Neurons in both pallidal segments change their firing properties similarly prior to closure of the eyes.

By esc_admin
Created 11/13/2011
By esc_admin November 13, 2011


Abstract:

Current anatomical models of the cortico-basal ganglia (BG) network predict reciprocal discharge patterns between the external and internal segments of the globus pallidus (GPe and GPi, respectively), as well as cortical driving of BG activity. However, physiological studies revealing similarity in the transient responses of GPe and GPi neurons cast doubts on these predictions. Here, we studied the discharge properties of GPe, GPi, and primary motor cortex neurons of two monkeys in two distinct states: when eyes are open versus when they are closed. Both pallidal populations exhibited decreased discharge rates in the "eye closed" state accompanied by elevated values of the coefficient of variation (CV) of their interspike interval (ISI) distributions. The pallidal modulations in discharge patterns were partially attributable to larger fractions of longer ISIs in the "eye closed" state. In addition, the pallidal discharge modulations were gradual, starting prior to closing of the eyes. Cortical neurons, as opposed to pallidal neurons, increased their discharge rates steeply on closure of the eyes. Surprisingly, the cortical rate modulations occurred after pallidal modulations. However, as in the pallidum, the CV values of cortical ISI distributions increased in the "eye closed" state, indicating a more bursty discharge pattern in that state. Thus changes in GPe and GPi discharge properties were positively correlated, suggesting that the subthalamic nucleus and/or the striatum constitute the main common driving force for both pallidal segments. Furthermore, the early, unexpected changes in the pallidum are better explained by a subcortical rather than a cortical loop through the BG.

Journal:
Journal of neurophysiology

Volume:
103

Issue:
1

Pagination:
346-59

Date Published:
2010 Jan

**Custom 1:**


**UPCOMING EVENTS**

Learn more about our exciting upcoming events!

**read more**

**Studying at ELSC**

Our Int'l Ph.D. program provides outstanding students with top-notch courses in computational neuroscience.

**read more**

**The Building**

The Jerusalem Brain Sciences Building will provide a state-of-the-art research and teaching facility for the Edmond and Lily Safra Center for Brain Sciences.

**read more**

**ELSC Media Channel**

Get into our media channel and investigate ELSC's latest videos: seminars, public lectures, courses and video articles.

**read more**

**Source URL:** https://elsc.huji.ac.il/prut/publications/neurons-both-pallidal-segments-change-their-firing-properties-similarly-prior-clos