The relationship between radial optic flow perception and neurodegeneration in Parkinson’s Disease: A volumetric MRI analysis

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Introduction

- Parkinson’s Disease (PD) is a disorder that affects one million people in the U.S.
- Symptomatic navigational veering in PD is related to abnormal processing of Radial Optic Flow (ROF), which are the motion patterns perceived during forward self-movement.
- Areas V6 of the parieto-occipital sulcus and V5/middle temporal (MT+) are important for the analysis of visual motion patterns during self-motion/response to visual motion stimuli, and therefore navigation.
- Information regarding the effects of ROF on particular neuroanatomical structures is currently limited.

Hypothesis

- We hypothesized that there is degeneration in the V6 of the parieto-occipital sulcus and V5/middle temporal (MT+) that correlates with radial optic flow measures in PD patients.

Methods

- SPM (Matlab): Conversion of T1 MRI data from DICOM
- FreeSurfer: Processing and Analyses of MRI images
- ITK-SNAP: Segmentation of Grey and White Matter Structures
- Volumetric Analysis: Association analyses of focal differences in brain anatomy
- Align ROI in all views (Axial, Sagittal, Coronal)
- Manual demarcation of ROI using Sagittal View
- Adjustments of ROI using Axial and Coronal Views
- ROI observed in 3d view

ROF Performance and Visual Field Volume

Conclusions

- Results show that there is not a significant relationship between ROF Coherence Threshold and Normalized Volume of the Right and Left V5/MT+ and V6.
- FreeSurfer atlas analysis resulted in the identification of additional cortical structures that have a significant relationship with ROF.
- Further research should explore the relationship between identified cortical structure average volume and ROF.

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