The Macro Problem of Microplastics

Emerging science on microplastics in the body is sparking everyday strategies to reduce exposure and protect long-term health

By **Melanie Mannarino**

For years, microplastics were considered an environmental problem—tiny plastic particles less than five millimeters in size that pollute oceans, choke marine life, and wash up on distant shores. Now, scientists have realized they're found uncomfortably closer to home: inside the human body.

In the past few years, researchers have detected microplastics in human blood, lungs, placentas, breast milk, semen, and even brain tissue. (If you just choked on a swig of water from your stainless bottle, we get it.) In 2022, researchers confirmed microplastics in human blood for the first time, and subsequent studies have found them in nearly every organ system examined.

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Optimistically, one might ask: Well, does it matter? Realistically, the answer is likely yes. In 2025 a brain study published in *Nature Medicine* reported dramatically higher concentrations of plastic particles in the brains of people who died with Alzheimer's disease compared with those without the condition.

"Other research has highlighted that microplastics seem to gather more in the brain than in other organs of the body," says Gerry Bodeker, PhD, a public health researcher focused on environmental toxicants and co-chair of the Microplastics Watch Initiative. "That's deeply concerning when you consider how sensitive brain tissue is to inflammation and toxic exposure."

While scientists are still working to understand what these particles mean for long-term human health, one thing is already clear: Plastic pollution is no longer just an external environmental crisis. It has become a biological one.

How Microplastics Enter the Body

Microplastics are tiny plastic particles roughly the size of a sesame seed—but as small as a grain of sand or even a speck of powdered sugar. Some are intentionally manufactured (such as microbeads used in exfoliating scrubs until 2018), while others form when larger plastics break down due to sunlight, friction, heat, and time. They enter the human body through three main routes:

- Ingestion: via drinking water, seafood, salt, produce, food packaging, and food prepared with plastic utensils or containers
- Inhalation: through household dust, airborne fibers from clothing, carpets, and furniture
- Skin exposure: from personal care products and textiles, especially those containing synthetic polymers

"Microplastics are now ubiquitous," says Alexander Tompkins, founder and CEO of

Remedion, a clean-water and sustainable aquaculture startup. "We're not just eating pollution—we're breathing it and absorbing it through our daily habits."

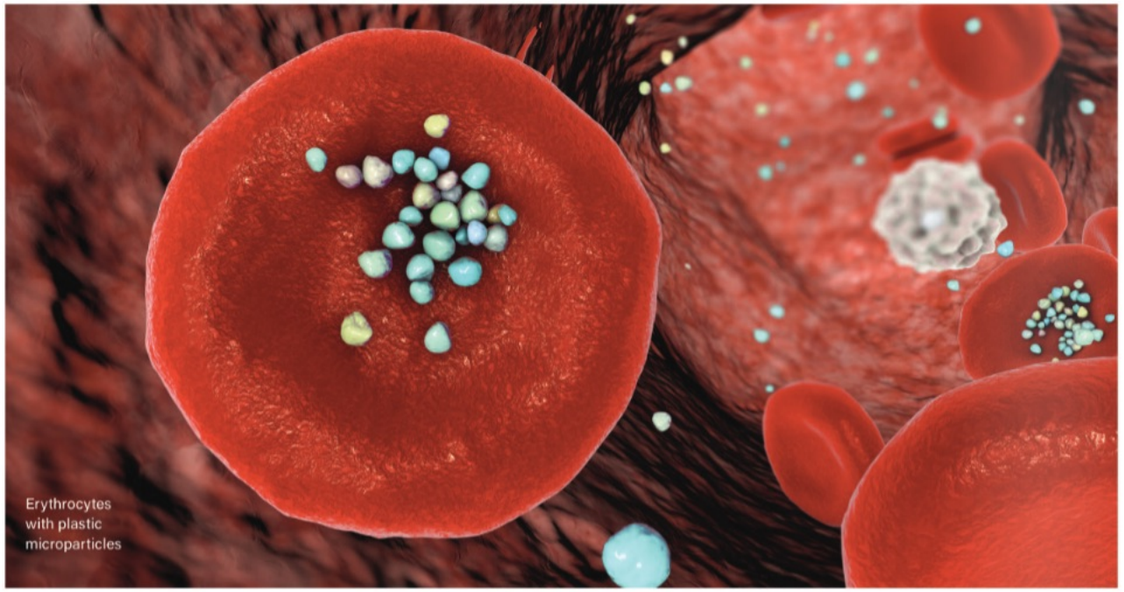
Research suggests bottled water may contain significantly higher levels of microplastics than filtered tap water, largely due to shedding from plastic bottles and caps. Synthetic fabrics like polyester and nylon release microscopic fibers during washing and everyday wear, which accumulate in indoor dust and wastewater. Even tea bags made with plastic—particularly mesh or heat-sealed paper varieties—can release billions of plastic particles into a single cup of tea.

Assessing the Health Risks

Once in the body, microplastics can circulate through the bloodstream and lodge in tissues. The research on microplastics' impact on human health is still emerging, but early findings are concerning. Microplastics are not inert; they can carry PFAS ("forever chemicals"), heavy metals, and other endocrine-disrupting compounds on their surfaces.

"Research has shown that microplastics are found in both male and female reproductive systems," Bodeker says. "Some of the chemicals used in plastics, such as PFAS, are associated with impaired brain development in children when mothers have elevated exposure during pregnancy. This intergenerational transfer represents a threat to human health and potential across generations."

Beyond reproductive and neurological concerns, studies have linked microplastic exposure to inflammation, oxidative stress, immune disruption, and cardiovascular risk markers. In animal models, microplastics have been shown to cross the blood-brain barrier and trigger neuroinflammation.



Erythrocytes with plastic microparticles

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—Gerry Bodeker, PhD, a public health researcher

Still, there are major gaps in the science. We don't yet know what levels of microplastic exposure are "safe" (if any), how long particles persist in human tissues, whether certain sizes or polymer types are more harmful than others, and what long-term disease risks may emerge over time.

Can You Flush Microplastics from Your Body?

Now that we know microplastics are in our bodies, scientists are eagerly exploring how to remove them, especially once they've embedded themselves in tissue. Some early-stage research is exploring how particles move through the body and whether natural detoxification systems can clear them.

There is emerging interest in sweating as a potential route of excretion of plastic chemicals such as BPA from the body, Bodeker says, citing exercise and sauna use as possible avenues worth studying. He also points to sleep as a foundational detox mechanism. "The brain has a waste clearance system—the glymphatic system—that is primarily active during deep sleep," he says. "Enhancing sleep quality may prove important for understanding how the brain clears toxic particles."

In the meantime, the wellness sector has introduced treatments aimed at microplastic reduction. High-profile blood filtration treatments, reportedly used by celebrities including Orlando Bloom, claim to remove microplastics and PFAS from circulation. While intriguing, it does make one wonder if the effects last only as long as it takes to leave the wellness spa and take a deep breath of outside air or grab a coffee at the corner cafe.

Another caveat? Removing microplastics from the blood doesn't fully remove microplastics from the body, Bodeker says. "Getting microplastics out of the blood is only the first stage of microplastic contamination of the human body," he says. "They can migrate into tissues and cells—including brain cells and heart muscle tissue—and at that point, we don't yet know how to remove them."

Bodeker is optimistic about study results that indicate that the traditional Ayurvedic purification program, Panchakarma, may be effective in reducing fat-soluble toxic chemicals like PCBs and beta-HCH in the body. Panchakarma includes warm oil massages, herbal steam baths, elimination therapies, and herbal preparations during and after treatments paired with light, nourishing foods, rest, and suitable exercise. "While microplastics themselves are not soluble in fat or water, the chemicals they contain and the toxins they attract are often highly fat-soluble," Bodeker explains, "making Panchakarma a strong candidate for research designed to measure microplastic removal from the body."

The Shift Away from Microplastics

On a policy level, momentum is building—slowly. The European Union passed Regulation 2023/2055, which will require labeling of certain products containing microplastics and phase out many intentionally added microplastics over time. By 2031, some cosmetics will be required to carry a "Contains Microplastics" label.

Many countries, including the U.S., Canada, China, and South Korea, have already banned microbeads in rinse-off cosmetics. Additionally, in the past decade or so major brands such as Unilever and Beiersdorf have publicly pledged to phase out microplastics in formulations.

Globally, third-party certifications, such as Europe's FLUSTIX plastic-free seal, are beginning to appear on cosmetics, personal care, and household products. But as Tompkins points out, greenwashing remains a major issue. "You'll see 'eco' claims on products that

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are still coated in PFAS or made from recycled plastics that leach chemicals," he says. "We're solving one problem and quietly creating another."

Meanwhile, innovators like Tompkins are working upstream. Remedion is developing microplastic-free bottled water and controlled-environment aquaculture systems designed to reduce contamination in seafood, with an eye toward similar systems for rice, grains, and berries. "Our goal is a pollutant-free food pyramid," he says. "If microplastics are in the rain and PFAS is in the groundwater, then 'organic' alone doesn't solve the problem anymore. We need controlled environments that prevent pollution from entering the food chain in the first place."

Actionable Ways to Reduce Microplastic Exposure

There are many ways to minimize your microplastic exposure—and you're likely doing some of them already. Choosing glass over plastic in any situation, prioritizing whole foods over packaged, filtering drinking water, and wearing natural fibers all meaningfully reduce daily intake. Here are other daily habits to try:

- Increase your sleep quality for better brain-waste clearing
- Replace plastic cutting boards and utensils with wood or stainless steel
- Choose loose-leaf tea instead of plastic-sealed tea bags
- Wear and wash natural fibers (cotton, linen, wool) more often than synthetics
- Use HEPA-filter vacuums and damp dusting to reduce airborne fibers
- Swap plastic toothbrushes for bamboo and plastic-handled razors for stainless steel safety razors
- Install microfiber filters on washing machines
- Clean the dryer lint trap after each cycle

"If you can't do everything at once, focus first on heat and friction," Bodeker advises. "Anything exposed to high heat or repeated abrasion sheds the most plastic into your body."

Microplastics represent a planetary-scale problem—but not a hopeless one. Regulation is advancing, materials science is improving, and consumer awareness is growing.

"We were sold plastic as a miracle material," Tompkins reflects. "Oil by-products turned into convenience. Now we're waking up to the biological cost. The solution isn't panic—it's redesign." O