

# **Synchronous neural oscillations in Parkinson's disease: Variability and its potential network mechanisms**

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## **Abstract**

Recent studies indicate that patterns of oscillatory synchronous activity in Basal Ganglia (BG) may be relevant to BG physiology and disorders, including Parkinson's disease (PD). Oscillations in BG, in particular, in relation to motor control, are observed in different species, different conditions and different dopaminergic states (e.g., PD vs. normal). The rich membrane properties of BG neurons easily support oscillatory behavior. Correlations of oscillatory activity between different BG locations depend on the brain state and are dynamically organized.

A general feature of BG oscillations is strong power and correlations of the  $\beta$ -band activity when no movement is performed and replacement of  $\beta$  with  $\gamma$ -band activity during movement. Dopamine-depleted state, such as PD, is marked by increase of oscillatory and synchronous activity, in particular in the  $\beta$ -band. This study explores the dynamical nature of these oscillations on short time-scales.