

# 2011 Award Winner

William Meurer, M.D., M.S.

## Stroke and the Brain-Heart Connection



Thanks to the Heart of a Champion Research Fund, Dr. Meurer is exploring the curious and fascinating connection between the brain and the heart.



William Meurer, U-M assistant professor of both neurology and emergency medicine, cares for stroke patients every day at University Hospital, witnessing firsthand the damage that can result when the brain is deprived of blood, even for a short time.

Every stroke is a critical medical emergency. But not all strokes are the same. A

small subset of patients suffer a severe episode known as a subarachnoid hemorrhage, or SAH, caused by the bursting of one of the primary blood vessels to the brain. These are among the most severely compromised stroke patients, and for some, the damage is not limited to the brain. The heart may be impacted as well, apparently the result of distress signals sent from the brain to the heart during the event. These signals cause a reaction very much like a heart attack. Science has yet to explain this curious brain-heart connection, let alone develop strategies to counter it. But with the support of the Heart of a Champion Fund, Dr. Meurer is out to change that.

The concept of the brain sending stress signals to the heart is not a new one – a similar phenomenon has been described in scientific literature as takotsubo cardiomyopathy or “broken heart syndrome.” Messages from the brain to the heart travel through the sympathetic nervous system, known to control the body’s “fight or flight” impulses. It is along this highway that the brain triggers the production of substances such as epinephrine (adrenaline), which signals the heart to beat more rapidly, sometimes injuring specific areas of the heart. Although the heart can usually rebound, in the case of vulnerable SAH stroke patients, this episode in the heart lowers blood flow to the brain at a time when they are already fragile and struggling to recover.

To better understand the complex connection between the brain and the heart, Dr. Meurer is approaching this question from multiple vantage points. First, he has designed a soon-to-open clinical trial to determine whether administering a beta-blocking drug immediately after a SAH may interrupt some of the stress signals coming from the brain, helping to protect the heart.

In a separate study made possible by the Heart of a Champion Research Fund, he will collect and analyze a range of data from SAH patients, including information from heart rate monitors and EKGs, to look for patterns that may shed light into how the sympathetic nervous system is functioning over time. To learn even more, Dr. Meurer is expanding on that study, employing positron emission tomography (PET) to image the heart. A select group of SAH patients who exhibit heart problems will undergo PET scans, and that information will be compared to healthy heart scans. It is hoped that this effort will shed light on the specific areas of the heart prone to this type of injury, and how the sympathetic nerve connections on the surface of the heart may be altered during a SAH event.

Only at an institution like Michigan would it be possible for Dr. Meurer to launch such significant and comprehensive research. The Heart of a Champion Fund is evidence of the CVC’s commitment to supporting the ideas of young investigators, and to fostering a high degree of cross-disciplinary collaboration. Dr. Meurer credits this “Michigan Difference” with helping him explore the brain-heart connection from so many angles. It was after attending a CVC lecture by U-M radiologist David Raffel, Ph.D., that he was inspired to expand his research, partnering with Dr. Raffel to design the PET imaging study.

The goal of all of these efforts is to gain better insight into how the brain communicates with and impacts the heart. Meurer hopes that he and other researchers can build on these initial studies, eventually developing treatments to protect the heart during SAH. For Meurer, it’s all about improving care. “Patients that are struggling to recover from a severe stroke need every advantage we can give them,” he says. “We need to do all we can to keep the heart working well so the brain can recover.”