

# Bile acids may play previously unknown role in Parkinson's

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Immunohistochemistry for alpha-synuclein showing positive staining (brown) of an intraneural Lewy-body in the Substantia nigra in Parkinson's disease. Credit: Wikipedia

What does bile acid production in the digestive tract have to do with

Parkinson's disease?

Quite a lot, according to a sweeping new analysis published in the journal *Metabolites*. The findings reveal that changes in the [gut microbiome](#)—the rich population of helpful microbes that call the [digestive tract](#) home—may in turn alter bile [acid](#) production by favoring synthesis of toxic forms of the acids.

These shifts were seen only in people with Parkinson's and not in healthy controls, a critical difference that suggests bile acids may be a viable biomarker for diagnosing Parkinson's early and tracking its progression. The insights also may provide new avenues for developing therapies that impede Parkinson's-related changes in the gut, thereby potentially slowing or stopping [disease](#) onset and progression.

The research was led by the late Viviane Labrie, Ph.D., of Van Andel Institute, in collaboration with colleagues at VAI, Beaumont Health, Michigan State University College of Human Medicine and Oregon Health & Science University.

"It's becoming increasingly clear that gut health is tightly linked to brain health," said Peipei Li, Ph.D., the study's first author and former postdoctoral fellow in the Labrie Lab. "Our findings provide exciting new opportunities for better understanding this relationship and possibly for developing new ways to diagnose—and even treat—Parkinson's."

To investigate differences in the microbiome, the team turned to the appendix, a frequently maligned bit of tissue that actually plays an important role in regulating gut microbes. Using a 'multi-omics' approach, the team comprehensively analyzed and compared the microbiome composition of appendix samples from people with Parkinson's and healthy controls. They found significant differences, with the changes in microbial composition of the Parkinson's samples

correlating with higher levels of toxic bile acids.

The findings track with a 2020 study led by scientists in Spain that suggest changes in bile acids in the plasma are associated with Parkinson's disease.

"My lab has grown increasingly interested in [bile acids](#) and Parkinson's disease following a study completed in collaboration with Dr. Patrik Brundin's group a few years ago," said Stewart Graham, Ph.D., director of Metabolomics Research at Beaumont Health. "We demonstrated that not only was there a significant shift in the bile acid metabolism due to changes we induced in the brain, but that these compounds have the potential to be used as early blood-based biomarkers of the disease. This is extremely important as this is when treatments are believed to be most effective."

In recent years, research has revealed a growing number of links between the gut and Parkinson's. For example, chronic constipation often is one of the earliest signs of Parkinson's disease and can occur years or even decades before the onset of the disease's hallmark motor symptoms. Other studies have shown that hepatitis C, which impacts the liver, increases the risk of developing Parkinson's.

Importantly, a 2018 study by Labrie and colleagues demonstrated that removal of the appendix is associated with a 19-25% reduction in Parkinson's risk when the surgery occurs early in life, before the start of the disease process. They also found that the appendix acts as a storehouse for Parkinson's-related proteins called alpha-synuclein, clumps of which are a key pathological sign of Parkinson's. However, [alpha-synuclein](#) was found in the appendixes of healthy controls as well as people with Parkinson's, implying that the presence of the protein alone isn't enough to trigger the disease.

**More information:** Peipei Li et al, Gut Microbiota Dysbiosis Is Associated with Elevated Bile Acids in Parkinson's Disease, *Metabolites* (2021). [DOI: 10.3390/metabo11010029](https://doi.org/10.3390/metabo11010029)

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