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Development of MRI Phantom for Assessing MR Image Quality and its Evaluation Program

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목적: **:** To evaluate MR image qualities and measure their evaluation parameters we developed a new MRI phantom with the fixation structures that can be used in various head coils of MRI companies and its semi-automatic evaluation program.

대상 및 방법: We designed a cylindrical MRI phantom with a length of 120 mm and a diameter of 200 mm for the head coil. It consisted of eight modules to evaluate items such as slice thickness accuracy, high contrast spatial resolution, low contrast object detectability, geometry accuracy, slice position accuracy, image intensity uniformity, percent signal ghosting and signal to noise ratio. For the right positioning of phantom inside coils, 8 fixation structures were attached to the right, left and bottom surfaces of phantom. A total of 11 images with a slice thickness of 5 mm and a gap of 5 mm were obtained through standard ACR and hospital - specific T1 and T2- weighted sequences. Phantom images were acquired on 5 MRI units of different MRI companies. Six evaluation items excluding high contrast spatial resolution and low contrast object detectability were semi-automatically measured with the evaluation program developed on a platform of IDL. We tested the feasibility of MRI phantom and its evaluation program.

결과: We acquired the good quality phantom images on all MR units and the positioning of our phantom into head coils with fixation structures worked well for proper imaging. Six evaluation items were successfully measured using the evaluation program. Slice thickness and slice position accuracy were shown to be within acceptable range compared to their real values.

결론: We found that our new MRI phantom and its evaluation program had the clinical feasibility for MR image quality assessment.