

## Diffusion anisotropy and diffusivity of the white matter tracts within temporal stem in Alzheimer disease.

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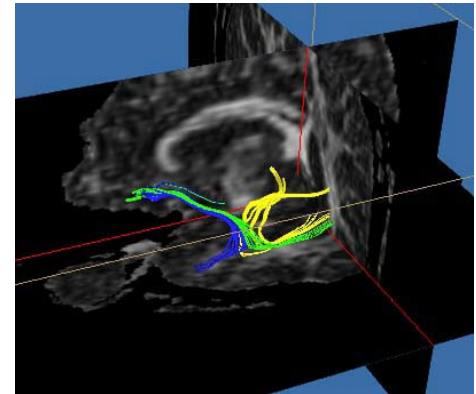
### Purpose

Temporal stem is a white matter region bridges between temporal lobe and frontal lobe, which contains uncinate fasciculus, inferior occipitofrontal fasciculus and optic radiations. We evaluated diffusion anisotropy and diffusivity of these tracts within temporal stem in Alzheimer disease cases.

### Materials and Methods

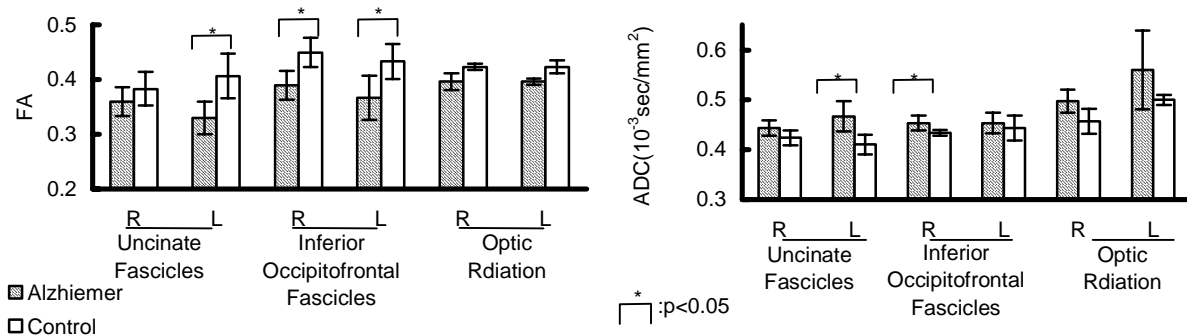
The subjects were eight Alzheimer disease cases and eight age-matched control cases. Diffusion tensor images were obtained using an echo planar sequence (TR = 2300 ms, TE = 122 ms, b = 1000 sec/mm<sup>2</sup>, 6 axes encoding, FOV = 230 mm, matrix = 128 x 128, slice spacing = 3.3 mm, slice thickness = 3 mm, averaging = 6). Tractography of Meyer's loop was made using diffusion tensor imaging software developed by Masutani et. al (University of Tokyo, diffusion tensor visualizer ver. 2, available at <http://www.ut-radiology.umin.jp/people/masutani/dTV.htm>).

Tractographies of uncinate fascicles ("blue" in the figure) were obtained by setting seeds in the white matter of frontal base and targets in ipsilateral temporal tip. Tractographies of inferior occipitofrontal fascicles ("green" in the figure) were obtained with seeds in the white matter of frontal lobe and targets in ipsilateral sagittal stratum. Tractographies of optic radiation ("yellow" in the figure) were obtained with seeds in the white matter just anterior to lateral geniculate nucleus and targets in ipsilateral sagittal stratum. We measured FA (fractional anisotropy) and ADC (apparent diffusion coefficient; sec/mm<sup>2</sup>) values along tracts and compared the values between control and Alzheimer disease cases.



### Results

As shown in figure below, FA of Alzheimer disease cases showed statistically significant lower value in left uncinate fasciculus and inferior occipitofrontal fascicles of both sides. ADC of Alzheimer disease cases showed significant higher value for left uncinate and right inferior occipitofrontal fascicles. Both FA and ADC showed no significant difference along optic radiation.



### Discussion and Conclusion

Uncinate fascicles are believed to play a role in memory function. Although functional significance of inferior occipitofrontal fascicles is not well known, they are believed to have some relationship with cognitive impairment. In current study, decreased diffusion anisotropy and increased diffusivity value along uncinate fascicles and inferior occipitofrontal fascicles has been observed in Alzheimer cases. In contrast, diffusion anisotropy and diffusivity of optic radiation did not showed differences between control and Alzheimer cases. These observations seem to indicate that diffusion anisotropy and diffusivity value along uncinate fascicles and inferior occipitofrontal fascicles reflect white matter changes in Alzheimer disease.

### Reference

AJNR 25:677-691, May 2004