Selection of appropriate fractional anisotropy (FA) threshold for tract based diffusion tensor analysis of uncinate fascicles in Alzheimer disease.

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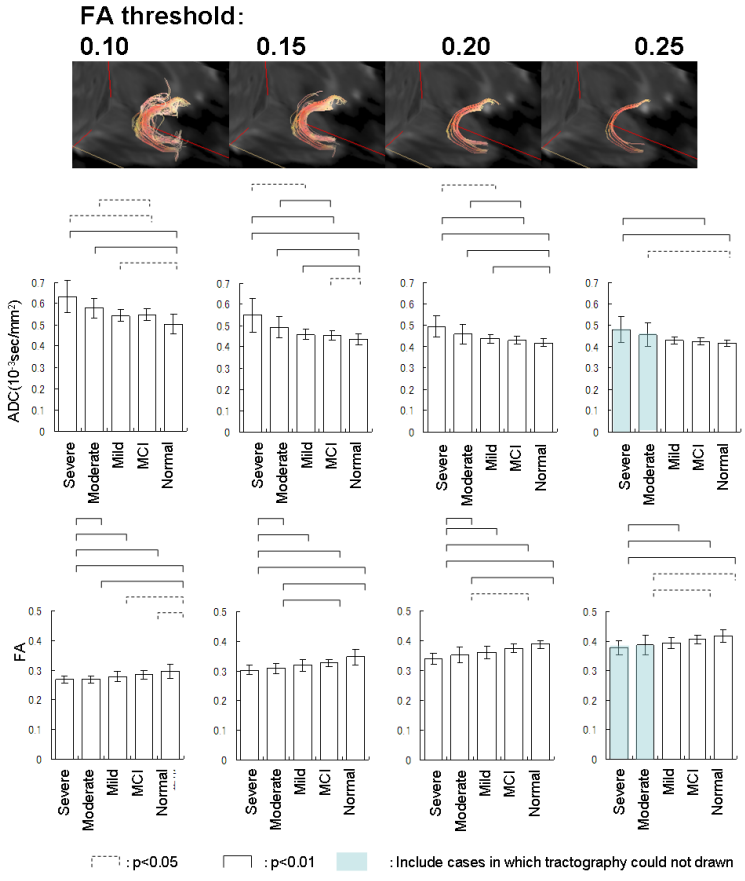
Purpose: Tract based analysis of white matter tract is a useful method to analyze pathological change in selected tract. Fractional anisotropy (FA) threshold is set when drawing tractography and has influence in drawn tractography. The purpose of the current study is to evaluate the influence of the FA threshold to measured FA and apparent diffusion coefficient (ADC) values in tract-based analysis for the cases with Alzheimer disease (AD).

Materials and methods: Subjects of the current study includes 25 AD cases (5 severe, 7 moderate, 6 mild and 7 Mild cognitive impairment (MCI) cases) and 10 normal controls.

Diffusion tensor images were acquired using EPI sequence. We acquired tractographies of uncinate fasciculus using different FA thresholds (0.1, 0.15, 0.2, 0.25) using diffusion tensor analysis software. For different FA thresholds, we measured FA and ADC along uncinate fasciculus and compared the values between AD cases, MCI cases and control subjects, and evaluated statistical difference by ANOVA.



Results: Figure shows the tractography of uncinate fascicles of various FA thresholds and results of measurement. With FA threshold of 0.25, tractography of uncinate fasciculus could not be drawn in three cases. Higher FA threshold bring lower value of ADC and higher value of FA along the uncinate fasciculus, while, order of measured value according to the severity of AD were not influenced by FA threshold. FA threshold of 0.15 and 0.2 showed better discrimination among different severity of AD both for FA and ADC.

Conclusion: FA threshold had influence for measured value of FA and ADC along the tract. For tract based analysis of degenerative disease, appropriate selection of FA threshold to draw tractography is important for effective and meaningful evaluation. In the case with analysis of uncinate fasciculus in AD, FA threshold of 0.15 and 0.2 showed better discrimination among different severity of AD both for FA and ADC.