

**Diffusion tensor tractography of cognitive impairment in neuromyelitis optica**

Ah-Ra Cho<sup>1\*</sup>, Hye-yeon Park<sup>2</sup>, Joo Hyun Park<sup>2</sup>

St. Paul Hospital, The Catholic University of Korea, Department of Rehabilitation Medicine<sup>1</sup>, The Catholic University of Korea Seoul St. Mary's Hospital, Department of Rehabilitation Medicine<sup>2</sup>

**Introduction**

Neuromyelitis optica spectrum disorder (NMOSD) is an immune-mediated disorder which affects optic nerve, spinal cord and specific brain area. The cognitive deficits in NMO showed variable relationships with brain lesions, white matter diffusion abnormalities but cannot be fully explained by a conventional magnetic resonance image (MRI) measure. The aim of this report was to investigate changes of white matter related to cognitive dysfunction in a NMO patient by means of diffusion tensor tractography (DTT).

**Case Report**

A 34-year old woman presented blurry vision on right visual field. Aquaporin-4-immunoglobulin-G (AQP4-IgG) was positive and autoimmune serological tests were unremarkable. She was diagnosed with NMOSD. She prescribed steroid for pulse therapy and maintenance for one month. Her visual acuity showed improvement during the first month of treatment. However, 3 months after discontinuing steroid, the patient experienced quadriplegia with mental deterioration. Her brain MRI demonstrated T2 high signal intensities involving both cerebral hemispheres and upper brainstem, especially involving subcortical white matters suggesting acute exacerbation state of NMO. Intravenous steroid pulse therapy and plasma exchanges were performed and she regained her alertness. Intravenous immunoglobulin was supplementary administered. One month after acute management, her motor power was MRC grade 3 on right upper and lower extremities and grade 1 on left side extremities. She achieved 14 score in Korean Mini-Mental State Examination (K-MMSE) regardless of her prior high educational level as dentistry doctor. She was transferred to department of rehabilitation and received physical and occupational therapy including cognitive rehabilitation. After one month, her motor power picked up MRC grade 4 on all extremities but showing dynamic instability on left weight bearing. She scored full marks in the K-MMSE but showed decreased attention, especially to visual stimulation. She received neuropsychological test and follow up brain MRI. Her performance showed average range in Train Making and forward Visual Span test but presented moderately atypical disability in backward Visual Span test. On tractography using DTI data, right CST demonstrated small volume compared to left. Her Cingulum and Uncinate fasciculus showed decrease volume and FA values on left hemisphere. However, no fibers projected to medial and orbitofrontal cortex from external capsule were observed on right IFOF despite of relatively preserved adjacent crossing tract of UF (Figure 1,2).

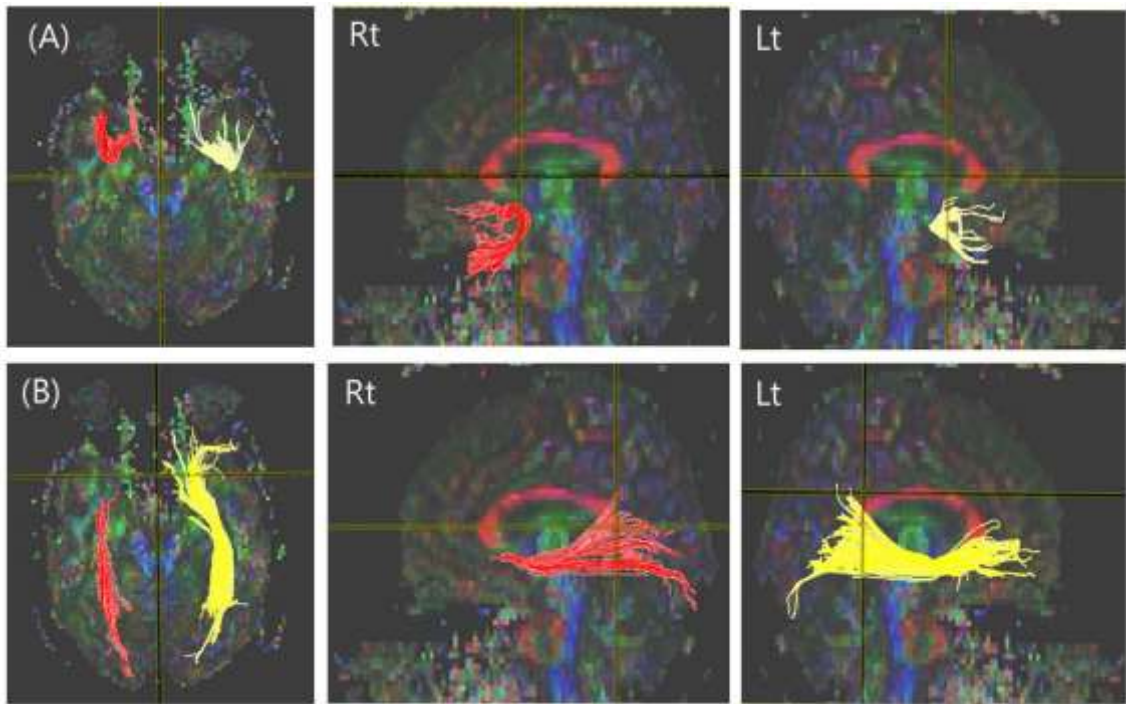


Fig 1. Uncinate fasciculus and Inferior fronto-occipital fasciculus

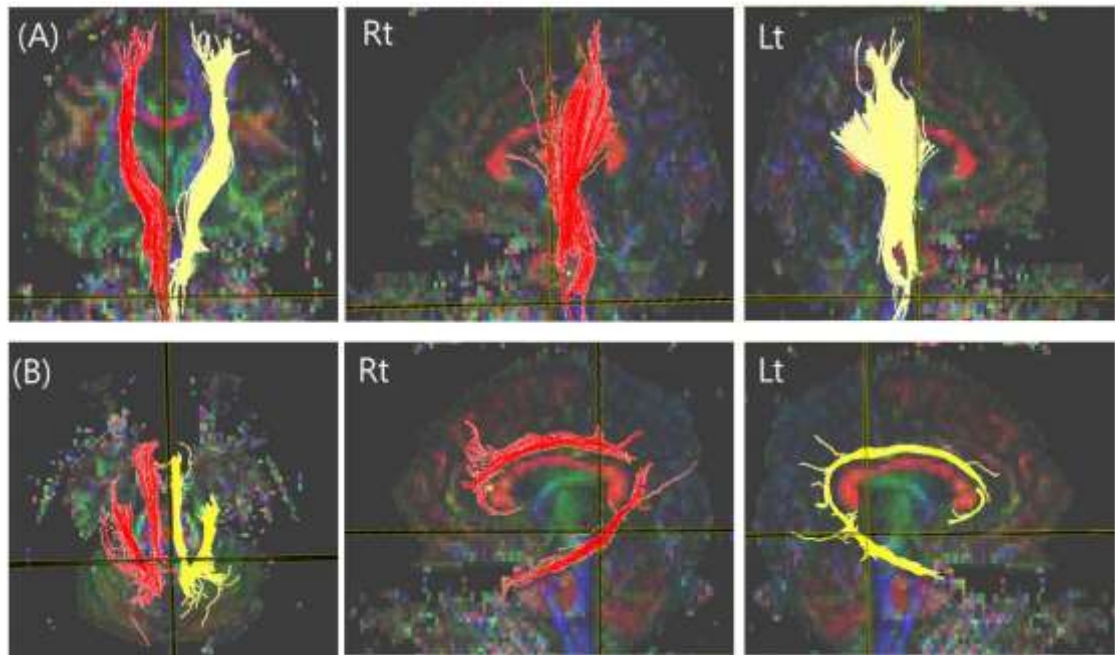


Fig 2. Corticospinal tract and Cingulum