Increased thalamocortical connectivity from the affected thalamus to the unaffected hemisphere in a stroke patient

Consciousness is controlled by complicated actions of various neural structures (Schiff, 2010; Long et al., 2016). The thalamocortical connections between the central thalamus and cerebral cortex are considered an important neural structure for consciousness (Laureys et al., 2000; Schiff, 2010; Jang and Lee, 2015). Here, we report a patient who revealed increased thalamocortical connectivity from the affected thalamus to the unaffected hemisphere through interthalamic adhesion.

A 79-year-old right-handed female underwent decompressive craniectomy for brain swelling due to infarction in the right intracerebral artery territory. At 10 weeks after onset when she started rehabilitation, brain MRI showed a leukomalastic lesion in the right fronto-parieto-occipito-temporal lobes, subcortical white matter, and midbrain (Figure 1A). The patient showed a vegetative state, with a Glasgow Coma Scale score of 6 (eye opening: 1, best verbal response: 1, and best motor response: 4) (full score: 15), Coma Recovery Scale-Revised score of 3 (auditory: 0, visual: 0, motor: 2, verbal: 1, communication: 0, and arousal: 0) (full score: 23), Mini-Mental State Examination score of non-checkable (full score: 30), Functional Ambulation Category score of 0 (full score: 5) and Mortality Index score of 21 (right extremities), and 14 (left extremities) (full score: 100) (Teasdale and Jennett, 1974; Folstein et al., 1975; Demourisse et al., 1980; Cunha et al., 2002; Giacino et al., 2004). The patient provided signed informed consent. This study was conducted retrospectively, and approval for the study was obtained from the Institutional Review Board of Yeungnam University Hospital (approval No. YUMC-2019-06-032) on June 21, 2019.

Diffusion tensor imaging was obtained at 10 weeks after onset using a 6-channel head coil on a 1.5 T Philips Gyroscan Intera. Fiber tracking was conducted using Functional Magnetic Resonance Imaging of the Brain Diffusion Software with routine options (0.5 mm step lengths, 5000 streamline samples, curvature thresholds: 0.2). Two parts of the ascending reticular activating system (ARAS) were analyzed by the following regions of interest (ROI): the lower dorsal ARAS through the interthalamic adhesion in a stroke patient. The central thalamus is a core structure of consciousness because it directly links to the cerebral cortex, brainstem and basal forebrain, and indirectly links to the cortico-basal gan-

Figure 1 DTT and MRI for a 79-year-old female patient with infarction in the right intracerebral artery territory. (A) Brain magnetic resonance imaging at 10 weeks after onset showing leukomalacic lesion (red arrows) in the right fronto-parieto-occipito-temporal lobes, subcortical white matter, and midbrain. (B) Results of DTT for the ascending reticular activating system of the patient. On 10-week DTT, the right lower dorsal ascending reticular activating system reveals narrowing and the majority of the right thalamocortical connections are connected to the left hemisphere via the interthalamic adhesion compared with a normal subject (a 78-year-old female). A: Anterior; DTT: diffusion tensor tractography; MRI: magnetic resonance imaging; R: right.