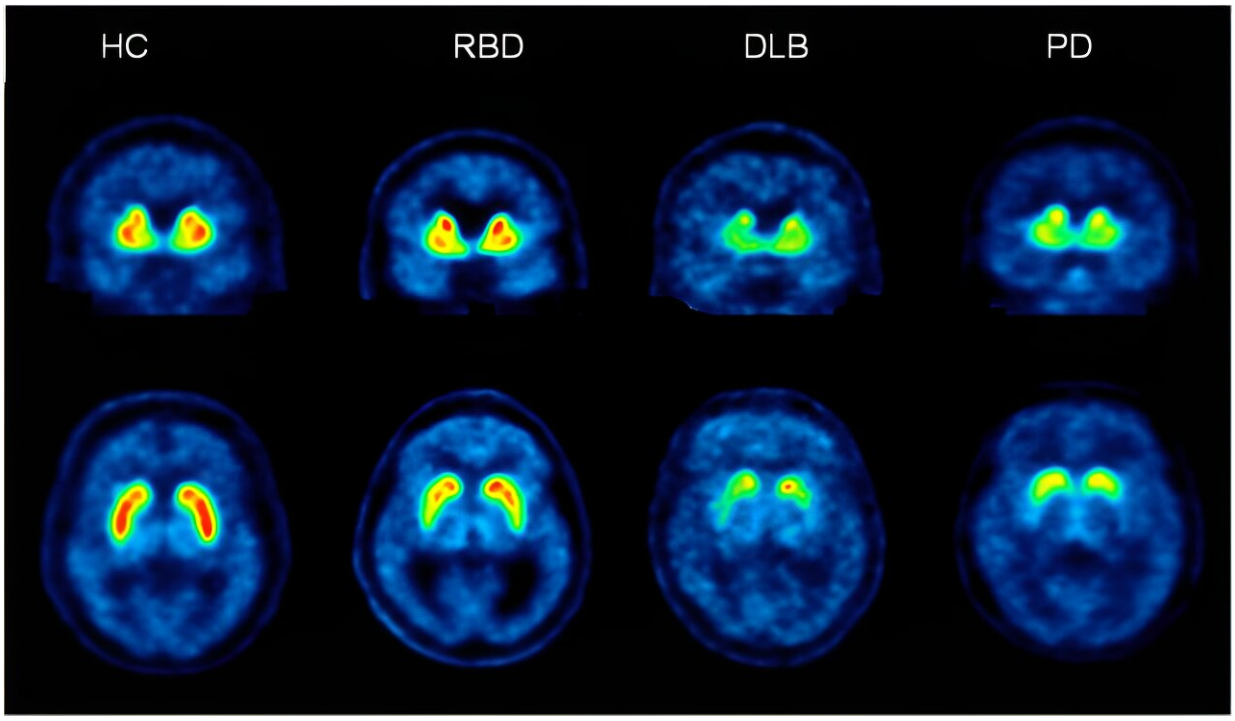
MedicalXpress

Detecting Parkinson's disease decades before symptoms appear

October 11 2023



PET scan of the brain. Credit: Austin Health

Researchers at The Florey and Austin Health have shown it is possible to detect tell-tale signs of Parkinson's disease 20–30 years before symptoms appear. Their work opens the door to screening programs and preventative treatments long before irreversible damage is done.

Florey Professor Kevin Barnham said Parkinson's disease, a debilitating neurodegenerative condition, is often thought of as an illness of old age, when in fact it starts in midlife and can go undetected for decades.

"Parkinson's disease is very hard to diagnose until symptoms are obvious, by which time up to 85% of the brain's neurons that control motor coordination have been destroyed. At that point, many treatments are likely to be ineffective," Professor Barnham said.

"Our long-term goal is to find a way to detect the disease much earlier and treat people before the damage is done."

In a study published in *Neurology*, lead researcher Professor Barnham and colleagues describe how a known biomarker called F-AV-133 can be used with positron emission tomography (PET) scans to diagnose Parkinson's disease and accurately track neurodegeneration.

In the Melbourne study, Florey Professor Chris Rowe and his team at Austin Health scanned 26 patients with Parkinson's disease, a control group of 12 people, and 11 people with Rapid Eye Movement sleep behavior disorder (RBD) which is a strong indicator of the disease.

Each person undertook two PET scans two years apart. Findings showed that there were no significant changes in clinical symptoms in any of the participants according to currently available assessments for Parkinson's disease. By contrast, the PET scans showed "significant neuronal loss" in three key regions of the brain in individuals with the disease, suggesting F-AV-133 is a more sensitive means of monitoring neurodegeneration than what is now available.

Further mathematical modeling calculated that there was an approximate total of 33 years' of slow neuronal loss in Parkinson's disease. This loss occurs for about 10.5 years before the disease is detectable on a PET

scan. Once a PET scan is able to detect the disease, it will be a further six and a half years before the onset of motor symptoms. After onset of physical symptoms, there are about a further three years until clinical diagnosis is confirmed. This equates to neuronal loss occurring for about 22.5 years before clinical symptoms are sufficient for diagnosis.

Professor Barnham said the findings open pathways for developing screening protocols for diagnosing and treating Parkinson's disease up to 10 years earlier than is currently possible. It could also assist in identifying patients for clinical trials.

What is RBD?

- RBD stands for rapid eye movement behavioral disorder.
- Individuals with RBD shout or thrash around, sometimes violently, in their sleep while acting out vivid and unpleasant dreams.
- RBD is caused by a lack of muscle atonia (sleep paralysis).
- 90% of people with RBD will develop a Parkinsonian condition.
- Half of people with Parkinson's have RBD.
- RBD is a significant warning sign for early Parkinson's disease.

If you have RBD, you should see a sleep specialist and/or a neurologist.

More information: Leah C Beauchamp et al, Utilizing18F-AV-133 VMAT2 PET Imaging to Monitor Progressive Nigrostriatal Degeneration in Parkinson Disease, *Neurology* (2023). DOI: 10.1212/WNL.0000000000207748

Provided by Florey Institute of Neuroscience and Mental Health

Citation: Detecting Parkinson's disease decades before symptoms appear (2023, October 11) retrieved 28 April 2024 from https://medicalxpress.com/news/2023-10-parkinson-disease-decades-symptoms.html

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