

AbstractID: 12732 Title: Modeling the pseudo displacement produced by spatially asymmetric enhancement during motion detections of DSC-MRI

Introduction

The signal changes, induced by susceptibility effect, in dynamic susceptibility contrast MRI (DSC-MRI) studies probably generate pseudo displacement in automatic motion detections. Kosior *et al.* has discussed the motion correction in a digital anthropomorphic brain phantom using statistical parametric mapping (SPM) [1]. This study is aimed to estimate the pseudo displacement which is caused by signal intensity change.

Methods

An asymmetric enhancement index (AEI) was calculated by an equation $(A_i - B_i) / d_i$. The A_i and B_i of the post-contrast image represent the symmetry points in up-down direction and the values have been divided by the pre-contrast image; the d_i represents the distance far from the central line. Two DSC-MRI images obtained from two patients and the simulated images were detected motion in SPM2 and compared to the AEIs.

Results

According to the simulation results, the translation was conspicuous only in x-axis considering that the simulated images were left-right symmetry. Its pseudo displacement was the most, about 0.8 pixels, while the positional changes were located at the uppermost and the lowest position (Fig. 1). Moreover, the more the signal of post-contrast image was decreased relative to the pre-contrast image, the more the pseudo displacement was produced (Fig. 2). The AEIs were correlated with the pseudo displacement of the simulated images (Fig. 3). Finally, the prognosis of the pseudo displacement (red line) was plotted with the motion detection (blue line) in the real images (Fig. 4).

Discussion

In this study, the pseudo displacement, which was caused by the asymmetric enhancement and the degree of signal change relative to pre-contrast image, showed the apparent negative x-translation in DSC-MRI. The spatially asymmetric enhancement in a brain resulted from the enhancing area of gray matter which was not asymmetry in up-down direction. Consequently, the AEIs were able to model the pseudo displacement in the first-pass period.