

Effect of intravenous superparamagnetic iron oxide on diffusion-weighted imaging

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Purpose: Diffusion-weighted imaging (DWI) is usually done before administration of intravenous superparamagnetic iron oxide (SPIO). Repetition of DWI is occasionally necessary after administration for quantitative evaluation of prediction of malignancy or monitoring of therapeutic response using apparent diffusion coefficients (ADC), but the effects of SPIO on ADC values have not been fully examined. The purpose of this study is to evaluate the effect of intravenous SPIO on DWI.

Materials and methods: The subjects were 20 patients with 31 hepatic metastases (tumor size: 1.2-12cm, median:3.3 cm) who underwent SPIO-enhanced diffusion weighted MR imaging. Diffusion-weighted MR images were obtained by single-shot EPI sequence during breath hold (on Siemens Magnetom Sonata 1.5T, TR/TE=2100/69-77, b factor=0, 500 s/mm², PAT factor=2, Acquisition time=23sec, Slice thickness=5mm, Matrix= 128 x 96) before and 10 minutes after the injection of SPIO (ferucarbotran: 8 μmol Fe/kg). ADC values of the lesions were measured on ADC maps. A paired *t*-test was used to determine the significance of differences between the values before and after administration of SPIO.

Results: The mean pre-contrast and post-contrast ADC values in metastatic lesions were 1.34 ± 0.28 and $1.24 \pm 0.27 \times 10^{-3}$ (mm²/s). A paired *t* test comparing the values before and after administration of SPIO revealed that ADC values significantly decreased after SPIO-enhanced DWI ($p < 0.001$).

Conclusions: Superparamagnetic iron oxide injection had significant effects on ADC values. Therefore, only pre-contrast diffusion-weighted images should be used on quantitative ADC studies.

