

Microplastics Could Cross Over From Mother to Fetus, Study Shows

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By [Suzanne Burdick, Ph.D.](#)

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The authors of a peer-reviewed [study](#) showing microplastics passed pregnant rats' intestinal and placental barriers, leading to impaired fetal development, concluded the same could be true for humans.

The study, published in [Nanomaterials](#), is the first to show that [microplastics](#) fed to pregnant mammals can reach fetal tissues.

Researchers fed five pregnant rats specially marked nanoscale microplastics. Through imaging, they determined the particles permeated the placentas. They detected particles in the livers, kidneys, hearts, lungs and brains of the fetuses.

The authors said what they observed in the rats could happen in humans — and given the anatomical difference between rats and humans, the placental barrier in humans “could be more permissive” and allow for “greater passage” of microplastics to the fetus.”

“Much remains unknown, but this is certainly [cause for concern](#) and follow-up study,” said [Philip Demokritou, Ph.D.](#), the study's corresponding author and professor of nanoscience and environmental bioengineering at [Rutgers University](#).

Commenting on the study, [Dr. James Thorp](#), a board-certified obstetrician and gynecologist, said it was a “no brainer” that microplastics would pass through the placenta into fetal issue.

“It is certainly not surprising that nano-sized pieces of plastic would cross from the maternal blood through the placenta into the fetal blood circulation,” Thorp told [The Defender](#).

“Many factors determine to what extent a molecule will pass through the ‘placental barrier’ including the size, concentration, and lipid versus water solubility ... I would expect a 20-nanometer plastic particle to easily cross the placenta,” added Thorp, who also is a board-certified maternal-fetal medicine specialist with more than 40 years experience.

Demokritou — who also directs the [National Institute of Environmental Health Sciences \(NIEHS\) Nanosafety Center](#) and the [Center for Nanotechnology and Nanotoxicology](#) at Harvard — said microscopic particles from the billions of tons of plastics in the world constantly “chip off” due to erosion from weathering and photooxidation, which occurs when the combination of light and oxygen degrade a [polymer surface](#).

A typical person ingests a credit card's worth of microplastics each week, he said.

Demokritou called the proliferation of microplastics in the environment a “human health concern” and said researchers have found the particles in [people's blood, lungs](#) and [placentas](#).

Prior studies of pregnant laboratory animals fed food containing nanoscale microplastics — a nanometer is one billionth of a meter, so the particles are far too small to be seen — revealed adverse effects in the fetus

and offspring. These included [metabolic disorders](#), [reproductive toxicity](#), [growth restriction](#) and multiple [brain abnormalities](#), accompanied by neurophysiological and cognitive deficits.

The authors said more studies are needed on how different types of plastics cross cell barriers and on which types of cells are collecting the microplastic clusters.

However, they said, their research suggested the microplastic particles might be clustering in [macrophages](#) — a type of white blood cell — in fetal organs.

“This would raise concerns about the impact on the health and function of those macrophages, which play critical roles in tissue remodeling and repair, angiogenesis, innate immunity and inflammation during development,” they said.

Researchers work to ‘inform policymakers and develop mitigation strategies’

“The use of plastics has exploded since the 1940s due to their low cost and versatile properties,” [Demokritou said](#). “From 9 billion metric tons produced over the last 60 years, 80 percent ended up in the environment, and only 10 percent were recycled.”

Indeed, approximately 7 billion of the 9.2 billion tons of plastic produced from 1950-2017 went into landfills or was “dumped,” the [UN Environment Programme said](#).

Meanwhile, the global plastic industry — valued in 2021 at \$593 billion — is expected to reach a value of [\\$811.57 billion by 2030](#).

In March 2022, numerous heads of state, environment ministers and other representatives from 175 nations endorsed a UN resolution to [end plastic pollution](#) by the end of 2024, [UN News reported](#).

The [top two global plastic polluters](#) — Coca-Cola and PepsiCo, according to a [2021 report](#) — have done little to reduce [plastic production](#).

[Coca-Cola said](#) in February 2022, it will aim for 25% of its packaging to be reusable by 2030.

[PepsiCo said](#) in Dec. 2022 that 20% of all beverage servings it sells will come via reusable models by 2030.

Meanwhile, microplastics continue to concern public health researchers like Demokritou as they work to assess the health risks from “such an emerging contaminant” and “inform policymakers and develop mitigation strategies,” Demokritou said.

“The goal is also to increase the reuse and recycling of plastics and even replace them with biodegradable, biopolymer-based plastics,” he added.

The study was funded by [NIEHS](#), the National Institutes of Health’s division for environmental health sciences.

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