

**Proton Chemical Shift Imaging (CSI) of the Pediatric Brain:
Application in Normal Subjects and Clinical Cases**

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Purpose: To evaluate the feasibility of CSI technique and to know the normal spectral value of the pediatric brain using this technique.

Materials and Methods: The measurements on normal pediatric subjects (n=13, age:6-17) and various brain pathologies (n=6) have been performed on whole-body MR scanner (Siemens Magnetom Vision). A hybrid CSI spin-echo technique (TR:1500, TE:135, matrix size:16x16, FOV:16 cm) was applied to a selected volume (8x8x1.5 cm) at the supraventricular level. SNR of NAA peak, NAA/Cho and NAA/Cr of four voxels in the center of VOI were analyzed. Statistical difference between white matter and gray matter, right and left hemisphere was analyzed. Spectra of whole voxels of each patient were evaluated qualitatively.

Results: In normal subjects SNR of NAA peak was in the range of 26.1-55.2 (mean±SD: 38.7±9.14). The mean values of NAA/Cho of both white matter (right/left) were 2.03±0.32/1.73±0.37 respectively and those of NAA/Cr were 2.17±0.31/1.98±0.38. The mean values of NAA/Cho of both gray matter (right/left) were 2.27±0.22/2.11±0.30 and those of the NAA/Cr were 2.03±0.26/1.71±0.27. The significant difference of NAA/Cho was found on both gray matter (p=0.009) and white matter (p=0.045) between right and left hemisphere, and between gray and white matter on both sides (right/left: p=0.004/p=0.002). In pathologic conditions (Leigh disease, brain tumor, MELAS, hypoxic brain damage), NAA/Cho and NAA/Cr were definitely deviated from normal range and sometimes showed lactate peak. Voxels at the periphery of VOI showed spectra of poor quality.

Conclusion: Proton CSI of the pediatric brain showed high SNR but wide range of NAA/Cho and NAA/Cr in normal subjects. And at the periphery of VOI, quality of spectra was sharply decreased, as compared with voxels in the center of VOI. But this technique was helpful in discriminating pathologies from normal condition both quantitatively and qualitatively.