Form 1-5-2

Japan-US Brain Research Cooperative Program
The Dispatch of Joint Researcher Report in 2008 fiscal year
[field:Brain Research]

1. Affiliation/ Title/ Name:
National Institute of Radiological Sciences
Chief researcher
Hidehiko Takahashi

2. The Project Title:
A real-time fMRI study of regulation of central emotional processing by neural feedback.

3. U.S. Investigator's Name, Title, and Affiliation:
Shinsuke Shimojo
Professor of Division of Biology
California Institute of Technology

4. The Term of Research: From 2008Y. 12M. 2D. To 2009Y. 2M.25 D. (3Months)

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

It has become possible to obtain results of fMRI immediately after acquisition of fMRI images (real-time fMRI). Using this technique as biofeedback training, possibility of effective volitional regulation of one's own brain activity has been investigated. At the time of application, we were thinking of applying real-time fMRI to subcortical "emotional" regions such as the amygdala or striatum. However, after final discussion, we decided change our functional region of interest from subcortical regions to dorsal lateral prefrontal cortex (DLPFC) because we think modulating subcortical activity is difficult in a limited period. Using 3T Siemens MRI, we identified functional ROI of DLPFC by working memory and decision making localizers. Then, subjects participated in real-time fMRI session and were instructed to increase their DLPFC activity by any mental strategy with a feedback of current their own DLPFC activity. If they succeeded to increase DLPFC activity to pass a threshold, they received monetary reward and the threshold was heightened. If they failed to pass the threshold, they received monetary penalty. They learned best strategy in a try and error manner. We aimed to examine the effect of real-time fMRI on prefrontal cognitive functions by comparing prefrontal function (working memory etc) before and after the real-time fMRI.
Due to unexpected MRI machine troubles, we were not able to scan fMRI for a couple of weeks. We could not finalize the study. We only scanned 3 healthy volunteers. Hopefully, I will go to Caltech again early in this summer to finalize the study. At the same time, we are planning to implement real-time fMRI technique in Japanese site and to apply to cognitive rehabilitation in neuropsychiatric disorders.

6. The Others (Other Comments):
It would be nice if we have a chance to invite US collaborators or visit again to finalize the study.