Barrow Neurological Foundation

FISCAL YEAR 2021 STEWARDSHIP REPORT

Barrow Aneurysm and AVM Research Center

↑ BAARC fosters collaboration between neuroscientists and physicians who share a goal of developing new therapeutic approaches to stabilize and prevent the rupture of aneurysms and AVMs.

Brain aneurysms and arteriovenous malformations (AVMs) are often thought of as ticking time bombs in the brain. When a brain aneurysm bursts, the resulting complications can be deadly. Approximately 50 percent of ruptured brain aneurysms are fatal, with 66 percent of survivors suffering permanent neurological damage. While less common, AVMs—abnormal tangles of blood vessels—can be even more life-threatening. About one-fifth of all AVM hemorrhages are fatal, and they occur most often in those 15 to 20 years of age.

The Barrow Aneurysm and AVM Research Center (BAARC), led by Barrow Neurological Institute President and CEO, Michael T. Lawton, MD, seeks to understand the underlying genetics, formation, and rupture of aneurysms and AVMs in order to discover better ways to detect and treat them. BAARC pushes the boundaries of care, leading to the development of new, less invasive, and more effective treatments for patients around the world.

5,000+

aneurysm surgeries performed by Dr. Lawton

14

active clinical research projects

Designated HHT Center of Excellence

BARROW NEUROLOGICAL INSTITUTE BY THE NUMBERS

CLINICAL IMPACT

77,600+
total number of patients seen at Barrow annually

22,200+
telemedicine visits

5,700+
brain and spine surgeries

GLOBAL IMPACT

11
research fellows and visiting scholars from Brazil, Columbia, India, Ireland, Pakistan, Russia, Thailand, and Turkey

PROGRAM ACCOMPLISHMENTS

As the founder and director of BAARC, Dr. Lawton has pioneered the effort to transform the lives of patients suffering from neurovascular diseases. Earlier this year, Dr. Lawton clipped his 5,000th aneurysm, a significant milestone, adding to his already impressive list of accolades, which includes over 900 AVMs surgically removed, over 1,000 cavernous malformation operations, and over 600 scientific peer-reviewed publications.

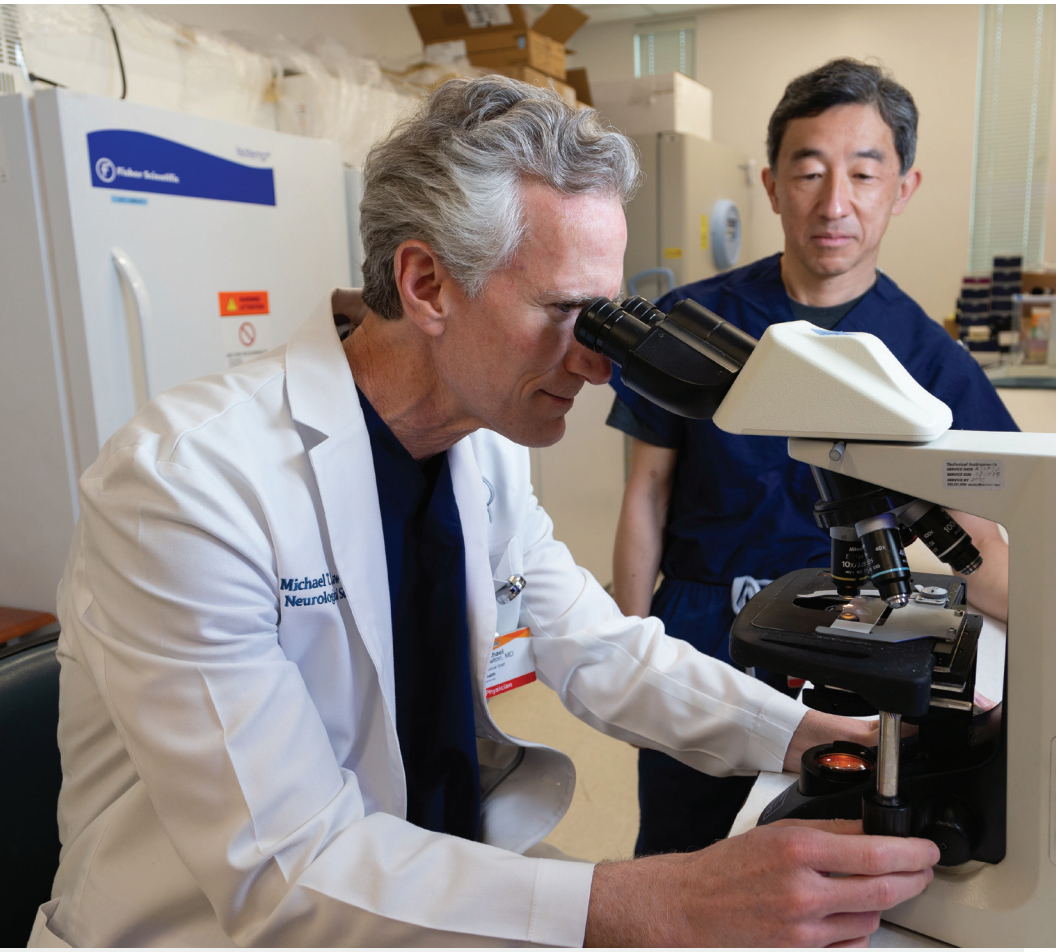
In summer 2021, Cure HHT, the nation's leading advocacy organization for hereditary hemorrhagic telangiectasia (HHT), a genetic disorder that causes multiple AVMs, named Barrow Neurological Institute a Center of Excellence. This designation recognizes centers equipped with the personnel, expertise, commitment, and resources to provide comprehensive evaluation, treatment, and education to individuals with HHT. Barrow is the only facility in Arizona to earn this distinction.

RESEARCH ADVANCES

Tomoki Hashimoto, MD, leads bench-to-bedside studies at BAARC. Last year, Dr. Hashimoto and Jinglu Ai, MD, PhD, studied the protective effects of phytoestrogens (plant-based, diet-derived compounds) against aneurysm formation and rupture in postmenopausal women. Initial results were promising, showing that the types of phytoestrogens they studied were protective against aneurysm formation, indicating a potential therapeutic value. A medication-based approach to preventing aneurysm rupture would be significant for patients with unruptured aneurysms whose risks associated with surgical treatment are higher than the risks of an actual rupture.

S. Paul Oh, PhD, studies the genetics and mechanisms that lead to AVM development and progression. Two of his preclinical models looked at gene mutations that occur in the formation of AVMs in HHT. Specifically, Dr. Oh looked at the Alk1 gene and the ENG gene. Results from initial studies indicated that AVMs in HHT patients are present from birth, implying that HHT patients who are negative for brain AVMs by three years old do not have to be screened for the presence of brain AVMs in adulthood.

Heidi Jahnke, RN, MSN, a senior clinical research nurse, has been leading efforts to build the Barrow Registry for Aneurysm and Vascular Outcomes. Not only does she collect data on all aneurysm and AVM patients entering the clinic, but she also has been transitioning decades of existing database information to one current platform. Last year, Heidi entered 5,445 retrospective cases into the database, pushing the



Dr. Lawton and Dr. Hashimoto work tirelessly to find better treatments for aneurysms.

total number of available cases to 12,206. Additionally, there are 344 neurovascular patients now enrolled and participating in the Barrow Neuro Clinical Outcomes Center, Cerebrovascular—a patient-centered outcomes database.

ON THE HORIZON

Over the next year, BAARC will continue to consolidate older research databases into one comprehensive database and enroll for the patient-centered outcomes database. Moving forward with the phytoestrogen study, Dr. Hashimoto and Dr. Ai are applying for an NIH grant to conduct further preclinical studies and prepare for future clinical trials. Dr. Hashimoto has also embarked on a new study that aims to identify blood biomarkers that can be used to predict the risk for aneurysm rupture. Dr. Oh will continue his work with AVMs in HHT patients by performing tests to determine factors that influence the timing of AVM induction, as well as factors that influence AVM rupture, such as inflammation and hypertension.

BARROW NEUROLOGICAL INSTITUTE BY THE NUMBERS

RESEARCH

320+
active research studies

791
patients enrolled in clinical trials

$11.7 MILLION
in federal research grant support

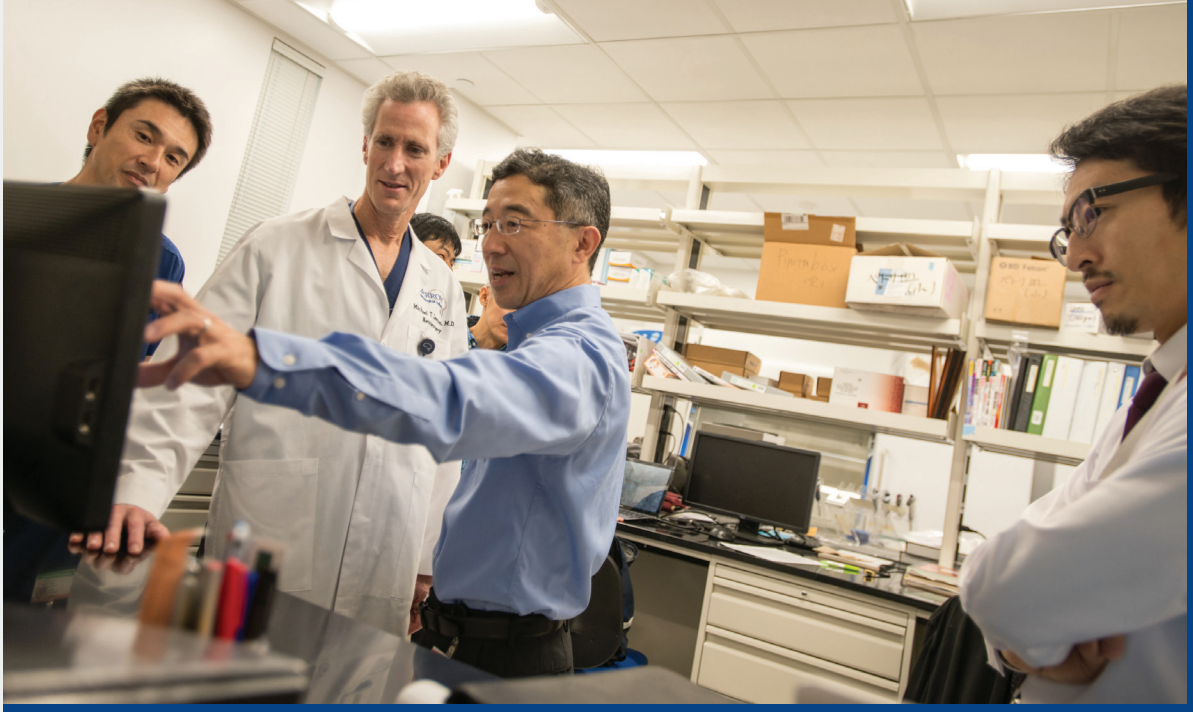
DONOR IMPACT

$28 MILLION
total distributed to Barrow Neurological Institute, including:

$21 MILLION
designated to specific centers/programs

$5 MILLION
for basic, clinical, and translational research

$1.7 MILLION
for endowed research chairs



↑ Michael T. Lawton, MD, President and CEO of Barrow Neurological Institute, is the founder and director of the Barrow Aneurysm and AVM Research Center.

THANK YOU FOR YOUR SUPPORT

The support of donors like you allows the Barrow Aneurysm and AVM Research Center to advance the treatments available for these dangerous conditions, benefiting patients around the world. Your generosity means that we are able to test the innovative ideas of our physicians and scientists. We also are able to dedicate our time and resources to mentoring the next generation of neuroscientists. Thank you for your critical support.

With gratitude,
Michael T. Lawton, MD
President and CEO, Barrow Neurological Institute
Founder, Barrow Aneurysm and AVM Research Center

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 by educating the next generation of the world's leading neuroclinicians.

Barrow
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