Correlation between Metabolite Peak Area Ratios by ^{1}H Magnetic Resonance Spectroscopy

Hyun-Man Baik[1], Bo-Young Choe[1], Tae-Suk Suh[1], Hyoung-Koo Lee[1], Kyung-Sub Shinn[1,2]

Departments of [1]Biomedical Engineering and [2]Diagnostic Radiology, College of Medicine, The Catholic University of Korea

Purpose: To evaluate quantitatively whether there is a considerable correlation between metabolite peak area ratios relative a certain reference under the inadequate shimming conditions, using ^{1}H magnetic resonance spectroscopy (MRS).

Materials and Method: A phantom containing *in vivo* levels of metabolites at concentrations in the adult human brain was used to study *in vitro* ^{1}H MRS. The inadequate shimming values in accordance with linear shim offsets were applied for optimized good shimming values specifically within the range of permitted autoprescans. Three major peaks such as N-acetylaspartate (NAA), creatine (Cr), choline (Cho) were used as a reference for data analysis. In addition, a coefficient of variation (COV = 100% × standard deviation / mean) was calculated by finding the mean and standard deviation of all the metabolite peak area ratios.

Results: Significant correlation between NAA/Cr and Cho/Cr ratios relative to Cr was statistically established in inadequate shimming conditions (r = 0.88, P < 0.001), and also observed for between Ins/Cr and Glu/Cr ratios (r = 0.71, P < 0.001). However, there was no correlation between metabolite peak area ratios relative to Cho and NAA in the same conditions. For all the metabolite peak area ratios, the calculated COV values were showed highly large range (20-60%, 2 standard deviation), indicating considerable metabolite peak area variations.

Conclusion: The present study suggested that peak area ratios based on the Cr metabolite could be used as a plausible quantification method for a reference, even if possible errors were subjected in determining the peak area under the inadequate shimming conditions in MRS examination. This peak area ratio method on the basis of Cr could be a desirable diagnostic tool to evaluate the metabolic alterations in clinical MRS studies. Further studies are in progress to establish whether there is a correlation between metabolite peak area ratios for *in vivo* tissues.