

Optimal k-space sampling in phase encoding direction for SPACE RIP

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목적: In SPACE RIP, the reconstructed image quality depends on the choice of the set of phase encoding lines. In this study, a method is proposed which determines the phase encoding lines so that the reconstructed image shows the best quality.

대상 및 방법: Almost information of a natural image concentrates on the low frequency band, which determines the image contrast. On the other hand, the high frequency band determines the image detail. Therefore, the image quality can be improved by assigning more phase encoding lines to the low frequency band than the high frequency band. Phantom and human brain data were acquired with 4-channel phased array coil where the matrix dimension is 128×128 . Of the total phase encoding lines, we used only 32 phase encoding lines to achieve 4-fold reduction (theoretically maximum reduction factor when 4-channel phase array coil is used). Two different sets of 32 lines of k-space are used to reconstruct images. In the first set, the phase encoding lines are equally spaced, but in the other set, the phase encoding lines are non-equally spaced. In order to determine the spacing between the phase encodings in the second set, Fourier transform was applied to the reference data. Based on the information of the frequency band, the phase encoding lines are assigned to each band. The more energy the frequency band has, the more phase encoding lines were assigned. The reconstructed image from the second set was compared with that from the first set and reference data.

결과: The reconstructed image quality from the proposed method was better than that from the equally-spaced method. And the reconstructed image quality is quite good even if the reduction factor is theoretically maximum.

결론: By using optimal phase encoding lines, the quality of the reconstructed image can be improved.