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The effect of deep brain stimulation on cognitive performance in patients with Parkinson's disease

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Introduction: There is a growing number of studies focusing on the short, medium and long term effects of deep brain stimulation (DBS) on motor and cognitive functions in Parkinson's disease (PD). Substantially smaller number of studies performed on the results of surgical treatment of drug-resistant tremor in patients with secondary Parkinson syndrome (PS).

In our study we aimed to assess the effect of DBS on main cognitive functions, depression and anxiety in PD and PS patients.

Methods: Ten PD patients with bilateral subthalamic-DBS and ten PS patients with bilateral thalamic Vim-DBS were evaluated before and after the surgery. Surgical planning was based on frameless MRI to CT image fusion with custom-developed Vister-3D planning software. The procedure was performed with guidance of RM and MHT stereotactic systems. Intraoperatively 3 to 5-channel microelectrode recording has been applied with registration of LeadTools (Medtronic) or Neurospot (Neurostar) recording equipment. Model 3389 electrodes were implanted bilaterally in all cases and connected to Activa PC or Kinetra dual channel implantable pulse generators.

Results/Conclusion: The electrode position has been controlled with postoperative CT to preoperative MRI and to tractography co-registration. The patients' cognitive performance level and clinical profile was compared not just to their own baseline, but also to a proper clinical control group, un-operated patients with PD and PS. The neuropsychological screening was focused on short term verbal and visuo-spatial memory, attention and executive functions. The possible relationships between area of stimulation, symptom severity and cognitive functioning will be discussed.