Form 1-5-2

Japan-US Brain Research Cooperative Program
The Dispatch of Joint Researcher Report in 2006 fiscal year
[field: 2 ]

1. Affiliation/ Title/ Name:

Affiliation: Systems Neuroscience, Department of Kansei-Cognition-Neuroscience, Graduate School of Comprehensive Human Sciences, University of Tsukuba.
Title : Research Fellow of the Japan Society for the Promotion of Science.
Name: Yoshiko Kojima

2. The Project Title:

Neural Mechanisms of Saccadic Adaptation.

3. U.S. Investigator's Name, Title, and Affiliation:

Department of Physiology and Biophysics, National Primate Research Center,
University of Washington.
Professor, Albert F. Fuchs

4. The Term of Research: From 2006/6/20 To 2007/3/19 (9 months)

5. The Abstract, the Result and the Significance of Research(300 Words):

Cerebellum exhibits changes for motor learning. How such cerebellar output achieves the changes of motoneuron activity remains an unresolved question in voluntary movements. To address this issue, I examined premotor neurons for saccadic eye movement. Previous studies indicate that the fastigial oculomotor region (FOR) in the cerebellar nucleus plays a crucial role in the adaptive control of saccade. Cells in the FOR have been shown to exhibit a gradual increase in their saccade-related discharge along with the course of amplitude-decreasing adaptation. Because of the direct projection from the FOR to the brainstem region containing premotor burst neurons, it has been suggested that the change in FOR activity could be responsible for the adaptive change in saccade amplitude. To test this possibility, I recorded the activity of burst neurons (BNs) in area of Inhibitory burst neurons (IBNs), which is known as premotor neuron, and examined their discharge patterns during amplitude-reducing adaptation induced by intrasaccadic target step paradigm. I specifically analyzed their activity associated with off-direction (contraversive) saccades, in which the changes in FOR activity would cause an increase to reduce the size of saccade. Before adaptation, 29 out of 43 BNs examined discharged, at least occasionally, for off-direction saccades, and the remaining 14 exhibited no spikes. After the amplitude of contraversive saccades was reduced by ISS, half of BNs that exhibited off-direction activity showed an increase in the number of spikes (14/29), a shortening of the burst lag (7/14) as adaptation progressed. BNs that had been silent during off-direction saccades showed no changes and remained silent after adaptation. These results suggest that the changes in BN activity during contraversive saccades is closely related to adaptation process and appropriate for the concomitant changes in the amplitude of saccades.

6. The Others (Other Comments):