

Accelerated zonal magnetic resonance flow measurement methods for assessing endothelial function

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Endothelial dysfunction plays a central role throughout the atherosclerotic disease process and can be assessed by measuring changes in arterial diameter and blood flow upon endothelial-dependent vasomotor interventions. These responses can be used to probe sub-clinical disease as well as possibly predict cardiovascular events. Magnetic Resonance phase-contrast imaging represents a non-invasive diagnostic tool for the evaluation of endothelial function. For accurate assessment, a higher spatiotemporal resolution than available up to now is necessary. To this end echo-planar and spiral zonal excitation schemes will be implemented, calibrated and tested on two clinical MR systems, in combination with multi-transmit technology to shorten composite radio-frequency pulse lengths. Using transform- coding approaches data correlations present in space and time will be exploited to further reduce the amount of data required to reconstruct velocity- encoded images. The ability to measure local endothelial function and relate this to local progression of disease could be used to guide the aggressiveness of systemic therapy for a high-risk segment (i.e. vulnerable lesions) and possibly guide future studies of the utility of interventions for high-risk, non-flow-limiting lesions.