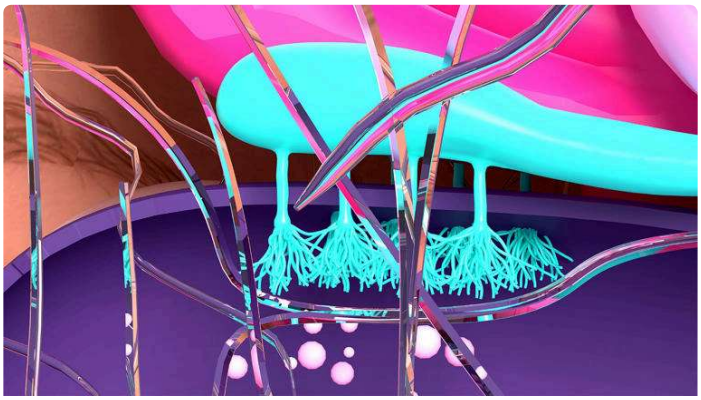
Microplastics Found in Human Olfactory Bulbs

Story by Judy George • 2w • 4 min read



Microplastics Found in Human Olfactory Bulbs

Microplastics were found in the olfactory bulbs of eight of 15 human brains at autopsy, a case series showed.

A total of 16 synthetic polymer particles and fibers were identified, reported Luís Fernando Amato-Lourenco, PhD, of Freie Universität Berlin in Germany, and co-authors.

Most microplastics (75%) were particles and 25% were fibers, the researchers wrote in *JAMA Network Open*. Most particles were fragments of commonly produced polymers for clothing and packaging, like polypropylene and nylon.

The findings suggest the olfactory pathway is a potential entry route for microplastics into the brain, Amato-Lourenco noted. "This is the

first study to detect and characterize microplastics in the human brain, specifically within the olfactory bulbs," he said.

"Until now, while microplastics had been found in various organs like the lungs, intestines, and bloodstream, no research had directly demonstrated their presence in human brain tissue," Amato-Lourenco told *MedPage Today*.

Microplastic pollution is a growing health concern, observed Philip Landrigan, MD, of Boston College, who wasn't involved with the study.

Recent research showed a higher risk of combined myocardial infarction, stroke, or death over nearly 3 years in people who had microplastics and nanoplastics in atherosclerotic plaque from surgically excised carotid plaque specimens, he pointed out.

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"Unfortunately, microplastics have become ubiquitous in the environment," Landrigan told *MedPage Today*. "They turn up everywhere scientists look for them. They've been detected in the Mariana Trench, 6 miles beneath the surface of the Pacific Ocean. They've been found in polar ice caps. They've been found in glaciers in the Alps and the Himalayas. In the ocean, they get into the food chain, and they get into us."

The olfactory bulb is one of the most ancient parts of the brain in evolutionary terms, Landrigan noted.

"In the human skull, it sits forward of the rest of the brain. It's a little bulb of tissue up inside the nose, separated from the nasal cavity by just a thin piece of bone," he said. "That piece of bone is porous, which is how we smell. Neuroscientists have speculated for years that the olfactory bone may be a point of entry of foreign substances into the human brain."

The blood-brain barrier likely stops most microplastics -- defined as plastic particles ranging from 5 mm to 1 nanometer (nm) by the

Environmental Protection Agency (EPA) -- from reaching the brain. Microplastics can degrade into smaller nanoplastics, which are smaller than 1 µm, or 1,000 nm. (For reference, a strand of human hair is about 80,000 nm wide, according to the EPA.)

No published studies have reported the presence of microplastics in the human brain. In a preprint paper not yet peer-reviewed, University of New Mexico researchers used a novel analytical chemistry method to identify microplastics or nanoplastics in autopsy samples and found that brains had higher concentrations than livers or kidneys. Many particles appeared to be in the nanoscale range.

In their case series, Amato-Lourenco and colleagues analyzed olfactory bulb tissues obtained from deceased individuals during routine coroner autopsies. Participants included 15 adult individuals who had been residents of São Paulo, Brazil, for more than 5 years. Exclusion criteria included previous neurosurgical interventions.

Age at death ranged from 33 to 100; the median was 69.5. Twelve of the deceased individuals were male. The researchers also collected samples from the olfactory bulbs of two stillbirth humans at 7 months gestation as negative controls for the study.

The presence of microplastics in the olfactory bulb was analyzed in two ways: through direct tissue examination and digested tissue filtration followed by infrared spectroscopy. Researchers used a plastic-free approach for all procedures: staff wore lab coats of 100% cotton and clean latex gloves. No plastic or textile bracelets, rings, and watches were allowed.

Polymeric materials were absent in procedural blank and negative control filters, indicating minimal contamination risk, the researchers said. One stillborn sample had no microplastics; the other had insufficient material for analysis.

"Our data support the idea that the olfactory pathway is an important entry site for environmental air pollutants," Amato-Lourenco and co-authors wrote.

And while that seems likely, "we cannot dismiss the possibility of multiple entry routes," they acknowledged. "Microplastics might have reached the olfactory bulb either through systemic circulation, crossing the blood-brain barrier, or via the respiratory pathway through the trigeminal nerve."

The case-series is an important addition to the emerging microplastic literature, Landrigan noted.

"I think there'll be a lot more information in the next few years about how microplastics are getting into the human body -- and what they're doing once they get in there," he said.

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Amato-Lourenco and co-authors reported no conflicts of interest.

Landrigan reported relationships with the Minderoo Foundation, Centre Scientifique de Monaco, and Ramazzini Institute.