Microplastics in humans: After blood, scientists find traces in the lungs

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Scientists have found microplastics in many tissues in the body, including the lungs. Arne Dedert/picture alliance via Getty Images

- **A study in lung tissue obtained from participants after surgery found microplastics in all lung regions, including in the deeper sections.**
- **Researchers found 39 microplastics in 11 of the 13 lung tissue samples and 12 different types of microplastics.**
- **Additional research is needed to determine the human health effects of microplastics.**

Plastics are a common component in many items we use in everyday life. The United States alone generated approximately 36 million tons of plastic in 2018 but only recycled about 9%.

Additionally, plastics take a long time to degrade in landfills—anywhere from 100 to 1000 years—raising environmental and health concerns. Plastics can deteriorate into minute particles between 1 micrometer and 5 millimeters, called microplastics.

They are present in the air we breathe, the water we drink, the items we touch, and the food we eat. Microplastics are everywhere, making human exposure inevitable. A new study, published in the *Science of the Total Environment*, adds to the latest evidence.

Microplastics in human tissues

Plastic particles smaller than 20 micrometers, which are too small to be seen by the naked eye, can cross the cell membrane and accumulate in tissues. Previous research detected microplastics in the human colon, feces, placental tissue, human blood, and most recently, the lungs.

Dr. Fransien van Dijk, a researcher at the University of Groningen, explains in a 2019 Plastic Health Summit presentation, "Clothing textiles release micro and nanofibers to the environment. [...] [In] the house where you live, approximately 20 kilograms of dust accumulates [per year], [of which] six kilograms [are] microplastic fibers, and because you spend most of the time indoors, this means that the exposure is pretty high."

Microplastic exposure has been shown to cause inflammation, cell death, and DNA damage in laboratory animals and cell cultures. There is concern that toxicity to human cells from inhaled microplastic fibers may depend on the type of plastic, level of exposure, particle shape, size, absorbed pollutants, and leaching of additives present in plastics.

A study conducted by researchers from the University of Hull and Hull York Medical School assessed the presence of microplastics in human lung tissue obtained following lung reduction surgery or lung cancer surgery.

Lung reduction surgery removes damaged tissue in people with chronic obstructive pulmonary disease (COPD) to improve lung function. Researchers used an analysis method called µFTIR spectroscopy to differentiate microplastics from non-microplastics.

µFTIR spectroscopy detected particles down to 3 micrometers in size.

Researchers used tissue samples taken from different lung areas after surgical procedures of 11 study participants at Castle Hill Hospital and Hull University Teaching Hospitals. 2 participants contributed 2 tissue samples from distinct lung areas.

45% of the study participants were female, with an average age of 63 years. Since microplastics are ubiquitous, the researchers used strict control measures to avoid and adjust for contamination.

Deep penetration into lungs

Researchers discovered microplastics in all the regions of the lung. They identified 39 microplastics in 11 of the 13 lung tissue samples, with an average of 3 microplastics per sample.

There were 12 types of microplastic found in samples.

The 4 microplastics present in the most considerable quantities included:

- polypropylene (PP): found in carpets, clothing, automotive plastics
- polyethylene terephthalate (PET): present in clothing, beverage, and food containers
- resin: a constituent of protective coating and paints
- polyethylene (PE): a component of food wrappers, milk containers, toys, and detergent bottles

Uncertain health implications

Dr. Osita Onugha, thoracic surgeon and assistant professor of thoracic surgery at Saint John's Cancer Institute at Providence Saint John's Health Center in Santa Monica, CA, commented about the study to *MNT*, "Now we know that plastics can get broken up [into] tiny, different particles, [...] it's not surprising that we now find those plastics—in some way—trapped in the lungs because the lung is essentially a filter for the body."

Dr. Laura Sadofsky, author and senior lecturer in respiratory medicine at Hull York Medical School, says the findings were surprising considering the structure of the lungs.

> "We did not expect to find the highest number of particles in the lower regions of the lungs, or particles of the sizes we found. This is surprising as the airways are smaller in the lower parts of the lungs, and we would have expected particles of these sizes to be filtered out or trapped before getting this deep into the lungs."
> — Dr. Laura Sadofsky

“The real question is what does something within the body [...] do? The body does not like things that cause inflammation[...] and things that are foreign [like plastics]. So, if it leads to chronic inflammation, that’s where you can have things that develop years down the road,” he continued.

The long-term human health effects of microplastics in the lungs are not currently understood.

Dr. Onugha said a follow-up study should address if microplastics within the lungs can lead to inflammatory lung disease or cancer. He added that it should be carried out in a significant population to determine “a cause and effect.”

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