

## Examining the Relationship between DTI Tractography and Epilepsy Localization

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**Introduction.** Epilepsy localization is critical in surgical intervention for patients with drug resistant epilepsy (DRE). Current presurgical workup may include scalp EEG and stereo EEG, brain MRI, PET, neuropsychological examination, and more to establish localization. However, information from these studies sometimes provides equivocal conclusions. Diffusion tensor images (DTI) with existing magnetic resonance imaging technology and measures water diffusion through anisotropy to highlight white matter tracts and could potentially provide additional localization information.

**Methods.** We obtained and retrospectively analyzed FA values for 17 white matter tracts from the bilateral hemispheres of 73 patients undergoing pre-surgical workup for DRE. Patient's FA values were calculated using DSI Studio, a tractography software tool for DTI. The laterality of the patient's epilepsy was determined using the epileptologist's report in the patient's chart. A total of 21 patients were excluded because source of epilepsy was bilateral or unable to be definitively localized by the epileptologist. We compared right and left FA differences for individuals to the standard deviation across the population for each tract.

**Results.** We found the hemisphere with smaller FA values corresponded with the clinically determined epileptic localization 76.8% of the time. Furthermore, when FA value differences between hemispheres were >2.5 standard deviations, the localization accuracy increased to 86.7% of the time.

**Conclusions.** This study suggests that differences in FA values between hemispheres may provide evidence for laterality localization with smaller FA values indicating higher likelihood of epileptic onset. Additionally, higher specificity was observed when differences in each patient were increased.