

Present Status of High Field 3.0T MRI System

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Purpose: According to the basic contract between Catholic Medical Center and Medinus (new branch company by Medison), we have developed high field 3.0T MRI system which contains the world first 3.0T active shield magnet. We present the present status of MR image quality, ongoing projects and the next stages.

Materials and Methods: The main 3.0T active shield magnet system was designed by Oxfrord Magnet Technology, and the gradient coil was designed by Tesla Company. The gradient amplifier was supplied by MTS Technology. Compared with the other 3.0T MRI systems, the specific features of our system have the versatile research functions and GUI with Korean language. We evaluated the various MR images (T1, T2 and proton density) which were obtained by SE, GRE, and FSE pulse sequences. And, we compared the 3.0T secondary parameters (i.e., SNR, CNR and resolution rate) compared with conventional 1.5T system. We developed the phantom for image enhancement. Visual and audible stimulators were equipped for basic and clinical studies.

Results: Due to the light weight 7.5 ton, the present system could be installed in the high floor building (i.e., 2nd, 3rd). The uniform homogeneity was as follows: FWHM (pole point plot pk/pk) = 0.38 with diameter of spherical volume 22 cm. The SNR of the 3.0T system was approximately 2.1 greater than the other 1.5T systems. STEAM and PRESS pulse sequences were also developed for MRS studies. The fMRI and MR spectroscopy packages were established for research and clinical applications. The present system provide the highly resolved brain, knee and foot images (matrix size 512x512) for routine MR examinations.

Conclusion: The world trend of MR system is going to be high field for achieving enhanced resolutions in fMRI and MRS. We expect the early-stage diagnosis of various diseases when the highly tuned complete system equipped with multi purpose packages is prepared. Eventually, the present system was

designed for clinical and research purpose 50:50, and commercial product. Thus, we focused the outer interior design, efficacy, economical expenses. The present 3.0T MRI system could be a commercially available in near future.