

New study links depression in newly diagnosed Parkinson's disease patients to reduced striatal dopamine synthesis

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According to the Parkinson's Disease Foundation, up to 60% of individuals with Parkinson's disease (PD) exhibit mild to moderate depression, which is often underdiagnosed. It is unclear whether depression results from having a debilitating disease or reflects a parallel abnormal change in the brain caused by PD pathophysiology.

One hypothesis is that [depression](#) in PD may reflect impaired striatal dopamine function, but previous investigations have produced contradictory results. By scanning the brains of newly diagnosed [patients](#) not yet taking PD medications, Finnish investigators have shown that the level of depression is inversely related to the ability to synthesize dopamine in the striatum and the effect is seen only in the left striatum. Their results are published in the latest issue of the *Journal of Parkinson's Disease*.

Depression in Parkinson's patients can reduce quality of life and impede daily activities, and those with depressive symptoms tend to begin medications for [motor symptoms](#) earlier than those who are not depressed. Treating depression can improve both quality of life and movement, and medications such as dopamine agonists have antidepressant effects in PD patients.

In the current report, investigators used ¹⁸F-fluorodopa PET scans to look at two different groups of PD patients. One group consisted of 15 de

novo patients, meaning that the patients were newly diagnosed with PD and that they had never been treated with PD medications such as levodopa. The average PD disease duration for this group was less than 5 years. Two of these patients were diagnosed with clinical depression.

In the unmedicated PD group, the authors found significant negative correlations between symptoms of depression (as measured by the Beck Depression Inventory (BDI)) and dopamine synthesis capacity (as measured by FDOPA uptake) in the left striatum (putamen $p=0.002$, caudate $p=0.042$). No significant correlations were observed in the right striatum. Neither the severity nor side of motor symptoms affected the findings.

Different results were found in a group of 20 patients with moderate disease severity who were already being treated with PD medications. The average duration of disease for these patients was 5.6 years and 90% were using levodopa, 90% a dopamine agonist, and 60% a MAO-B inhibitor. Ten percent were also on an antidepressant. In this group, no significant correlations were found between BDI scores and regional FDOPA uptake in the caudate or putamen.

"Previous studies looking at depression and striatal dopamine synthesis capacity using ^{18}F fluorodopa PET scanning yielded inconsistent results, most likely reflecting marked heterogeneity in patients' disease severity and medication history," says lead investigator Juho Joutsa, MD, of the Division of Clinical Neurosciences at Turku University Hospital and University of Turku in Finland. "The results should be interpreted to indicate a link between mood and dopamine, which can be observed in early-stage unmedicated patients, but the relationship may also be present, but masked, in more advanced patients."

The study was the first using ^{18}F fluorodopa PET scanning technology to show that depression was associated with reduced dopamine synthesis

capacity only on the left side. However, Dr. Joutsa comments that studies using dopamine transporter ligands have also reported a similar lateralization of effect.

PD is the second most common neurodegenerative disorder in the United States, affecting approximately one million Americans and five million people worldwide. Its prevalence is projected to double by 2030. The most obvious symptoms are movement-related, such as involuntary shaking and muscle stiffness. Non-motor symptoms, such as worsening depression, anxiety, and sleep disturbances, can appear prior to the onset of motor symptoms.

More information: Joutsa, J. et al. Reduced Striatal Dopamine Synthesis Capacity is Associated with Symptoms of Depression in Patients with de novo Unmedicated Parkinson's Disease, *Journal of Parkinson's Disease*, Volume 3/Issue 3. [DOI: 10.3233/JPD-130205](https://doi.org/10.3233/JPD-130205)

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