**ABSTRACT**

Background: White matter fiber tracts, especially those interconnecting the frontal and temporal lobes, are likely implicated in schizophrenia. Very few studies, however, have focused on the fornix, a compact bundle of white matter fibers, projecting from hippocampus to the septum, anterior nucleus of the thalamus and the mamillary bodies. Diffusion Tensor Imaging (DTI), and a new post-processing method, fiber tractography, provide a unique opportunity to visualize and to quantify entire trajectories of fiber bundles, such as the fornix, in vivo. We applied these techniques to quantify fornix anisotropy in schizophrenia.

Methods: DTI images were used to evaluate the left and the right fornix in 36 male patients diagnosed with chronic schizophrenia and 35 male healthy individuals, group matched on age, parental socio-economic status, and handedness. Regions of interest were manually drawn to guide tractography, and Fractional Anisotropy (FA), a measure of fiber integrity, was calculated and averaged over the entire tract for each subject.

Results: Analysis of variance was performed, with side as within subject factor, and findings demonstrated a group effect (P=0.006) for fornix FA. Post-hoc independent sample t-tests demonstrated bilateral FA decrease in schizophrenia, compared to control subjects (left side: P=0.048; right side P=0.006).

Conclusions: Our investigation shows the utility of applying imaging tools, such as DTI and tractography, to study white matter fiber tracts in vivo. Our results point to bilateral disruption in the fornix integrity in schizophrenia, broadening our understanding of the pathophysiology of this disease.

**BACKGROUND**

White matter fiber tracts, especially those interconnecting the frontal and temporal lobes, are likely implicated in schizophrenia. Very few studies, however, have focused on the fornix, a compact bundle of white matter fibers, projecting from hippocampus to the septum, anterior nucleus of the thalamus and the mamillary bodies. Diffusion Tensor Imaging (DTI), and a new post-processing method, fiber tractography, provide a unique opportunity to visualize and to quantify entire trajectories of fiber bundles, such as the fornix, in vivo. We applied these techniques to quantify fornix anisotropy in schizophrenia.

**METHODS**

Subjects: DTI images were used to evaluate the left and the right fornix in 36 male patients diagnosed with chronic schizophrenia and 35 male healthy individuals, group matched on age, parental socio-economic status, and handedness. Regions of interest were drawn manually to guide tractography, and Fractional Anisotropy (FA), a measure of fiber integrity, was calculated and averaged over the entire tract for each subject.

DTI acquisition: images were acquired on a 1.5 Tesla system using a Line Scan Diffusion Imaging technique. 36 coronal, 5mm slice thickness, 128x128 scan resolution; 6 independent directions, 1 NEX, TE (echo time) 70 ms, TR (repetition time) 80ms, effective TR 2500 ms

Sensitivity tool: The goal of using this tool is to eliminate the fibers with a low signal anisotropy on the selected ROIs.

**RESULTS**

- **Fig 1:** First ROI in coronal plane
- **Fig 2:** Coronal view of left and right ROI
- **Fig 3:** Sagittal view of the fibers passing through the 5 ROI’s
- **Fig 4:** Tracts with ROIs

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ANOVA FA

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CONCLUSIONS

- Our results point to bilateral disruption in the fornix integrity in schizophrenia.
- Considering the role of the fornix in connecting key brain structures involved in superior cognitive functions, this study can help broaden our understanding of the pathophysiology of this disease.
- DTI and tractography has proven as an imaging useful tool to study white matter fiber tracts in vivo.

**REFERENCES**