Levels of microplastics in human brains may be rapidly rising, study suggests

Research looking at tissue from postmortems between 1997 and 2024 finds upward trend in contamination

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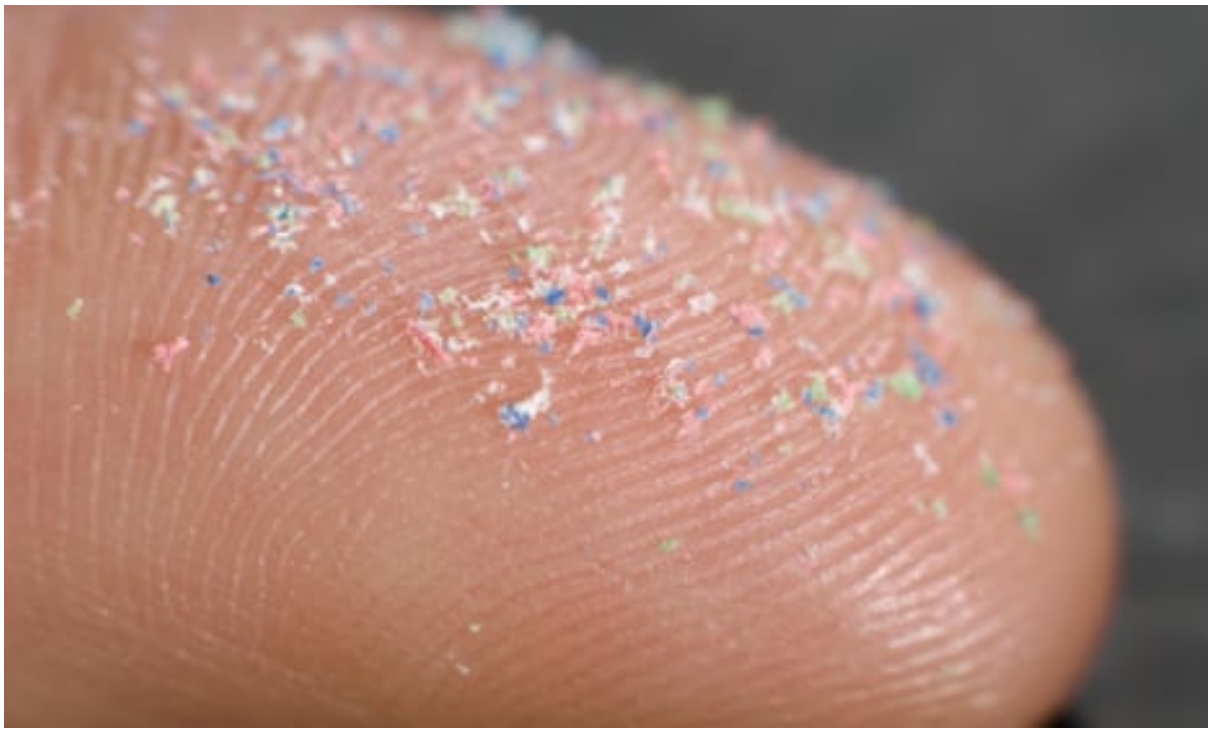


Microplastics were found in the brain, liver and kidneys. Photograph: Alamy

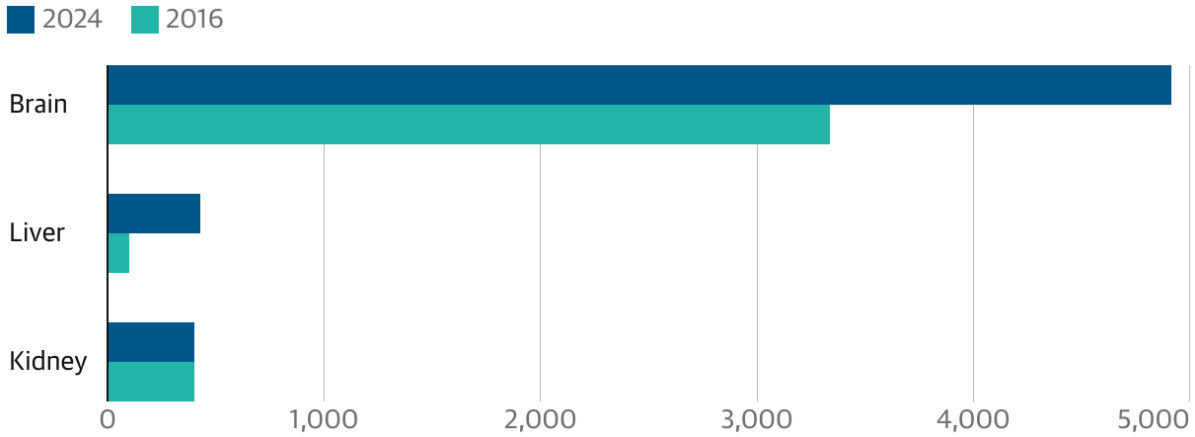
The exponential rise in microplastic pollution over the past 50 years may be reflected in increasing contamination in human brains, according to a new study.

It found a rising trend in micro- and nanoplastics in brain tissue from dozens of postmortems carried out between 1997 and 2024. The researchers also found the tiny particles in liver and kidney samples.

The human body is widely contaminated by microplastics. They have also been found in blood, semen, breast milk, placentas and bone marrow. The impact on human health is largely unknown, but they have been linked to strokes and heart attacks.

Microplastic levels in brain samples increased from 2016 to 2024

Micrograms of plastic per gram of tissue, median



(Please use a modern browser to see the interactive version of this visualization)

Guardian graphicSource: Nihart et al, Nature Medicine, 2025

The scientists also found that the concentration of microplastics was about six times higher in brain samples from people who had dementia. However, the damage dementia causes in the brain would be expected to increase concentrations, the researchers said, meaning no causal link should be assumed.

“Given the exponentially rising environmental presence of micro- and nanoplastics, this data compels a much larger effort to understand whether they have a role in neurological disorders or other human health effects,” said the researchers, who were led by Prof Matthew Campen at the University of New Mexico in the US.

Microplastics are broken down from plastic waste and have polluted the entire planet, from the summit of Mount Everest to the deepest oceans. People consume the tiny particles via food, water and by breathing them in.

A study published on Thursday found tiny plastic pollution to be significantly higher in placentas from premature births. Another recent analysis

found that microplastics can block blood vessels in the brains of mice, causing neurological damage, but noted that human capillaries are much larger.

The new research, published in the journal Nature Medicine, analysed samples of brain, liver and kidney tissues from 28 people who died in 2016 and 24 who died in 2024 in New Mexico. Microplastic concentration was much higher in the brain tissue. It was also higher in brain and liver samples from 2024, compared with those from 2016.

The scientists extended the analysis with brain tissue samples from people who had died between 1997 and 2013 on the US east coast. The data showed an increasing trend in microplastic contamination of brains from 1997 to 2024.

The most common plastic found was polyethylene, which is used in plastic bags and food and drink packaging. It made up 75% of the total plastic on average. The particles in the brain were mostly nanoscale shards and flakes of plastic. The plastic concentrations in the organs were not influenced by the age of the person at death, or the cause of death, their sex or their ethnicity.

The scientists noted that only one sample from each organ was analysed, meaning the variability within the organs remains unknown, and that some variation in the brain samples could be due to geographic differences between New Mexico and the US east coast.

“These results highlight a critical need to better understand the routes of exposure, uptake and clearance pathways and potential health consequences of plastics in human tissues, particularly in the brain,” said the researchers.

Prof Tamara Galloway at the University of Exeter in the UK, who was not part of the study team, said the 50% increase in levels of brain microplastics over the past eight years mirrored the increasing production and use of plastics and was significant. “It suggests that if we were to reduce environmental contamination with microplastics, the levels of human exposure would also decrease, offering a strong incentive to focus on innovations that reduce exposure,” Galloway said.

Prof Oliver Jones, at RMIT University in Australia, said the new research was interesting, but the low number of samples and the difficulty of analysing tiny plastic particles without contamination meant care should be taken when interpreting the results.