

Aggressive immune cells aggravate Parkinson's disease

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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

Parkinson's disease, formerly referred to as "shaking palsy," is one of the

most common disorders affecting movement and the nervous system. Medical researchers at Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) have reported a possible cause of the disease in the immune system. The scientists have published their research findings in the journal *Cell Stem Cell*.

Currently, approximately 4.1 million people suffer from Parkinson's disease around the world. In Germany alone, more than 300,000 people are affected. Typical symptoms of the disease are slowness of movement, rigidity, frequent shaking and an increasingly stooped posture. The cause is the continuous death of dopamine-producing [nerve cells](#) in the brain.

Scientists are working to gain insights into the mechanisms that lead to the loss of [nerve cells](#) that produce dopamine. Until now, little has been known about whether [human immune cells](#) have an important role to play in Parkinson's disease. The stem cell researchers Dr. Annika Sommer, Dr. Iryna Prots and Prof. Dr. Beate Winner from FAU and their team have made a major leap forward in research into this aspect of the disease. The scientists from Erlangen were able to prove that in Parkinson's disease, T cells attack and kill nerve cells that produce dopamine in the mid-brain.

The FAU team based its research on a surprising observation: the scientists found an unusually high number of T cells in the midbrain of Parkinson's [patients](#). These cells are commonly found in the brains of patients suffering from diseases in which the immune system attacks the brain. During tests carried out in collaboration with the movement disorders clinic (molecular neurology) at Universitätsklinikum Erlangen (Prof. Jürgen Winkler), researchers discovered an increased number of certain T cells, specifically Th17 cells, in Parkinson's patients, similar to patients with autoimmune diseases such as rheumatoid arthritis.

In view of these results, the researchers developed a very unusual cell culture from human cells. A small skin sample was taken from affected patients and healthy test subjects. These skin cells were converted into stem cells, which can develop into any type of cell. The research team then further differentiated these cells into midbrain nerve cells specific to the patient. These midbrain nerve cells were then brought into contact with fresh T cells from the same patients. The result: The immune cells of Parkinson's patients killed a large number of their nerve cells, but this did not appear to be the case with healthy test subjects. Another result gives reason for hope: Antibodies that block the effect of Th17 cells, including one antibody which is in common use to treat psoriasis, largely prevented the death of the nerve cells.

"Thanks to our investigations, we were able to clearly prove not only that T cells are involved in causing Parkinson's disease, but also what role they actually play," explains Prof. Dr. Beate Winner. "The findings from our study offer a significant basis for new methods of treating Parkinson's [disease](#)."

More information: Annika Sommer et al, Th17 Lymphocytes Induce Neuronal Cell Death in a Human iPSC-Based Model of Parkinson's Disease, *Cell Stem Cell* (2018). [DOI: 10.1016/j.stem.2018.06.015](https://doi.org/10.1016/j.stem.2018.06.015)

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