

## TRANSCRANIAL SONOGRAPHY OF BRAIN PARENCHYMA IN NEURODEGENERATIVE DISORDERS

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Transcranial B-mode sonography (TCS) is a non-invasive, low-cost, short-duration neuroimaging method that allows high-resolution imaging of deep brain structures in patients with movement disorders. With contemporary high-end ultrasound systems, image resolution of echogenic deep brain structures can even be higher on TCS than on MRI. On TCS, about 90% of patients with idiopathic Parkinson's disease (PD) exhibit abnormal hyperechogenicity of the substantia nigra (SN). This finding is already present in presymptomatic disease stages, suggesting TCS as a screening tool for populations at risk of later developing PD. Meanwhile, a number of independent TCS studies have shown that SN hyperechogenicity well discriminates PD from other Parkinsonian disorders such as multiple-system atrophy, vascular Parkinsonism and welding-related Parkinsonism. In turn, normal SN echogenicity in combination with lenticular nucleus hyperechogenicity indicates an atypical Parkinsonian syndrome rather than PD with a specificity and positive predictive value of more than 95%. TCS detects characteristic basal ganglia changes also in other movement disorders such as lenticular nucleus hyperechogenicity in idiopathic dystonia and Wilson's disease and caudate nucleus hyperechogenicity in Huntington's disease. The TCS finding of reduced echogenicity of midbrain raphe is frequent in depressive disorders and was found to correlate with responsivity to serotonin reuptake inhibitors. Emerging applications of TCS are the intra- and postoperative localization of deep brain stimulation electrodes in patients with movement disorders, the detection of changes of deep brain structures in multiple sclerosis patients that may have a predictive value for further disease progression, as well as the characterisation of basal ganglia alterations in children with neurobehavioral disorders.

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