

Magnetic Resonance Imaging Parameters of Atherosclerotic Plaque Burden Successfully Predict Manifested Cardiovascular Disease

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Background: MR measures of atherosclerotic plaque burden may improve retrospective discrimination of patients with and without manifested cardiovascular disease (mCVD) and may therefore be useful in identifying patients at risk. The purpose of this study was to evaluate if MRI plaque burden measures in conjunction with traditional risk factors improve predictive capacity for cardiovascular disease, and may therefore be useful in pre-identification of patients at risk.

Methods: Black blood carotid and thoracic aorta images were obtained from 296 patients at intermediate to high risk for atherosclerosis using a rapid extended coverage turbo spin echo sequence. MR measures of plaque burden including wall area, wall thickness and normalized wall index (wall area / (lumen area + wall area)) were obtained by manual tracing of lumen and outer vessel wall contours. Resulting data were correlated with traditional risk factors such as age, BMI, smoking status, hypertension, diabetes, and lipid profile. The ability of quasi-Framingham risk scores weighted according to the current data and MR atherosclerotic burden scores to predict mCVD was evaluated using receiver operating characteristics (ROC) curves.

Results: ROC curves showing the effect of individual MR measures in predicting retrospective mCVD are shown in Figure 1A and results obtained by combining MR measures (mscore) (ROC area = 0.853) and combining traditional risk factors to obtain a quasi Framingham risk score(fscore) (ROC area=0.874) is shown in Figure 1B. Figure 2 shows that wall thickness and standard deviation of wall thickness of carotids in patients with mCVD is significantly higher than in those without mCVD.

Conclusions: MR imaging may be incorporated with traditional risk factors in pre identification of patients at risk for mCVD.

