

### **New 3-D MRIPH Technique Helps Detect High-Risk Diseased Arteries**

Toronto, ON (September 16, 2008) – Sunnybrook researchers are the first worldwide to show a new form of MRI technique may prove to be a useful screening tool to prevent stroke and heart attack by detecting a specific type of dangerous plaque in the arteries of high-risk patients.

This new non-invasive technique provides radiologists a closer, more in-depth look into diseased arteries, providing information never seen before, and has the potential of changing the standard of imaging everywhere.

“There’s been a major sea change in our research: we now know that the composition of carotid artery plaque is likely to be more predictive of future stroke events than the amount of narrowing in the blood vessel,” says Dr. Alan Moody, lead investigator of a new study and radiologist in chief in the Department of Medical Imaging at Sunnybrook Health Sciences Centre. “Complicated plaque increases the risk of stroke or heart attack regardless of the degree of narrowing within the artery. The detection of bleeding within the walls of diseased carotid arteries may provide an opportunity to intervene and stabilize the plaque before it causes a vascular event, such as stroke and heart attack, or sometimes death.”

The investigators show that magnetic resonance imaging of plaque hemorrhage (MRIPH), a three-dimensional magnetic resonance imaging technique, is capable of detecting the bleeding that occurs within a plaque in an artery. This can lead to thrombosis or even blockage in the artery resulting in a heart attack or stroke.

There are different types of plaque within an artery: one is the type that won’t necessarily cause any problems if it is not completely blocking the blood flow through an artery; the other type is the dangerous kind that is more prone to rupture. These complicated plaques can lead to additional clot on top of the ruptured clot in the vessel itself. Within the carotid artery pieces can then break off and flow from the neck into the brain, causing a stroke. This results in damage to the brain, often disabling the person, often with loss of cognitive and physical function. In the heart, the same process of vessel wall disease leading to end organ damage results in a heart attack.

Until now, standard techniques to detect plaques included traditional ultrasounds, CT scans and MRI’s, which focused on the degree of narrowing of the blood vessel. This new MRI technique however looks at the disease within the vessel wall itself, often before it causes any significant narrowing. This early warning sign can flag a physician to a patient’s risk, providing them with the opportunity to treat the problem before it escalates into a full-blown blockage.

A first in North America, Dr. Moody brought the 3-D MRIPH technique to Canada from England. “This technology gives us information we’ve never had before,” says Moody, also a professor at the University of Toronto. “It tells us how dangerous the plaque is and if it is likely to rupture. Until recently, we didn’t know the specifics about the type of blockage, we only went by how much narrowing it caused to the blood flow. If the narrowing was severe it could be taken out surgically. Now, it can tell us information about the plaque before it is causing major problems.”

There are many unanswered questions regarding the risk of stroke in patients with complicated plaques in the carotid arteries, including the necessity for surgery in certain patients. This new technique may assist in selecting appropriate patients for surgery to remove a troublesome plaque, or to avoid surgery in patients who may not require it. Moody and his team are collaborating with scientists and clinicians across Canada through the Canadian Atherosclerosis Imaging Network (CAIN) to undertake larger more powerful trials to quickly answer some of these questions

Dr. Moody and his fellow researchers have successfully applied the technique in the neck vessels of trial patients in both England and in Canada at Sunnybrook since 2003. "Results of larger trials will allow us to assess exactly how MRI of the vessel wall should be used in clinical practice after which we are looking forward to providing this service on a clinical basis to improve stroke prevention," adds Dr. Moody. "Understanding the disease process and then applying modern imaging techniques for their detection allows rapid translation of these advances into the clinic. I believe the research we are performing within radiology into these advanced cardiovascular imaging techniques has clinical applications throughout the vascular system".

The investigators performed the 3-D MRIPH on the carotid arteries of 11 patients, ages 69 to 81. Complicated plaques were then surgically removed from the patients' diseased arteries and analyzed under a microscope. The research team found strong agreement between the lesions identified by the MRI as complicated plaques and the microscopic analysis of the tissue samples.

The 3-D MRIPH technique is easy to perform and interpret and it adds only a few minutes to an MR angiography exam.

The results of the study are published in the October 2008 issue of *Radiology*.

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