

Imaging Biomarkers in Cardiovascular Disease:

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This course will cover Imaging Biomarkers for cardiovascular disease. Although many imaging biomarkers exist, this lecture will focus on biomarkers related to atherosclerosis imaging. 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. A series of quantitative measurement can be obtained from MRI of atherosclerosis including tissue components, wall morphology, and inflammation. This course will focus on validated imaging biomarkers and the information they provide about plaque status, biomarker validation and use in single and multi-center clinical trials, and will also discuss novel targeted imaging approaches and their applications, and future directions and targets for atherosclerotic plaque imaging.