

The Pervasive Problem of Plastics in Your Food

Analysis by [Dr. Joseph Mercola](#)

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STORY AT-A-GLANCE

- › A Consumer Reports investigation into plasticizers, which are chemicals widely used to make plastic flexible, found the compounds in 84 out of 85 food and beverages tested
- › Bisphenol A (BPA) was found in 79% of the samples, which included fruits, vegetables, milk, meat, seafood, baby food and more; phthalates were detected in every food tested except one
- › The product with the most phthalates was Annie's Organic Cheesy Ravioli, with 53,579 nanograms per serving; Del Monte sliced peaches and Chicken of the Sea pink salmon had the next highest levels
- › Phthalates enter food via multiple avenues, including agriculture, pasteurization, packaging and from plastic tubing, conveyor belts and vinyl gloves
- › Plasticizer chemicals may contribute to multiple health problems, including diabetes, obesity, cardiovascular disease, certain cancers, birth defects, premature birth, neurodevelopmental disorders and infertility

There's a good chance you're eating plastic with virtually every meal, according to sobering findings from Consumer Reports. Their latest investigation into plasticizers, which are chemicals widely used to make plastic flexible, found the compounds in 84 out of 85 food and beverages tested.¹

Perhaps most disconcerting, there was no rhyme or reason to the amount of plastic chemicals hiding in foods. Dairy products, ready-to-eat meals, canned or paper wrapped

and even organics — all were contaminated with plastic. Further, while food packaging is part of the problem, it's far from the only one. The human health implications of eating all this plastic are unprecedented.

84 of 85 Foods Contaminated With Plastic Chemicals

Consumer reports tested 85 foods, using two or three samples of each, for bisphenols and phthalates, well-known endocrine-disrupting chemicals. Bisphenol A (BPA) was found in 79% of the samples, which included fruits, vegetables, milk, meat, seafood, baby food and more. All of the foods were packaged, but the materials of the packaging varied from cans and pouches to plastic and paperboard.

Levels of BPA were "notably lower" than levels detected in foods in 2009, "suggesting that we are at least moving in the right direction on bisphenols," James E. Rogers, Ph.D., who oversees product safety testing at Consumer Reports, said in a news release.² This wasn't the case for phthalates, however, which were detected in every product tested except for Polar raspberry lime seltzer.

The product with the most phthalates was Annie's Organic Cheesy Ravioli, with 53,579 nanograms per serving. Del Monte sliced peaches and Chicken of the Sea pink salmon had the next highest levels.³ General Mills Cheerios, Wendy's crispy chicken nuggets and Fairlife Core Power High Protein Milk Shake were among the other tested foods with notable levels of phthalates.

While none of the products tested contained BPA or phthalates at levels that exceeded thresholds set in the U.S. and Europe, this isn't an indication of safety. "[M]any of these thresholds do not reflect the most current scientific knowledge, and may not protect against all the potential health effects," Tunde Akinleye, a Consumer Reports scientist who oversaw the tests, said. "We don't feel comfortable saying these levels are OK. They're not."⁴

There's growing concern that regulators haven't taken the necessary steps to keep these toxins out of the food supply. According to Consumer Reports:⁵

"For example, the federal government has banned eight phthalates in children's toys. But, with the exception of a 2012 ban on BPA in baby bottles (extended in 2013 to infant formula cans), there are no substantive limits on plastic-related chemicals in food packaging or production.

Although the Food and Drug Administration no longer allows certain phthalates in materials that come into contact with food, the agency updated its regulations only after those chemicals were no longer in use. And just last year, it rejected an appeal from several groups calling for a ban on multiple phthalates used in materials that come into contact with food."

How Are Plastic Chemicals Getting in Your Food?

Food packaging has received considerable attention for its role in contaminating the food supply. Indeed, bisphenols are common in the lining of metal cans, while plasticizers are widely used in plastic wraps, jar gaskets and other packaging. However, part of what makes the plastic problem so pervasive is that exposure occurs at each step of the food manufacturing process – starting on the farm.

Black plastic, sometimes referred to as plastic mulch, is a primary method of weed control for many organic farmers, particularly for tomato, pepper and melon plants. Many grass and perennial weeds are unable to penetrate the plastic, which also prevents sunlight from hitting the ground and stimulating the growth of weeds. But plastic mulch may be plowed back into the fields⁶ or is added to landfills as more plastic trash.

Plastic debris can contaminate water and soil near landfills, while burning plastic waste cause the chemicals to be released into the air. Microplastics from plastic trash end up in the environment, and plants can uptake plasticizers from the soil, as can animals, which consume plastics in their own food and water. During processing, foods are exposed to another round of plastics, Consumer Reports notes, including via:⁷

- Pasteurization, during which high temperatures may speed up leaching
- Vinyl gloves, which may contain more than one-third plasticizers

- Plastic tubing, used for milk and oils
- Conveyor belts, which are often plasticized

Plastics Are Widespread in Human Blood

It's estimated that 11 million tons of plastic waste enter the world's oceans annually — an amount that could nearly triple by 2040, to 29 million metric tonnes per year.⁸ What's the end result of a plastic world, complete with plastic food? Your blood may now be polluted with plastic. Researchers in the Netherlands analyzed 22 blood samples, finding plastic particles in 17 — a rate of 77%.

They used the term "plastic particles" to describe particles ≥ 700 nanometers in dimension, a size that can be absorbed across membranes.⁹ The mean concentration of plastic particles in the blood was 1.6 $\mu\text{g}/\text{ml}$, "showing a first measurement of the mass concentration of the polymeric component of plastic in human blood."¹⁰

Some of the blood samples contained up to three different types of plastic; steel syringe needles and glass tubes were used so no plastic would be introduced to the samples.¹¹ Accurate measurements of plastics in human blood will be important for conducting a human health risk assessment, or HRA, for plastic particle pollution, in order to determine the health consequences of plastics accumulating in the human body.

Previous studies have detected micro-sized plastic particles in human feces, providing evidence that such particles travel through the gastrointestinal tract. Plastic particles have also been found in colectomy specimens from humans as well as in human placental tissue.¹² Out of the 17 samples in which plastic particles were detected:¹³

- Half contained polyethylene terephthalate (PET) plastic, which is used to make plastic water and soda bottles
- One-third contained polystyrene, widely used in food packaging
- One-quarter contained polyethylene, which is used to make plastic bags

Disturbingly, researchers have even found **PET in meconium samples**, which is a baby's first stool.^{14,15} The study evaluated concentrations of PET and polycarbonate (PC) microplastics in 10 adult, three meconium and six infant feces samples collected in New York state. The PET concentration in infant stool was 10 times higher than what was found in adult samples.

The PC levels appeared to be similar between the two groups. Yet, even meconium samples contained both PET and PC, which suggested that babies have plastic in their system that is absorbed from their mother.

Infants and children are particularly vulnerable to endocrine-disrupting chemicals as their bodies are still developing. Kurunthachalam Kannan, Ph.D., an environmental health scientist at New York University School of Medicine and researcher of the pilot study, commented:¹⁶

"Unfortunately, with the modern lifestyle, babies are exposed to so many different things for which we don't know what kind of effect they can have later in their life. I strongly believe that these chemicals do affect early life stages. That's a vulnerable period."

There's Also Plastic in Human Hearts and Brains

The human bloodstream isn't the only vulnerable place where plastics are showing up. Scientists have also revealed that the contaminants are showing up in "completely enclosed human organs."¹⁷

Using a laser direct infrared chemical imaging system and scanning electron microscopy, researchers with Capital Medical University in Beijing, China, examined heart tissues from people undergoing heart surgery. Microplastics were detected in 15 patients, including in the following tissues:¹⁸

- Six pericardia, the membrane enclosing the heart
- Six epicardial adipose tissues, or fat in the heart

- 11 pericardial adipose tissues, or outer fat accumulation in the heart
- Three myocardia, or muscular heart tissue
- Five left atrial appendages, which are small pouches in the heart's left chamber

In seven additional cases, microplastics were found in pre- and postoperative blood samples.¹⁹ Most tissue samples contained tens to thousands of microplastic pieces,²⁰ which the team concluded "cannot be attributed to accidental exposure during surgery, providing direct evidence of microplastics in patients undergoing cardiac surgery."²¹

Meanwhile, animal studies show nanoplastics can end up in the brain after being inhaled, where they trigger neuron toxicity and alter behavior.²² In another example, plastic particles reached mice brains just two hours after the mice had ingested drinking water containing plastic.^{23,24} It's possible the plastic particles could contribute to inflammation, neurological disorders or neurodegenerative diseases like Alzheimer's and Parkinson's, according to the researchers.²⁵

What Are the Health Risks of Plasticizers?

An estimated 8.4 million metric tons of plasticizers, including phthalates, are used worldwide each year,²⁶ with phthalate production amounting to about 4.9 million metric tons annually.²⁷ Exposure is so widespread that a study by University of Newcastle, Australia, researchers revealed that the average person could be eating about 5 grams of plastic per week – about the amount found in one credit card.²⁸

While the ramifications are unknown, endocrine-disrupting chemicals may contribute to multiple health problems, including diabetes, obesity, cardiovascular disease, certain cancers, birth defects, premature birth, neurodevelopmental disorders and infertility.²⁹ Phthalate syndrome, which refers to a number of disturbances to male reproductive development that have been observed after exposure to phthalates in utero,³⁰ is another risk.

Even at low levels – those well below "safety" limits set by U.S. and European regulators – the phthalate DEHP has been linked to insulin resistance, high blood pressure, early

menopause and reproductive issues.³¹ And according to Consumer Reports, DEHP was the most common phthalate found in their investigation.³²

One silver lining is that phthalates leave your body quickly, in a matter of four to six hours, after exposure.³³ They're non-persistent chemicals — unlike other toxins like dioxin, PCBs or lead. Unfortunately, they're so widespread that your body faces a constant barrage of exposure, making permanent elimination difficult.

What's the Best Way to Limit Your Exposure to Plasticizers?

You can help reduce your exposure by becoming conscious of the plastic you're using daily — and cut back where you can. Some steps are easy, like swapping plastic bags, bottles, straws, utensils and food containers for more durable, reusable options. You'll also want to choose fresh foods as much as possible. Avoid fast foods and ultraprocessed foods, and choose those with minimal natural packaging or glass packaging instead.

You should also filter your drinking water and be mindful of the materials you use in your home. Avoid flooring, shower curtains and furniture made with phthalates, and vacuum often to pick up household dust, which is often contaminated. Personal care products are another route of exposure, so choose fragrance-free cosmetics, as well as natural cleaners to eliminate exposure to plasticizers whenever possible.

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