

Parkinson's Disease

Parkinson's disease is a widespread, chronic and disabling neurodegenerative disease that afflicts millions of people and their families. A progressive degenerative disorder, Parkinson's affects nerve cells, or neurons, in the part of the brain that controls movement. Parkinson's disease causes symptoms such as tremors, slowness of movement, muscle stiffness and balance problems. Across the globe, it is estimated that 10 million people are living with this disease, with approximately 60,000 Americans diagnosed each year.

While there are pharmaceutical and alternative therapies available to manage Parkinson's disease, there are currently no cures or treatments that definitively slow its progression. Northwestern Medicine is leading the way in the quest for treatments to delay disease progression. For example, our scientists are studying neurons obtained from patients via skin biopsy to develop and test new therapies for Parkinson's and related disorders. Catalyzed through philanthropic support, our clinicians and scientists are involved in this and other landmark projects that are garnering significant national and international recognition.



Dimitri Krainc, MD

Aaron Montgomery Ward Professor and chair of The Ken and Ruth Davee Department of Neurology, Dr. Krainc also directs the Center for Neurogenetics. He is focused on the study of neurodegenerative diseases, with an overarching goal to define molecular mechanisms and specific targets for therapeutic development.

"In pursuing the development of targeted therapies for Parkinson's disease, Alzheimer's disease and other dementias, we have an opportunity to revolutionize care for patients with neurodegenerative diseases just like what has been and is being done for patients with cancer."

Parkinson's Disease and Movement Disorders Center



Tanya Simuni, MD

Arthur C. Nielsen Jr. Research Professor of Parkinson's Disease and Movement Disorders
Director, Parkinson's Disease and Movement Disorders Center

Dr. Simuni is a prominent physician scientist who serves as principal investigator on more than a dozen Parkinson's disease clinical trials. Of note, she leads as the national principal investigator on a multicenter Phase III clinical trial, supported by a \$16 million grant from the National Institutes of Health, evaluating dihydropyridine isradipine as a potential disease-modifying agent in early Parkinson's disease.

Within the Parkinson's Disease and Movement Disorders Center at Northwestern—the only National Parkinson's Foundation Center of Excellence in Illinois and a training model in the region—investigators are enhancing our understanding and treatment of Parkinson's disease and other movement disorders.

The center embraces a multi-faceted mission that focuses on:

- Research that will translate into improvements in treatment and overall prognosis for individuals affected by Parkinson's disease;
- A multidisciplinary approach to promote optimum health and quality of life for Parkinson's patients; and
- Parkinson's-related education and support for patients and their loved ones, healthcare providers and members of the community.

"The nilotinib study is another example of a longstanding and fruitful collaboration between Northwestern and The Michael J. Fox Foundation. The Foundation supported our Phase 2 study of isradipine—the results of which led to the currently ongoing Phase 3 study funded by the National Institutes of Health."

—Dr. Tanya Simuni

The Michael J. Fox Foundation for Parkinson's Research

The Michael J. Fox Foundation has been supporting breakthrough Parkinson's disease research at Northwestern Medicine for more than a decade. Recently, they made an extraordinary commitment of \$10 million to fund a study being led by Dr. Tanya Simuni titled "Nilo-PD2 Cohort 1 Trial," which studies the effect of the drug nilotinib on people with moderate to advanced Parkinson's.

Nilotinib, a United States Food and Drug Administration (FDA)-approved treatment for chronic myelogenous leukemia, is one of many examples of a repurposed (or repositioned) drug for Parkinson's. Repurposing is a promising and relatively efficient way to seed the pipeline of drugs by taking an existing medicine approved by the FDA for one condition and using it to treat another. Nilotinib inhibits the activity of c-Abl, a protein that has been linked to cellular pathways associated with Parkinson's disease. This trial aims to expand on these preliminary findings to better understand the implications of nilotinib's long-term use in Parkinson's.

The study also will further explore nilotinib's potential to treat symptoms or to slow or stop disease progression (something no current PD treatment has been proven to do). Until researchers can conclusively demonstrate repurposed therapies are effective and safe for people with PD to take long term, patients and clinicians are urged to wait before adding nilotinib or any other repurposed treatments to their regimen.

Founded in 2000 by prolific actor, writer and philanthropist Michael J. Fox, who himself lives with Parkinson's disease, The Michael J. Fox Foundation is dedicated to finding a cure for Parkinson's through an aggressively funded research agenda. The Foundation is guided by a single mission: accelerating breakthroughs that patients can feel in their everyday lives.

Morris K. Udall Center of Excellence for Parkinson's Disease Research



D. James Surmeier, PhD

Nathan Smith Davis Professor
Chair, Department of Physiology
Director, Morris K. Udall Center
of Excellence for Parkinson's
Disease Research

Dr. Surmeier is a world-renowned Parkinson's disease expert and neurodegenerative disease investigator. His work focuses on the basal ganglia, which are neural structures controlling movement that are intimately involved in the pathophysiology of Parkinson's disease.

Northwestern is home to the prestigious National Institutes of Health (NIH) Morris K. Udall Center of Excellence for Parkinson's Disease Research. Under the leadership of Dr. Surmeier, the Northwestern Udall Center is one of only nine NIH-funded Udall Centers in the nation and has been funded since 2002. The center focuses on gaining a better understanding of the causes of Parkinson's disease and translating this understanding into new disease-modifying therapies.

One highlight of the program is research pointing to the role of voltage-gated calcium channels in making neurons vulnerable to degeneration in Parkinson's disease. The stress induced by calcium entry through these membrane channels can be minimized with isradipine, an FDA-approved drug. This insight has led to a multicenter, Phase 3 clinical trial in early stage Parkinson's patients with isradipine. This trial, which is led by Dr. Simuni, is one of the most important bench-to-bedside accomplishments of the NIH Udall Center program.

Partnering Against Parkinson's

The translational collaboration of Drs. Surmeier and Simuni exemplifies what is possible at Northwestern through partnership. By building an open and collaborative environment of basic and clinical faculty with cutting-edge tools at their fingertips, Northwestern is creating opportunities for major medical breakthroughs.



Dr. James Surmeier (left) and John Flanagan (second from right) with Flanagan fellows (left to right) Drs. Yijuan Du, Cecilia Tubert and Patricia Gonzalez Rodriguez.

John Flanagan

Northwestern alumnus **John R. Flanagan, '58 MBA**, a longtime supporter of his alma mater, has made gifts to numerous areas across Northwestern University and its medical school. In 2015, he created a fund to support three fellows conducting Parkinson's disease research in the laboratory of Dr. James Surmeier:

Yijuan Du, PhD, focuses her work on how the brain changes in the late stages of Parkinson's disease. Specifically, she is investigating the mechanisms responsible for levodopa-induced dyskinesia. This is one of the major side effects of symptomatic treatment in Parkinson's and has few palliative options. Her work could lead to new treatments that lessen this side effect and improve the lives of late-stage Parkinson's patients.

Patricia Gonzalez Rodriguez, PhD, is a trailblazer in the study of mitochondrial function in neurons. Mitochondrial dysfunction is widely thought to be a primary cause of neurodegeneration in Parkinson's. Dr. Rodriguez is exploring how disruption of energy production by mitochondria affects dopaminergic neurons. Findings from her studies could help to develop new strategies and treatments to ultimately slow the progression of Parkinson's.

Ceci Tubert, PhD, studies cholinergic neurons, which play a role in Parkinson's, in the pedunculopontine nucleus. These neurons degenerate at very close to the same rate as dopaminergic neurons, but are not as well understood. The loss of these neurons is responsible for the gait and balance problems that Parkinson's patients experience. Her work could lead to new therapeutic strategies to protect these neurons from degeneration.

Parkinson's Disease Research Society Distinguished Physician Award



Alison Monette, RN, Dr. Michael Rezak's head nurse with whom he has worked for many years, was among the many colleagues, friends and supporters who gathered to celebrate Dr. Rezak at his investiture as the PDRS Distinguished Physician.

Thanks to the generosity of Northwestern Medicine donors and support from the Parkinson's Disease Research Society, Northwestern Medicine Central DuPage Hospital established the Parkinson's Disease Research Society (PDRS) Distinguished Physician position. In fall 2016, Michael Rezak, MD, PhD, director of both the Movement Disorders and Neurodegenerative Diseases Center and the Deep Brain Stimulation Program at Central DuPage Hospital, became the inaugural recipient of this prominent award.

"It is a great honor to be named the inaugural recipient of the PDRS Distinguished Physician award, and I am grateful to everyone who made this opportunity possible," said Dr. Rezak. "Throughout my career, I have tried to do everything I can to improve the health and quality of life of people living with Parkinson's disease and other movement disorders, and I pledge to only strengthen my efforts. I am moved by the strength, resilience and optimism of all of my patients, and I am honored to be their partner and advocate."

An internationally recognized physician and scientist in the areas of Parkinson's disease and other movement disorders, Dr. Rezak has received high praise for his efforts to improve clinical care for people with movement disorders, for his commitment to leading-edge research and education, and for the numerous contributions that he has made to the field of neurology as a whole. As the PDRS Distinguished Physician, Dr. Rezak is accelerating studies of neuro-protective and disease-modifying strategies that could potentially benefit many people with Parkinson's. Additionally, he is expanding investigations to identify biomarkers that might predict the onset of Parkinson's before symptoms emerge and is striving to enhance precision medicine treatments for Parkinson's through the use of ultrasound technology. Dr. Rezak also hopes to develop an autonomic nervous system laboratory to further the development of targeted treatment strategies for individuals with Parkinson's.