Introduction

Cognitive symptoms of schizophrenia are often regarded as core symptoms in the treatment of schizophrenia. However, there have been few studies that have investigated the relationship between white matter abnormality and executive function in first-episode schizophrenia, compared with healthy controls, using a whole brain voxel-based diffusion tensor imaging approach called tract-based spatial statistics (TBSS), and relationship between these findings and executive function.

Method

Subject: 17 first episode Schizophrenia (FESZ) (mean age: 21.5 ± 4.75) and 17 Healthy Controls (HCs) (mean age: 23.1 ± 3.46) matched for age, gender, handedness, and parental socioeconomic status. Mean duration of illness (FESZ) was 9.4 ± 6.3 months

Executive function: Wisconsin Card Sorting Test (WCST).

MRI: 3 Tesla GE scanner, Echo planar imaging (EPI) DTI sequence
Scan parameters: 51 directions, TR 17000ms, TE 78ms, FOV 24cm, 144 x 144 encoding steps, 1.7 mm slice thickness, 85 axial slices
Software: Tract-based Spatial Statics (version 1.2), 3D-slicer, Image processing:

Individual FA images  
FMRIB58 FA Standard template  
All FA image  
Mean FA image  
Mean FA skeleton  
3D individual FA skeletons  
Projection  
Whole Brain FA Skeleton Analysis  
Voxel-wise Analysis

Results Summary and Conclusion

- First-episode patients with schizophrenia showed lower FA values in the genu and body of corpus callosum, the internal capsule, the external capsule, the forni, and the cerebellum compared with healthy volunteers.
- Pearson correlation analysis demonstrated that the integrity of right external capsule and right inferior fronto-occipital fasciculus were significantly correlated with total number of correct answer and categories completed, and negatively correlated with number of total errors in the WCST in first-episode schizophrenia.
- These data suggest that first-episode schizophrenia might be associated with disruptions in extensive portions of white matter fiber tracts, especially corpus callosum, internal external capsule, cerebellum and forni, and that executive functioning might be associated with right external capsule and right inferior fronto-occipital fasciculus integrity.

Result : Whole Brain FA Skeleton Analysis

Differences of mean FA values in whole brain FA skeleton and FA skeletons of each region

Result : Voxel-wise Analysis ( Significant FA reduction in FESZ compared with HCs : Avery, Orange )

Result : Correlation between Executive Function and White Matter Integrity

- Pearson correlation analysis showed no significant difference in mean FA values bilaterally for frontal, temporal, parietal, occipital, and subcortical region between FESZ patients and Healthy Controls
- Result : Correlation between Executive Function and White Matter Abnormalities in First-Episode Schizophrenia

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