

Altered resting-state functional connectivity of basal ganglia nuclei related to speech impairment in Parkinson's disease

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Little is known about the relationship between basal ganglia functional connectivity and speech impairments in Parkinson's disease (PD). The present study compared resting-state basal ganglia connectivity of 35 PD subjects with speech impairment ("PDSI"), 42 PD subjects without speech impairment ("PDN"), and 12 older healthy controls ("OHC") using data from the Parkinson's Progression Markers Initiative (PPMI). Seed to whole-brain functional connectivity was calculated for the left and right putamen, caudate, internal globus pallidus (GPi), external globus pallidus (GPe), and subthalamic nucleus (STN). Group-averaged connectivity maps were compared using a multivariate ANCOVA controlling for the effects of age and sex. Subsequent pairwise t-tests were subjected to a voxel-wise threshold of $p < 0.001$ and cluster-extent threshold of 272mm^3 (FWE < 0.05). Analyses in the bilateral putamen, bilateral GPe, and right caudate showed that both PDN and PDSI groups had reduced resting-state cortico-basal ganglia connectivity compared to OHCs. When compared to the PDN group, PDSI subjects had lower functional connectivity between the left putamen and left superior temporal gyrus as well as lower connectivity between left GPi and left dorsal premotor cortex and bilateral angular gyrus. These findings show that speech impairment in PD is associated with differences in basal ganglia connectivity.