New study details inflammation in early stages of Parkinson's disease

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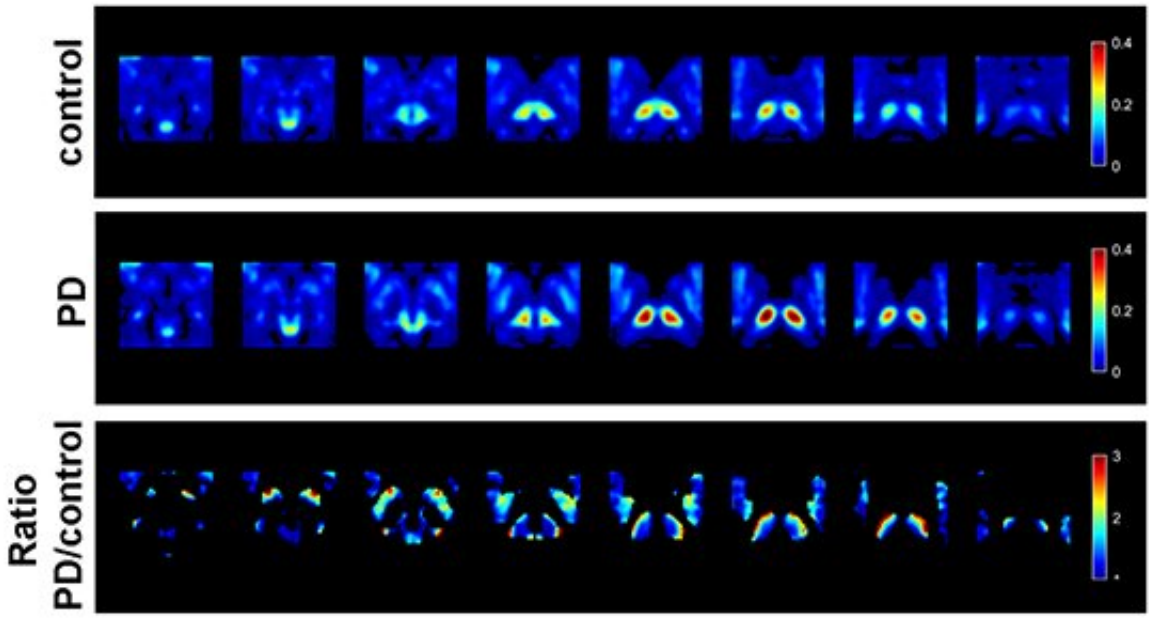

TSPO lights up in images of subjects with Parkinson's disease (middle row), showing increased inflammation in the brain compared to controls. Credit: University of Alabama at Birmingham

New research by investigators at the University of Alabama at Birmingham supports the premise that inflammation is associated with Parkinson's disease early in the disease's progression. The findings, published online in *Movement Disorders*, support the conclusion that central inflammation is observed early in the disease process of Parkinson's, is independent of treatment for the disease, and correlates

with cognitive features and certain peripheral markers of inflammation.

"An association between inflammation and Parkinson's is well known, but a fundamental question remains unanswered," said Talene Yacoubian, M.D., Ph.D., professor in the Department of Neurology in the Marnix E. Heersink School of Medicine. "Does inflammation play a role in the onset of Parkinson's, or is it a byproduct of the disease itself? Our findings show that inflammation is present in the early stages of the disease."

Yacoubian's team enrolled 58 people with newly diagnosed Parkinson's disease and 62 healthy controls.

"Enrolling study subjects early in their disease progression was significant," said Yacoubian, who holds the John A. and Ruth R. Jurenko Endowed Professorship at UAB. "We wanted to see if inflammation was present early on in the disease, before patients had even begun on Parkinson's medications."

The team used PET imaging to target translocator protein, or TSPO, a protein found primarily in microglial cells and other immune cells in the brain. Increased TSPO has been shown to be associated with inflammation. Yacoubian and colleagues were the first United States research team to employ a radioligand developed in Europe called 18F-DPA-714. Once injected into the bloodstream, this radioactive molecule binds to TSPO, causing it to light up on PET imaging.

"We found elevations in TSPO binding in untreated subjects at early stages of Parkinson's, indicating the presence of inflammation," Yacoubian said. "Our data clearly demonstrate that increased TSPO binding is present in Parkinson's independent of treatment effects. Our multimodal study provides further evidence that TSPO signal as measured by 18F-DPA-714 is a marker of inflammation."

Yacoubian says several key gaps still remain as to the role of inflammation in Parkinson's disease, including the potential effects of Parkinson's treatments on inflammation, whether inflammation changes over time and whether pro-inflammatory signals predict more rapid progression of the disease.

The study subjects were enrolled over three years, and each has been involved in the study long enough to have had at least a one-year follow-up, with some subjects now followed for as long as four years. The goal is to repeat the imaging at five years for study participants.

"Follow-up of these study subjects will be critical to determine the significance of early inflammatory changes and to observe whether certain inflammatory changes predict clinical progression," Yacoubian said. "We will continue to collect biospecimens annually to determine whether the inflammatory measures change over time in Parkinson's disease. Future studies will need to examine the potential causal relationship between inflammation and neurodegeneration."

More information: Talene A. Yacoubian et al, Brain and Systemic Inflammation in De Novo Parkinson's Disease, *Movement Disorders* (2023). DOI: 10.1002/mds.29363

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