

Research Grant Investigates Vascular Brain Imaging

Leonardo Rivera, Ph.D. University of Wisconsin-Madison

The Alzheimer's Association is committed to changing the course of Alzheimer's for millions through early detection and discovering ways to slow, stop or cure this fatal disease. The Alzheimer's Association Research Grant and Fellowship Awarded Leonardo Rivera a 3-year, \$174,999 grant.

Using Vasular Imaging to detect Early-stage Alzheimer's

As a part of Rivera's Ph.D. studies, he was working on translating 4D flow MRI into the clinic. "People tend to think of the MRI for structural imaging, but what is less known is that you can also track blood circulation using MRI." The grant he received focuses on developing MRI techniques to look at vessels to quantify blood flow and if these techniques can help detect the early stages of Alzheimer's disease.

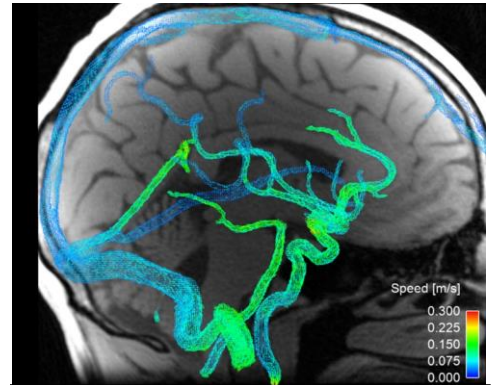
A key element of his research is data provided by the Wisconsin Alzheimer's Disease Research Center (ADRC). The ADRC had been collecting 4D flow MRI data for years, but a comprehensive analysis was needed. Their data suggested that Alzheimer's patients have less blood flow to the brain. A key focus for Rivera is to develop a study to analyze historical data and blood flow to the brain.

Traditional techniques for measuring cerebral blood flow measured perfusion – the amount of blood in tissue on a capillary level. With 4D flow MRI, researchers can see the intracranial arteries and the veins. The key difference is you're measuring blood flow in larger arteries so you have a different aspect of measurement which can be used to determine vascular health and the amount of blood flow delivered to the brain. If brain blood flow is a determinant of early stage Alzheimer's, being able to probe larger vessels can be very revealing.

Rivera explained that traditional research suggests that vascular dementia and Alzheimer's are different. However, his research is studying the relationship between the two. "If we can better understand how vascular health is related to Alzheimer's, then we have the potential to develop targeted treatments for vascular disease that might impact Alzheimer's disease," Rivera shares. "It could help us diagnose Alzheimer's earlier or if you have Alzheimer's disease and vascular disease it could help slow cognitive decline."

Importance of Research

"Alzheimer's is a complex disease and we need the best and brightest working to find a cure," says Rivera. "With more than 5 million Americans living with this disease, it's a social and public health problem for our world. There is a lot we still don't understand about the disease and it's important we harness talent from different backgrounds and specialties to further the research."



Example of a brain 4D flow MRI scan.

Provides both structural and physiological information, allowing assessment of blood flow in the intracranial arteries and veins.



Rivera is motivated by the community this impacts. "I have so much empathy for the caregivers who help manage this disease every day," says Rivera. "This is enough to make me wake up every morning feeling motivated to work hard and help in the fight."

Dr. Rivera is presenting a poster at the Alzheimer's Association International Conference on July 28th. He will be displaying the findings of vascular health related to new imaging methods.

Dr. Rivera has lived in Madison for over a decade. He completed his Ph.D. at the University of Wisconsin – Madison with his dissertation on vascular health and Alzheimer's disease. He is a native of Puerto Rico.