

# Transcranial sonography in movement 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 effectively discriminates PD from other Parkinsonian disorders such as multiple system atrophy, progressive supranuclear palsy, 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 the midbrain raphe is frequent in depressive disorders and was found to correlate with responsiveness to serotonin reuptake inhibitors. An emerging application of TCS is intra- and post-operative localisation of deep brain stimulation electrodes in patients with movement disorders.