Changes in cortical networks during motor imagery and action observation of walking

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Abstract

Motor imagery (MI) and action observation (AO) are cognitive motor processes. Previous studies have examined the modulation of corticospinal excitability, spinal reflex excitability, and cortical activity during MI and AO. However, how the cortical network changes during these processes were still unknown. Here, this study investigated the cortical network changes during MI, AO, and MI combined with AO (MI+AO) by analyzing changes of phase relations (phase synchrony analysis). 64-ch electroencephalographic signals were recorded from twelve healthy males while they were performing MI, AO, and MI+AO of walking. In our results, phase desynchronization occurred between the sensorimotor areas and the visual areas during AO and MI+AO, while MI by itself did not cause phase desynchronization. These results suggest that AO changes cortical connectivity between the sensorimotor and visual areas while the cortical connectivity stays during MI. These findings have implications for understanding the cortical network changes induced by cognitive motor processes.