Are plastics killing us?

2005-11-06 - United States

Few chemicals on the planet enjoy more use than bisphenol A. We come into contact with it every day in tin-can linings, CDs, electronics, sports equipment, cars and baby bottles, just to name a few products. More than six billion pounds of it are made each year.

However, tiny amounts of BPA can leach out and new research shows it can get into us -- a study done this year for the U.S. Centers for Disease Control found the chemical in 95 per cent of American urine samples.

More than a hundred other studies suggest that BPA is linked to a staggering number of health problems, including prostate and breast cancer, obesity, attention deficit and hyperactivity disorder, brain damage, immune suppression, lowered sperm counts and early puberty.

The plastics industry maintains that BPA is completely safe. But academic and government researchers say the chemical needs to undergo a new risk assessment. Previous assessments were done more than 15 years ago, when the technology to screen for health risks was immature. Most of the research pointing to its potential for harm has come out in the past five years.

BPA is a synthetic plasticizer used to make polycarbonates (clear, shatter-resistant plastics), epoxy resins (coatings that line food containers) and white dental sealants, but this is not what it was originally intended for.

In 1936, British chemist Charles Edward Dodds found that BPA could mimic estrogen, and he proposed that it be produced as a synthetic hormone. But it was never used for that purpose because Dr. Dodds abandoned it when he discovered the now-banned synthetic estrogen DES.

Scientists later found that BPA had another property -- the ability to produce strong plastics and smooth coatings. "Materials made from BPA have unique attributes, including shatter resistance, optical clarity and chemical resistance," says Steve Hentges, executive director of the polycarbonate business unit of the American Plastics Council.

However, the BPA molecules are bound by "ester bonds," which can be disrupted by heat and by acidic or basic conditions to release the chemical. This has prompted many researchers to worry that the chemical may pose a risk to human health.

Any hormone can harm you if you receive too much of it, and estrogen is no exception. It normally stimulates cells to grow and divide, making it integral to the development of the sex organs. But too much of it can cause cell division to spiral out of control.

For this reason, estrogen-only hormone-replacement therapy may increase a woman's chances of developing breast cancer. Estrogen overload can also lead to lowered sperm counts, malformed testicles and penises, prostate cancer and a host of other problems.

Although it is well established that BPA can bind to the body's natural estrogen receptors, the plastics industry contends that exposure to the chemical through food poses no threat.

"In the intestine and liver, BPA is completely metabolized into BPA-glucuronide, a different form of BPA that is not estrogenic," Dr. Hentges says. "Essentially, none of the estrogenic compound reaches the blood."

However, research by Ana Soto, a Tufts University professor who has spent the past decade studying BPA, suggests otherwise. In 2002, she conducted a study in which the chemical was attached to radioactive labels in order to see where it went when given to mice. "We found unchanged BPA and BPA-glucuronide in the fetuses," Dr. Soto wrote. "This shows that BPA was able to cross the placenta."

Fetal development is of greatest concern to those worried about BPA. Embryos have not yet developed their adult detoxification systems so they are much more vulnerable to chemical pollutants. (This explains why a woman eating mercury-contaminated fish can give birth to a deformed fetus, yet remain healthy herself.)

Many studies have found adverse effects from prenatal exposure to BPA. Male mice can develop prostate cancer and females breast cancer. Mice also can grow into larger animals (suggesting a link to the rise in obesity) and tend to be hyperactive and slow to learn (implying a link to ADHD in children).

The chemical has also been shown in mice to lower sperm quality, cause brain damage, alter the immune system, lead to early puberty in females and damage chromosomes.

However, Dr. Hentges plays down the studies. "The level of BPA that causes adverse effects in lab animals is more than millions of times higher than what people are typically exposed to -- there's a huge margin of safety," he says.

A number of studies have found the typical concentration of BPA in human urine to be in the part-per-billion range. However, many experiments in lab animals have documented effects in the part-per- trillion range. "But that's not totally surprising, given that that's the level where hormones have effects," says Frederick vom Saal, a biologist who researches BPA at the University of Missouri.

In a recent paper in the journal Environmental Health Perspectives, Dr. vom Saal compared studies on BPA that were funded by industry, all 11 of which found no effect, with studies funded by governments, of which 94 out of 104 documented harmful effects. "The chances of 100 per cent of industry studies being negative, and over 90 per cent of government studies being positive is about one in two billion," he said.

Although few studies have been done on humans, ones conducted in Japan have suggested that women with high levels of BPA in their blood are more likely to experience frequent miscarriages and to suffer from polycystic ovaries.

Given the animal studies, some scientists are calling on federal regulatory agencies to perform new risk assessments on BPA. Health Canada is re-evaluating all 23,000 chemicals in use in this country, but the work is not expected to be complete by 2006. The U.S. Environmental Protection Agency has not performed a risk assessment on BPA since 1988 (when estrogenicity was not even considered), and has no current plans to re-evaluate it.

Source: Globe and Mail