

Brain GABA levels in patients receiving ECT. Preliminary findings from a case-control study.

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INTRODUCTION

- Electroconvulsive Therapy (ECT) is by many clinicians regarded the most effective acute treatment of major depression¹ and has been used for more than 70 years².
- Still, the mechanism of action of ECT is unknown, but already in 1983 a possible mechanism implying GABA was presented³. In 2003 Sanacora⁴ published findings strengthening this hypothesis.
- This study is part of a larger, multidisciplinary ongoing project investigating the mechanisms of ECT.

METHODS

- Brain GABA levels of 12 patients and 6 healthy controls were measured.
- All patients were treated with right upper unilateral brief pulse (0,5 ms) ECT.
- Patients received either thiopental or propofol as an anesthetic.
- ECT was given 3 times a week for 3-6 weeks.
- Time points for measurement: 1-2 hours before first treatment (pre-treatment) and approximately one week after treatment series (post-treatment).
- Acquisition by a 3T GE 750 Discovery MR scanner with 32 channel head coil.
- MEGA PRESS was used for single-voxel point resolved spectroscopy⁵.
- Editing was done by a 16 ms 180 degree pulse applied at 1,9 ppm and 7,5 ppm, see Figure 2.
- Acquisition parameters: TE=68 ms, TR= 1500 ms, 192 averages on each on- and off acquisition, giving total acquisition time of 10 min.
- Voxel was placed in the midline of the anterior cingulate cortex (ACC) and measured 3x3x3 cm, see Figure 1
- GABA quantification by Gannet⁶. Tissue correction was applied⁷.
- Pre-processed spectra were assessed according to standard signal quality metrics, as well as visual inspection.
- Statistical analysis was performed by use of SPSS. Datapoints were normally distributed and t-tests were used for comparing groups.

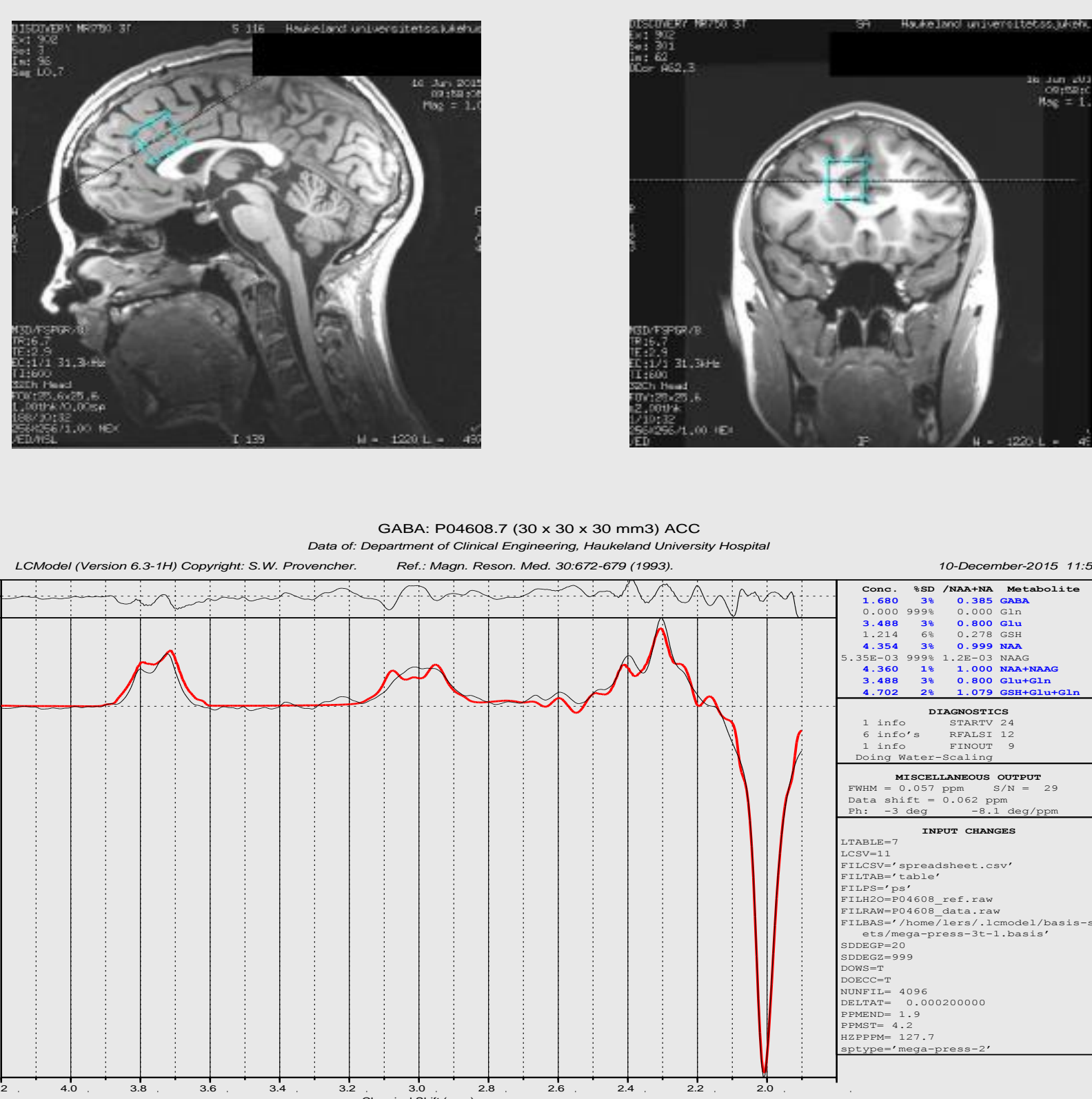


Figure 1 – Voxel placement

Upper panel: showing voxel placement in a sagittal plane (left) and coronal plane (right).

Lower panel: a representative H-MRS MEGA PRESS spectrum from the ACC.

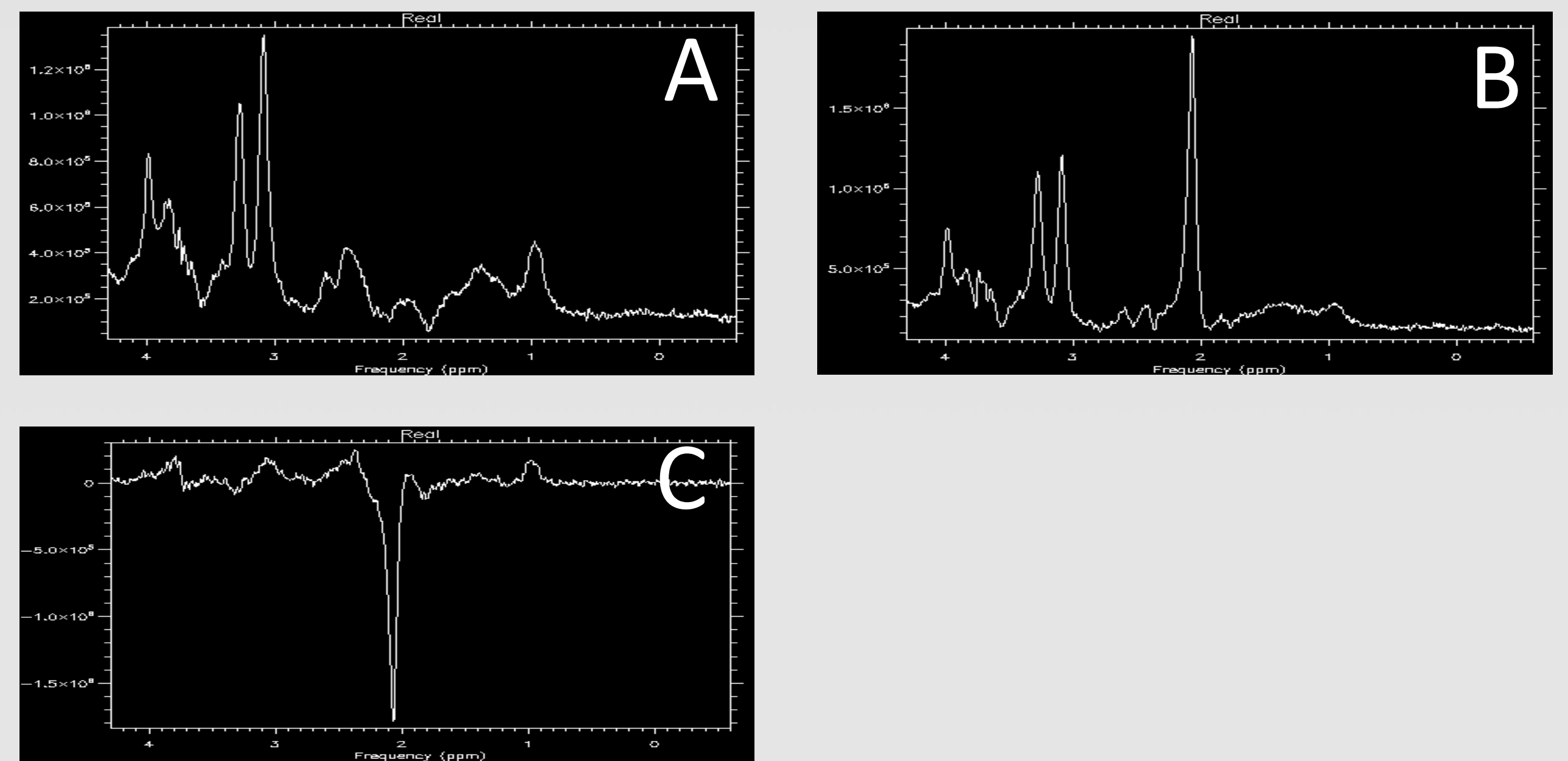


Figure 2 – The MRS spectrum

GABA spectrum from the anterior cingulate cortex

GABA editing was done with 16 ms 180° Gaussian editing pulses applied at 1.9 ppm and 7.5 ppm with alternating acquisition, giving the “edit on” (A) and “edit off” (B) spectra. The GABA spectrum (C) is obtained by subtracting the two acquisitions.

RESULTS

- No changes were found in GABA levels for patients (GABA -8,4%, p=0,1, n=8).
- For controls at similar time points: -2,7% (p=0,9, n=6).
- There was no significant difference between patients and controls pre-treatment.

CONCLUSIONS

- Results are preliminary and the number of patients limited.
- No statistically significant changes in GABA levels between pre-treatment and post-treatment measurements.
- There was no difference in GABA levels pre-treatment between patients and healthy controls.
- The increased GABA levels found by Sanacora⁴ in the occipital cortex could not be found in the ACC,

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