

## Clinical Application for Cirrhosis with Susceptibility Weighted Imaging

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### Purpose

As SWI is taking advantage of susceptibility of tissues and vessels to provide a new special image contrast which is different from conventional T1, T2 and Proton Density weighted contrast, it has been proven to be of great value to clinical diagnosis for human brain diseases. In this study we extended SWI application from human brain to abdomen (cirrhosis in this study) at 3T to see if SWI could provide extra benefit to abdomen diagnosis in addition to conventional MR images.

### Methods

Two cirrhosis patients and one normal volunteer (2 female, 1 male, 45, 46, 57years) underwent clinical measurement on a whole body 3T scanner (Siemens, MAGNETOM Verio) equipped with a 12-channel body matrix coil. T1, T2 weighted and SWI images were taken in axial or coronal directions for upper abdomen coverage. Scanning parameters of SWI were: 2D gradient echo sequence, FOV 380\*285mm, Spatial Resolution: 1.5\*1.0\*5 mm<sup>3</sup>, TE/TR = 10/135 ms, FA = 20°, parallel imaging (iPAT = 2), several times of breath-hold, 30 slices per-measurement, acquisition time is less than 1 minute. For this two cirrhosis cases, the performance of abnormal nodules of SWI and conventional T1, T2 weighted images were compared with software SPIN (Signal Processing in NMR, MRI Institute of Biomedical Research, Detroit).

### Results

For the female cirrhosis patient, both SWI and SWI filtered phase images showed abnormal nodules (circle and arrow in Fig.1) of different size and irregular shape though the entire liver. Although in T2 weighted image some siderotic nodules could also be detected due to their shorter T2 or T2\*, the conspicuity of them is not as good as SWI and SWI filtered phase images due to "dark" liver background. In T1 weighted image, only the boundaries of macro nodules could be found. For the male cirrhosis patient, siderotic nodules (arrow in Fig.2a) of similar size distributed densely through the entire liver in SWI and SWI filtered phase images, which could not be easily found in T1 weighted image. In T2 weighted image with fat saturation, the conspicuity of nodules was still undermined by the dark liver. For the normal volunteer, no abnormal nodules were found from all images (Fig. 2b).

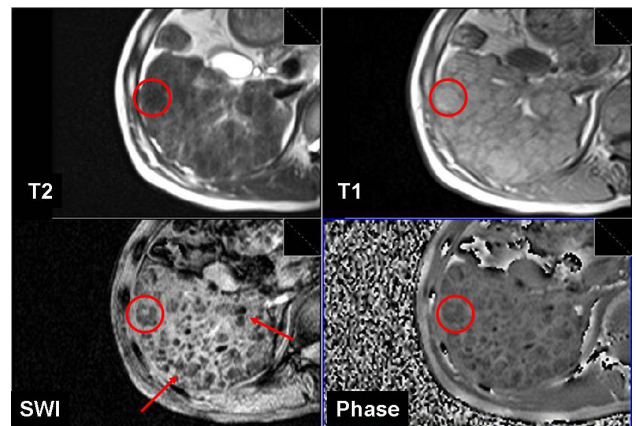


Fig.1 Conventional T2, T1 weighted images, SWI and SWI filter phase images for one cirrhosis patient at severe stage.

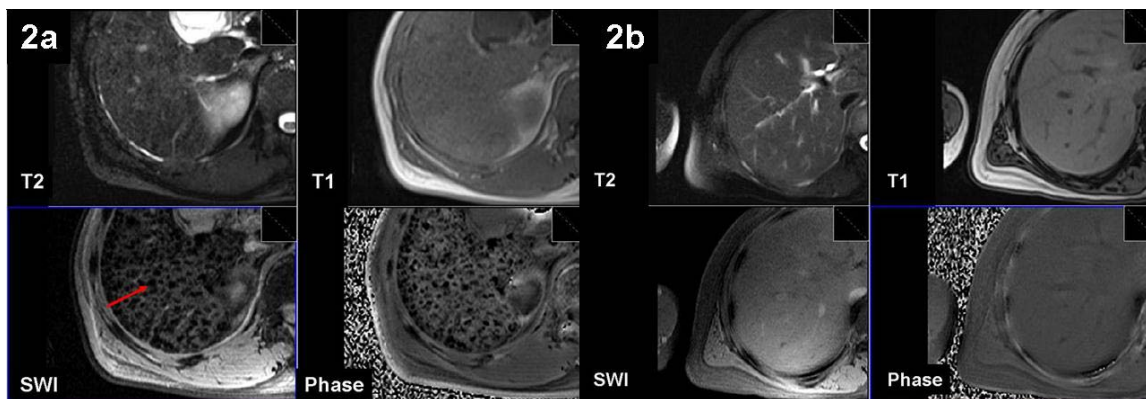


Fig.2 Conventional T2, T1 weighted images, SWI and SWI filter phase images for one cirrhosis patient at medium stage (2a) and one normal volunteer (2b).

### Conclusions

In this cirrhosis study, SWI has shown its prominent ability to find out details of abnormal nodules of patients, which is beyond what could be found by conventional T1, T2 weighted images. Based on the exciting performance of SWI and SWI filtered phase images in this study, we believe SWI will be developed as a promising method for hepatic diseases diagnosis and research in the future, although SWI still need some pathologic verification in hepatic application.

### Reference

1. Zhang J, et al, NMR in Biomedicine, 17, 7: 459-464(2004); 2. E.M. Haacke, et al, MRM, 52:612-618 (2004).