

## Techniques and Applications of Atherosclerosis MRI

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Atherosclerosis is widely recognized as a multifactorial disease with outcomes that arise from complex factors such as plaque components, blood flow, luminal stenosis, and inflammation. Despite recent advances in understanding of plaque biology, diagnosis and treatment, atherosclerosis remains a leading cause of morbidity and mortality. Further research into the development and validation of reliable indicators of the high-risk individual is greatly needed. MRI of atherosclerosis is a histologically validated, noninvasive imaging method that can track disease progression and regression, and quantitatively evaluate a spectrum of parameters associated with *in vivo* plaque morphology and composition.

Technically, MRI of atherosclerosis relies on the use of combined black and bright blood techniques to distinguish vessel lumen and wall tissues, multi-contrast approaches to identify main plaque tissue components, the use of novel coils designs to improve image SNR and spatial resolution, and contrast-agent applications which highlight vessel neovasculature and improve tissue contrast. Recently, both heavily T1 and T2\*-weighted techniques have also been explored for plaque tissue characterization. MRI of atherosclerosis is being applied in all major arteries in many studies aiming to identify key factors linked with current or future cardiovascular events, as well as for monitoring lesion progression/regression under medical treatment and for clinical diagnosis.

This lecture will review the remarkable technical advances of MRI atherosclerosis and the new insights into high risk lesions provided by MRI. It will also address the challenges for making MRI of atherosclerosis a routine diagnostic tool.