New method maps the dopamine system in Parkinson's patients

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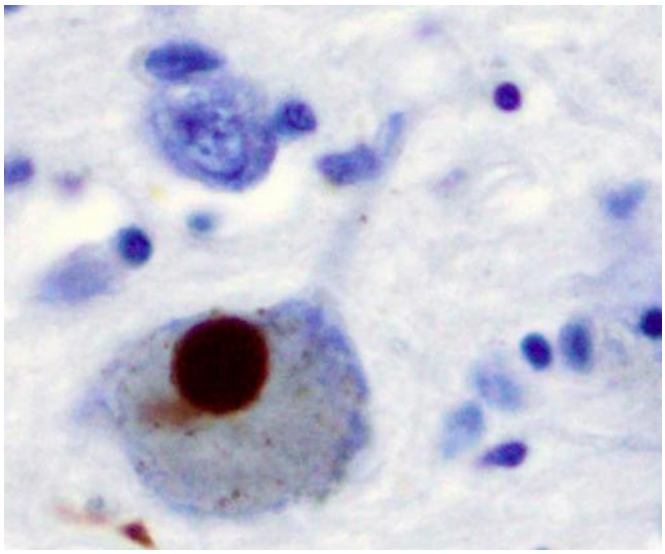

Immunohistochemistry for alpha-synuclein showing positive staining (brown) of an intraneural Lewy-body in the Substantia nigra in Parkinson's disease. Credit: Wikipedia

With the aid of a PET camera, researchers from Karolinska Institutet in Sweden have developed a new method for investigating the dopamine system in the brains of patients suffering from Parkinson's disease. The method measures levels of a protein called dopamine transporter and could lead to improved diagnosis of Parkinson's disease and the development of new treatments. The study is published in the scientific journal Movement Disorders.

Dopamine is a substance produced in the brain and is responsible for controlling our movements. The cells that produce dopamine are located in an area known as the brainstem, from where dopamine is then secreted into the basal ganglia, an area of the brain that plays an important function in regulating our movements.

In Parkinson's disease, dopamine cells degenerate and their loss is responsible for the motor symptoms that characterise the disorder, such as shaking, slowness of movement and difficulty in walking.

Using a special brain imaging technique known as Positron Emission Tomography (PET), a group of researchers at Karolinska Institutet have measured the levels of the dopamine transporter protein DAT that regulates the levels of dopamine in the brain. DAT functions as a biomarker for dopamine cells and is present on the surface of the dopamine cells in the cell bodies, on the nerve fibres and on the nerve endings. By measuring where DAT is found, researchers have been able to map the presence of dopamine cells.

The study was based on 20 patients suffering from mild Parkinsonism and an equal number of healthy individuals. The results showed significantly lower amounts of DAT in nerve endings in the Parkinson's patients than those not suffering from the disease. However, the amount of DAT remained relatively intact in cell bodies and nerve fibres.

"These results suggest that in the early stages of the disease dopamine cells are still viable and that, given the correct treatment, it should be possible to restore their function," says Andrea Varrone, senior lecturer in nuclear medicine at Karolinska Institutet's Department of Clinical Neuroscience who led the study.

"The method we have developed is likely to be able to assist in the diagnosis of Parkinson's disease at an earlier stage and predict the development of the disease. DAT can also be used as a biomarker in clinical trials of new medicines and treatment strategies," he continues.

Future studies will examine patients with more advanced Parkinson's, in order to gain a greater

understanding of the links between DAT and clinical variables such as motor symptoms and the various stages of the disease.

More information: Patrik Fazio et al. Nigrostriatal dopamine transporter availability in early Parkinson's disease, *Movement Disorders* (2018). DOI: 10.1002/mds.27316

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