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Stimulation of cerebral neurogenesis with transcatheter intracerebral laser revascularization (photobiomodulation) in patients with Alzheimer's disease

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Background: The research is devoted to cerebral neurogenesis after intracerebral laser revascularization (photobiomodulation (PBM)) in patients with Alzheimer's disease (AD).

Materials & Methods: 200 patients with AD were examined. Examination included a cerebral CT, MRI, SG, rheoencephalography (REG), cerebral MUGA, CDR determination, tomography dementia rating scale (TDR) and MMSE. Selected 93 patients aged 34-80 (mean age 67.5), 32 (34.40%) men, and 61 (65.59%) women. Test group 48 (51.61%) patients: pre-clinical stage (dementia at TDR-0 level)-4 patients, early stage (dementia at TDR-1 level)-16, middle stage (dementia at TDR-2 level)-21, severe stage (dementia at TDR-3 level)-7. Transcatheter intracerebral laser revascularization was performed. Control group 45 (48.39%) patients: preclinical stage (dementia at TDR-0 level)-6 patients, early stage (dementia at TDR-1 level)-13, middle stage (dementia at TDR-2 level)-15, severe stage (dementia at TDR-3 level)-11. Conservative treatment was provided with memantine or rivastigmine.

Results: In the test group, all 48(100%) patients showed improvement in cerebral microcirculation and 10-20% increase in cerebral temporal lobes volume, which indicated development of cerebral reparative processes and neurogenesis. The process was accompanied by decrease in dementia level and cognitive functions restoration. Consequently, patients were transferred to a lighter TDR group. Patients with stages TDR-0 and TDR-1 had a positive effect for more than 10 years. In patients with stage TDR-2, the effect was observed for 4-5 years. In patients with stage TDR-3, the effect lasted for 2-2.5 years. While undergoing the treatment, control group patients featured further temporal lobes volume decrease, which indicated involutive changes growth and lack of neurogenesis. In patients with early AD stages (TDR-0, TDR-1), the state stabilized for a period of 0.5 to 2 years, followed by an increase in dementia and cognitive impairment, in patients with advanced AD (TDR-2, TDR-3) further increase in dementia and cognitive impairment.

Conclusion: Transcatheter intracerebral laser revascularization (PBM) is an effective treatment for AD. The method allows revascularization of the brain causing restoration of tissue structures and neurogenesis. The resulting effect persists for a long time causing dementia regression and greatly improving the quality of patients' life.

Biography

Ivan V Maksimovich MD, PhD is a Professor. He is the member ISTAART, ESC, EAPCI, WSO, ESO and EPA. He is the Head Physician at the Clinic of Cardiovascular Diseases named after Most Holy John Tobolsky, Moscow, Russia) since 1993. One of the major problems the clinic deals with is the diagnosis and treatment of various brain lesions including Alzheimer's disease. Over the past 20 years, he has published over 200 scientific works on this subject.

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