BPA Is Everywhere, Except Where It's Not

BY STEVE HENTGES | SEPTEMBER 6TH 2016 09:24 AM

With the high level of attention to bisphenol A (BPA) over the years, it's easy to get the impression that BPA is everywhere and we're constantly being exposed to high and harmful levels in our daily lives. You might even have seen BPA referred to as an "everywhere chemical."

Adding to the confusion, the media is notorious for attaching pictures of products that contain absolutely no BPA to articles about BPA. Perhaps the most common examples are pictures of bottled water. Single-serve bottles containing water, sports drinks or carbonated beverages are almost universally made from a plastic known as polyethylene terephthalate (PET), which has no connection to BPA at all.

Perhaps stimulated by the controversy and confusion, scientists have been conducting studies to look for BPA in various places and measure how much BPA we're actually exposed to. It may be a surprise to some, but many of these studies show that BPA is not present everywhere, exposure levels are very low, and, most importantly, those levels are not harmful.

How Is Exposure to BPA Measured?

An entire field of science, known as exposure science, is dedicated to studying exposure of people to chemicals that occur in their environment. Several types of studies from this large and growing field are particularly informative to understand human exposure to BPA. These studies measure how much BPA goes in the body, how much comes out and, most importantly, what happens in between.

What Goes In? These studies measure BPA in products or places that people contact, and estimate how much of that BPA could enter the body. Although exposure may only be estimated and not directly measured, these studies can evaluate specific sources of exposure. Several studies published this year focused on potential exposure to BPA from sources either known or suspected of containing BPA.

> *Dental sealants. Many sealants are based on a derivative of BPA known commonly as bis-GMA (bisphenol A glycidyl methacrylate). Because bis-*

GMA could contain ultra-trace levels of residual BPA, the American Dental Association analyzed 12 dental sealants from the U.S. market to determine how much BPA could be released. As reported in ADA's Professional Product Review, the median amount of BPA released was 0.09 nanograms from the amount of sealant applied to four teeth. That vanishingly small amount led ADA to conclude, as summarized in the headline to its news release, "BPA in dental sealants safe."

Hair care products. For some time, concerns have been raised that hairdressers may be exposed to unsafe levels of various chemicals from hair care products they use in the salon. To address these concerns, the Finnish Institute of Occupational Health and the National Institute for Health and Welfare conducted a study to measure exposure to BPA (and several other chemicals). As reported: "According to the results, hairdressers in Finland are not exposed to … bisphenol A … any more than the rest of the population." The result is important not only for hairdressers but also for consumers. If hairdressers, applying hair care products throughout their workdays are not exposed to BPA, it seems highly likely that consumers using the same products on their own hair would also not be exposed to BPA.

Food products. It's well-known that BPA-based epoxy resins are commonly used as protective coatings on food and beverage cans to help protect the contents from contamination. The Food Safety Authority of Ireland (FSAI) conducted a Total Diet Study to measure levels of BPA (and other chemicals) in 147 foods and beverages representative of the normal Irish diet. Not surprisingly, trace levels of BPA were found in 30% of the samples analyzed. Exposure to BPA was then estimated based on food consumption data. Comparison of estimated exposure to the stringent health-based guidance value for BPA in Europe led FSAI to conclude that "exposure to BPA is of low concern."

The studies listed above, along with many earlier studies, confirm that BPA is not literally "everywhere." Where it is present, the levels are very low and estimated exposures are well within health-based guidance values for safety.

What Comes Out? Since BPA is quickly eliminated from the body through urine after exposure, analysis of BPA in urine provides a good measure of total exposure to BPA from all sources combined. Recent studies have focused on exposure to BPA in the potentially sensitive subpopulations of reproductive-aged women and reproductively active couples.

> *Reproductive-aged couples. A study conducted by researchers at the University of Utah measured BPA in repeated urine samples from couples planning pregnancy. The median BPA level (2.4 microgram BPA/L urine) was comparable to levels reported in large-scale studies conducted by the U.S. Centers for Disease Control and Prevention (CDC) that are representative of the U.S. population.*
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> *Reproductive-aged women. A similar study from the U.S. National Institutes of Health and a team of researchers in the U.S. and France measured BPA in repeated urine samples collected from reproductive-aged women. The median BPA level (2.8 micrograms BPA/L urine) in this study was also comparable to levels measured in the U.S. population.*

A separate series of studies conducted by CDC (known as the National Health and Nutrition Examination Survey, or NHANES) indicate that typical exposure to BPA in the U.S. population is less than 50 nanograms BPA/kg bodyweight. This level is more than 1,000 times below safe intake levels set by U.S. government agencies based on extensive scientific review. The two new studies indicate that exposure to reproductive-aged women and reproductively active couples are also well within these safe limits.

What's Inside the Body? In contrast to the studies above, which measure BPA outside the body, these studies measure how much BPA is actually in the bloodstream where it could potentially cause harm. The studies are more challenging to conduct, but are of high value for evaluating whether exposure to BPA is harmful. Two recent studies examined levels of BPA in the blood of a potentially sensitive subpopulation and a potentially more highly exposed group.

> *Pregnant women. A study jointly conducted by researchers at the Pacific Northwest National Laboratory and the U.S. Food and Drug Administration*

(FDA) measured BPA levels in urine and blood from a group of pregnant women. Low levels of BPA were found in urine, indicating exposure similar to levels found in the studies above. More importantly though, no BPA was detected in blood for most of the samples with a very sensitive analytical method. In cases where BPA was detected, clear evidence was found that the trace levels near the detection limit were the result of contamination and not indicative of actual exposure.

Cashiers. A minor use of BPA is as a component of the heat-sensitive coating on some thermal receipt papers. Since cashiers handle receipt paper throughout the day in the course of their work, a U.S. National Toxicology Program study measured BPA levels in urine and blood from a group of cashiers before and after their work shifts. Although low levels of BPA were detected in urine, no BPA was detected in most of the blood samples. Similar to the study above, sample contamination was suspected in most of the sample where trace levels of BPA were detected.

These studies are particularly informative in that they demonstrate that measureable levels of BPA are not present in blood, even when low-level exposure to BPA is confirmed by measurement of BPA in urine. This seeming contradiction is due to the efficient metabolism and clearance of BPA from the body that has been demonstrated in numerous studies on laboratory animals and human volunteers. Any BPA to which we are exposed is converted to a biologically inactive metabolite that is quickly eliminated from the body in urine. As a result, the potential for BPA to be harmful at typical exposure levels is virtually eliminated.

BPA Is Safe Where It Is, But It's Not Everywhere

Although no single study can answer all of our questions on BPA, results from these studies taken together provide powerful evidence to evaluate the safety of BPA. These new results strongly support the conclusions of government bodies worldwide that have reviewed the extensive science on BPA. A representative example is FDA, which answers the question "Is BPA safe?" with an unambiguous answer – "Yes."