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47 Evolution of Brain Morphology and Cognitive Performance in Parkinson's Disease with Impulse Control Disorder

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Objective: Parkinson's disease (PD) affects the person's quality of life, but the comorbidity of PD and impulsive control disorder (ICD), which has an average prevalence of 23%, can enhance the disruption of quality of life for the patients and their caregivers. The effects of ICD in PD on brain morphology and cognition have been little studied. Thus, this study proposes to investigate the differences in the evolution of cognitive performance and brain structures between PD patients with ICD (PD-ICD) vs. without ICD (PD-no-ICD).

Participants and Methods: Parkinson's Progression Markers Initiative (PPMI) data of 58 patients with idiopathic PD, including their MRI data at baseline and three years later, were analyzed. The MRIs were processed with FreeSurfer (7.1.1) to extract cortical volumes, areas, thicknesses, curvatures and folding index as well as volumes of subcortical segmentations. All participants underwent cognitive evaluations. The Questionnaire for Impulsive-Compulsive Disorders in Parkinson's Disease was used to differentiate those with at least one ICD from those without any ICD. 12 of the 58 patients had an ICD at their first visit and 19 had an ICD at their visit three years later. There was no significant difference between PD-ICD and PD-no-ICD with respect to sex, use of overall medication, age, age of onset, age at diagnosis, years of education and the Montreal cognitive assessment score. Two-way mixed ANOVAs were performed for each neuropsychological test and brain structure extracted from MRIs with the time of the visit as the repeated independent variable (within participants) and the presence or absence of an ICD as the other independent variable (between participants).

Results: The mixed ANOVA revealed that PD-ICD had their performance decline after three years, for the Hopkins Verbal Learning Test delayed recall and the Symbol Digit Modalities Test while PD-no-ICD saw their performance increase. A whole brain analysis showed that PD-ICD had a significant decrease after three years of the right cortex area total brain volume in comparison to PD-no-ICD. Specific brain structures also underwent significant changes over three years. Cortical changes in PD-ICD were: (1) increased surface area in the left temporal parahippocampus and (2) decreased surface areas of the right insula, right middle and superior temporal regions, left occipital lingual as well as left cingulate isthmus. Furthermore, in the subcortical nuclei, PD-ICD showed (1) increased volumes of the paratenial thalamic nucleus and whole right amygdala and (2) decreased volumes of the right amygdalian basal nucleus and thalamic ventromedial nucleus.

Conclusions: This study suggests that PD patients who also have ICD might be prone to develop over three years: (1) significant changes in cognitive performance (memory, attention), (2) morphological changes in the amygdala and thalamic nuclei and (3) significant atrophy and area shrinkage in the temporal and insula regions.

Categories: Neurodegenerative Disorders

Keyword 1: Parkinson's disease

Keyword 2: neuropsychiatry

Keyword 3: neuroimaging: structural

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48 Longitudinal Study: Impact of Anxiety on the Evolution of Cognitive Performance and Brain Morphology in Patients with Parkinson's Disease

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Objective: Anxiety is very common in Parkinson's disease (PD) where according to a systematic review, the average prevalence is 31%, surprisingly higher than the average 17% of depressive disorders found in PD. Only a few studies have investigated the impact of anxiety on cognitive performance and brain morphology in PD. They demonstrated anxiety to be a significant predictor of cognitive impairment, where PD patients with anxiety have shown to be twice more likely to have deficits in the memory domain compared to those without anxiety. Furthermore, poorer cognitive performance in all cognitive domains was reported to be a significant risk factor for increased anxiety the following year. Anxiety in PD has also shown reduced volume/thinning in the fronto-cingulate, anterior cingulate cortex, left parietal cortices and the precuneus, despite the scant number of studies on this topic. Hence, the objective of this study aims to determine the evolution of cognitive performance and brain morphology in PD patients with and without anxiety over a three-year span.

Participants and Methods: We analyzed the baseline and three-year follow-up Parkinson's Progression Markers Initiative (PPMI) data of 58 PD patients. MRI 3T was processed with FreeSurfer 7.1.1 on the Compute Canada cluster "Cedar" and we extracted cortical (Desikan-atlas-based volumes, thickness, area, folding index, curvature) and volumes of subcortical structures. Additionally, anxiety subscores from the State-trait anxiety inventory as well as neuropsychological tests were analyzed. PD patients were classified in two groups: PD-no-anxiety (n=46) and PD-anxiety (n=12) (subscore of ≥ 40 on the State anxiety scale). Two-way mixed ANOVA models were established with presence/absence of anxiety as a between-subjects factor, time (baseline and three year) as a within-subjects factor and neuropsychological and MRI data were regarded as dependent variables.

Results: Mixed ANOVA revealed that PD-anxiety saw a significantly greater decline in performance on the Montreal Cognitive Assessment test compared to PD-no-anxiety. In addition, PD-anxiety saw their performance decline over time in the Hopkins Verbal Learning test (HVLT) immediate recall, HVLT retention and HVLT delayed recall while PD-no-anxiety saw an increase in performance. In terms of brain morphology, over the three years, PD-anxiety had a greater decrease in the frontal

precentral thickness, cingulate isthmus area and thickness, and temporal regions (transverse area and inferior folding) all in the left hemisphere compared to PD-no-anxiety. In subcortical regions, PD-anxiety had a greater decrease in volume of the hippocampal cornu ammonis-1 and pallidum compared to PD-no-anxiety. By contrast, PD-anxiety showed a greater increase in curvature of the frontal middle rostral, frontal pole, parietal supramarginal, and insula cortex as well as in the folding of the parietal superior and occipital pericalcarine of the right hemisphere in comparison to PD-no-anxiety.

Conclusions: This study highlights the importance of taking into consideration anxiety symptoms in PD, as they contribute to poorer cognitive performance and frontal, parietal and temporal differences over time. More studies with a larger sample size are needed in order to confirm these results.

Categories: Neurodegenerative Disorders

Keyword 1: Parkinson's disease

Keyword 2: anxiety

Keyword 3: neuroimaging; structural

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49 Adaptive Functioning in a Mixed Clinical Sample of Older Adults: The Importance of Processing Speed

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Objective: The presence of cognitive impairment corresponds with declines in adaptive functioning (Cahn-Weiner, Ready, & Malloy, 2003). Although memory loss is often highlighted as a key deficit in neurodegenerative diseases (Arvanitakis et al., 2018), research indicates that processing speed may be equally important when predicting functional outcomes in atypical cognitive decline (Roye et al., 2022). Additionally, the development of performance-based measures of adaptive functioning offers a quantifiable depiction of functional deficits within