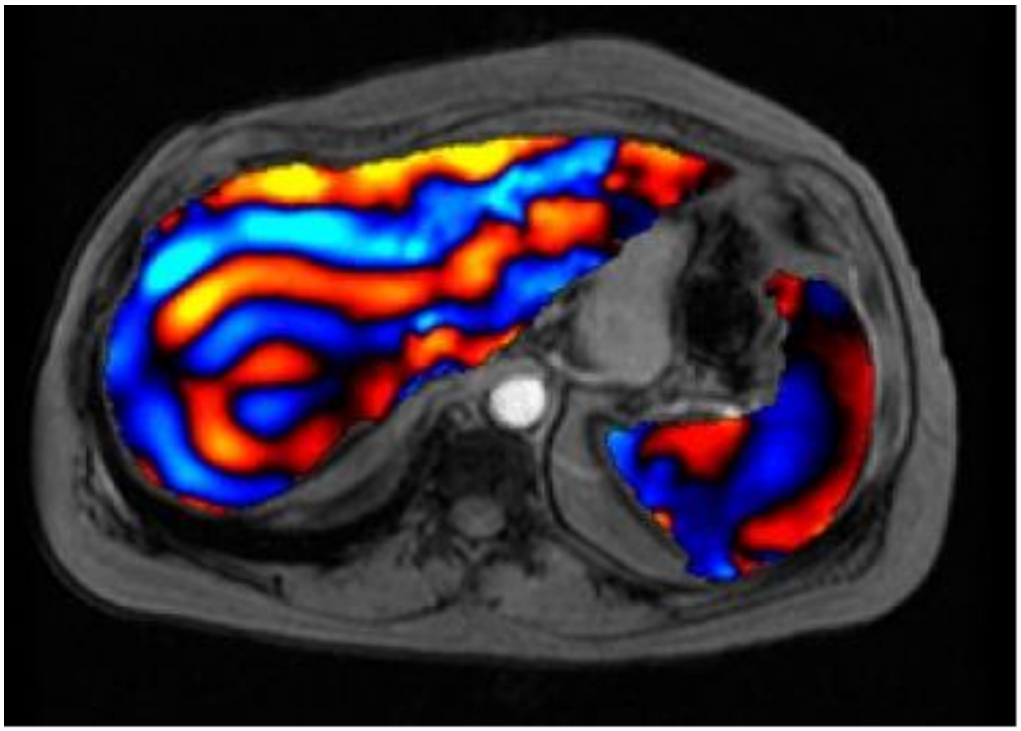

3T MR Research Program

Center for MR Research

University of Illinois at Chicago

TECH 2000 3T MRI RESEARCH FACILITY

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3T Research News

By Mike Flannery

The 3T MR Research Program would like to remind everyone of the importance of MRI safety while working in the scan or control room. All participants and new personnel must undergo properscreening and safety clearance by a 3T CMRR technologist prior to entry into the MR scan room. MR contraindications may include:

- Pacemaker / defibrillator
- Aneurysm clips
- Deep brain stimulator / neurostimulator
- Magnetically activated surgical devices

A participant with any history of or possible presence of metal in the vicinity of the eyes will need to obtain an orbital CT or x-ray screening to rule out metallic foreign bodies prior to any MR scan.

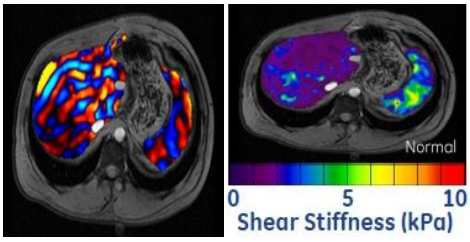
Please confirm the MR compatibility of any questionable surgical implants with a research technologist prior to scheduling your participant's scan. The device manufacturer and model are needed to properly determine MR safety at 3T.

GE MR750 Advanced Application: MRE

The 3T MR Research Program recently acquired the GE MRE hardware and software for advance liver imaging capabilities. Magnetic resonance elastography (MRE) is an imaging technique developed by Richard Ehman, MD and colleagues at Mayo Clinic. It involves the use of both an active acoustic driver and a passive driver delivering low-frequency mechanical waves to determine a tissue's elastic properties. A MRE specific phase-contrast pulse sequence is used to image the generated mechanical waves. After t data collection, complex algorithmic calculations generate color wave images and elastograms depicting the relative tissue stiffness of the tissues.

MRE facilitates the evaluation of liver tissue stiffness in various pathologies, such as hepatic fibrosis, cirrhosis, and tumors. Advantages of this new liver assessment method include:

- Non-invasiveness in comparison to conventional liver biopsy
- Ability to image through bone
- Expanded anatomical coverage
- Increased diagnostic sensitivity



Wave Image **Elastogram**

The relative tissue stiffness in an elastogram is measured in kiloPascals. Normal liver tissue stiffness, which has softness similar to subcutaneous fat, averages 2 kPa. In contrast, the average tissue stiffness in hepatic fibrosis measures approximately 5.8 kPa and higher depending upon the disease state.

Research spotlight

Effect of Hemodynamics on Stroke Risk in Symptomatic Atherosclerotic Vertebrobasilar Occlusive Disease.

Dr. Amin-Hanjani, MD

Dr. Sepideh Amin-Hanjani, a Professor, Residency Program Director, and Co-Director of Neurovascular Surgery at UI Hospital & Health Science System, specializes in cerebrovascular surgery for brain aneurysms, Moya-Moya disease, carotid artery disease, arteriovenous malformations (AVM's), and cavernous malformations. She also evaluates and manages patients with hemorrhagic and ischemic stroke, including intra-cranial disease and vertebro-basilar insufficiency (VBI). In 2013, she was elected member-at-large of the Congress of Neurological Surgeons (CNS) Executive Committee for a 2-year term. Dr. Amin-Hanjani served as lead investigator for a study recently published in *JAMA Neurology*, in which patients with low blood flow to the back of the brain were identified using new MRI-based software developed at UI Hospital & Health Science System.

The following abstract was shared with the research community. For further reading, please refer to the full article published in the February 2016 issue of JAMA Neurology.

Importance

Atherosclerotic vertebrobasilar (VB) occlusive disease is a significant etiology of posterior circulation stroke, with regional hypoperfusion as an important potential contributor to stroke risk.

Objective

To test the hypothesis that, among patients with symptomatic VB stenosis or occlusion, those with distal blood flow compromise as measured by large-vessel quantitative magnetic resonance angiography (QMRA) are at higher risk of subsequent posterior circulation stroke.

Design, Setting, and Participants

A prospective, blinded, longitudinal cohort study was conducted at 5 academic hospital-based centers in the United States and Canada; 82 patients from inpatient and outpatient settings were enrolled. Participants with recent VB transient ischemic attack or stroke and 50% or more atherosclerotic stenosis or occlusion in vertebral and/or basilar arteries underwent large-vessel flow measurement in the VB territory using QMRA. Physicians performing follow-up assessments were blinded to QMRA flow status. Follow-up included monthly telephone calls for 12 months and biannual clinical visits (for a minimum of 12 months, and up to 24 months or the final visit). Enrollment took place from July 1, 2008, to July 31, 2013, with study completion on June 30, 2014; data analysis was performed from October 1, 2014, to April 10, 2015.

Exposure

Standard medical management of stroke risk factors.

Main Outcomes and Measures

The primary outcome was VB-territory stroke.

Results

Of the 82 enrolled patients, 72 remained eligible after central review of their angiograms. Sixty-nine of 72 patients completed the minimum 12-month follow-up; median follow-up was 23 (interquartile range, 14-25) months. Distal flow status was low in 18 of the 72 participants (25%) included in the analysis and was significantly associated with risk for a subsequent VB stroke (P = .04), with 12- and 24-month event-free survival rates of 78% and 70%, respectively, in the low-flow group vs 96% and 87%, respectively, in the normal-flow group. The hazard ratio, adjusted for and age stroke risk factors, in the low distal flow status group was 11.55 (95% CI, 1.88-71.00; P = .008). Medical risk factor management at 6-month intervals was similar between patients with low and normal distal flow. Distal flow status remained significantly associated with risk even when controlling for the degree of stenosis and location.

Conclusions and Relevance

Distal flow status determined using a noninvasive and practical imaging tool is robustly associated with risk for subsequent stroke in patients with symptomatic atherosclerotic VB occlusive disease. Identification of high-risk patients has important implications for future investigation of more aggressive interventional or medical therapies.

Table 3. Risk-Adjusted Multivariate Model of Predictors of Subsequent Stroke

Risk Factor	HR (95% CI)	*P* Value
Low distal flow status	11.55 (1.88-71.00)	.008
Age	0.80 (0.70-0.91)	.001
Coronary artery disease	10.47 (1.54-71.34)	.02
Diabetes mellitus	9.63 (1.66-55.76)	.01
Physical activity	0.06 (0.005-0.64)	.02

Abbreviation: HR, hazard ratio.