Effects of the TMS on the posterior parietal cortex during the eye-hand coordination task with spatial offsets

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Previous studies using fMRI have reported the changes in the posterior parietal cortex (PPC) activity with corresponding changes in performance during the eye-hand coordination tracking task. The purpose of this study was to establish the causal relationship between the function of PPC and the eye-hand coordination with various levels of spatial offsets. Therefore, we have disrupted the PPC function by using the repetitive Transcranial Magnetic Stimulation (rTMS) prior to the task. In the control condition without the rTMS, the mean RMS error showed significant changes when the clockwise or counter-clockwise spatial offsets with various degrees were introduced during the eye-hand tracking task. As the amount of the spatial offset increased, the amount of performance error increased. Once the TMS was delivered to the PPC, there was an overall increase of the performance error, and the amount of increase in the error weren't different among different spatial offsets. There was a direct correlation between the changes in the spatial offsets and the changes in the spatial transformation. However, the fact that there was no selective performance changes depending on the spatial offsets among the PPC stimulated subjects suggests the role of the PPC in this task is not significantly related to the spatial transformation. Rather, the results from this study indirectly display the possible involvement on the predictive motor control mechanism in the PPC during the eye-hand coordination task suggested by the forward model.

Key Words: Eye-hand coordination, Posterior parietal cortex, Transcranial magnetic stimulation