BRAIN ATROPHY IN MILD VASCULAR AND DEGENERATIVE COGNITIVE IMPAIRMENT

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According to the WHO, the total number of people with dementia worldwide in 2010 is estimated at 35.6 million and is projected to nearly double every 20 years, so it will be 65.7 million in 2030 [1, 2].

Therefore, there is particular interest in studying predementia syndrome called Mild Cognitive Impairment (MCI) because it is possible to slow the progression of the disease by means of medication, *psychological* intervention and *rehabilitation training* [3, 4, 8].

According to the International Statistical Classification of Diseases and Related Health Problems (ICD-10), MCI is a syndrome that leads to memory decline and other cognitive function deterioration in elderly people, exceeds normal age-related cognitive decline, but doesn't lead to *social* and labor *disadaptation* [1, 3, 4, 6, 8]. *The vast majority of patients* (55-65%) *with* MCI will transform to dementia of the Alzheimer's type within 5 years [1, 3, 4, 6].

The improvement of neuropsychological methods enables early diagnostic of MCI. And voxel-based morphometry (VBM) is one of the methods that can reveal certain brain regions atrophy in cases where conventional MRI and CT don't show any brain changes [2, 5, 7]. The aim of our study was to exam the neuropsychological changes in white and gray matter of the brain in patients with MCI using VBM.

Materials and methods

A total of 58 patients (28 men and 30 women, mean age 70) with MCI were included in this study. The clinical *diagnosis* of *MCI was based on the criteria proposed by* R. Petersen [8]. All patients underwent neuropsychological evaluation, including the Montreal Cognitive Assessment (MoCA), a verbal *associative test*/verbal fluency test, frontal assessment battery and others. The MoCA score was from 18 to 24. The MRI brain scanning was performed on a 1.5 Tesla scanner with evaluation of *leukoaraiosis,* lacunes and subarachnoid space enlargement. Brain atrophy was measured by means of VBM. We examined patients with cerebral small vessel disease and MCI suspected of the Alzheimer's type. Subjects with other central nervous

system diseases were excluded from this study.

Results and discussion

All the patients were divided into 3 groups according to the neuropsychological and neuroimaging examination:

1) 37 patients with cerebral small vessel disease, with prevalence of mental neurodynamic problems than memory decline. Brain MRI changes included *leukoaraiosis, multiple* white matter T2 hyperintense lesions and mild ventricles and subarachnoid space enlargement.

2) 13 patients with MCI suspected of the Alzheimer's type with prevalence memory problems (especially short-term memory decline). Some of the patients had subarachnoid space enlargement predominantly in temporal lobes other patients didn't experience that.

3) 8 patients with MCI of mixed type (vascular and degenerative). Brain MRI revealed subarachnoid space enlargement, *leukoaraiosis and few* white matter T2 hyperintense lesions. All the patients had hypertension as well as the subjects from the 1st group. Neuropsychological study revealed a combination of frontal dysfunction, short-term memory decline and visual-spatial sphere disturbances.

VBM showed different brain regions atrophy in all the groups, nevertheless there was no statistically significant difference in the whole gray matter. Patients with cerebral small vessel disease showed cortical grey matter loss in frontal lobes, inferior parietal lobules and thalamus atrophy besides white matter changes.

Patients with MCI suspected of the Alzheimer's type showed hippocampal, amygdala atrophy and other parts of temporal lobes. Patients with MCI of mixed type showed grey matter loss in frontal and temporal lobes.

Thus, all groups of patients experienced different brain regions atrophy measured by VBM. It is possible to suggest the etiology of MCI according to the atrophy pattern, different neuropsychological features and MRI data that plays an important role in adequate treatment.

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