P - 30

HIGH RESOLUTION IMAGING IN 3T MRI SYSTEM

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INTRODUCTION

The 3.0T MRI system has advantages of higher signal to noise ratio (SNR) and better i mage resolution than the lower field MRI systems. In general a high-resolution image can detect tiny pathological legions of human body by minimizing the partial volume effect and consequently improve the sensitivity of diseases. In this study we demonstrated the a dvantage of 3T MRI system in terms of higher spatial resolution by performing a bench mark study between the 3T and the conventional 1.5T MRIs.

METHOD

All scans were performed from the home-built 3.0T MRI system facilitated with the activ ely shielded magnet. To evaluate high-resolution images with 3.0T and 1.5T MRIs, all sc ans were performed with thin slice thickness (less than 3mm) and higher matrix size (mo re than 512). Various pulse sequences such as SE (Spin Echo), GE (Gradient Echo) and IR (Inversion Recovery) and FSE (Fast Spin Echo) were used for the clinical evaluations. The scan parameters used in this study are shown in the table 1. Each scan parameter was optimized for the 3T MRI.

Pulse Seq	TR	TE	TI	MAT
SE	700	25	-	512
GE	600	15	-	512
IR	2600	25	1000	512
FSE	4000	90	-	512

Table. 1. Scan Parameters (less than 3mm slice thickness)

For phantom studies, we used a multi purpose phantom which has 4 sets of square ho les (0.5mm, 0.75mm, 1.0 and 2.0mm) and counted the maximum number of distinguishab le hot holes to evaluate the spatial resolution.

In human volunteer studies, home built quadrature head and knee coils were used usi ng the same scan parameters. The acquired images from the 3T MRI were compared wit h the 1.5T MRI's obtained with the same protocols and scan parameters.

RESULT

The phantom images are as shown in Fig 1. The T1-weighted spin-echo pulse sequence was employed with TR=600ms, TE=25ms, FOV=256mm. Each 0.5mm hot hole was well resolved at the high-resolution images of which imaging matrix size is 512X512.
the high-resolution human brain images are shown.

DISCUSSION

Each image has the 0.5mm spatial resolution per pixel, high-resolution ankle images were compared at the both magnetic field strength of 3.0T and 1.5T. In this experiment, the s ame scan parameters were applied. 3T images clearly demonstrate the superior spatial res

olution and higher SNR as expected.

CONCLUSION

The high-resolution images can be routinely obtained in the clinical situation at the 3.0T MRI. The results of benchmark experiment clearly demonstrate that the 3.0T have a better performance in terms of SNR and spatial resolution with both phantom and *in-vivo* studies.