CSF-corrected NAA levels are decreased in the anterior cingulate of elderly schizophrenic patients

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Introduction

We performed a MRSI study of the anterior cingulate gyrus in 28 elderly chronic schizophrenic patients under stable medication and 21 age-matched controls. Our aim was to corroborate previous findings of reduced NAA in the anterior cingulate region in schizophrenia (1) with CSF-corrected metabolite values.

Methods

28 patients (18 male, 10 female) satisfying DSM-III-R (American Psychiatric Association, 1987) as well as ICD 10 criteria for schizophrenia who had been diagnosed for at least 144 months participated in this MRSI study. The age range was 48-75 years (mean age 62.9 ± 7.2 years). All patients were clinically stable for at least 12 months and had no medication changes during a period of at least 18 months.

MRSI data of 21 healthy subjects (11 male, 10 female, age range 53-82 years, mean age 64.4 ± 8.3 years) were obtained for control. There were no significant group differences between patients and controls for age. Written informed consent was obtained after the purpose of the study and the procedures were explained to all participants. The study was approved by the university ethics committee.

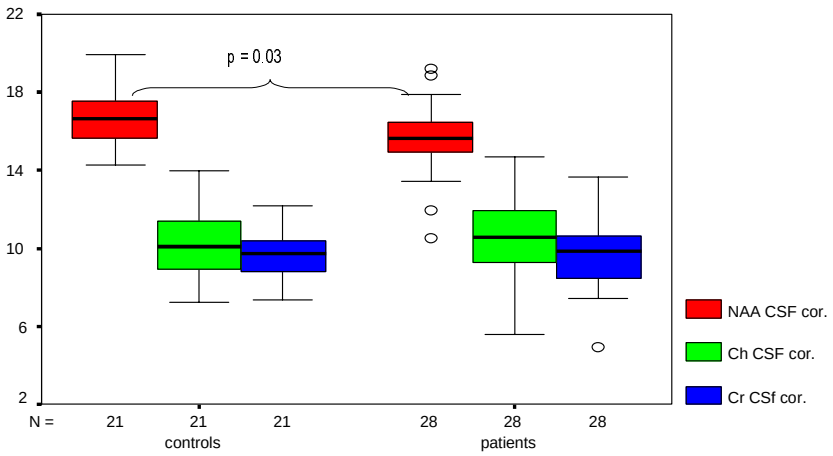
The MRSI data were acquired on a 1.5 T Magnetom VISION™ (Siemens, Erlangen, Germany). For localization, 2D FLASH images in coronal, sagittal, and oblique transverse orientation were acquired. The transverse images were angulated parallel to the cingulate gyrus. A 2D MRSI sequence with PRESS volume selection was used with the volume angulated parallel to the transverse images and centered on the anterior cingulate gyrus. A MRSI field of view (FOV) of 210 × 210 mm was used with circular k-space sampling equivalent to a maximum of 24 × 24 phase encoding steps. Other measurement parameters included TR = 1.5 s and TE = 135 ms, resulting in a measurement time of 11 minutes.

Postprocessing of the MRSI data was done with an automated spectral fitting program. Voxels including primarily gray matter from the anterior cingulate gyrus were selected and the signals of NAA, creatine (Cr), and choline-containing compounds (Ch) were curve fit. An average of 3 voxels was selected from each subject. Mean values of spectra from those voxels are reported and added spectra are shown in absolute integral values for NAA, Cr, and Ch were corrected for differential head coil loading and for the voxel CSF content as well as the individual point spread function and pulse profiles (2).

Results

The voxel composition differed significantly between patients and controls for gray and white matter (GM, WM) but not CSF content. Voxels chosen from patients had less GM and more WM. Nevertheless, no significant correlation of GM or WM with any metabolite value could be found.

In a general linear model analysis with age and voxel GM content as covariates we found significantly reduced NAA values with and without CSF correction. No differences were found for signals from choline-containing-compounds and creatine/phosphocreatine.



Discussion

We could corroborate our previous findings of decreased NAA in the anterior cingulate of chronic schizophrenic patients in a cohort of elderly patients with a long illness duration. Our findings do not support the recent reports by Yamasue et al. (3) of choline alterations rather than NAA changes in schizophrenics.

References:

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(3) Yamasue H., Fukui T., et al. Neuroreport. 1H-MR spectroscopy and gray matter volume of the anterior cingulate cortex in schizophrenia. 15;13:2133-7, 2002