

MRS Shows Syndrome Differentiated Metabolite Changes in Human Generalized Epilepsies

G. Helms¹, Y. Österman², I. Savic^{3,4}

¹Dept. Clinical Neuroscience, Karolinska Institute, Stockholm, Sweden, ²Neuroradiology, Karolinska Hospital, Stockholm, Sweden, ³Dept. of Neuroscience, Karolinska Institute, Stockholm, Stockholm, Sweden, ⁴Div. of Neurology, Huddinge University Hospital, Stockholm, Sweden, Sweden

Objective:

Whilst it is generally accepted that the thalamo-cortical loop is abnormal in idiopathic generalized epilepsy (IGE), it is uncertain whether this loop is similarly affected among different IGE-syndromes. We recently demonstrated reduced frontal lobe levels of N-acetyl aspartate (NAA) in patients with juvenile myoclonic epilepsy (JME). The present follow-up study investigates if similar, or other types of changes exist in subjects with pure primarily generalized tonic clonic epilepsy (GTCS).

Methods:

Twenty patients with GTCS, twenty-six patients with JME, and ten matched healthy controls were investigated at 1.5 Tesla with quantitative single-voxel MRS measurements of NAA, Choline (Cho), Creatine (Cr) and myo-Inositol (mI) (concentrations in mmol/l) in cerebellum, thalamus, prefrontal and occipital cortex.

Results:

Patients with JME had reduced frontal lobe NAA (Fig. 1) in relation to controls (9.8 ± 1.1 vs. 10.8 ± 0.7 , $p=0.01$), and GTCS-patients (9.8 ± 1.1 vs 10.6 ± 0.7 , $p=0.007$), whose values were normal. Patients with GTCS, on the other hand, showed lower thalamic NAA (Fig. 2) than controls (9.7 ± 1.0 vs. 10.8 ± 0.9 , $p=0.002$). Both patient groups had reduced thalamic Cho [2.0 ± 0.4 (control), vs. 1.61 ± 0.3 (JME) $p=0.001$, vs. 1.57 ± 0.3 (GTCS) $p=0.0005$] and mI: [4.8 ± 1.5 (control), vs. 3.3 ± 1.4 (JME) $p=0.003$, vs. 3.2 ± 1.5 (GTCS), $p=0.002$]. No other regional changes were observed.

Conclusion:

The present MRS data emphasize the involvement of thalamus in IGE. These are in line with a recent independent report [2]. They also show partly differentiated alterations within the thalamo-cortical loop in JME vs. GTCS. The various clinical expressions of IGE may, thus, be associated with more localized neuroanatomical substrates than generally believed.

References:

- [1] Savic I, Lekvall A., Greitz D, Helms G. MR spectroscopy shows reduced frontal lobe concentrations of N-acetyl aspartate in patients with juvenile myoclonic epilepsy. *Epilepsia* 2000; 41:290-296.
- [2] Bernasconi A, Bernasconi N, Natsume J, Antel SB, Andermann F, Arnold DL. Magnetic resonance spectroscopy and imaging of the thalamus in idiopathic generalized epilepsy. *Brain* 2003;126:2447-54.

Figure 1: Spectra from prefrontal cortex in JME (A) and controls (B)

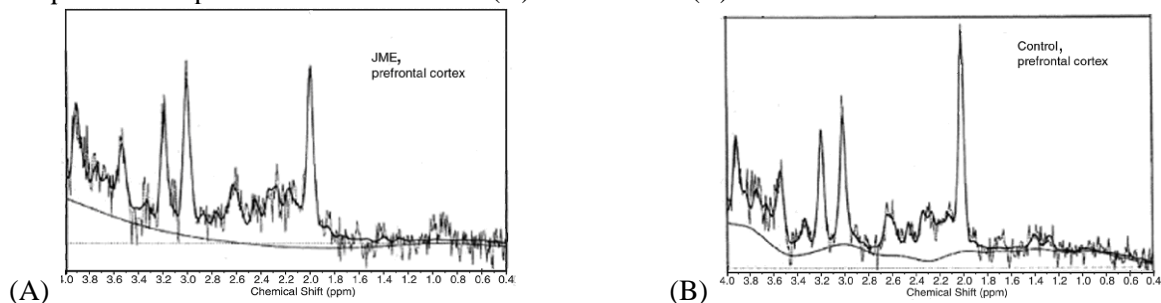


Figure 2: Spectra from thalamus in GTCS (A) and controls (B)

