

## UCSF Named Center of Excellence for Hemorrhagic Stroke

Q&A with Heather Fullerton, M.D., M.A.S.

By Nancy Tao

The American Heart Association and the Henrietta B. and Frederick H. Bugher Foundation have recently awarded a grant to researchers at UC San Francisco to create a [Center of Excellence for Hemorrhagic Stroke Research](#) – the first-ever Bugher Center dedicated to pediatric hemorrhagic stroke. UCSF also received a separate grant to establish the Bugher Foundation Hemorrhagic Stroke Scholars Program: A centralized research training and leadership center to train the next generation of hemorrhagic stroke scientists.

The recipients of the \$11.2 million grant, which also include research teams from Massachusetts General Hospital and Yale University, will create a new stroke research network to develop scientific breakthroughs to improve prevention, treatment, and health outcomes related to hemorrhagic stroke.

The new pediatric Center at UCSF is led by Heather Fullerton, MD, MAS, Chief of Child Neurology and Medical Director of the Pediatric Brain Center (PBC) at UCSF Benioff Children's Hospital. The UCSF research projects have a special emphasis on brain arteriovenous malformations (AVMs), which are abnormal tangles of arteries and veins and remain the leading cause of hemorrhagic stroke in children. The Center aims to better inform treatment decisions and improve the care of pediatric AVMs around the world. Investigators at UCSF will partner with a global network of pediatric stroke researchers in the International Pediatric Stroke Organization (IPSO), and AVM experts at the Hospital for Sick Children (Toronto) and Boston Children's Hospital.

While AVMs can be cured by radiation or surgical resection, a recent publication from the research team uncovered that there is a high rate of AVM recurrence in children, as opposed to adults.

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### What is the significance of the grant to the Pediatric Brain Center?

It's an exciting time for us. We are the only children's hospital selected as a Center of Excellence for the new Bugher Hemorrhagic Stroke Research Network and the second children's hospital to be chosen to be part of a Bugher stroke research network, the first being the University of Colorado **Anschutz Medical Campus** to study pediatric ischemic stroke in 2014.

Although hemorrhagic stroke accounts for half of the strokes we see in kids, it has not gotten much attention by researchers. Hemorrhagic stroke is more complicated in its care because it requires a multidisciplinary team, which is what we have at the PBC - neurologists, neurointerventional radiologists, and neurosurgeons. The fact that it is complex in its care also makes it more complex to study, so we have an ambitious project that spans across the globe.

## Why is UCSF in a good position to be designated as a Center of Excellence?

UCSF has long-standing expertise in brain vascular malformation research, and the PBC is considered a leading center nationally and internationally for the care of children with brain AVMs. We've essentially married the basic science and genetic epidemiology work in the laboratory on brain AVMs from the [Center for Cerebrovascular Research](#), the PBC's expertise in caring for kids with AVMs, and our collaboration with the [International Pediatric Stroke Study](#) to create three projects that make up the new Center.

## What does this mean for patients and their families?

We are fortunate to have resources and tools like advanced imaging technology to make surgeries as safe as possible at UCSF. In our state-of-the-art hybrid-angiography operating suite, our neurosurgeons can obtain high-quality angiograms in the operating room, which minimizes risks and further surgeries for revisions.

However, our goal is to go beyond the care of the children at UCSF and think about children in more resource-limited settings. How can we utilize the knowledge we've gained to help children and providers globally with resources and guides on hemorrhages and AVMs?

## There is a very heavy imaging component to the research plan. What kind of advanced imaging techniques are being used and how are they important to understanding AVMs and hemorrhage?

For the [first project](#), led by Helen Kim, PhD, MPH, we'll be looking at imaging and biological predictors through a new technology called Forty Flow imaging, which is a way to measure blood flow in vessels in the brain. This will help us identify the kids that are at risk for the recurrences, when the recurrences are happening, and predict the behavior of brain AVMs. This will ultimately help us to better take care of these children.

The [second project](#) will be led by pediatric neurosurgeon Jarod Roland, MD. He will look at imaging predictors of outcomes after brain AVMs by studying functional brain networks with resting-state fMRIs. The functional MRIs will help us identify and understand which networks, such as movement or language, are working together with different parts of the brain. How does the location of an AVM affect the functional networks, and how can we use that information to guide surgical planning to make it safer for kids?

If the ultimate goal of the grant is to develop guidelines for pediatric stroke, who are the guidelines written for, and can they be implemented at non-academic hospitals without advanced imaging and surgical capabilities?

We are anticipating that the new Center will develop a large body of knowledge that will be useful at many different levels. For kids in the US, we hope to better understand the timing of recurrences to tailor imaging studies to avoid excess imaging studies.

For kids globally, we want to collaborate with the international network and partner with the providers from resource-limited settings to understand what the specific limitations are and how we can we provide helpful advice and use this info to develop strategies that can help kids.

Which part of the grant are you most hopeful about?

We always have to think about setting ourselves up for the future, including training young investigators to continue the line of work. This work won't end in the time limit of the grant so the legacy of a new generation of investigators is important and exciting.

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