



# Hazards of Hydration

## Choose your plastic water bottles carefully

By Frances Cerra Whittelsey

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% of the mouse eggs, spiked to 40%, 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.

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 2003 in *Environmental Health Perspectives* confirmed this finding and 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 every-where 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.



*When selecting plastic water bottles, #2 HDPE (left), #4 LDPE & #5 PP bottles are good choices. #1 PET/PETE bottles (center) are not recommended for repeat use due to the risk of bacterial contamination. Clear, hard #7 polycarbonate bottles (right) may leach an artificial estrogen.*

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