**Oral MO-2** *(11:29 - 11:38)*

## Effect of the Number of Diffusion-Sensitizing Gradient Direction on Anisotropy Measurement and Fiber Tracking of the White Matter in Diffusion Tensor MR Imaging

이종세, 홍성우, 김재형
서울의대 분당서울대학교병원 진단방사선과

**목적 :** Diffusion tensor MR imaging (DTI) is highly sensitive to image acquisition noise and therefore depend on the number of diffusion-sensitizing gradient direction, the number of signal averaging, b value and voxel size. The purpose of this study was to evaluate the effect of the number of applied diffusion-sensitizing gradient direction on the measurement of fractional anisotropy (FA) and fiber tracking of the white matter.

**대상 및 방법 :** We performed DTI in 13 volunteers with different numbers of diffusion-sensitizing gradient direction (6, 15 and 32 directions), keeping all other parameters constant. Single-shot spin-echo EPI imaging technique was used at 1.5T with following parameters; TR/TE/FA 7228ms/70ms/90°, number of averaging 3, b value 600s/mm$^2$, SENSE factor 2.5, measured voxel size 2x2x2mm. Acquisition time was 2min 54s for 6 directions, 6min 9s for 15 directions and 12min 18s for 32 directions. FA was measured in the genu and splenium of the corpus callosum. Fiber tracking of the right and left corticospinal tracts was performed and the number of tracked fibers was measured. Then measured FA, its standard deviation, and number of tracked fibers were compared between 6, 15 and 32 directions using the statistical analysis.

**결과 :** FA values of both genu and splenium were not significantly different between 6, 15 and 32 directions. By increasing the number of diffusion-sensitizing gradients, standard deviations of these FA values decreased significantly ($p < 0.001$) and the number of fibers tracked in the corticospinal tracts increased significantly ($p < 0.001$).

**결론 :** Increasing the number of diffusion-sensitizing gradient direction did not influence the measured FA, However, reduction of the standard deviation of the measured FA, and consequently increased similarity of anisotropic diffusion (magnitude and direction) between contiguous voxels along the white matter tract might improve fiber connectivity. Higher number of diffusion-sensitizing gradients is recommended within practically acceptable acquisition time.