THE FUNCTIONAL CHANGES IN THE BRAIN CORTEX IN THE MULTIPLE SCLEROSIS PATIENTS WITH COGNITIVE DISORDERS AND DIFFERENT TYPES OF THE DISEASE MEASURED BY MEANS OF THE POSITRON EMISSION TOMOGRAPHY

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INTRODUCTION

Cognitive disorders are one of the most frequent symptoms of multiple sclerosis (MS). It is not known yet the damage of which parts of the brain has the main role in the cognitive disorders development. The mechanisms of cognitive disorders in different types of MS are also obscure.

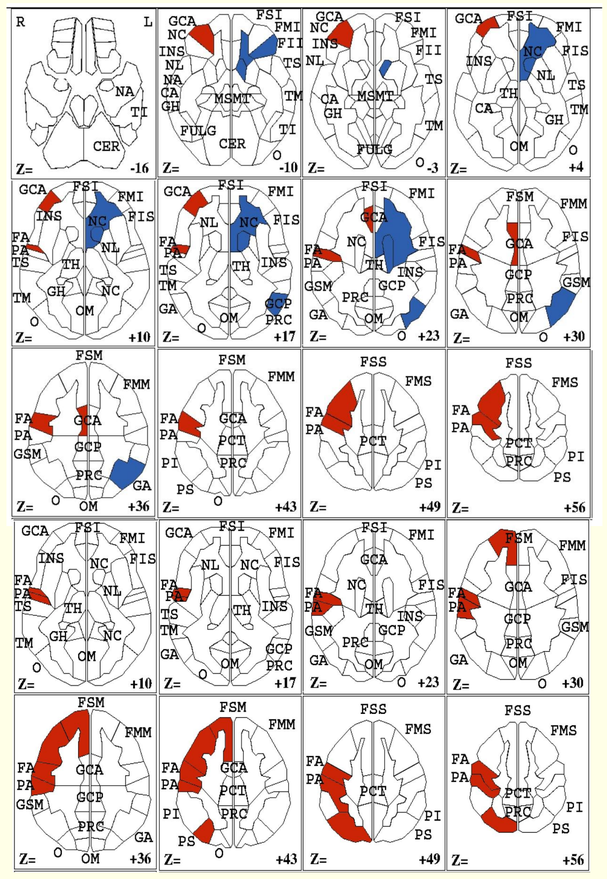
The aim of our study was to evaluate the ratio of cognitive disorders in patients with different MS types and various disability levels and to assess the correlation between cognitive disorders and the changes of the regional cerebral metabolic rate of glucose (rCMRglu) in the brain grey matter measured by positron emission tomography with 18-fluorodeoxyglucose (PET-FDG).

Patients and methods. 71 MS patients and 25 healthy controls were examined. 59% of the patients had relapsing-remitting MS (RRMS), 41% – progressive MS (PMS). The mean age was 35,1±3,3 y.o., the mean disease duration – 8,2±2,5 years, the mean Expanded Disability Status Scale (EDSS) score – 3,8±1,9. The disability was measured with EDSS and functional systems score. The neuropsychological examination included: short-term and long-term memory, concentration, counting and cognitive performance tests. PET-FDG study of rCMRglu was made.

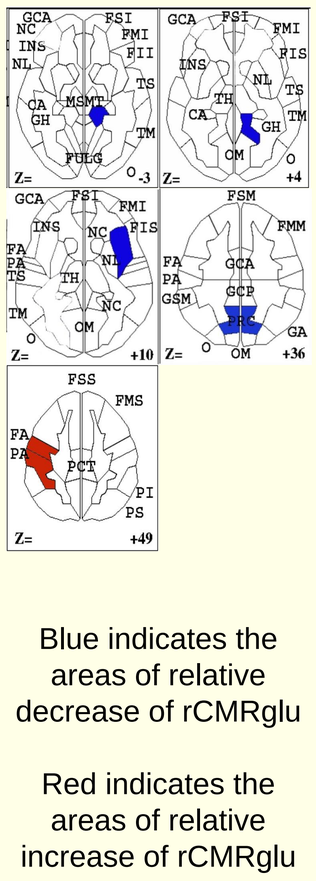
RESULTS

Analysis of rCMRglu in patients with RRMS and PMS

rCMRglu in patients with RRMS



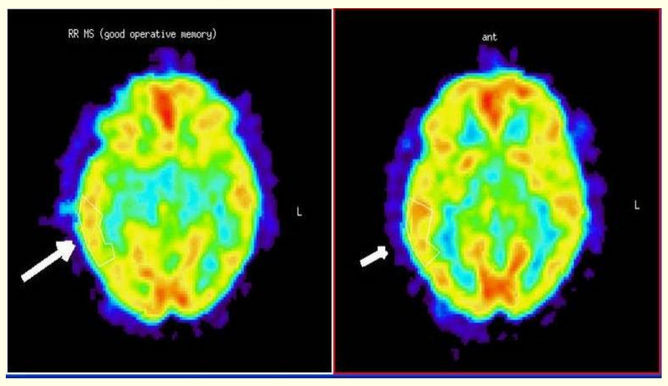
rCMRglu in patients with PMS



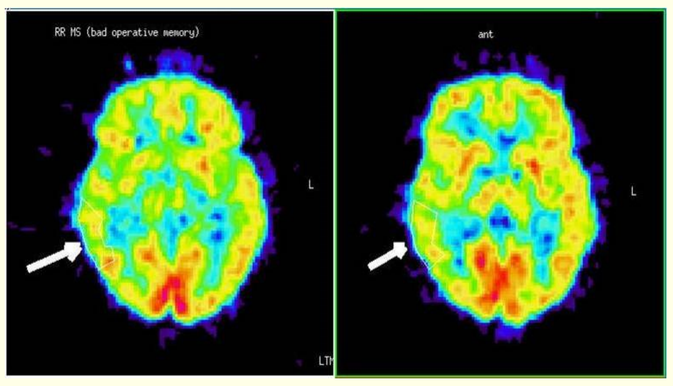
Blue indicates the areas of relative decrease of rCMRglu

Red indicates the areas of relative increase of rCMRglu

PET of a patient without cognitive disorders



PET of a patient with severe cognitive disorders



- 92% of the patients had cognitive disorders, even those with EDSS<3.
- In some cases there was rapid progression of cognitive disorders in the patients with low disability level.
- It was revealed that the reduction of the grey matter functional activity was more marked in the patients with PMS then in those with RRMS, despite of the equal disability score (3<EDSS<6).
- Cognitive disorders are more severe in the patients that had onset of MS with movement disorders, then in those that had MS onset with optic or sensitive symptoms.
- The most marked rCMRglu reduction was observed in precentral gyrus, frontal cortex, right cingulate gyrus, left parietal cortex, postcentral gyrus. In the patients with PMS the reduction of rCMRglu was also revealed in insula and basal ganglia.

DISCUSSION

The high incidence of cognitive disorders (92%) in the patients with MS and the cases of the rapid cognitive disorders progression in the patients with low disability level improve the difference and independence of the pathogenesis of the cognitive disorders and other neurological symptoms.

The fact that the reduction of grey matter functional activity is more marked in the patients with PMS then in those with RRMS, despite of the equal disability score (3<EDSS<6), improves the role of the type of MS in the development and progression of cognitive disorders.

Cognitive disorders are more severe in the patients that had onset of MS with movement disorders, then in those that had MS onset with optic or sensitive symptoms. On the one hand it confirms the more rapid progression and more severe course of MS with movement onset. On the other hand this fact helps to predict more marked cognitive disorders in this group of patients and to try to prevent it with more active treatment.

The relative increase of rCMRglu in some areas, that was revealed in both groups of patients, is a probable evidence of the compensatory activation of some parts of the brain tissue. But in the patients with PMS these compensatory mechanisms were not enough to improve the results of cognitive tests, hence it can be suggested that in the PMS patients there is a failure of compensation.

The most marked rCMRglu reduction was observed in precentral gyrus, frontal cortex, right cingulate gyrus, left parietal cortex, postcentral gyrus. In the patients with PMS rCMRglu reduction was also revealed in insula and basal ganglia, that corresponds with more vast damage of brain tissue in the patients with PMS.

Conclusion. Cognitive disorders can be an independent characteristic of the disease severity and should be evaluated regularly even if there is no aggravation of focal neurological symptoms. Cognitive disorders are associated with the functional changes in different parts of the brain cortex and it depends on the type of MS.

LITERATURE

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