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Dangers of Drinking Water from Plastic Water Bottles

Health-conscious consumers have been shying away from single-use plastic water bottles for years, both due to their environmental impact and potential health impacts. But are plastic bottles bad, and if so, what are the dangers of drinking from plastic water bottles? The answers to these questions are complex.

Though nearly every authority agrees that the dramatic turn towards single-use plastic water bottles over the last few decades has resulted in a massive rise in plastic waste, the potential health impacts of drinking bottled water are more ambiguous. While proponents within the plastic water bottle industry argue that drinking water from plastic bottles is safe to consume, advocates outside of the industry tell a different story.

Let's take a closer look to discern whether drinking water from plastic bottles is safe, and if it isn't what you can do to protect your health and the health of your family.

BPA-Free?

The primary criticism you'll see leveraged at plastic water bottles circles around the compound bisphenol A, otherwise known by its acronym 'BPA'. BPA was first developed in the 1890's as a synthetic estrogen, but it wasn't until the 1950's that it began to see use in early epoxy resins. Shortly thereafter, major manufacturers discovered that, when used in specific ways, BPA could produce a type of plastic known as polycarbonate.

Polycarbonate was attractive due to the fact that it was both hard and shiny, which made it great for use in a variety of products including drinking cups. Within a short period of time, BPA was being used in a large number of products, many of which were outside of the beverage industry.

Uses of BPA included:

- The liners in canned goods
- Sippy cups, baby bottles and pacifiers



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- Thermal receipts like those you get at a cash register
- Food storage containers
- Compact discs
- Dental sealants
- Water supply pipes
- Safety equipment

Many of these products still contain BPA today, unless they are specifically noted to be “BPA-free”. In the United States, the use of BPA in food products is regulated by the Food and Drug Administration (FDA). It is notable that currently, BPA is only banned in specific products for babies like sippy cups and formula packaging.

How Common is BPA?

It’s difficult to assess how widespread BPA is in both the products we use and the environment in general. A 2003-2004 study conducted by the Centers for Disease Control and Prevention found that, of around 2,500 people tested, around 93% had detectable levels of BPA in their system.

Detectable levels of BPA have been found in the urine of nearly all adults and children tested in the United States. These include individuals living in both rural and urban environments, in the tissue of pregnant women, their breast milk, amniotic fluid, and in developing fetuses. BPA exposure isn’t limited to one geographic area, but exposure can be greater in certain regions or countries. For example, higher BPA levels were found in women who had lived their entire lives within the United States versus women who had immigrated from Mexico.

Despite consumer-led pressure to move towards a “BPA-free” world, the use of BPA in a variety of products remains widespread. In 2002 around 2.8 metric tons of BPA was produced for use in a variety of industries. By 2011 nearly 5.5 metric tons were produced.

What are the Health Impacts of BPA Exposure?

BPA is considered an endocrine disrupting compound, which means that it can disrupt how hormones normally function in your body. This can have



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profound, and lasting effects. While little was known about the health effects of BPA 20 years ago, many studies have since been released that point towards potential health impacts in humans.

Many studies in animals have demonstrated the BPA can result in negative effects on reproduction, development, and metabolic function. More recently, a slew of studies focusing on human health impacts have linked BPA exposure to negative human health outcomes. A meta-analysis of these studies conducted in 2013 found that BPA may be associated with the following negative health impacts:

- Miscarriage
- Premature birth
- Cardiovascular disease
- Reduced male sexual function
- Reduced sperm quality
- Altered liver function
- Obesity
- Oxidative stress
- Reduced fertilization success
- Implantation failure
- Altered thyroid hormone concentrations.

Exposure during gestation and the early development stages of children is particularly concerning. Potential impacts include:

- Spontaneous abortion
- Altered gestation times
- Higher risk of male genital abnormalities
- Lower birth weight
- Childhood obesity
- Behavioral issues
- Altered neurodevelopment
- Higher rates of asthma and wheezing

The more profound and lasting effects of BPA exposure seem to stem from exposure occurring during key developmental windows in children, with effects resulting throughout or later in life.



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What About “BPA-Free” Plastics?

The fundamental challenge in understanding whether chemical exposure can lead to negative health impacts lies in the delay between exposure and the health effects from that exposure, as well as the length of time it takes to conduct studies on the chemical and possible impacts. Consider that BPA has been widely used in packaging since the 1950’s, yet only in the last few years have a number of studies come out that draw a clear link between BPA exposure and health impacts in humans.

That same challenge lies at the heart of whether “BPA-free” plastics pose a health risk. In the face of public pressure to move away from BPA-plastics, manufacturers began exploring alternatives. Nearly all of these alternatives contain bisphenol, the “BP” in “BPA”. BPAF, BPS, BPZ, and BPP are just a few examples of BPA-alternatives that are now being used in some “BPA-free” plastics.

While little is known about whether these BPA-alternatives result in negative health outcomes in humans, early evidence suggests that this may be the case. A meta-analysis of BPA and BPA-alternatives conducted in 2018 suggests that BPA-analogs may similarly result in disruptions to reproductive functions as BPA.

In response to the cry for BPA-free plastics, many bottled water producers turned to polyethylene terephthalate (PET) bottles. These plastic bottles can also leach a toxic substance, antimony, into the water they hold. Like BPA, the rate that the chemical leaches into the water is dependent on the temperature it is stored at. However, unlike BPA, PET bottles must be stored in very hot conditions for long periods of time, up to 38 days, until levels of antimony exceed safety thresholds.

A Better Alternative

To limit exposure to BPA and BPA alternatives in drinking water and reduce plastic use, consider using a glass container for drinking water on-the-go. Though avoiding BPA specifically in drinking water containers is possible thanks to the rise of BPA-free plastics, tracking which chemicals those plastics



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do contain can be challenging. Experts recommend avoiding plastics with the recycling numbers 3, 6, and 7 to start. But the best alternative is to simply abandon plastic containers for drinking water entirely.

Transitioning away from bottled water also carries with it some great benefits, including:

- **Lower Environmental Impact** – A key to addressing sustainability is the waste associated with single-use plastics like drinking water bottles. Limiting your use of single-use plastics is crucial for reducing your carbon footprint. It is estimated that between now and 2050, plastic production and incineration will result in nearly 56 billion tons of carbon emissions, which is roughly 50 times that of all of the coal power plants in the United States. Looking for other tips that you can use to lower your environmental impact? Check out our guide for how to be sustainable on holiday, which includes strategies for reducing plastic use and creating a more sustainable workplace.
- **Lower Cost** – Bottled water can certainly be convenient, but that convenience comes at a price. Even moderately priced bottled water can cost hundreds of times the equivalent amount of tap water. Filtering your own tap water allows you to produce great-tasting, filtered drinking water for pennies a gallon.
- **Greater Control Over Contaminants** – What you may not realize about bottled water is that bottled water is regulated differently from tap water. While your municipal water supplier is required to do regular testing and notify authorities in case of a rise of contaminants, your bottled water supplier is responsible for testing their own water and information about their test results can be difficult to come by. Filtering your own water gives you greater control over the level of contaminants that ultimately end up in your glass.

Closing Thoughts

The dangers of plastic water bottles stem from the chemicals used to manufacture the bottles. As plastic bottles heat up, the molecules in the bottle move around more rapidly and can leach into the products they hold. While the focus has mostly remained on the dangers of BPA-containing plastics, a new movement towards plastics containing BPA-analogs has given rise to additional ongoing risks associated with plastic containers.

Though eliminating bottled drinking water won't eliminate your exposure to BPA and BPA-analogs given their widespread use in food packaging and other industries, it will lessen your exposure to any chemicals that may leach



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from your bottles into your water. Whether it's BPA, BPS or other BPA alternatives, or antimony found in PET bottles, transitioning to glass or steel containers for your water is an easy way to reduce your exposure. Transitioning away from plastic water bottles also carries other benefits, such as lower-cost drinking water, reduced environmental impact, and greater control over contaminants.

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