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Brain-derived neurotrophic factor and cognitive symptoms of dementia

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Dementia is a syndrome of global and progressive impairment of cognitive abilities which is related to difficulties in performing normal daily activities. Brain-derived neurotrophic factor (BDNF) is a member of neurotrophin family which has been associated with dementia and cognitive decline. The aim of this study was to define the role of BDNF in the development of cognitive symptoms of dementia by analysing BDNF plasma concentration in patients with different types of dementia or diagnosed with mild cognitive impairment (MCI).

The study included 207 patients with Alzheimer's disease (AD), 59 patients with MCI and the total of 52 patients with other non-AD types of dementia (dementia with Lewy bodies, frontotemporal and vascular dementia), diagnosed according to NINCDS-ADRDA and DSM-IV criteria. Cognitive impairment was evaluated using Mini-Mental Status Examination (MMSE) and Clock Drawing Test (CDT). Plasma BDNF levels were measured with enzyme-linked immunosorbent assay, according to the procedures supplied by the manufacturer (R&D Systems GmbH). The association of plasma BDNF levels with cognitive decline was evaluated using Kruskal-Wallis one-way analysis of variance and Spearman correlation coefficient.

The results revealed increased BDNF concentration in plasma from patients with AD compared to subjects with MCI or other types of dementia ($H=14.22$; $df=4$; $p=0.007$). After dividing the patients with AD according to MMSE scores into patients with mild (mild AD), moderate (moderate AD), and severe cognitive impairment (severe AD), a significant ($H=9.45$; $df=4$; $p=0.050$) association between plasma BDNF levels and cognitive decline was detected, due to a significantly higher BDNF plasma levels in patients with moderate AD compared to patients with mild and severe AD, and compared to patients with MCI or non-AD dementia. The study also points to the positive correlation between plasma BDNF concentration and the total CDT scores in a group of patients diagnosed with non-AD dementia ($r_s=0.34$; $p=0.028$).

This research further contributes to the current knowledge on the role of BDNF in the development of cognitive symptoms of dementia, with the purpose to offer new and easily accessible biochemical indicator of cognitive impairment and to provide new insights that will help us to better understand and treat these symptoms.