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Post-traumatic fatigue due to injury of the lower ventral ARAS in mTBI

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Introduction
We investigated the relation of post-traumatic fatigue with injury of the ascending reticular activating system (ARAS) in patients with mild traumatic brain injury (TBI), using diffusion tensor tractography (DTT).

Methods
Fifty-five consecutive patients with mild TBI and 30 normal control subjects were recruited for this study. The severity of fatigue was assessed using the fatigue severity scale (FSS). We classified the patient group (55 patients) into two groups based on their the FSS score: 42 patients were placed in group A (with post-traumatic fatigue; FSS score: 4~9) and 13 patients were assigned to group B (without post-traumatic fatigue; FSS score: 0~3). Values of fractional anisotropy (FA) and fiber number (FN) of the reconstructed three parts of the ARAS were determined in each subject.

Results
Significant differences were observed in the values of FA and FN of the lower ventral ARAS between the patient group A and B, and between the patient group A and control group ($p < 0.05$). However, there was no significant difference in the values of FA and FN of the lower dorsal and upper ARAS between patient group A and B, between patient group A and control group, and between patient group B and control group ($p > 0.05$).

Conclusion
We found that post-traumatic fatigue appeared to be ascribed to injury of the lower ventral ARAS in patients with mild TBI. These results suggest that DTT for the ARAS could be provide useful information in detecting injury of the ARAS in patients with fatigue following mild TBI, because mild TBI usually does not show any abnormalities on conventional brain MRI.

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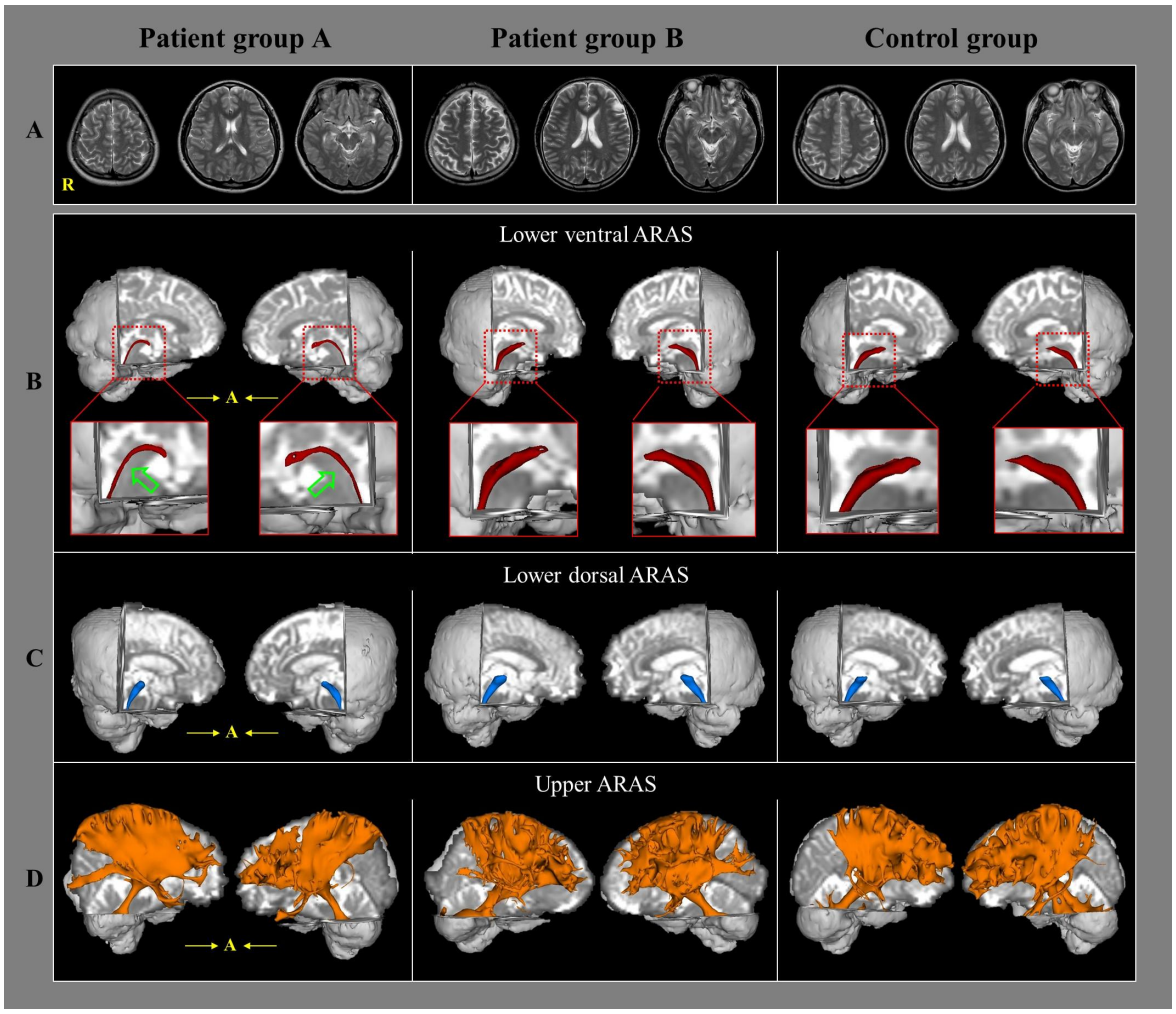

Figure1. (A) T2-weighted brain MR images at the time of diffusion tensor imaging scanning in a patient with patient group A and B, and control group show no abnormality. (B) Results of diffusion tensor tractography (DTT) for the lower ventral ascending reticular activating system (ARAS); a representative patient (44-year old female) of patient group A is narrowed in the patient on both sides (green arrow), compared with those of the a representative patient (46-year old female) of patient group B and a representative subject (47-year old female). (C) Results of DTT for the lower dorsal ARAS. (D) Results of DTT for the upper ARAS.