구두발표 III

Neuronal Abnormalities in Patients with Chronic Alcoholism Evaluated by In Vivo ^{1}H MRS

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I. INTRODUCTION

Severe central nervous system (CNS) complications can be affected by a variety of specific processes related to ethanol intoxications, such as Wernicke's encephalopathy, hepato-cerebral degeneration, central pontine myelinolysis, and Marchiafava-Bignami syndrome. Cerebral atrophy and ventricular dilatation are well known lesions that can be detected in patients with chronic alcoholism by MRI [1] and PET [2]. However, the pathophysiological pathways of the CNS dysfunction and brain shrinkage are not fully elucidated. Employing *in vivo* ^{1}H MRS, we have studied the spectral patterns in patients with chronic alcoholism, and report the relative proton metabolite differences between patients and normal controls.

II. MATERIALS and METHODS

Ten patients with chronic alcoholism (10 males; age range 31-64 years) were recruited from Catholic Medical Center detoxication unit. The average amount of alcohol consumed was 155 cans of beer per week (SD=36). All of the patients fulfilled DSM III-R criteria for alcohol dependence, had a family history of alcoholism in at least one first-degree relative, had an early onset history of alcoholism, had at least a 10-year history of alcohol abuse, and had undergone detoxification 7-50 days before the study. The control group consists of 10 healthy volunteers (10 males; age range 27-61 years).

In vivo ^{1}H MRS study was performed on a 1.5 T MRI/MRS system (GE

Signa Advantage, version 4.8) using STEAM sequence after water suppression with CHESS RF pulse and dephasing gradients. As a single voxel technique, a 2x2x2 cm^3 (8 ml) voxel in the cerebellum and basal ganglia was selected using the T1-weighted MR images (20 ms TE , 400 ms TR). Spectral parameters were: 20 ms TE, 2000 ms TR, 128 averages, 2500 Hz spectral width, and 2048 data points. Raw data were processed by the SAGE data analysis package. Peak areas of choline-containing compounds (Cho), Cr, myo-inositol (Ins) and N-acetylaspartate (NAA) were calculated by means of fitting the spectrum to a summation of Lorentzian curves using a Marquardt algorithm.

III. RESULTS

Brain atrophy and ventrical enlargement were well demonstrated in the T1-weighted spin echo MR images in patients with chronic alcoholism. Unlike spectral patterns of the basal ganglia, those of the cerebellum were substantially different between patients with alcoholism and control subjects.

In particular, NAA and Ins signal intensities in chronic alcoholism showed a marked decrease compared with those in normal control. The specific feature in chronic alcoholism was a significant decrease of NAA/Cr (p=0.002) and Ins/Cr (p=0.001) ratios compared with normal controls.

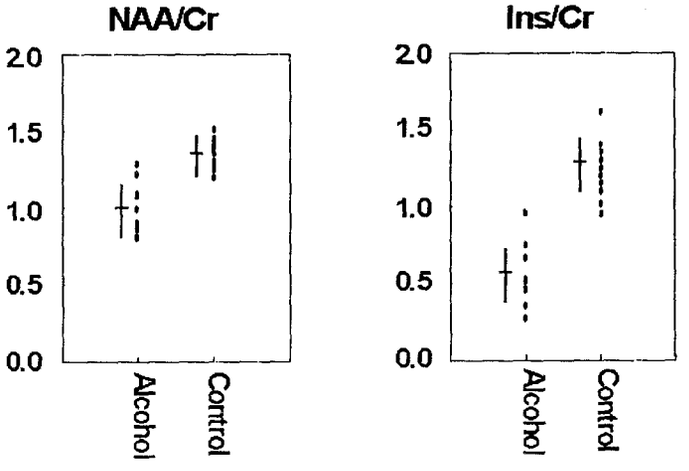

Fig. 1. Comparison of NAA/Cr and Ins/Cr ratios between chronic alcoholism and normal controls. Note that the mean and SD are shown with cross mark (†).

IV. CONCLUSIONS

The decrease of NAA signal intensity may indicate neuronal dysfunction in the cerebellum in chronic alcoholism. Although the ratio of Ins/Cr showed relatively good differentiation between alcoholism and normal controls, it did not show any good clinical correlation. Thus, the ratio of NAA/Cr may serve as a metabolic criterion that can specify the grade in chronic alcoholism and predict the patients clinical outcome.

Like other previous studies [3,4], we observed that chronic alcoholism had decreased ratio of NAA/Cr. We also observed that the ratio of Ins/Cr in the cerebellum was decreased. Although single voxel 1H MRS studies have been performed, to our knowledge, this is the first study that demonstrates the decreased Ins/Cr ratio in chronic alcoholism. *In vivo* ^{1}H MRS could aid in further understanding the neuropathologic process of chronic alcoholism and enhance the ability to accurately assess post-alcoholic brain damage as well as to improve patients outcome prediction.

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