

## Association between structural brain abnormalities and cognitive functioning in patients with type 2 diabetes mellitus

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**Background and aims:** Recent clinical and epidemiological studies revealed an association between cognitive impairment, dementia, on the one side, and type 2 diabetes mellitus (T2DM), on the other side. However, the exact association between structural brain abnormalities and cognitive functioning in patients with T2DM is still not entirely clear. Therefore, the aim of this study was to investigate the association between structural brain abnormalities and cognitive functioning in patients with T2DM.

**Materials and methods:** We examined 93 patients with T2DM (mean age 62.3±5.5 years, diabetes duration 9.7±6.7 years, BMI 32.5±10.4 kg/m<sup>2</sup>, HbA1c 8.1±1.3%). All subjects did not have a history of cerebrovascular accidents or depressive episodes. Cognitive functioning was assessed by means of a standardized psychometric test battery covering the domains Memory, Processing Speed and Executive functioning. All cognitive tests were performed in the morning. There were no episodes of hyperglycemia or hypoglycemia immediately before assessment of cognitive functioning. All subjects were scanned on a 1.5T MRI scanner. Intracranial volume (ICV), total brain (TBV), total cerebrospinal fluid (CSF), white matter (WM), grey matter, peripheral CSF, lateral ventricular and white matter hyperintensity (WMH) volume were determined on the MRI scans automatically by kNN-based probabilistic segmentation. Infarct volumes were manually segmented. Volumes were corrected for ICV. Pearson correlation tests were performed.

**Results:** We found statistically significant positive correlations between WM, on one side, and the Memory score ( $r=0.214$ ,  $p<0.05$ ) and Executive Functioning ( $r=0.216$ ,  $p<0.05$ ). Significant negative correlations were found between Processing Speed, on one hand, and WMH ( $r=-0.22$ ,  $p<0.05$ ), and total CSF ( $r=-0.236$ ,  $p<0.05$ ), on the other hand. Moreover, Processing Speed positively correlated with TBV ( $r=0.236$ ,  $p<0.05$ ). The correlations between domain scores and other brain volumes did not reach the level of statistical significance.

**Conclusion:** Our analysis indicates that WM volume positively correlates with the memory and executive functioning scores while the function of processing speed was negatively affected by WMH and total CSF but positively correlates with the total brain volume. These data could indicate the presence of an association between the structural brain abnormalities and cognitive impairments in patients with T2DM free of clinically significant cerebrovascular disease.

*Supported by: EFSD Collaborative Program "New Horizons"*

*Disclosure: N. Zherdova: None.*