## Pallidocortical

Relating to the globus pallidus and the cerebral cortex.

Deep brain stimulation (DBS) has demonstrated to be an advanced therapy for selected patients with Parkinson disease (PD) from numerous clinical trials, while its maximal therapeutic effect is capped by the inadequate understanding of precise neuronal mechanisms underlying PD. Recordings from multichannel electrodes placed in subcortical and cortical regions of the basal ganglia-thalamocortical (BGTC) motor network during DBS surgical procedures can provide rich physiologic information from accessible network nodes. However, most investigations focus on presumed spatio-spectral points of interest, neither fully utilizing the richness of spatial, spectral and temporal aspects of the multivariate signals nor making discoveries in the context of all possible candidates. In addition, aggregated network-level information has been missed out.

Xiao et al. used complex network analysis to characterize functional network characteristics of the pallidocortical subcircuit of the BGTC motor network in PD at rest and with movement. The network matrix was constructed using distinct frequency bands at each anatomic recording site as virtual nodes and spectral connectivity (through phase-amplitude coupling and coherence) as network edges.

They confirmed the critical roles of beta bands and provide additional evidence on their differential functional roles in the pallidocortical motor network. Moreover, significant changes (p<0.05) in network functional segregation and integration between rest and movement conditions are revealed for the first time. More importantly, movement-dependent modulation of these network metrics are significantly correlated with hemi-body Unified Parkinson Disease Rating Scales (UPDRS), providing network-level perspectives of pallidocortical motor network pertaining to PD symptoms (p&amp;lt;0.05).

Findings in the present study provide network-level understanding of neuronal mechanisms in the pallidocortical motor network underlying PD. The demonstrated approach is also highly plausible to be applied in other important subcircuits towards comprehensive understanding of the BGTC motor network <sup>1)</sup>.

## 1)

Xiao R, Malekmohammadi M, Pouratian N, Hu X. Characterization of pallidocortical motor network in Parkinson disease through complex network analysis. J Neural Eng. 2019 Sep 10. doi: 10.1088/1741-2552/ab4341. [Epub ahead of print] PubMed PMID: 31505469.

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