Seriously stop microwaving your food in plastic

plastic

'We're exposed to a chemical soup.'

By Lauren Leffer

Posted on Sep 22, 2024 8:01 AM EDT

https://www.popsci.com/science/plastic-food-packaging-safety/?utm_term=pscene092424&utm_campaign=PopSci_Actives_Newsletter&utm_source=Sailthru&utm_medium=email

Inside your refrigerator and pantry, plastic is everywhere. There's plastic wrap, storage bags and bins, clamshell takeout containers, beverage bottles, and condiment tubs, of course. Plastics (synthetic polymers) are also a component of the multi-layer material that make up chip bags and encase granola bars. Tin, steel, and aluminum cans, like the type that might hold beans or a soda, are lined with plastic. Even many paper products, such as paper cups and frozen food trays, are coated in–you guessed it–plastic.

So how worried should you be about the plastic cradling your next meal? Is it safe?

The answer depends on multiple factors, experts tell *Popular Science*–but plastic panic isn't something to dismiss and there are ways to reduce your exposure risk.

The unsettling science of plastic exposure

For decades, scientists have known that certain compounds present in some plastics can leach out of packaging into food, and end up ingested and absorbed. Bisphenol A (BPA), for instance, has been known to migrate from wrapper or liner to food and accumulate in living organisms, including people, since the 1990s. And some studies have demonstrated potential health impacts from ingestion of BPA, which can mimic the hormone estrogen. Though the consequences of low-level BPA exposure are debated, recent research has identified cognitive and behavioral effects associated with the levels found in food, particularly in infants and children, says Joe Braun, a professor of epidemiology at Brown University's School of Public Health.

In response to the research findings, BPA has been phased out of some applications. It's no longer used in baby bottles, in accordance with FDA regulations, for instance. However, it still shows up in lots of other food packaging, like many can liners, and emerging studies indicate that replacement compounds may be just as problematic. Such patterns have repeated multiple times throughout environmental health and epidemiology history, notes Braun. Often, chemicals such as pesticides or flame retardants that are known to be harmful will be swapped out for alternatives once they've gotten enough negative attention. But these replacements are usually not well-studied and can turn out to be similarly damaging. "With the current regulatory framework, there's not a lot of testing that goes on of those [new] substances to know whether they're harmful," Braun says.

Beyond BPA, other chemicals like phthalates (and their alternatives)–used as softeners and plasticizers to make hard plastics more flexible–are well-known to cause health problems ranging

from preterm birth to increased asthma risk and neurodevelopmental disorders, and can leach into food from packaging. PFAS (aka forever chemicals) are associated with increased cancer risk, and are also present in plastics as a byproduct of manufacturing. These, too, end up in plastic-stored food and beverages.

Dose is a critical aspect of assessing chemical exposure risk. Very small amounts of some compounds may be harmless, while larger volumes can trigger disease. But it's often difficult to determine exactly how much of any given compound is coming from food and packaging versus another source, or if the amount regularly ingested is enough to trigger problems. Nonetheless, a January study published in the *Journal of the Endocrine Society,* scientists estimate that the disease burden of exposure to harmful chemicals in plastic adds up to hundreds of billions of dollars in medical costs for Americans over the course of a single year.

More worrying: The handful of well-understood chemicals is dwarfed in number by the amount of compounds present in plastic food packaging that we know far less about, yet are still inadvertently ingesting. One large review study published earlier this week in the *Journal of Exposure Science & Environmental Epidemiology* determined that more than 3,500 chemicals found in food packaging and processing materials have made their way into human bodies. The bulk of these compounds were from food contact with plastics, but other materials like recycled paper and cardboard also contain lots of chemicals known to migrate into food, says Jane Muncke, senior study author and an environmental toxicologist and managing director of the non-profit Food Packaging Forum.

Though this new study doesn't establish if or how each of these thousands of chemicals is affecting us, it does demonstrate that we're being exposed to a whole lot in our day-to-day diets. And that there are massive holes in our knowledge of what that means. For example, oligomers, which are short-chain polymers that are an accidental byproduct of plastic manufacturing, are common in food packaging and processing materials, and are known to leach into foods. "We don't know anything, really, about their toxicity," Muncke says. "It's concerning. That's one of the data gaps I think needs to be studied more."

Still, even thorough studies of isolated compounds often don't provide enough information, say both Munke and Braun, because reality is far more complex. We don't just take in one chemical at a time. Through food packaging and our wider environments, "we're exposed to a chemical soup of these things," Braun says. "We know less about the impact of all of these chemicals together on health than we do about each component." So far, the few studies that do exist of multiple chemical exposure interactions suggest that compounds can exacerbate one another and that the harms add up, Braun notes.

What can you do?

It's alarming to consider all of the places plastic infiltrates our food supply and the ways it could be affecting us. Yet eliminating all plastic from your pantry could easily become a full-time job. Instead of worrying and working yourself into a tizzy, there are ways to take realistic actions to minimize your risk of chemical exposure at home.

Heat, surface area, duration of contact, and basic chemistry are all useful factors to consider when making a choice about how to store food.

First of all, DO NOT MICROWAVE FOODS IN PLASTIC. “Higher temperatures facilitate the leaching of chemicals and the release of microplastics,” says Martin Wagner, a biologist studying plastic exposure at the Norwegian University of Science and Technology. “Never microwave in plastic,” agrees Philip Landrigan, an epidemiologist and public health physician at Boston College. Avoid storing hot foods, like fresh-off-the-stove soups, in plastic containers as well, says Braun.

Then, consider the relative amount of food to plastic contact. Liquids, powders, and grains all have lots of surface area to absorb chemicals, notes Muncke. Single-serving containers result in a higher plastic to food ratio, so it is wise to opt for the bulk option where possible. And food stored in plastic for months at a time is more of a concern than something sitting in plastic overnight or for a couple of days in the fridge. Non-perishables and pantry staples, like flour, rice, and cooking liquids are better kept over the long term in glass, stainless steel, or ceramic vessels, she says.

Finally, high fat and high acid foods can pull more chemicals out of a storage container. Oils, vinegars, cheeses, tomato sauce, and sodas are more reactive and “can be a driver for migration,” Muncke tells *Popular Science*. Consider purchasing versions of these items that don’t come in plastic or plastic-lined cans.
As a bonus, most of these changes have dual benefits: reducing the negative health risks of chemical exposure and cutting the amount of single-use plastic that ends up land-filled, says Braun.

However, compromise is inevitable and plastics do have uses. For instance, plastic wraps, though they may carry some health risks, are usually one of the most effective means of short term storage to prevent food spoilage. Reducing food waste and costs are reasonable goals, and it may be tough to find alternate storage methods that work as well and are equally flexible, notes Braun. Though again, glass, ceramic, and stainless steel vessels are all reusable and chemically inert– so if you can fit your food in there, go for it. But be wary–not all reusable kitchen products live up to their sustainability claims.

Ultimately, you don’t need to be perfect to make beneficial changes, stresses Muncke. “I think the most important thing is don’t drive yourself crazy,” she says. There are aspects of our individual chemical exposure risk we can control, but lots that we can’t. “There’s only so much you can do as a consumer.”

In the long term, a more complete solution to the risks posed by plastic packaging will have to come through policy. Currently, food packaging is regulated from an “innocent until proven guilty” perspective, says Braun. Companies put chemicals out in packaging and then we learn if they’re harmful after the fact, in stark contrast to the rigorous safety testing that something like pharmaceuticals must undergo before they’re approved for use, he adds. “I think the whole paradigm has to be shifted.”

This story is part of Popular Science’s Ask Us Anything series, where we answer your most outlandish, mind-burning questions, from the ordinary to the off-the-wall. Have something you’ve always wanted to know? Ask us.