

Proton Magnetic Resonance Spectroscopy of the Primary Motor Cortex in Patients with Hemiparesis

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Purpose: To determine the laterality between metabolite ratios obtained from motor cortex contralateral (CL) and ipsilateral (IL) in patients with hemiparesis using proton magnetic resonance spectroscopy (¹H MRS).

Materials & Methods: Fourteen patients with hemiparesis due to intracranial hemorrhage (ICH) were studied using a conventional whole body 1.5T MR scanner with single-voxel STEAM ¹H MRS (TR/TE/TM=2000/20/30ms). MR spectra were acquired from a 6.5mL voxel positioned to include a primary motor cortex CL and IL in patients. Peak areas of N-acetylaspartate (NAA), creatine/phosphocreatine (Cr), and choline-containing compounds (Cho) were calculated by means of fitting the spectrum to a summation of Lorentzian curves using a Marquard curve-fitting routine (SA/GE software; GE). The results are expressed as mean ± SD of NAA/Cr, Cho/Cr, and NAA/Cho ratios.

Results: Differences of the NAA/Cho and NAA/Cr ratios between IL and CL primary motor cortex in patients were statistically significant. The main observations were that these ratios were reduced in the hemiparesis side (P = 0.01, P = 0.04). No differences were found comparing Cho/Cr ratios from IL and CL within the patients (P = 0.76).

Conclusions: Spectroscopic changes in the primary motor cortex to the hemiparesis side correspond with a reduction in levels of NAA. Since NAA is exclusively expressed in neurons, the observed decrease of NAA reflects neuronal loss or dysfunction. The present study suggested that NAA/Cho and NAA/Cr may provide a diagnostic marker for neuronal dysfunction in patients with hemiparesis due to ICH.