WHITE MATTER IN PARKINSON’S DISEASE: PRELIMINARY DATA

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Introduction

It is accepted that the cognitive sequelae of Parkinson’s Disease (PD) most prominently involve disruption(s) within the frontal-striatal system [1]. This system involves a white matter circuit connection between the subcortical structures (e.g., basal ganglia) and frontal cortex [2]. While the subcortical nuclei (e.g., basal ganglia) are known to play the critical role in the deregulation of the frontal-striatal system, much remains to be answered about this system breakdown. The purpose of the present pilot study is to examine differences in the frontal white matter of the individuals with PD relative to age matched ‘healthy’ controls. These data will be used to apply for a NIH K-23 application.

Experimental

Data obtained at UF AMRIS facility with 3 Tesla Siemens. Diffusion Tensor Imaging (DTI) used 12 directions, axial plane, 5mm thickness. Voxelwise group comparison of Fractional Anisotropy (FA) was carried out using TBSS (Tract-Based Spatial Statistics, part of FSL, http://www.fmrib.ox.ac.uk/fsl/). FA values were quantified from DTI whole brain FA maps and were processed and analyzed with MAS software (MRI Analysis Software; In house Software with IDL, ITT Boulder, CO). Groups (4 PD, 4 NC) matched in age, education and general cognitive status.

Results and Discussion

Fractional Anisotropy (FA) Voxelwise group comparison: Figure 1 - Crosshairs highlight the reduced frontal FA (involving the frontal forceps) of the PD group relative to NC group (yellow/red voxels). Radiological convention shown.

Figure 1:

Region of interest FA analyses: ROI FA Analyses were conducted independent and blind to the voxelwise group comparisons and demonstrate reduced left and right frontal forcep FA in the PD group relative to the NC group [Left forcep: t(6)=3.40, p=.02; Right forcep: t(6)=3.4, p=.01]. There were no differences for the anterior internal capsule. The cerebellum served as a control FA condition which, as expected, showed low FA values for both groups.

Conclusions

These data preliminarily support the hypothesis that white matter integrity, particularly within the frontal lobe, may be compromised in PD relative to age matched controls.

Acknowledgements

NHMFL funding to AMRIS, UF Opportunity Fund which provided the control group data

References