

# Neuromodulation



*Deep Brain Stimulation is a surgical treatment that uses a “pacemaker” for the brain to help control motor symptoms.*

→ **THE BARROW CENTER FOR NEUROMODULATION** explores and expands therapies used to restore and improve function in patients with neurodegenerative diseases. Deep Brain Stimulation (DBS) has proven effective as a surgical treatment for Parkinson’s disease, essential tremor, epilepsy, and dystonia. It uses electrical stimulation to correct abnormal rhythms in the brain, as a cardiac pacemaker does for the heart. Barrow Neurological Institute is the leading center in the U.S. for implanting DBS devices. Center director Francisco Ponce, MD, performs more DBS lead implantations than any other neurosurgeon in the country. In fact, Dr. Ponce led the transition from the historical requirement that patients be awake for the operation to a more standardized “asleep” workflow, where the patient is under general anesthesia.



**1,000**

DBS procedures  
performed by Dr. Ponce



Barrow

**PIONEERED**

asleep DBS Surgery



Barrow leads

**FIRST EVER**

study of DBS for  
Alzheimer’s

ABOUT BARROW  
NEUROLOGICAL INSTITUTE



**#1 IN ARIZONA**  
**#11 IN THE UNITED STATES**  
for neurology and neurosurgery



CLINICAL IMPACT

**92,515**

BNI Clinic visits

**3,135**

number of neurosurgeries

**1,578**

number of spine surgeries

**\$2.8 MILLION**

amount of charity care



GLOBAL IMPACT

**54**

visiting scholars, research fellows and observers from Mexico, India, Egypt, Pakistan, UK, Russia, China, Chile, Spain, Brazil, Japan, France, Italy, Kingdom of Saudi Arabia, Indonesia, Turkey, Germany, Poland, Colombia, Philippines, Israel, Argentina and Thailand.

PROGRAM ACCOMPLISHMENTS

The growth of the Barrow Center for Neuromodulation is due to an unwavering commitment to advancing patient care and improving quality of life. Medicare considers DBS an underutilized treatment for Parkinson's disease. The standardization of the operation advanced at Barrow makes the surgery safer and the outcomes more consistent. Patient education and community outreach increases awareness, and this in turn renders the therapy more accessible to the community. In 2019, Dr. Ponce performed his 1000th DBS surgery, further solidifying his reputation as the groundbreaking leader in the field. He was the first in the country to implant a new directional DBS system. This allows more precision in programming the device, and adjustments can be made as the needs of patients change.

Although DBS has long been used for movement disorders, it is now an approved treatment for epilepsy patients who do not respond to medication. Epilepsy is likened to an electrical storm in the brain. As part of our ongoing efforts to educate patients and their families, Barrow has published a book about epilepsy and DBS. Our education efforts also took to social media when one of Dr. Ponce's DBS procedures was streamed live on Facebook. Dr. Ponce and Meg Lambert, RN, speak regularly at community education events and at local and national conferences. DBS education classes have expanded weekly at Barrow and monthly in Sun City and Scottsdale. We also produced a video for patients unable to attend the class in person.

We believe it is our responsibility to share our expertise so we created a second opinion program, which allows Dr. Ponce to review imaging and make recommendations for DBS lead revisions, if necessary.

RESEARCH ADVANCES

On September 9, Barrow became the **first institution in the world** to implant a deep brain stimulator in an Alzheimer's patient as part of a pivotal Phase III clinical trial evaluating whether this therapy can slow the symptoms of the disease. The second patient was also enrolled and treated at Barrow, and there are four additional subjects in the screening process. This is the final step toward FDA approval. DBS has provided remarkable therapeutic benefits for otherwise treatment-resistant movement disorders such as Parkinson's disease and essential tremor, and the pilot Phase II study suggested clinical benefit at 12 months in individuals over age 65 with mild Alzheimer's disease.

“When I arrived at Barrow and met Dr. Ponce, I learned I would be his 1,000th patient and immediately felt assured that he was the right person to perform this surgery for me. His calm demeanor and outstanding record of success made me feel that I could be in no better hands.”

STEPHEN SMITH, PATIENT



Holly Shill, MD, director of the Muhammad Ali Parkinson's Center, programs the DBS device of Stephen Smith, Dr. Ponce's 1,000th DBS patient. ↑

We have active collaboration with the department of bioengineering at Arizona State University where the effect of electrical stimulation on brain circuits are being studied during DBS implantation.

Numerous studies have been published based on information from more than 1,000 patients in Barrow's DBS Database. The database includes pre-operative information on diagnosis, symptoms, medication usage, and patient quality-of-life surveys. It also includes data about surgical complications, length of stay in the hospital, and outcomes.

## ON THE HORIZON

While we are providing the best care possible to our patients, we will keep looking for the next, best treatment. We will begin enrolling patients in a study investigating whether DBS can improve the symptoms of tinnitus, a persistent ringing in the ears, which affects 15 to 20 percent of the population. Physicians are also designing a study to measure whether DBS can help reduce falls in patients with movement disorders.

Moving forward, the Barrow Center for Neuromodulation hopes to advance the science behind neuromodulation, targeting new circuits and exploring non-invasive neuromodulation therapies such as focused ultrasound waves to treat movement disorders.



### RESEARCH

**320**

active research studies

**839**

patients enrolled in clinical trials

**\$9 MILLION**

in federal research grant support



### DONOR IMPACT

**\$3.98 MILLION**

for basic and translational research

**\$3.65 MILLION**

for strategic initiatives including Barrow Aneurysm & AVM Research Center, Barrow Artificial Intelligence Center, neuroimaging and stroke

**\$1.26 MILLION**

for education and fellowship programs

**\$2.52 MILLION**

for community outreach programs



## THANK YOU FOR YOUR SUPPORT

Much of what we do at the Center for Neuromodulation focuses on improving quality of life for patients. We pioneered “asleep” DBS surgery, making it a more efficient and more comfortable surgery for the patient. We are the first in the world to use DBS for Alzheimer’s. As always, Barrow’s commitment to discovery and advancement is what makes this institute special, and our work would not be possible without your support.

With Gratitude,  
Francisco Ponce, MD

↑ *Dr. Francisco Ponce (right) discusses the new Phase III clinical trial testing the use of DBS to manage Alzheimer’s symptoms. Patient Elizabeth “Ann” Alderson received a DBS device in 2014 as part of the Phase II study. Her husband Jay (left) said the device has slowed her dementia progression.*

**Barrow Neurological Foundation** raises awareness and funding for patient care, medical education, community outreach and research offered at Barrow Neurological Institute. Barrow is an internationally-recognized leader in neurology, neurosurgery and neuroscience research, treating patients with a wide range of conditions, including brain and spinal tumors, concussion and brain and spinal traumas, neuromuscular diseases, stroke, cleft and craniofacial disorders, and cerebrovascular disorders. It is home to several centers of excellence, including the Ivy Brain Tumor Center, Muhammad Ali Parkinson Center and Gregory W. Fulton ALS and Neuromuscular Disease Center. **[www.SupportBarrow.org](http://www.SupportBarrow.org)**



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