Form 1-5-2

Japan-US Brain Research Cooperative Program
The Dispatch of Joint Researcher Report in 2005 fiscal year
[field: ② ]

1. Affiliation/ Title/ Name:
National Institute for Physiological Sciences, Department of Integrative Physiology
Postdoctral Fellow, Toshiaki Wasaka

2. The Project Title:

Mechanisms of sensori-motor integration relating to the preparation and execution of voluntary movement

3. U.S. Investigator's Name, Title, and Affiliation:
Human Motor Control Section, Medical Neurological Branch,
National Institute of Neurological Disorders and Stroke, National Institutes of Health
Mark Hallett, MD

4. The Term of Research: From 3/8/2006 To 10/31/2006 ( Years)

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

The excitability of neural circuits in the cerebral cortex is not static. Not only do changes occur during use, but also use itself can promote changes in excitability that outlasts the period of training. Training and learning can induce substantial reorganization of the brain, which is referred to as use- or experience-dependent plasticity. However, there are even greater problems with this cortical mechanism. Therefore, the aim of this collaborative project is to elucidate the mechanism of sensorimotor integration depending on the cortical excitability in humans.

Transcranial magnetic stimulation (TMS) has become a useful tool for investigating the mechanisms of plasticity in the human cerebral cortex and even, when applied repetitive TMS (rTMS), as a tool for provoking plastic changes to occur. To change the cortical excitability, theta burst stimulation (TBS) of TMS and paired associative stimulation (PAS) appears to have considerable potential for use in situations requiring an increase in cortical excitability. I tried to measure human brain activity using electroencephalography (EEG) from multiple regions of scalp.

The amplitudes of movement related cortical potentials (MRCP) and somatosensory evoked potentials (SEPs) were modulated by the change of cortical excitability caused by PAS. In addition, recovery function of blink reflex was also modulated by the inhibition of cortical excitability caused by TMS. These results are useful for the better understanding of motor control and sensory perception. The combination of rTMS and EEG may provide new therapeutical potentials for improving the rehabilitation of sensory function deficits after lesion of the somatosensory cortex or in dystonic patients. Although I could not accomplish all the experiments in this stay, the collaborative study will be maintained and further development of the analysis will be attained.

6. The Others (Other Comments):