

How BPA and BPS Are Making People Sick

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STORY AT-A-GLANCE

- › BPA and BPS are endocrine-disrupting chemicals, responsible for hypertension, structural changes to your brain, pre-term birth and diabetes; research shows both are able to cross the placental barrier
- › Chemicals used to replace BPA carry the same risks to your health as they are nearly identical, increasing health care costs and obesity rates
- › While plastics have become commonplace, there are healthier alternatives that present far less risk to your and your child's health

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Just when you thought you knew how dangerous bisphenol-A (BPA) was to your health, research demonstrates both BPA and substitute chemicals are able to cross the placental barrier, increasing the toxic load on a growing infant.¹ When tested, over 200 chemicals were found in umbilical cord blood of newborns.²

First created in 1891 by a Russian chemist, **BPA** didn't make an appearance in the manufacture of products until the 1950s, when it was used to produce resilient, and often transparent plastics. Despite strong scientific evidence that BPA has a negative effect on health, the industry was valued at over \$18.1 billion in 2018, and is expected to reach \$30 billion by 2030.³

BPA is found in countless personal care and plastic products, from the lining of canned goods to plastic wraps, water bottles and cashier receipts. Although the U.S. Food and

Drug Administration (FDA) claims BPA is safe for human consumption, it has been banned from sippy cups and other baby products.

Unfortunately, substitute chemicals being used to increase the strength and resiliency of plastics are probably no safer than the BPA they replaced, as they are near-identical chemical compounds.

BPA and BPS Cross the Placental Barrier Increasing Risk to Children

In 2010, researchers discovered BPA does cross the placental barrier.⁴ But, more importantly, the researchers found while the active form of BPA stays active in the developing infant, the inactive form can be converted to an active form, indicating pre-birth exposure to BPA was greater than originally anticipated.

In the movement toward the removal of BPA from products, manufacturers have been using bisphenol-S (BPS) and bisphenol-F (BPF) instead. These substitute chemicals are as hormonally active as BPA and are both strong endocrine disruptors.⁵ Both demonstrate adverse effects on the physiological functioning of humans and rats.⁶

Canadian and Chinese scientists have demonstrated what environmentalists have long believed – BPS and BPA can both cross into the placenta, affecting the pre-birth growth of infants.⁷ BPS had already been found in urine samples of over 80% of infants from China, U.S. and six other Asian countries.⁸

Previous studies had reported behavioral differences in rodent mothers exposed to BPS during pregnancy and in their female offspring. A 2011 study measured levels of BPS and BPA in 61 pairs of maternal and cord blood samples, proving "the first evidence that BPS crosses the human placenta."⁹ BPA metabolites in cord blood were also higher than found in maternal blood.

Current biomonitoring usually relies on the detection of total BPA in the urine and not the metabolites, BPA-sulfate and BPA-glucuronide. Monitoring metabolites of BPA is

limited and even less is known about the metabolites of substitutes BPS and BPF. Lead author Dr. Jonathan Martin from the University of Alberta explained:¹⁰

"The [fetus] has more difficulty excreting BPA than the mother. The mother can easily pass metabolites through urine, whereas the [fetus] excretes to the amniotic fluid and, to some extent, back to the mother's circulation. The human [fetus] is known to have a different metabolic capacity.

It's known to have a very immature glucuronidation pathway, whereas sulfation begins earlier. So it's not uncommon for the human [fetus] to produce more of the sulfate than the respective glucuronide."

How Endocrine Disruption Works

BPA metabolites may not have the strong **estrogenic chemical activity** of total BPA, but they are also not biologically inactive. Several studies have identified different types of biological activity between cultured cells and one BPA metabolite, and total BPA is a known endocrine disruptor.

Through widespread exposure and multiple effects on human cells, BPA represents a complex risk to human health.¹¹ Exposure to rodents in the perinatal period, during the weeks just prior to and after birth, BPA had a significant effect on the neuroendocrine stress response.¹²

Researchers theorized this exposure may be associated with the development of stress-related disorders later in life. Endocrine disruptors work by mimicking, or partially mimicking, hormones that occur naturally in the human body. This may produce overstimulation.

Some interfere or block the way receptors or hormones are made or controlled. This interruption in the endocrine system may produce negative results in infant development or in the reproductive, neurological and immune systems of children and adults.

There is a wide range of chemicals and substances that may cause **endocrine disruption**, of which bisphenol chemicals are only one. Pesticides, pharmaceutical interventions, dioxin-like compounds and polychlorinated biphenyls are just a few of these endocrine disruptors that are found in products, water supply and food supply affecting your health.

According to the National Institute of Environmental Health Sciences (NIEHS), research demonstrates these endocrine disruptors carry the greatest risk when humans are exposed during prenatal and early childhood development.¹³ This is the point during which organ and neurological system formation is being completed.

Increases Long-Term Risk of Illness and Adds Billions to Health Care Cost

While exposure during prenatal and infancy periods may hold the greatest risk, adolescents and adults are also at risk from endocrine disruptors and the subsequent health conditions that may develop.

A 2015 study of the health care cost impact in Europe demonstrated endocrine-disrupting chemicals contributed to the development of disease and illness.¹⁴ The study found the subsequent health care cost from only the chemicals with the highest probability of causation resulted in a cost of at least \$175 billion each year. The researchers estimated a broader analysis would have resulted in a greater burden of disease and health care cost.

The research detailed costs related to **obesity**, neurological disorders and male reproductive disorders. The study evaluated the effect of only 5% of the known endocrine disruptors, making this only the tip of the proverbial iceberg. Linda Birnbaum, Ph.D., former microbiologist and director of the NIEHS, commented:¹⁵

"The point is that there is a wide variety of effects being seen in the general population related to endocrine-disrupting chemicals. We have increasing

amount of data raising concerns about their use. We are seeing effects from [chemical] levels that are present in the general population."

As your endocrine system is instrumental in regulating mood, growth and development, tissue function, metabolism, as well as sexual function and reproductive processes, it is not surprising BPA and substitute chemicals are associated with a number of different health conditions, including:

Structural damage to your brain; hyperactivity, increased aggressiveness and impaired learning

Early puberty, stimulation of mammary gland development, disrupted reproductive cycles, ovarian toxicity and infertility¹⁶

Breast cancer¹⁷

High blood pressure and heart disease^{18,19,20}

Increased fat formation and risk of obesity

Increased prostate size, decreased sperm production, hypospadias (penis deformation),²¹ erectile dysfunction²² and stimulation of prostate cancer cells

Altered immune function

Preterm birth²³

Diabetes

Reduced efficacy of chemotherapy treatment²⁴

BPA and Substitutes Increase Your Risk of Obesity and Diabetes

As obesity is a primary factor in the development of many of the health conditions listed above, it is important to note that nearly 67% of women and 75% of men are either overweight or obese today.²⁵ These numbers represent a rising trend and significant public health risk.

While it is tempting to blame an increasing waistline on one or two factors, **metabolism** and weight control are complex and are dependent on different influences. In a 2016 study, researchers discovered that in order to maintain the same weight in 2006 as in 1988 you would have to eat less and exercise more.²⁶

The logical conclusion is that an environmental factor more prevalent after 1988 is influencing your metabolism. Research from Health Canada demonstrated the human body doesn't safely metabolize and excrete BPA, but instead transforms it into something that grows fat cells.²⁷ This confirmed the results of multiple past studies linking BPA to increasing obesity.^{28,29,30,31}

One study was also able to demonstrate BPA not only increased the number of fat cells that differentiate from pre-adiposity cells, but also increased the amount of fat inside the cells.³²

Research demonstrates the nearly identical BPS has some of the same characteristics. Interestingly, in this study, all cells exposed to BPS created fat, but those exposed to the least and greatest amount grew greater amounts of fat than those exposed to moderate amounts.³³ Senior author of a 2016 study on BPS, Ella Atlas, Ph.D., of Health Canada, commented on the results, saying:³⁴

"Our research indicates BPS and BPA have comparable effects on fat cells and their metabolism. The study is the first to show that BPS exposure can induce the formation of human fat cells.

Since BPS is one of the replacement chemicals used in consumer products that are marketed as BPA-free, it is important to examine whether BPS acts as an endocrine-disrupting chemical. This study shows that BPS and BPA have similar effects on fat cell formation, lipid accumulation and expression of genes important for lipid metabolism."

Is 'BPA-Free' Meaningless?

Concerns about the health effects of BPA have caused many consumers to seek out products that are BPA-free. However, research indicates the substitute compounds used to increase the strength of plastics also interfere with hormones and pose a public health risk. In a study evaluating the risks of both BPS and a secondary substitute chemical, BPF, researchers concluded they are both as hormonally active as BPA.³⁵

The structure between these three chemicals is remarkably similar, they provide the same stability to plastics and create similar health risks to humans.³⁶ Study author Johanna Rochester, Ph.D., researcher at the Endocrine Disruption Exchange, commented:³⁷

"According to pretty much all the literature there is on these two substitutes, they are hormonally active in ways similar to BPA – similar mechanisms, similar potencies."

Products labeled "BPA-free" have also been found to leach chemicals with estrogenic activity after undergoing real-world testing. Plastics labeled "BPA-free" were microwaved and exposed to ultraviolet lights and other common stressors.³⁸ Almost all the commercially available products tested released chemicals with estrogenic activity, including those labeled "BPA-free."

The researchers pointed out that manufacturers now have the ability to produce plastics without estrogenically active compounds in a cost-effective manner that would significantly reduce public health risks.³⁹ So why don't they?

Take These Steps to Reduce Your Risk

BPA is used in an amazing number of products in your home. In this short video, results from a study on canned foods are described. As it turns out, the researchers found more than just BPA. Until manufacturers place a higher value on human health than on profit, consider taking these steps to reduce your exposure to BPA and all the substitute compounds that also contain endocrine-disrupting features:^{40,41,42}

Eat mostly fresh whole foods – Processed and packaged foods are a common source of BPA and phthalates – particularly canned, but also foods packaged in plastic wrap. **Real food** is always your best option.

Consider taking progesterone – BPA and its substitutes are known as xenoestrogens, meaning they mimic the hormone estrogen in your body, potentially disrupting hormonal balance. To counteract their effects, you can use progesterone, which acts as an antagonist to estrogen by binding to estrogen receptors, thereby reducing the estrogenic effects.

I generally recommend a daily dose of 30 to 50 milligrams of bioidentical progesterone, ideally taken in the evening before bed, as it can also promote sleep. Combine it with natural vitamin E (look for supplements labeled "d alpha tocopherol") to increase its bioavailability. You can also dissolve about 1/32 teaspoon of pure USP progesterone powder into one capsule of high-quality vitamin E, and then rub the mixture on your gums.

Buy and use glass – Buy products that come in glass bottles rather than plastic or cans. Store your food and beverages in glass and use **glass containers** if heating food in your microwave, as heat tends to increase the release of chemicals from plastic. Be aware that even BPA-free plastics typically leach other endocrine-disrupting chemicals that are just as bad as BPA.

Use **glass baby bottles** for your infants. Never drink coffee or tea from plastic cups and replace all your plastic cups with glass. Avoid plastic utensils and don't use drinking water packaged in plastic. Filter your own water and store it in glass containers. Don't use plastic grocery bags from the store. Bring your own reusable canvas or cloth variety.

Avoid plastic wrap – If you are using it to cover a glass container, don't allow it to touch the food and don't **use it in the microwave**.

Be careful with cash register receipts — If you go to the store regularly, encourage the management to switch to BPA-free receipts. I shop at Publix for my food and when I called them about the [receipts](#) it turns out they had already switched. Nevertheless, it is wise to limit your contact with all these receipts.

Use sustainable, certified organic, GMO-free products — Look for products that are earth-friendly, animal-friendly, sustainable, certified organic and [GMO-free](#). This applies to everything from food and personal care products to building materials, carpeting, paint, baby items, furniture, mattresses and more.

When redoing your home, look for "green," toxin-free alternatives in lieu of regular paint and vinyl floor coverings, the latter of which is another source of [phthalates](#). Replace your vinyl shower curtain with a fabric one. Don't use nonstick cookware.

Choose children's toys carefully — [Choose toys made from natural materials](#) to avoid plastic chemicals like phthalates and BPA or BPS, particularly for items your child may be prone to suck or chew on.

Breastfeed for at least a year — [Breastfeed](#) your baby exclusively, if possible, for at least the first year (as you will avoid phthalates exposure from infant formula packaging and plastic bottles or nipples). Breastfeeding has additional advantages for your child as well.

Avoid commercial cleaning products — [Use natural cleaning products](#) or make your own. You can clean most of your home with white vinegar and baking soda. There are options for dryer sheets and [fabric softeners](#).

Switch to organic toiletries — Switch over to organic toiletries, including shampoo, toothpaste, antiperspirants and cosmetics. EWG's Skin Deep database can help you find personal care products that are free of phthalates and other potentially dangerous chemicals.⁴³

Switch feminine hygiene and urinary incontinence products — Replace feminine hygiene products (tampons and sanitary pads) and [urinary incontinence](#) products

with safer alternatives. While most ingredients in feminine hygiene products are undisclosed, tests suggest they may contain dioxins and petrochemical additives.

Opt for fragrance-free – Look for fragrance-free products; phthalates are often used to help the product hold its fragrance longer. Artificial fragrances can also contain dozens of potentially toxic chemicals. Avoid fabric softeners, dryer sheets, air fresheners and scented candles for the same reason.

Test tap water – Check your home's tap water for contaminants and filter the water if necessary. You may also want to use an alternative to PVC pipes for your water supply.

Don't drink from the hose – Teach your children not to drink water from the garden hose, as many are made with phthalate-containing plastics.

Check with the dentist – Verify any dental sealant used is BPA-, BPS- and BPF-free.

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