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Peril in plastic? Some researchers fear that a chemical found in plastic products we use every day could be harming the development of children and triggering a wide array of maladies from cancer to diabetes.

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By David Kohn, Sun Reporter

There is a roaring battle these days over whether a chemical called Bisphenol A is dangerous to humans. The chemical is ubiquitous - used to harden plastic in consumer products including baby bottles, food containers, cling wrap, toys, CDs, sunglasses, and thousands of other products.

A number of independent researchers say tests on animals and other research indicates that Bisphenol A can be toxic at very low doses.

But a review committee created by the National Institutes of Health's National Toxicology Program has yet to find significant danger from the drug. Last month the panel released a preliminary report finding that Bisphenol A is of some concern for fetuses and small children. But it found that adults have almost nothing to worry about.

Still, many researchers say that Bisphenol A, known as BPA, may cause a wide range of health problems, including breast and prostate cancer, infertility, diabetes, brain damage, even obesity. And they warn that the chemical is especially toxic to babies and children.

These scientists point to hundreds of studies showing that Bisphenol A harms animals. They say problems occur at exposure levels equivalent to those commonly seen in humans.

Several state legislatures, including those of California and Minnesota, have considered, but not passed, bills limiting use of BPA. This year, Prince Georges County Del. James W. Hubbard, a Democrat, introduced a bill outlawing use of BPA in baby products, including toys and bottles. The bill was voted down; Hubbard will try again in the January legislative session.

The controversy is part of a larger debate over how to measure the risks posed by the thousands of industrial chemicals that have become part of our lives over the past century - everything from plastics to Teflon to formaldehyde. Many activists and researchers say government rules allow industry to use potentially dangerous compounds without first ensuring the chemicals' safety.

In the U.S., industrial chemicals are regulated under the Toxic Substances Control Act (TSCA). Passed in 1976, the law requires companies to ask the U.S. Environmental Protection Agency for permission to use new chemicals. But companies do not have to test for potential health hazards, or provide any proof that the compound isn't hazardous.

Since the law passed, more than 82,000 chemicals have been registered with the EPA; environmental health scientist Michael Wilson says only a few thousand have received careful vetting. "The great majority of chemicals in common use have not been adequately studied for their effects on human health," says Wilson, executive director of the Center for Occupational and Environmental Health at the University of California, Berkeley. "The big picture is that there's a complete lack of basic public health information."

But the chemical industry says the law is effective. "It's absolutely clear that the EPA has the necessary regulatory authority to ensure that chemicals are safe," says Michael Walls, managing director of the American Chemistry Council, the industry's trade group. "TSCA is a strong statutory framework for chemical regulation."

But critics of TSCA say hundreds of chemicals - compounds commonly used in detergents, cleaning supplies, cosmetics, sunscreens, food packaging, and many other products - may pose serious human health risks. They say this is particularly true of chemicals, including BPA, introduced before TSCA took effect in 1979. Such compounds received a waiver, and are automatically assumed to be safe.

"There's a presumption that a chemical is safe because we know nothing about it," says Lynn Goldman, a pediatrician and a professor of environmental health sciences at the Johns Hopkins Bloomberg School of Public Health. Dr. Goldman was a high-ranking EPA official in the Clinton administration. "That's a perverse disincentive for industry to find out more about their chemicals."

BPA belongs to a class of chemicals that disrupt the hormonal system, mimicking the effects of hormones such as estrogen and testosterone. There are hundreds of such compounds, including common pesticides, fungicides and flame retardants, as well as other plastic components besides BPA. While dozens may cause human health problems, many researchers and activists have focused on BPA because it is so widespread, and may be more toxic.

Everyone agrees that BPA mimics estrogen. The disagreement is over how much effect the compound has, and at what doses. The question is crucial, because estrogen is a biological workhorse: It plays a role in a wide range of physiological processes, from sexual maturation to brain cell formation.

The debate over BPA has heated up in recent months. In August, 38 researchers published a journal article warning that "human exposure to Bisphenol A is widespread," and exists at levels shown to cause harm in animal experiments. After reviewing more

than 700 studies, the researchers concluded that the chemical can damage DNA and the immune system, and may cause cancer.

"The consensus was that we have a very high level of concern due to the levels of exposure that are occurring today," says Frederick vom Saal, a University of Missouri toxicologist who was on the panel.

But that same month the National Toxicology Program's panel released its preliminary report finding that the chemical poses a comparatively small risk to humans or wildlife. The group expressed "some concern that exposure to Bisphenol A causes neural and behavioral effects" to fetuses, babies and children. But it concluded that the chemical is unlikely to cause other harm.

Both panels were funded by the federal government, but they worked separately. The 38-scientist panel was convened by the the National Institute of Environmental Health Sciences (NIEHS) and the U.S. Environmental Protection Agency, and consisted of scientists who had studied BPA or endocrine disruption. The second group was chosen by the National Toxicology Program (NTP), an arm of the NIH that analyzes health risks from chemicals.

This panel consisted of researchers who were not BPA experts. One member of the BPA panel, Earl Gray, a toxicologist with the Environmental Protection Agency, said the idea was to include scientists who had a fresh perspective and wouldn't be reviewing their own research. It is not unusual for the NTP to use non-experts on a chemical review panel.

But many scientists criticize this approach, and say non-experts can't adequately understand the complexity of the issue. The NTP panel also excluded many lab studies that found BPA risks. Gray says the disqualified studies weren't adequately rigorous, and may have come up with results that overstated the hazard.

Others dispute this view. "They excluded vast amounts of legitimate research," says Scott Belcher, a University of Cincinnati neurobiologist who has found that BPA can harm growing brain cells. He calls the decision a "mistake."

The NIEHS panel has completed its work. The NTP panel will release its final conclusions next year. Neither panel has any direct regulatory role, but the NTP group wields significant influence within the government, and its findings have more potential to lead to regulatory change.

Fourteen years ago, the EPA set a minimum exposure level for the chemical, but critics and many researchers say far lower doses can cause harm. EPA spokeswoman Suzanne Ackerman concedes that the level is out of date, and says the agency is now studying the chemical.

The U.S. Food and Drug Administration doesn't regulate BPA because the chemical is not an official ingredient in food and drink. Three decades ago, the agency classified BPA as safe under a sort of grandfather clause called "Generally Recognized As Safe" (GRAS). Vom Saal says that's a copout: "GRAS means 'we don't know anything about this chemical, so we're going to say it's safe.'"

He and others say the federal government should set strict limits on how BPA is used, particularly in food-related products. "The science on Bisphenol A is moving at a rapid rate, and the regulators are moving at a snail's pace," he says.

Determining BPA's guilt, or innocence, is not an easy task. In humans, most of the ailments allegedly caused by the chemical would likely show up decades after exposure. As a result, the line between cause and effect becomes difficult to draw. Many researchers used epidemiological evidence, pointing out that certain cancers and reproductive ailments have increased over the past few decades, just as use of BPA and other endocrine disruptors has spiked. But while suggestive, these arguments do not provide unassailable proof.

Researchers have relied on studies of animals, such as rats and mice, which have shorter lifespans. This evidence, however, is not as clear-cut as human studies. Many activists and researchers argue that such proof is unnecessary. "We can't test industrial chemicals on people. That would be unethical," said Jane Houlihan, vice president of research at the Environmental Working Group, a Washington-based nonprofit advocacy organization that wants to overhaul TSCA and ban BPA in many consumer products. "So we test them in the lab, on animals. Our public health system is grounded on animal studies. And those studies show that this is clearly toxic."

Another issue: Our understanding of endocrine disruptors is changing rapidly. New research suggests that BPA, and other similar chemicals, may cause harm at much lower doses than previously suspected. Some studies have found that low doses of the chemical actually cause more harm than higher ones. As a result, previous studies using high doses may not reveal much about the chemical's real risks.

Most human exposure to BPA likely occurs through food and drink, when the chemical leaches out of water bottles, plastic containers and cups, and cans. Many if not most cans contain BPA lining, which keeps food from eating away at the metal itself. Manufacturers are not required to tell consumers that food packaging contains BPA, so it's impossible to know which cans include the compound. In March, the Environmental Working Group tested 97 name-brand fruit, vegetable, soda and other food cans; over half contained BPA. The EWG says that pregnant women who eat several servings of canned food per day could be exposing their fetuses to levels of BPA that have been harmful in lab animals.

Earlier this year, the U.S. Centers For Disease Control and Prevention tested more than 2,500 people, and found that 93 percent had the chemical in their bodies. "This confirms

that there is widespread exposure to Bisphenol A," says Antonia Calafat, a CDC chemist who led the study. "This compound is getting into people."

And children may be exposed to more BPA than adults. The CDC found that subjects between the ages of 6 and 11 had the highest concentrations (the study did not include subjects younger than 6). Most researchers suspect that kids are more likely to be harmed by BPA. Because their bodies are still developing, scientists say, fetuses, babies and children are probably more susceptible to chemicals - such as BPA - that alter the growth process.

To minimize exposure, researchers recommend reducing use of plastic food containers, particularly for hot liquids, which cause increased leaching. But because it is so pervasive, avoiding BPA completely is all but impossible.

A few months ago, Kate Canada decided to minimize the amount of BPA her 7-month-old daughter, Lily, ingested. She bought BPA-free baby bottles and toys, but she still worries about other sources. "It's hard to know what's in your home, or in the food you eat," says Canada, 31, who lives in the Rodgers Forge neighborhood of Baltimore County.

Belcher, the University of Cincinnati scientist, has stopped drinking water out of BPA-containing plastic bottles, and has cut back on the amount of plastic-contained food and drink he gives to his 3-year-old daughter. But he knows this only goes so far: "There is a huge amount out there. It's in everything we do."

Some activists and researchers see the one-compound-at-a-time approach as a dead end. Focusing on individual chemicals, or even classes of chemicals, obscures the larger problem, they argue. BPA and other endocrine disruptors may act synergistically. "We're not exposed to one chemical at a time," says Houlihan. "We're exposed to many dozens, or even hundreds, at a time." She notes that a recent EWG study of 10 newborns found that on average each had measurable amounts of 200 manufactured chemicals in their blood. The study did not look for BPA (other studies have, and show that it does cross the placenta).

This summer, the European Union passed a law known as REACH, which requires companies to provide safety information about many of the chemicals they produce or use. Some lawmakers and environmental groups in California are planning to introduce a similar proposal there. If passed, the measure would likely have nationwide effect, since most chemical companies that operate in California also do business in other states.

"We're barking up the wrong tree if we're just talking about banning one chemical," says Wilson, the Berkeley scientist. "We should be looking at an entire overhaul of how we test and regulate industrial chemicals. Anything short of that will be just a Band-Aid."

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How to reduce BPA exposure

Because it is so pervasive, avoiding BPA completely is all but impossible. But experts say there are ways to decrease exposure:

- Canned foods are a key source of BPA exposure. According to a study by the Environmental Working Group of 97 name-brand cans, beverages appear to contain less BPA residues, while canned pasta and soups contain the highest levels.
- Use powdered infant formulas packaged in non-steel cans. Steel cans for powdered formulas likely have a BPA lining.
- Leaching from plastics appears to occur at a much lower level than from can linings. Polycarbonate plastic food containers marked on the bottom with the recycling label No. 7 often contain BPA. Rigid and transparent plastic containers for food and drink, and toddler sippy cups, may contain BPA. Some polycarbonate water bottles are marketed as 'non-leaching,' but BPA may still migrate from these containers, particularly if used to hold hot liquids, which cause increased leaching.
- Avoid using old and scratched plastic bottles, which leach more.
- Plastics with the recycling labels No. 1, No. 2 and No. 4 on the bottom do not contain BPA.
- When possible, use glass bottles, or those made from the safer plastics polypropylene and polyethylene. Soft or cloudy-colored plastic does not contain BPA. Bottles used to pump and store expressed breast milk by the brand Medela are also labeled BPA-free.
- Many metal water bottles are lined with a plastic coating that contains BPA. Look for stainless steel bottles that do not have a plastic liner.
- While the level of BPA leaching from hard plastics is generally low, we recommend avoiding plastic containers to heat food in microwaves. Use ceramic, glass, and other microwaveable dishware.
- In the past, some plastic wraps may have contained BPA. Some brands, such as Saran, do not contain BPA.