytically sensitive ester bonds at the temperature and pH of the mouth.
3. Abrasion: abrasion produces small particles of polymers that are more accessible to the hydrolysis reaction.

All of these processes begin immediately, with hydrolysis and abrasion taking place over a longer period of time. (Santerre, 2007)

Health Canada is currently preparing a database that will identify materials that could potentially release BPA. In the meantime, dentists might find it useful to consult the Material Safety Data Sheets (MSDS) of dental sealants to identify the chemical composition of materials in use.

#### **CLINICAL PRACTICE ADVICE:**

To reduce the potential of any BPA being released from dental sealants, dentists should fully cure the sealants or composites according to manufacturer's instructions. In addition, dentists can treat the surface layer by performing 1 of the following 3 procedures:

1. use a mild abrasive, such as pumice, either on a cotton applicator or in a prophylaxis cup;
2. have older children and adolescents gargle with tepid water for 30 seconds; or
3. wash the sealant surface for 30 seconds with an air-water syringe while suctioning fluids and debris from a child's mouth. (Azarpazhooh and Main, 2008).

**References:**

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