

Comparison of Signal-to-Noise and Metabolite Ratios on Single Voxel 1H Spectroscopy at 1.5 T Versus 3.0 T MR : Preliminary Study in 12 Cases of Brain Tumor and 5 Normal Human Brains

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목적 : The 3.0 T MR imagers theoretically yield double signal-to-noise ratio (SNR) of 1.5 T units. To evaluate the practical improvements for proton MR spectroscopy (1H-MRS) in the human brain tumor and normal human brain, we compared the SNRs of the metabolites (choline (Cho), creatine (Cr), and *N*-acetylaspartate (NAA)) and metabolite ratios of Cho/Cr between 1.5 T and 3 T MR units.

대상 및 방법 : Single voxel 1H-MRS was performed at both 1.5 T and 3.0 T in twelve patients with brain tumor and five normal volunteers. Pathologic diagnosis included glioblastoma (n=3), anaplastic astrocytoma (n=3), oligodendroglioma (n=2), central neurocytoma (n=1), metastatic adenosquamous carcinoma (n=1), meningioma (n=1), and pineal parenchymal tumor (n=1). Using same data acquisition parameters at both field strengths, 1H-MRS spectra were obtained with short TE (35 msec) and long TE (144 msec) PRESS sequences at the possible homogenous solid area in the brain tumors and left frontal periventricular white matter in the normal volunteers. The SNRs of metabolite (choline, creatinine, and NAA) and the metabolite ratio of Cho/Cr were compared between 1.5 T and 3 T in each brain tumor and normal volunteer.

결과 : In brain tumors, the SNRs of the metabolites (Cho, Cr, NAA) at 3T demonstrated 55 ± 35 %, 58 ± 35 %, 75 ± 98% increase at short TE sequence and 5 ± 30% , 13 ± 43% , 3 ± 40 % increase at long TE sequence compared to those of 1.5T. In normal volunteers, those SNR gains were slightly decreased at short TE and slightly increased at long TE but not significantly different from brain tumors. And the metabolite ratios of Cho/Cr showed no significant difference between 1.5T and 3T.

결론 : At 3T, SNRs of the metabolites increased partially than expected gain at both short and long TE sequences, compared to 1.5 T. Further systematic study with refined software and improved RF coil is needed to improve the results.