Time line follow back of alcohol consumption is positively correlated with brain choline levels in healthy volunteers

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Introduction

In our MSSI study of the cerebellum and the frontal lobe in alcoholics at the beginning of withdrawal we found a significantly decreased signal of choline-containing compounds (Ch) in detoxifying alcoholics compared to healthy controls (1). In a recent study of chronically alcohol exposed rats Lee et al. (2) found an initial increase of Ch/NAA as well as GPC and PC after 16 weeks of exposure and a subsequent significant decrease of these measures after 44 weeks of exposure.

The aim of this work was to determine significant correlations of Ch with the amount of alcohol consumption within the last 90 days (time line follow back, TLFB).The results are part of a longitudinal study supported by the Deutsche Forschungsgemeinschaft (DFG).

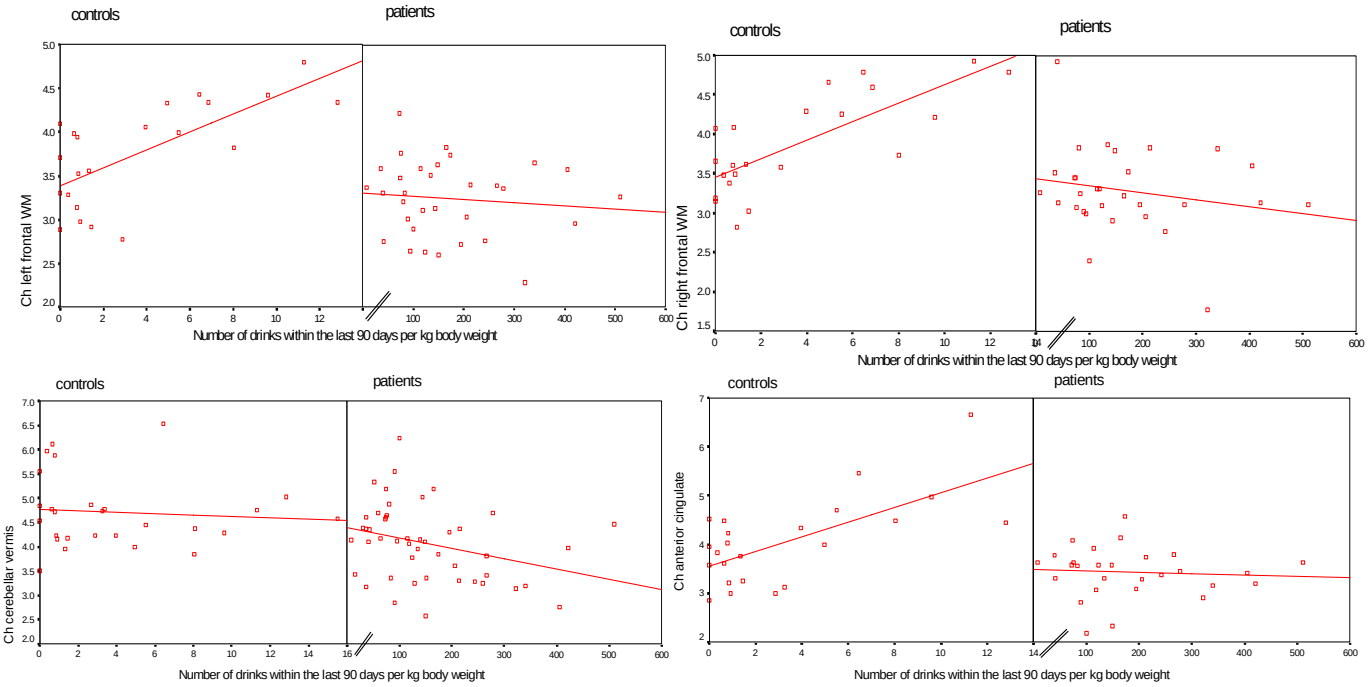
Methods

All MRS studies were performed on a 1.5 T Siemens Vision system.

MRS: Two axial planes of ^{1}H multislice SI data were collected using a single spin-echo multislice sequence (TE 135/TR 1500 ms). The first ^{1}H MRSI plane was positioned through the cerebellum and pons, using anatomical landmarks for reproducible slice positioning and the second slice superior to the lateral ventricles including frontal lobe gray and white matter and anterior cingulate gyrus. Data of 61 patients and 32 controls are presented. With use of an automated image co-registration and segmentation program (3) all MRSI voxels were corrected for the CSF content as well as the individual point spread function.

Results

In the patient group the only significant correlation of Ch with TLFB was found for the cerebellar vermis data. Here we see a negative correlation of Ch and TLFB (Fig 1). In the group of healthy controls who drank significantly less than patients (a mean of 4.5 ± 5.0 drinks compared to 145 ± 113 drinks for the patients) we found a significant positive correlation of frontal WM Ch (left and right) and anterior cingulate Ch with TLFB.



Discussion

These results support the assumption that Ch changes might reflect an adaptive mechanism of the brain to alcohol consumption. They are in good agreement with the spectroscopic finding in chronically alcohol exposed rats by Lee et al. (1). The authors interpret their findings with an initially increased turnover of phosphatidylcholine and other phospholipids reflecting an adaptive mechanism of the brain. This opposes the effect of chronic alcohol consumption that leads to membrane adaptation to minimize the fluidizing influence of alcohol (4).The cerebellar vermis results suggest that the time scale and alcohol amount for the induction of equivalent changes in this brain region might be much larger than in the cerebrum.

References:

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