

Study reveals link between air pollution and incidence of Parkinson's disease

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A new study led by researchers at Barrow Neurological Institute has found that people living in regions with median levels of air pollution have a 56% greater risk of developing Parkinson's disease compared to those living in regions with the lowest level of air pollution.

The study, published in *Neurology*, was conducted to identify national, geographic patterns of Parkinson's disease and test for nationwide and region-specific associations with [fine particulate matter](#).

"Previous studies have shown fine particulate matter to cause inflammation in the brain, a known mechanism by which Parkinson's disease could develop," says Brittany Krzyzanowski, Ph.D., a researcher at Barrow Neurological Institute, who led the study.

"Using state-of-the-art geospatial analytical techniques, we were, for the first time, able to confirm a strong nationwide association between incident Parkinson's disease and fine particulate matter in the U.S."

The study also found that the relationship between air pollution and Parkinson's disease is not the same in every part of the country, and varies in strength by region. The Mississippi-Ohio River Valley was identified as a Parkinson's disease hotspot, along with central North Dakota, parts of Texas, Kansas, eastern Michigan, and the tip of Florida. People living in the western half of the U.S. are at a [reduced risk](#) of developing Parkinson's disease compared with the rest of the nation.

"Regional differences in Parkinson's disease might reflect [regional differences](#) in the composition of the particulate matter. Some areas may have particulate matter containing more toxic components compared to other areas," says Krzyzanowski.

Although the authors have not yet explored the different sources of air pollution, Krzyzanowski notes there is relatively high road network density in the Mississippi-Ohio River Valley and the rust belt makes up part of this region as well.

"This means that the pollution in these areas may contain more combustion particles from traffic and [heavy metals](#) from manufacturing

which have been linked to [cell death](#) in the part of the brain involved in Parkinson's disease," says Krzyzanowski.

The population-based geographic study identified nearly 90,000 people with Parkinson's disease from a Medicare dataset of nearly 22 million. Those identified with having Parkinson's disease were geocoded to the neighborhood of residence, enabling researchers to calculate the rates of Parkinson's disease within each region. The average annual concentrations of fine particulate matter in these specific regions were also calculated.

After adjusting for other [risk factors](#), including age, sex, race, smoking history and utilization of medical care, Barrow researchers were then able to identify an association between a person's previous exposure to fine [particulate matter](#) and their later risk of developing Parkinson's disease.

"Population-based geographic studies like this have the potential to reveal important insight into the role of environmental toxins in the development and progression of Parkinson's, and these same methods can be applied to explore other neurological health outcomes as well," says Krzyzanowski.

Researchers hope the data from this novel study will help enforce stricter policies that will lower air pollution levels and decrease the risk for Parkinson's disease and other associated illnesses.

"Despite years of research trying to identify the environmental risk factors of Parkinson's disease, most efforts have focused on exposure to pesticides," says Krzyzanowski. "This study suggests that we should also be looking at air [pollution](#) as a contributor in the development of Parkinson's disease."

More information: Brittany Krzyzanowski et al, Fine Particulate Matter and Parkinson Disease Risk Among Medicare Beneficiaries, *Neurology* (2023). [DOI: 10.1212/WNL.0000000000207871](https://doi.org/10.1212/WNL.0000000000207871)

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