AbstractID: 7089 Title: Separate water and fat imaging with a novel phase-correction algorithm

Purpose:

The purpose of this study is to describe the implementation of an efficient and robust 2-point Dixon technique with a novel phase-correction algorithm and a triple-echo fast spin-echo (fTED) data acquisition.

Methods and Materials:

An fTED pulse sequence was developed and used to collect an in vivo raw dataset on 1.5T GE whole body MRI scanner. The pulse sequence was modified from the FSE pulse sequnece by replacing each readout gradient between each 180^o refocusing RF pair with three readout gradients of alternating polarity. The separation between the three readout gradients is timed so that the three corresponding raw images have a relative water and fat phase of 180^o, 0, 180^o, respectively. A novel phase-correction algorithm was developed to remove phase errors and produce the water-only and fat-only images. The algorithm determines the phase vector direction rather than the phase value. Both the pixel intensity and precalculated phase gradients are used to guide the region growth sequence. The advantages of the algorithm include its easy implementation, computational efficiency, and robustness in the presence of pixels with large phase uncertainty.

Results:

Clean water and fat separation was achieved using the novel phase-correction algorithm for all the images. Using only phase gradients for determining the growth sequence, small local regions were noted to have reversed water and fat assignment. Such processing errors were corrected when pixel intensity was included in the determination of the growth sequence.

Discussion and Conclusion:

We showed that both the pixel intensity and phase gradients can be incorporated in the new phase-correction algorithm. The pulse sequence and the phase-correction algorithm were demonstrated to be capable of producing water-only and fat-only images with excellent scan time efficiency and processing robustness.

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