

## **A Tract-Based Spatial Statistics (TBSS) Study Of Diffusion Tensor Imaging (DTI) On Focal Epilepsy**

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### **PURPOSE**

The aim of this study to investigate the white matter diffusion changes in patients presenting with focal epilepsy in the frontal and temporal regions of the brain and to determine the feasibility of voxel-based analysis with Tract-Based Spatial Statistics (TBSS) in the evaluation of irritative zone in presurgical evaluation.

### **METHOD AND MATERIAL**

We prospectively studied on 24 patients with focal epilepsy and 24 normal control subjects. Cross sectional MRI brain was performed using epilepsy protocol and diffusion tensor sequence (B value of 1000 ) on 3T MRI. Interictal electroencephalogram (EEG) findings were available for the 24 focal epileptic patients. A set of diffusion parameters; fractional anisotropy (FA), mean diffusivity (MD), axial diffusivity (AD) and radial diffusivity (RD) were acquired and calculated from the voxel-based analysis using TBSS.

### **RESULTS**

Study population included 14 patients with unitemporal, 4 patients with unifrontal, 4 patients with bitemporal and 2 patients with bifrontal diffusion changes. The 4 groups showed bilateral and extensive white matter diffusion changes when compared to the normal control subjects. Abnormal diffusion parameters were seen involving the limbic circuit and the major association fibres (superior longitudinal fasciculus, superior and inferior fronto-occipital fasciculi) as well as the corpus callosum and projection fibres. The unitemporal and bitemporal groups demonstrate reduced FA and AD whereas the unifrontal group demonstrates reduced FA and increased RD. The bifrontal group demonstrates reduced in AD only.

### **CONCLUSION**

Diffusion MRI is useful in detecting the microstructural and micropathological changes in the brain in patients with epilepsy. In this study, it also shows that the irritative zone (IZ) is slightly more affected than the non irritative zone (NIZ) and that there is a difference between tracts affected in unilateral IZ and bilateral IZ. Different micropathological changes are also seen affecting the four groups.