

뇌신경재활

게시일시 및 장소 : 10 월 19 일(토) 08:30-12:30 Room G(3F)

질의응답 일시 및 장소 : 10 월 19 일(토) 11:00-11:30 Room G(3F)

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Increased medial prefrontal connectivity in a HI-BI patient

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Introduction

Elucidation of neural correlates for consciousness (NCC) is clinically important for management for patients with consciousness disorders. The medial prefrontal cortex (mPFC) is involved in consciousness, and recent studies have demonstrated that it is an NCC [1-5]. However, the correlation has not yet been fully elucidated. Herein, we report on a patient who showed increased thalamocortical connectivity to the mPFC with recovery of impaired consciousness following hypoxic-ischemic brain injury (HI-BI).

Method

A 40-year-old female patient underwent conservative management for HI-BI that had been induced by hanging at a general hospital. Brain magnetic resonance images obtained at six weeks after onset showed leukomalactic lesions in the fronto-parieto-temporo-occipital lobes in both hemispheres. The patient was in a vegetative state (VS) with a Coma Recovery Scale-Revised (CRS-R) score of 9 (auditory function: 2, visual function: 3, motor function: 2, verbal function: 0, communication: 0, and arousal: 2). Transcranial direct current stimulation (tDCS; neuroConn DC-stimulator; neuroCare Group, Ilmenau, Germany) was applied on both mPMCs (the anode) using saline-soaked surface sponge electrodes (7 cm × 5 cm) with the cathode in the supraorbital region (stimulation intensity: 2 mA, stimulation duration: 20 minutes/session, one session/day, and seven sessions/week)

Result

Serial DTTs were used to demonstrate changes in the lower dorsal ARAS between the pontine reticular formation and the thalamic ILN, as well as in the thalamocortical connectivity between the thalamic ILN and the cerebral cortex, in a patient who concurrently exhibited recovery from a vegetative state to a minimally conscious state during six weeks of rehabilitation. The main neural changes were the increases in thalamocortical connectivity to both mPFCs, occurring between 6 and 12 weeks after onset. These results appear to indicate that the increased thalamocortical connectivities to both mPFCs could be attributed to the partial recovery of impaired consciousness in

this patient, which supports findings in previous studies showing that the mPFC is an important NCC.

Conclusion

Increased thalamocortical connectivity to the mPFC was demonstrated in a patient with HI-BI who showed concomitant recovery from a vegetative state to a minimally conscious state. The results suggest that increased neural connectivity to the mPMC contributed to the recovery of consciousness in this patient.

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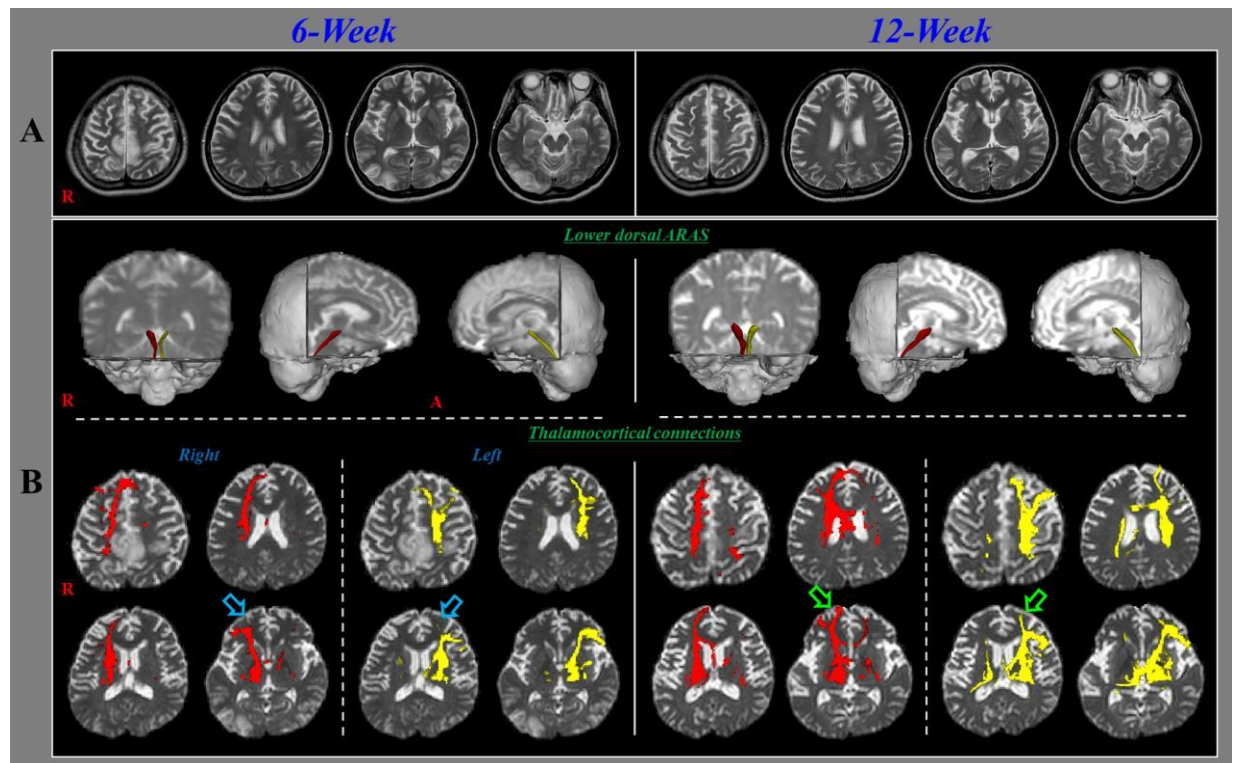


Fig 1. Brain magnetic resonance images obtained at 6 and 12 weeks after HI-BI onset show leukomalactic lesions in the fronto-parieto-temporo-occipital lobes in both hemispheres (B) Results of diffusion tensor tractography (DTT). The lower dorsal ascending reticular activating system does not show a significant change between 6- and 12-week DTT images. By contrast, neural connectivities to both medial prefrontal cortices (blue arrows) are lower on 6-week DTT compared to those on 12-week DTT (green arrows) and show increments to the left lateral PFC.