



PATIENTS WITH PARKINSON'S DISEASE suffer from increasing tremors, rigidity, and changes in gait and balance that can lead to serious injury. Similarly, patients with essential tremor struggle with simple, everyday tasks such as getting dressed, brushing their teeth, and using utensils to eat. Even with medication, patients with these conditions can still experience symptoms and a significantly lower quality of life.

Under the leadership of Francisco Ponce, MD, the Center for Neuromodulation at Barrow Neurological Institute is changing the lives of patients with previously untreatable conditions by correcting abnormal electrical or chemical activity in the brain. One promising type of neuromodulation is deep brain stimulation (DBS), which is proven to be effective for Parkinson's, essential tremor, dystonia, and epilepsy, and it holds great promise for a range of other neurological conditions.



9

ongoing DBS
studies



3

non-DBS
studies



1ST

focused ultrasound
procedure for essential
tremor in Arizona

BARROW NEUROLOGICAL INSTITUTE BY THE NUMBERS



CLINICAL IMPACT

117,700+

total number of
patient visits

5,800+

brain and spine surgeries

14

Centers of Excellence



GLOBAL IMPACT

59

research fellows and visiting

scholars: Argentina, Austria,
Brazil, Chile, China, Colombia,
Czech Republic, Denmark,
Finland, Germany, India, Italy,
Jordan, Mexico, Pakistan,
Peru, Portugal, South Korea,
Spain, Taiwan, Turkey,
United Kingdom

PUSHING BOUNDARIES IN NEUROMODULATION

The Center for Neuromodulation has experienced significant growth over the past year, with 12 ongoing studies, including new ones for neurological conditions such as epilepsy and stroke. The following are examples of innovative studies in the Center for Neuromodulation made possible through the generosity of Barrow Neurological Foundation donors.

DBS for chronic pain: Barrow neurosurgery resident Baltazar Zavala, MD, PhD, has been working to refine DBS treatment for chronic pain by analyzing recordings of electrical activity inside the brain as patients experience exacerbations and relief of pain. Last year, Dr. Zavala started enrolling patients in the study, for which they participated in a variety of short, computer-based tasks while recordings were made from their DBS device. He also developed a protocol specifically for chronic pain patients, which has received FDA approval as an investigational device exception and is now with the Institutional Review Board for approval.

New electronic stimulation device: To measure a patient's level of consciousness when in a coma, clinicians use the Glasgow Coma Scale (GCS), which relies on painful, manual stimulation. Barrow neurosurgery resident Brandon Fox, MD, has been investigating whether an electronic stimulation device that measures patients' level of consciousness would limit potential injury and provide more consistency in how the exam is administered. To develop his novel stimulation device and expand it into clinical studies, Dr. Fox received funding from the Barrow Neurological Foundation Board of Trustees and a translational research grant from the Flinn Foundation.

Monitoring brain activity in epilepsy: The neuromodulation team started enrolling for its first study specifically focused on the brain activity of patients with epilepsy during routine stereoelectroencephalography (SEEG) monitoring or responsive neurostimulation (RNS) therapy.

Focused ultrasound for essential tremor: Last year, Dr. Ponce performed Arizona's first focused ultrasound treatment on a patient with essential tremor. This noninvasive technique uses MRI guidance to deliver beams of ultrasound energy accurately onto a precise target deep in the brain without damaging surrounding normal tissue. Barrow was able to acquire this technology with philanthropic support, and the neuromodulation team has created a patient outcomes database to measure its effectiveness in order to maximize procedural benefits.

In addition, studies investigating use of DBS in patients with tinnitus and dysphonia are nearly complete, with results expected to be published soon.

CHANGING THE LIVES OF PATIENTS

Jim Kurtz, an Arizona retiree, first realized something was wrong about 12 years ago when he attempted to get himself a cup of coffee. Jim tried to lift the cup after pouring his coffee, but his arm started shaking so severely that he spilled it all over. He was later diagnosed with essential tremor. Gradually, Jim lost the ability to hold anything steady with his left hand. He couldn't even write or type on a keyboard with it. First he tried medication, which was successful for a while, but over time, his tremor worsened and the medication no longer worked.

Jim decided to call Barrow Neurological Institute, where he met with Dr. Ponce to learn about a new neurosurgical procedure to treat essential tremor called focused ultrasound. Focused ultrasound is a noninvasive procedure that uses heat generated by sound waves to deactivate the neural circuits responsible for some movement disorders in a way similar to DBS. Jim had his procedure in March 2023, and it was a huge success. He regained not only full use of his left hand, but also a greater sense of control over his life.

ON THE HORIZON

In the coming year, the Center for Neuromodulation will continue existing clinical trials as well as move forward with several new ones. One new study will test a novel device developed by Barrow neurosurgeon Kris Smith, MD, to assist in DBS implantation for epilepsy patients. Barrow will also be partnering with Virginia Tech to learn more about electrochemical structure of the brain in patients with epilepsy and in patients receiving awake DBS implantation.

The Center has multiple upcoming sponsor-driven clinical trials, including one testing an adaptive DBS device that adjusts the level of stimulation automatically based on a patient's response. Another trial tests a new DBS location to improve neuroplasticity and help patients regain function after suffering a stroke. The Center also is beginning its first gene therapy trial for Parkinson's disease and testing the efficacy of using surgical robotics for DBS targeting.

BARROW NEUROLOGICAL INSTITUTE BY THE NUMBERS



RESEARCH

327

active research studies

200+

peer-reviewed
journal publications

\$12 MILLION

in new federal research
grant support



DONOR IMPACT

3,898

total donors

\$44 MILLION

distributed to Barrow Neurological
Institute, including:

\$25.4 MILLION

designated to the
Ivy Brain Tumor Center

\$5.3 MILLION

designated to specific
centers/programs

\$11.9 MILLION

for basic, clinical, and
translational research

\$1 MILLION

in endowments



THANK YOU FOR YOUR GENEROSITY

Thank you for your support of the Center for Neuromodulation. Our goal is to provide patients with treatments that restore normal movement and improve their symptoms, level of independence, and day-to-day quality of life. Your generosity will continue to spur innovation by supporting research on other uses for neuromodulation technology, such as treating Alzheimer's disease, post-stroke symptoms, tinnitus, obsessive-compulsive disorder (OCD), and other mental health conditions. In addition, we can continue making breakthroughs with our existing clinical trials, most notably with focused ultrasound technology, DBS for chronic pain, and epilepsy.

On behalf of the entire neuromodulation team, thank you for your ongoing support and dedication to our mission.

With gratitude,

Francisco Ponce, MD
Chief, Stereotactic and Functional Neurosurgery
Director, Center for Neuromodulation
Director, Neurosurgery Residency Program

The mission of Barrow Neurological Foundation is simple: to be the catalyst of our donors' passion for transformation by providing the resources for Barrow Neurological Institute to achieve its mission of saving human lives through innovative treatment, groundbreaking research, and educating the next generation of the world's leading neuroclinicians.

Barrow
Neurological Foundation

Barrow Neurological Foundation
2910 N. Third Ave., Ste. 450, Phoenix, AZ 85013
www.SupportBarrow.org