JOHNS HOPKINS
BIOMEDICAL ENGINEERING

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New frontiers in atherosclerotic lesion characterization with MRI

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Abstract: Cardiovascular disease remains the leading cause of death in the US and the industrialized world. To prevent acute events, atherosclerotic lesions need to be detected, characterized and followed up at an early stage, preferably using noninvasive methods. Magnetic resonance imaging (MRI) is already a noninvasive clinical method for the assessment and detection atherosclerosis in most major blood vessels.

I will present two projects designed to extend MR's atherosclerotic plaque characterization capabilities. First, I demonstrate the use of real-time MR guidance combined with catheter-based optical imaging. Excitation emission spectroscopy (EES) is a well known optical imaging technique that can simultaneously identify multiple targeted contrast agents located in a target tissue. The combination of a custom-designed EE spectrometer with MR's active catheter tracking is demonstrated as a innovative way in which to further assess non-stenotic plaques.

Second, I will present the use of ultra-short echo time (UTE) MR for the evaluation of calcifications in atherosclerotic lesions. Due to their solid nature, calcified tissues have a very short T2 relaxation rates on the order of ~0.5-2ms, resulting in signal voids in standard MR imaging. UTE imaging acquired data before signal decay is complete, allowing for the detection of calcified tissues. I will show MR and CT images correlating calcium in *ex vivo* human aortic and carotid plaques. Preliminary patient data will also be presented, showing the potential of this technique for plaque characterization.

For more information call 410-516-7903
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