Barrow Neurological Foundation

FISCAL YEAR 2023 STEWARDSHIP REPORT

Barrow Aneurysm and AVM Research Center

WHEN AN ANEURYSM or arteriovenous malformation (AVM) ruptures, causing intense bleeding in the brain, patients suddenly find themselves in a race for their life. For aneurysms, more than 40% of ruptures are fatal, and for AVMs, more than 50% of ruptures are fatal. Those who do survive are often left with permanent, life-altering neurological deficits. Unfortunately, the majority of patients don't even know that they have an aneurysm or AVM until it ruptures.

The Barrow Aneurysm and AVM Research Center, led by Barrow Neurological Institute President and CEO Michael T. Lawton, MD, conducts critical research into the genetics, formation, and rupture of aneurysms and AVMs. Scientists in the Center recognize the challenges that remain in detecting and treating these vascular malformations, and they are committed to pushing boundaries in research to develop more effective treatments for patients worldwide.

10+

research studies funded by the Foundation

3

studies by Dr. Hashimoto currently funded by NIH R01 grants

5,200+

aneurysm surgeries performed by Dr. Lawton

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

INNOVATIONS IN ANEURYSM RUPTURE PREVENTION

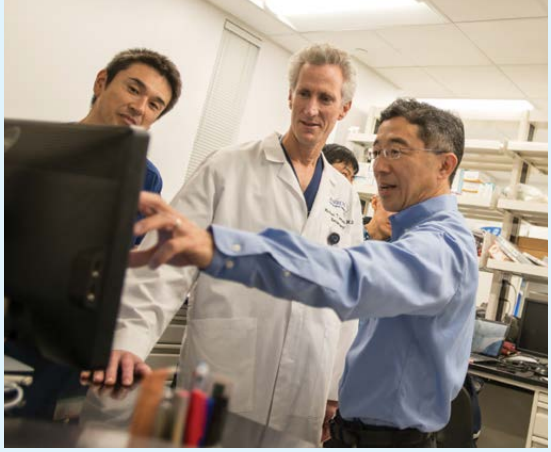
Barrow scientist Tomoki Hashimoto, MD, is renowned for pioneering a preclinical model to test potential drug targets for preventing aneurysm ruptures that has become the standard in labs worldwide. Thanks to a generous $2.5 million gift from Sam and Rita Garvin, Dr. Hashimoto has been named the inaugural Sam and Rita Garvin Aneurysm Research Chair. Sam Garvin learned firsthand just how dangerous aneurysms can be when his wife, Rita, suffered a rupture and had to be rushed to Barrow for emergency surgery. They credit Barrow for saving her life and endowed the Chair to support Dr. Hashimoto's innovative work developing better aneurysm detection and treatment methods.

Just months before Dr. Hashimoto's Chair appointment, he received a $3 million, five-year R01 grant from the National Institutes of Health (NIH) to further his research investigating the association between aging and aneurysm rupture. The ongoing study, which utilized seed funding from Barrow Neurological Foundation, focuses on the process of cell senescence—when cells stop dividing due to aging. These cells produce substances that cause inflammation and damage blood vessels, potentially triggering an aneurysm rupture. As Dr. Hashimoto delved deeper into this process, he found that while cell senescence occurs predominantly in older individuals, it also can occur in younger individuals due to extreme stress on the body or diseases such as high blood pressure and diabetes.

Ultimately, Dr. Hashimoto aims to evaluate whether a drug treatment can be used to remove senescent cells in both older and younger individuals in order to prevent aneurysm ruptures. This study underscores one of Dr. Hashimoto's primary research goals: to develop a medication-based approach to preventing aneurysm ruptures, sparing patients from undergoing risky and invasive surgery.

USING GENETICS TO STABILIZE AVMS

A simple fall led high school senior Morgan Bailey to receive the shocking diagnosis of a brain AVM. However, because of the size of her AVM and its proximity to the thalamus (a structure in the brain that processes all motor and sensory information), surgery was not a viable option. Morgan would have to wait while her doctors monitored the AVM for any changes. Four years after her initial diagnosis, Morgan's AVM ruptured, seemingly out of nowhere. Her life hung in the balance as the bleeding in her brain intensified until she finally arrived at Barrow and received a life-saving surgery.



S. Paul Oh, PhD, investigates the genetics and mechanisms that lead to AVM induction, progression, and rupture. With funding from Barrow Neurological Foundation, Dr. Oh developed a new preclinical model to regulate the overexpression of the KRAS gene, which is linked to the formation of AVMs. Preliminary data showed that the size of an AVM can be reduced with a KRAS inhibitor, but if the inhibitor is stopped, the AVM will grow again. This important finding could lead to the development of a medication-based approach to stabilizing AVMs and preventing their rupture. For patients like Morgan Bailey, whose risks associated with AVM surgery are extremely high, this could be life-saving.

In addition, Lea Scherschinski, MD, a postdoctoral fellow in Dr. Oh's laboratory, utilized Foundation funding to develop the first preclinical model to successfully reproduce the AVMs found in hereditary hemorrhagic telangiectasia (HHT), a genetic disorder that causes the formation of multiple AVMs. This preclinical model will allow Dr. Scherschinski and her team to advance their understanding of how AVMs develop and test new therapies to stabilize them.

ON THE HORIZON

Dr. Hashimoto plans to expand his research investigating the link between aging and aneurysm rupture with a study focusing on the protein sirtuin-1, which helps protect blood vessels, as a potential drug target to prevent ruptures. Dr. Hashimoto is also expanding his research program to include studies that aim to find new methods of reducing or preventing brain injuries in patients who have suffered a stroke due to an aneurysm rupture and in the general stroke patient population.

Dr. Oh will begin using a new, Foundation-funded piece of equipment, the Iconeus One imaging system, to complement traditional MRI methods in studying brain AVMs. This high-powered ultrasound machine can monitor the presence, progression, and rupture of AVMs in preclinical models, which will be extremely beneficial to Dr. Oh and his team. He will also submit an R01 grant application to the NIH for further funding of his study investigating the use of a KRAS gene inhibitor to halt the progression of AVMs.

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

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

THANK YOU FOR YOUR SUPPORT

Support from Barrow Neurological Foundation donors is extremely important in providing seed funding that allows scientists in the Barrow Aneurysm and AVM Research Center to conduct high-risk, high-reward studies. While these scientists may test many novel ideas, only a few go on to receive further funding from external entities such as the NIH. However, those few studies could lead to the next major breakthrough in aneurysm or AVM treatment, impacting countless patients around the world. For instance, Dr. Hashimoto's innovative cell senescence study received seed funding from philanthropy that allowed him to apply for and receive a $3 million, five-year R01 grant from the NIH. This would not have been possible without your support.

With your generosity, we can continue producing and testing groundbreaking ideas that can transform aneurysm and AVM treatment for patients around the world. Thank you.

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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