

Oral presentation

## Visualization of carotid plaque calcification - a novel approach using susceptibility weighted MR imaging

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### Introduction

Black-blood sequence has been the method of choice in carotid artery plaque imaging. Susceptibility weighted imaging (SWI) can be used to image the vessel wall and calcifications without the need to suppress the signal from the blood.

### Purpose

To demonstrate the feasibility of susceptibility weighted imaging (SWI) for visualization of carotid artery wall calcifications by MRI using CT as the reference standard.

### Methods and materials

Carotid arteries of 12 consecutive subjects were imaged with non-contrast multi-detector computed tomography (MDCT) and high resolution 3D susceptibility weighted imaging (SWI) at 3.0 T (MAGNETOM Trio, A Tim System, Siemens AG). Imaging parameters for SWI were optimized to: TE = 15.6 ms; TR = 38 ms (with fat saturation); FA = 10°; BW = 80 Hz/pixel; resolution = 0.5 mm × 0.5 mm × 2.0 mm; coverage: 40 mm, covering the carotid bifurcation. The Head-neck matrix coil was used. MR and CT images were analyzed by two experienced radiologists for the identification of the vessel wall calcification and the measurement of the calcified area, which was determined as high attenuation on CT and high signal intensity on the SWI phase images. SPIN software (Detroit, MI) was used for Phase image review and measurement of the MRI data. Sensitivity and specificity were calculated using CT

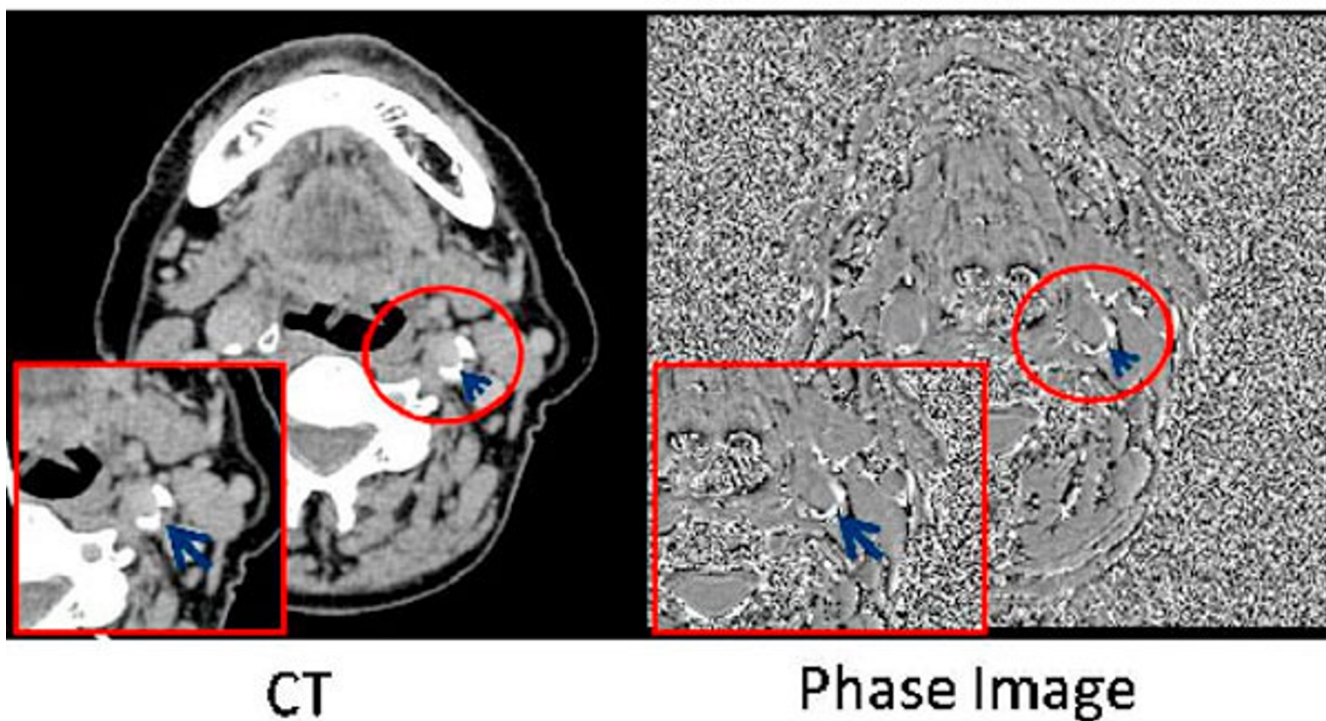
as the reference standard. Pearson correlation coefficient was determined for the calcified area measurements of the CT and MR images Figure 1.

### Results

A total of 13 calcifications in 6 subjects located in the carotid artery wall were identified with CT. Sensitivity and specificity with SWI was 84.6%(11/13) and 92.8%(13/14), respectively. The mean area of calcification measured on CT and SWI phase images was  $0.45 \pm 0.13$  cm<sup>2</sup> and  $0.38 \pm 0.18$  cm<sup>2</sup> respectively. The Pearson correlation coefficient of the measured calcification area between CT and SWI phase image is 0.88 ( $p < 0.001$ ).

### Conclusion

Despite the preliminary character, this study clearly indicates that carotid artery wall calcification seen in SWI phase images correlate well in both location and size with the CT results. MRI can therefore offer an alternative approach to CT for detection of plaque calcification.



**Figure 1**  
A typical case of carotid calcification.

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