

POISON PLASTIC?

Chemical used in polycarbonate products may cause health risks, research suggests

Published: Tuesday, May 10, 2005

NEWS - SCIENCE 06A

By Mike Lafferty

THE COLUMBUS DISPATCH

Evidence is growing that a chemical used in some plastic water bottles, food-storage containers and even baby bottles might cause health problems.

"One of my favorite gifts for friends who get pregnant is to give them glass baby bottles," said Patricia Hunt, a researcher at Washington State University at Pullman.

Hunt is one of a number of researchers looking at what bisphenol A, the chemical used to make polycarbonate plastics, does to us.

Frederick vom Saal, a researcher at the University of Missouri, first raised questions about bisphenol A eight years ago. Since then, his work has been confirmed and extended in more than 100 experiments, he reports in the current issue of the journal *Environmental Health Perspectives*.

Some of the research suggests that simply heating a polycarbonate container can release the chemical.

The plastics industry says many studies say bisphenol A is safe. But vom Saal said a growing body of research indicates that even in concentrations as small as one part per trillion, the chemical can act like a sex hormone and cause health problems that include altering the immune system, brain damage, learning disabilities, reproductive problems and tumor growth.

Vom Saal said although more study is needed, he thinks the early research is ominous.

"If you wanted to create a terrorist chemical, you'd design this," he said. "This is a phenomenally potent sex-hormone chemical. It's staggering in low concentrations."

Because the chemical is ubiquitous in the environment -- the federal government estimates 95 percent of U.S. residents have some in their bodies -- vom Saal speculates that it could be linked to a variety of unexplained health problems, including declining sperm counts, increased attention-deficit hyperactivity disorder and auto-immune diseases.

How to tell

Numbers and letters sometimes are found on the bottom of plastic containers to indicate the type of plastic. The number is for recycling. Sometimes it is accompanied by letters. For example, polycarbonate is identified as PC and is usually indicated for recycling by the number 7. Here's the code:

- 1 - Polyethylene terephthalate (PET)
- 2 - High-density polyethylene (HDPE)
- 3 - Vinyl (polyvinyl chloride or PVC)
- 4 - Low-density polyethylene (LDPE)
- 5 - Polypropylene (PP)
- 6 - Polystyrene (PS)
- 7 - Other (polycarbonate, ABS, nylon, acrylic or a composite of two or more resins)

Source: American Plastics Council

Hunt discovered potential problems with the chemical when a reproduction experiment went awry. Cells in unfertilized mouse eggs would not properly divide, leading to eggs with the wrong number of chromosomes.

"It took us weeks to learn what it was," she said.

The mice were in polycarbonate cages and were drinking from polycarbonate bottles. When the cages began to deteriorate and the bottles began to leak, Hunt discovered that a lab worker had used the wrong detergent to wash them, causing them to leach bisphenol A, she said.

California lawmakers are considering banning the chemical in some children's products such as formula bottles and teething devices. It would be the first state to do so.

Steve Hentges, a chemist and spokesman for the American Plastics Council, said bisphenol A is not a risk at the low levels we are exposed to.

Only minute quantities are left after manufacturing, Hentges said. Humans are exposed to about 20 to 30 parts per billion per day, he said, pointing out that federal safety limits are about 2,000 times higher.

Vom Saal has been a thorn in the plastic industry's side since the mid-1990s, in part because of his criticism of a study the plastics council funded. The Harvard School of Public Health conducted a safety study of bisphenol A and reported in 2004 that the chemical was safe.

Vom Saal said the school relied on 19 studies for its review, while his review of more than 100 studies indicated potential health problems.

The researcher said polycarbonates should be limited to nonfood uses such as building materials and industrial components. But he recognizes that the plastics are so common in households that rather than tossing food containers, people should exercise care in how they use them.

For example, vom Saal said, polycarbonate containers shouldn't be microwaved.

Bisphenol A is among a group of alphabet-soup chemicals -- including PCBs, DDT and DES -- that are suspected of disrupting endocrine glands that produce hormones.

Hormones regulate many things in the body, including brain function, reproduction and development. Disrupters have been linked to cancer, birth defects and immunity problems.

Worldwide, an estimated 6 billion pounds of bisphenol A are made each year, according to the industry. Most is made overseas and is put in products that include greenhouse glazing, high-end food containers and the resin lining in food cans.

What is it?

Bisphenol A is used to manufacture resins and polycarbonate plastic products. Some products in which bisphenol A is used:

- * Hard, clear or tinted baby bottles, water bottles and storage containers
- * Sports safety equipment including goggles and helmets
- * Resin liners in food and drink cans
- * Dental sealants
- * Casing for electronic equipment
- * Animal cages and carriers

The type of plastic is sometimes marked on the bottom of containers. Polycarbonate is listed as PC. Other codes include PP for polypropylene, PE for polyethylene, PVC for polyvinyl chloride or PS or EPS for polystyrene.

University of Cincinnati biologist Karen Knudsen looked at bisphenol A after vom Saal's first paper and determined that the chemical makes certain human prostate cancer cells grow faster.

She estimated that as many as one-fourth of the 220,000 cases of prostate cancer diagnosed annually in the United States could be affected by it.

"It acts like estrogen. In this case, there are certain genetic mutations that arise during the (hormone therapy) treatment of some prostate cancer that make the tumors receptive to being stimulated by estrogen," Knudsen said.

Patients treated with surgery or radiation would be unlikely to experience the problem.

"The lower doses (of the chemical) are where we saw effects," Knudsen said.

The tissue-culture experiment was based on levels recorded in humans. She said the experiment is being repeated in mice, and results should be available next year.

Ohio State University food scientist Melvin Pascall said he is not alarmed by the bisphenol A studies. The key, he said, is whether the chemical can leach from the plastic. That won't happen if the plastic is manufactured properly.

Some of the chemicals used in food packaging have some toxicity, Pascall said. "When they are used in correct proportions, then the exposure and toxicity can be minimal."

The exposures are under federal tolerance levels for bisphenol A of about 0.05 parts per million per day.

Pascall said he wonders how minute quantities of many chemicals might react with one another when used in packaging.

"We may find in a number of cases some of these chemicals are below legal limits, but what happens when you have several of them?"

mlafferty@dispatch.com

Illustration: Photo Illustration appeared in newspaper, not in the archive.

Photo caption: (1) DISPATCH PHOTO ILLUSTRATION

- (2) Baby bottle
- (3) Sports safety equipment
- (4) Resin liners in food and drink cans
- (5) Dental patient
- (6) Casing for electronic equipment
- (7) Animal cages and carriers