

NMR-BASED METABONOMICS OF CEREBROSPINAL FLUID APPLIED TO AMYOTROPHIC LATERAL SCLEROSIS

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Abstract

The aim of this study was applications of cerebrospinal fluid (CSF) NMR-based metabolic fingerprinting to amyotrophic lateral sclerosis (ALS) as possible early diagnostic tool. Two CSF sample categories were collected: 9 ALS patients and 13 age-matched control patients (without neurological disease). Metabolic profile of the CSF was determined by high resolution proton NMR spectroscopy. For statistical analysis magnitudes of 33 signals of the NMR spectrum were selected. Partial least square discriminant analysis (PLS-DA) and orthogonal PLS-DA (OPLS-DA) modeling were used to find potential biomarkers of the disease. Those analyses showed that it was possible to distinguish the ALS patients from the control ones on the basis of the CSF metabolic profile. Significantly higher levels of metabolites observed in the patients with ALS may represent the state of anaerobic metabolism and excitotoxicity.

Keywords: cerebrospinal fluid, amyotrophic lateral sclerosis, NMR spectroscopy, metabolomics, discriminant analysis