

SPACE RIP with regularization for high reduction factor in parallel imaging

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목적: In parallel imaging, the reconstructed image quality is poor when the data is acquired with high reduction factor which means that it is close to the number of channels. In order to improve the reconstructed image quality in this situation, we add regularization technique in the conventional parallel imaging reconstruction.

대상 및 방법: In this study, we chose SPACE RIP (Sensitivity Profiles from an Array of Coils for Encoding and Reconstruction In Parallel) technique as parallel imaging method. The method requires the initial estimation of the 2D sensitivity profile of each coil used in the receiver array. These sensitivity profiles are then used to partially encode the images of interest. A fraction of the total number of k-space lines is consequently acquired and used in a parallel reconstruction scheme, allowing for a substantial reduction in scanning. In reconstruction process, the matrix equation must be solved. However, when the reduction factor is high, solving this matrix equation is in general an ill-posed problem which means that the condition number of the matrix is too large. In order to improve the conditioning of the problem, we used Tikhonov regularization technique, thus enabling stable and robust reconstruction. We applied this algorithm to the phantom data which was acquired with 8 channel phased-array coil. And the reconstruction is performed for various reduction factor from 1 to 8.

결과: The reconstructed image quality from the proposed method appears much improved than that from the conventional parallel imaging reconstruction technique.

결론: The regularization technique improves the conditioning of the matrix equation, thus preserving the image quality until the reduction factor reaches high.