

PO-07-P

## **Fiber tractography and FA map combined method in determining peritumoral infiltrations in low- and high- grade gliomas**

안국진, 김영주, 김범수, 정소령  
가톨릭의대 방사선과학 교실

### Purpose

Until now a reliable differentiation between tumor infiltration and vasogenic edema is known to be not yet possible on the basis of diffusion tensor imaging (DTI). We want to investigate the usefulness of fraction anisotropy (FA) map and fiber tractography combined method in determining the peritumoral infiltrations of white matter beyond the tumor edge in various grade gliomas to search for erroneously known as tumor infiltrated region.

### Methods

Ten patients with biopsy or operation-proved glioma (2 gliomatosis cerebri, 1 low grade gliomas, 1 high grade glioma, and 6 glioblastoma multiforme) underwent conventional MRI and diffusion-tensor MR imaging (DTI). The tumor mass was defined as the enhancing area in malignant gliomas and as the area of increased T2-signal in low- grade gliomas. FAs were measured on peritumoral hyperintense white matter (WM) seen on T2-weighted MR images and the extent of peritumoral infiltrations were determined. Fiber tractography around the tumor mass was performed, and tumor-induced changes of fiber tracts were evaluated. The changes of the fiber tracts were categorized into: 1) disrupted, 2) reduced in number, 3) displaced, and 4) intact. Two radiologists determined tumor extent and categorized the WM tract changes by consensus, and investigated FA map and fiber tractography mismatch regions to search for erroneously known as tumor infiltrated region.

### Results

On FA maps of seven high grade glioma and glioblastoma multiformes, peritumoral low value areas were demonstrated beyond the tumor edge, and these low value areas included lots of major fiber tracts. By using the fiber tractographies we confirmed tumor infiltrations shown as 'disrupted' tract and 'reduced in number' in all seven malignant gliomas. However, among the seven malignant gliomas, five tumors (7 regions in total number) showed FA map and fiber tractography mismatches (low FA values, but displaced or intact fiber tracts). In case of low grade glioma, some areas with low FA value were noted, however, these areas showed also

mismatches on fiber tractography. In two cases of gliomatosis cerebri, there is no area with low FA value and 'disrupted' or 'reduced in number' on fiber tractography

#### Conclusion

In high grade gliomas, peritumoral low FA values were too sensitive to represent tumor infiltrations, and in these cases, fiber tractographies performed around the mass were useful to confirm true infiltrations.

FA map and fiber tractography combined method seems to be very useful in determining and differentiating peritumoral infiltrations and vasogenic edema of white matter beyond the tumor edge in various grade gliomas.