

## Effects of Poor Shimming on Quantitative Measurement of Metabolite Levels In Vivo by $^1\text{H}$ MR Spectroscopy

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**Purpose:** The authors investigate the effects of poor shimming on quantitative measurement of ratios of metabolite levels by proton magnetic resonance spectroscopy ( $^1\text{H}$  MRS).

**Materials & Methods:** Coefficient of variation (COV) of metabolite ratios for point resolved spectroscopy (PRESS) and stimulated-echo acquisition mode (STEAM) spectra was evaluated from a phantom containing *in vivo* levels of metabolites using a conventional whole body 1.5T MR system and conventional acquisition and analysis protocol. A statistical *P*-value was also calculated from a linear regression for relationship of metabolite ratios.

**Results:** N-acetylaspartate (NAA)/ creatine (Cr) and NAA/ choline (Cho) had low COV values for the long and short TE spectra (29.1 and 27.5 %; 23.8 and 12.6 %), whereas Cho/Cr and Cr/Cho had high COV values (50.0 and 68.6 %; 27.5 and 29.3 %). A linear relationship between NAA/Cr and Cho/Cr, and between NAA/Cho and Cr/Cho revealed the statistical significance in the long and short TE spectra, respectively ( $P < 0.0001$  and  $P < 0.0001$ ;  $P = 0.015$  and  $P = 0.005$ ). There was no significant relationship between Cho/NAA and Cr/NAA in the measurement ( $P = 0.159$ ;  $P = 0.910$ ).

**Conclusions:** The present study suggested that NAA/Cr and NAA/Cho could be useful for data with poor shimming in  $^1\text{H}$  MR spectroscopy. Statistical significance of metabolite ratios indicated that the Cr and Cho levels could be interpreted as a significant alteration factor in the long and short TE spectra, and then should be used with care to provide precise metabolite quantification.