Comparison of magnetic resonance imaging based atherosclerotic plaque index in patients with and without coronary artery disease

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Introduction: Traditional risk factors have predictive power for cardiovascular events but do not determine presence of coronary artery disease (CAD). The purpose of this study was to use a magnetic resonance imaging (MRI)-based atherosclerotic Plaque Index (PIN) to measure the burden of atherosclerotic disease (BAD) and its correlation with various traditional risk factors for CAD.

Methods: Seventeen patients (14 male, mean age 68± 9 years) with history of CAD and 17 age and gender matched controls (total n =34) were imaged using a 1.5T scanner. 12-24 transverse images 3mm thick centered on the carotid bifurcation and 32-48 transverse images 5mm thick of the aorta from the aortic arch to the level of the iliac bifurcation were obtained using rapid extended coverage black blood turbo spin echo sequence (REX). The total examination time was < 1 hour. The inner, outer vessel wall and the diameter of the lumen on two axes were measured (Figure). Average wall area of carotids (CWA) and aorta (AWA) and PIN (vessel wall area normalized to average lumen diameter) for aorta (PINA) and carotids (PINC) were calculated for all patients Framingham Score and 10-year risks were determined.

Results: Comparing patients without CAD and those with CAD, Framingham Scores (6.02 ± 2.53 for patients without CAD vs. 7.28 ± 4.07 for patients with CAD, p =0.129, NS) and 10-year risks (0.117 ± 0.069 for patients with no CAD vs. 0.141 ± 0.089 for patients with CAD, p = 0.168, NS) were not significantly different in this cohort. CWA and PINC were also not significantly different comparing non-CAD and CAD groups. However, AWA (143.8 ± 41.1 for patients without CAD vs. 190.2 ± 62.9 for patients with CAD, p < 0.01) and PINA (7.05 ± 1.17 for patients without CAD vs. 8.76 ± 2.67 for patients with CAD, p < 0.01) were significantly higher in patients with CAD as compared to those without it.

Conclusions: MRI may non-invasively detect vascular pathology in high-risk patients. PIN may be used to screen patients especially at risk for CAD and may be used as an adjunct to cardiovascular assessment

Acknowledgements: This work was partially supported by the NIH/NHLBI HL071021 and HL078667