

ARE PLASTIC WATER BOTTLES SAFE?

We all know the importance of staying hydrated. The method of choice for most people these days is to carry around a trendy, colorful plastic sports bottle filled with water. You know, the tough, hard plastic ones that everyone from bikers and hikers to active business folks to on-the-go moms tote around - not to mention students ranging from elementary to college. They're perfect for an active lifestyle - light, durable and available in a rainbow of colors. However, new research has shown that these plastic sports bottles may pose serious health hazards.

The irony is that the hazard may actually come from the material that makes these bottles so attractive. Lexan polycarbonate resin, a plastic polymer accidentally developed by General Electric in 1953, was and still is a revolutionary material. It's been used in a variety of products over the last four decades including compact discs and DVDs, bulletproof windows, mobile phones, computers, baby bottles and water bottles. Lexan is a perfect choice for water and baby bottles as it's durable, doesn't hold flavors or odors nor delivers any taste from the bottle material itself to the fluids it holds.

The Problem: This is where the confusion begins. Many folks assume that because it doesn't impart flavor to the liquid it holds that it's safer than other types of plastic bottles. Research findings published in 2003 by the journal *Current Biology*, show otherwise. These findings were the result of a study by Dr. Patricia Hunt of Case Western University in Ohio that questioned the use of polycarbonate plastics such as Lexan.

In 1998, Hunt discovered that plastics made from polycarbonate resin can leach bisphenol-A (BPA), a potent hormone disruptor. BPA, a chemical found in epoxy resin and polycarbonate plastics, may impair the reproductive organs and have adverse effects on tumors, breast tissue development and prostate development by reducing sperm count.

BPA can be leached into the water bottles contents through normal wear and tear, exposure to heat and cleaning agents. This includes leaving your plastic water bottle in your car during errands, in your back pack during hikes and running it through your dishwasher and using harsh detergents. And, a 2003 study conducted by the University of Missouri published in the journal *Environmental Health Perspectives* confirmed Dr. Hunt's study conclusions but also found that detectable levels of BPA leached into liquids at room temperature. This means just having your plastic water bottle sitting on your desk can be potentially harmful. In this author's humble opinion, the best thing to do is to avoid plastic altogether. (Side note: baby bottles made from polycarbonate plastics have quietly disappeared from the market despite industry assurances that polycarbonate plastics are safe)

The Solution: There are two approaches to take to avoid exposure to BPA. First, if you are active and take water with you, switch to a stainless steel water bottle. But, be careful. Many products on the market are lined with an epoxy finish. This defeats the purpose. Make sure that the bottle is stainless steel both inside and out. Stainless steel water bottles are light, durable and hold both hot and cold liquids well.

The second approach is to reuse glass containers such as quart sized juice bottles. Yes, they are a bit heavier but are good solutions if you're in an office environment where mobility isn't an issue.



Either way, to avoid bacteria build up, wash out your containers with warm water and biodegradable dish soap. Be sure to wipe the mouth of the container and the lids. And most importantly, let the container completely dry before refilling. Keeping any container continually filled with liquid can lead to bacteria developing and potential illness.

Keeping hydrated is extremely important year round - but especially during the summer. It keeps our systems functioning properly and is important in sustaining good health. Here's a tip on how much water you should be consuming daily based on a formula provided by the Mayo Clinic: Simply take your body weight and divide in half. For example, if you weighed 150 pounds, you need 75 oz (9-10 8oz glasses) daily. Caffeinated and alcoholic beverages are dehydrating so for every glass of these

beverages you drink, add an extra glass of water.

So, while you take care to only fuel your body with plenty of pure, filtered water, take the next step and ensure the container holding your water is safe.

Bottom's up!

Written by: GreenFeet.com. GreenFeet.com offers a stainless steel water bottle called the [Klean Kanteen](#).

Hazards of Hydration

Choose your plastic water bottles carefully

Clear, lightweight, and sturdy polycarbonate plastic bottles are standard equipment for millions of hikers and babies. (They are usually labeled #7 on the bottom; Nalgene is the best-known producer.) Since polycarbonate bottles don't impart a taste to fluids, many users assume they are safer than bottles made out of other kinds of plastic. But now an accidental discovery has cast doubt on their safety.

The surprise results came in 1998 during an animal study led by Dr. Patricia Hunt, a geneticist at Case Western Reserve University in Cleveland. Her team was investigating causes of miscarriages and birth defects, which often result from aneuploidy, the loss or gain of chromosomes. A lab worker washed the team's mouse cages in a harsh detergent not ordinarily used for that purpose. Suddenly the number of chromosomal abnormalities, which had earlier been found in only 1 to 2 percent of the mouse eggs, spiked to 40 percent, setting the researchers on a detective hunt for the cause.

The culprit was found to be bisphenol-A (BPA), a chemical that mimics the hormone estrogen; it had apparently leached from the polycarbonate mouse cages after the washing. Hunt's team reproduced the accident to make sure, and published its findings in the April 2003 issue of Current Biology.

"We just stumbled into this," says Hunt, "but we have been stunned by what we have seen."

For years, scientists have been finding that endocrine disruptors like BPA can impair the reproductive organs of rats and mice, reduce sperm counts in rats, and bring about changes in tissue that resemble early-stage breast cancer, among other effects. But Nunc International, maker of Nalgene bottles, maintains that its products are "safe for use with human consumables"; cites other research that found no dangerous leaching; and points to a 2002 study in which rats fed a diet containing BPA at levels higher than those in Hunt's laboratory suffered no apparent reproductive or developmental effects.

Not all plastics are equal. At left #1 PET bottles should not be reused. Center, clear, hard #7 polycarbonate bottles may leach an artificial estrogen. Right #2 HDPE (as well as #4 LDPE and #5 PP) are good choices for reuse.

Hunt counters that the rat study did not look at eggs or embryos. "The [plastics] industry says this is just rodent studies," she says, "but we know that the human egg is more fragile than the mouse egg. If we wait for really hard evidence in humans, it will be too late."

Normal wear-and-tear and cleaning of polycarbonate plastic bottles in a dishwasher, Hunt says, could cause the chemical to leach, and the amount of leaching increases as the plastic ages and is degraded by use. A separate study published in July in *Environmental Health Perspectives* confirmed this finding, and also detected leaching from new polycarbonate plastic.

Theo Colborn, author of the groundbreaking book about endocrine disruptors, *Our Stolen Future*, calls BPA a "very, very sticky problem. This is a product that's everywhere, and in everything." (In addition to bottles, BPA turns up in dental sealants and the resin linings of many food and beverage cans.) She recommends washing polycarbonate bottles with mild detergent only, and rinsing well. (Thorough washing is crucial for any reused bottle, because of the danger of bacterial contamination.)

Most at risk, says Colborn, are people with developing endocrine systems: pregnant women and newborns, followed by young children, and women who might get pregnant. Hunt says that if she had an infant, she would switch to polypropylene (#5 PP), which is not known to leach harmful substances. (Other plastics that are not known to leach are #2 HDPE and #4 LDPE. "Single use" plastic bottles made of polyethylene terephthalate [#1 PET or PETE] are not recommended for repeat use because of the risk of bacterial contamination from infrequent and insufficient washing.

Or you could avoid plastic altogether and switch to glass or lightweight stainless steel containers.
—*Frances Cerra Whittelsey*