Abnormal neural activity recorded from the deep brain of Parkinson's disease and dystonia patients

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Movement disorders such as Parkinson's diseases and dystonia are caused by abnormal neural activity of the basal ganglia located deep in the brain. The basal ganglia are connected to the cerebral cortex in the brain surface through complex neural circuits. Their basic structure and connections, as well as the dysfunctions in movement disorders, have been examined extensively by using experimental animals. On the other hand, little is known about the human brain that is much more complex in either normal or diseased states.

An international joint research team led by Professor Toru Itakura and Assistant Professor Hiroki Nishibayashi from Wakayama Medical University, Japan, Professor Atsushi Nambu from the National Institute for Physiological Sciences, Japan, and Professor Hitoshi Kita from The University of Tennessee Health Science Center, TN, succeeded, for the first time, in recording cortically induced neural activity of the basal ganglia in patients with Parkinson's disease and dystonia during stereotaxic neurosurgery for the deep brain stimulation (DBS). This research has been reported in "*Movement Disorders*".

With the consent of patients and based on the ethical guidelines of Wakayama Medical University, the team recorded the neural activity of the globus pallidus, one of the nuclei in the basal ganglia, and examined their activity changes in response to the stimulation of the primary motor cortex. Typical triphasic responses were observed in patients with

Parkinson's disease, and enhanced inhibitory responses were observed in a dystonia patient. The results confirmed previous data observed in experimental animals. These results suggest: 1) Cortically evoked neural responses in the basal ganglia can be useful for determining the target location of the DBS electrodes, and 2) Enhanced inhibitory neural responses in the globus pallidus may cause abnormal movements observed in dystonia.

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