

Why some Parkinson's patients develop harmful addictive behaviours

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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

A QIMR Berghofer study has discovered how the medications given to

people with Parkinson's disease cause some patients to develop addictive behaviours such as problem gambling, binge eating, hypersexuality and excessive shopping.

Medicines that increase dopamine levels in the brain are the cornerstone of treatment for symptoms of Parkinson's disease. This neurodegenerative disorder damages nerve cells that produce dopamine in the deep structures of the brain.

QIMR Berghofer Medical Research Institute lead researcher and St Andrews Hospital neuropsychiatrist Dr. Phil Mosley said while [dopamine replacement therapy](#) was effective for most people diagnosed with Parkinson's disease, about one in six people treated with the medication developed impulse-control behaviours, such as gambling.

"We found people who developed these addictive behaviours differed in the way their [brain structure](#) interacted with dopamine-containing medication, which gave rise to the impulsive behaviour," Dr. Mosley said.

"None of these people had a history of addictive behaviours before diagnosis and only developed them after they began treatment with dopamine-replacement medications.

"There is currently no way of predicting which individuals are at risk of these terrible side-effects."

More than 80,000 Australians are living with Parkinson's disease, with most people diagnosed after the age of 65, although about 20 percent are of working age, according to Parkinson's Australia.

Dr. Mosley said the study recruited 57 people with Parkinson's disease from St Andrews War Memorial Hospital in Brisbane, in collaboration

with neurologist Professor Peter Silburn.

"We used an advanced method of brain imaging, called diffusion MRI, to reconstruct the connections between different regions of the brain, akin to developing an individualised brain "wiring" diagram for each person in the study," Dr. Mosley said.

"We asked our participants to gamble in a virtual casino, which gave us a readout of impulsive and risk-taking behaviour in real time.

"By combining data from brain imaging, [behaviour](#) in the virtual casino, and the effect of dopamine-replacement medication, we were able to identify people who were susceptible to impulse-control behaviours.

"More broadly, we found a clear link between the strength of the connections in the brain, within circuits that we think are crucial for making decisions and suppressing impulses, and [impulsive behaviour](#), even in people without clinically-significant impulse-control behaviours."

Dr. Mosley said the study findings indicated that [brain](#) imaging and computer-based testing could be used in the future to determine which individuals were at risk of developing these harmful behaviours when treated with dopamine-replacement drugs.

"These disorders are often a second blow to people and their families living with Parkinson's disease. Some individuals suffer financial problems or relationship breakdowns because of these harmful behaviours," he said.

"We could offer targeted education to at-risk individuals, or adapt their treatment regimen to minimise the potential harms from these therapies."

The study's co-author Professor Michael Breakspear said the findings could also have implications for other psychiatric conditions that are marked by impulsivity, such as ADHD, alcohol and drug addiction.

The research findings have been published today in the journal *Brain*.

More information: *Brain* (2019). [DOI: 10.1093/brain/awz327](https://doi.org/10.1093/brain/awz327)

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