


# Cortical basal ganglia pathway

Many studies showed that abnormal oscillations in the cortical-basal ganglia loop is involved in the  pathophysiology of [Parkinson's disease](#) (PD).

The cortico-basal ganglia and corticothalamic projections have been extensively studied in the context of neurological and psychiatric disorders. Deep brain stimulation (DBS) is known to modulate many of these pathways to produce the desired clinical effect.

The aim of a work is to describe the anatomy of the main circuits of the [basal ganglia](#) using [tractography](#) in a surgical [planning](#) station. Avecillas-Chasin et al used imaging studies of 20 patients who underwent [DBS](#) for movement and psychiatric disorders. We segmented the putamen, caudate nucleus (CN), thalamus, and subthalamic nucleus (STN), and we also segmented the cortical areas connected with these subcortical areas. We used tractography to define the subdivisions of the basal ganglia and thalamus through the generation of fibers from the cortical areas to the subcortical structures. We were able to generate the corticostriatal and corticothalamic connections involved in the motor, associative and limbic circuits. Furthermore, we were able to reconstruct the hyperdirect pathway through the corticosubthalamic connections and we found subregions in the STN. Finally, we reconstructed the cortico-subcortical connections of the ventral intermediate nucleus, the nucleus accumbens and the CN. We identified a feasible delineation of the basal ganglia and thalamus connections using tractography. These results could be potentially useful in DBS if the parcellations are used as targets during surgery <sup>1)</sup>.

<sup>1)</sup>

Avecillas-Chasin JM, Rascón-Ramírez F, Barcia JA. Tractographical model of the cortico-basal ganglia and corticothalamic connections: Improving Our Understanding of Deep Brain Stimulation. Clin Anat. 2016 May;29(4):481-92. doi: 10.1002/ca.22689. Epub 2016 Feb 13. PubMed PMID: 26779936.

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