Assessment of Malignancy in Brain Tumors by 3T MR Spectroscopy

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Purpose: To assess clinical proton MR spectroscopy (MRS) as a noninvasive method for evaluating tumor malignancy at 3T high field system.

Methods: Using 3T MRI/MRS system, localized water-suppressed single-voxel technique in patients with brain tumors was employed to evaluate spectra with peaks of N-acetyl aspartate (NAA), choline-containing compounds (Cho), creatine/phosphocreatine (Cr) and lactate. On the basis of Cr, these peak areas were quantificated as a relative ratio.

Results: The variation of metabolites measurements of the designated region in 10 normal volunteers was less than 10%. Normal ranges of NAA/Cr and Cho/Cr ratios were 1.67 ± 018 and 1.16 ± 0.15, respectively. NAA/Cr ratio of all tumor tissues was significantly lower than that of the normal tissues ($P=0.005$). Cho/Cr ratio of high-grade gliomas was significantly higher than that of low-grade gliomas ($P=0.001$). Except 4 menigiomas, lactate signal was observed in all tumor cases.

Conclusions: The present study demonstrated that the neuronal degradation or loss was observed in all tumor tissues. Higher grade of brain tumors was correlated with higher Cho/Cr ratio, indicating a significant dependence of Cho levels on malignancy of gliomas. This results suggest that clinical proton MR spectroscopy could be useful to predict tumor malignancy.