whether cognitive or behavioral changes are related to a neurodegenerative disease.

Categories: Neurodegenerative Disorders
Keyword 1: dementia - other cortical
Keyword 2: neuroimaging: structural
Keyword 3: sports-related neuropsychology
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65 Is Basal Forebrain Volume Loss Associated with Visual Hallucinations, Mild Cognitive Impairment, or Concomitant Symptomology in Advanced Parkinson's Disease?

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Objective: Among individuals with Parkinson's Disease (PD), visual hallucinations (VH) and mild cognitive impairment (MCI) are highly prevalent and often co-occur. Atrophy in similar brain regions [e.g. cholinergic basal forebrain (BF) nuclei] as well as specific cognitive difficulties (e.g. posterior-cortical abilities such as semantic fluency and visuoperception) have been associated with the presentation of each symptom type. While there are separate lines of evidence implicating BF volume in MCI and VH, no study to date has examined BF integrity in patients with concurrent MCI and VH symptomology. Furthermore, no prior studies examining BF integrity in MCI and VH have accounted for the potential confounding effects of dopaminergic medications which are known to exacerbate both symptom types. The aims of this study were to harmonize or bridge the two bodies of literature to determine the common neural substrate of PD-VH and PD-MCI (with an emphasis on the BF), to examine the confounding effects of dopaminergic pharmacotherapy, and to examine whether non-dopaminergic "posterior" cognitive abilities differ between PD-MCI with versus without VH.
Participants and Methods: This study used a clinical chart review and MRI data to examine the associations between BF volume in a large group (n=296) of advanced PD patients (~10 years disease duration) with and without each VH and MCI, covarying the effect of dopaminergic therapy. A two-way ANCOVA was run on total and regional BF volumes (i.e., total BF volume, and four nuclei including Ch4, Ch4p, Ch1-2, Ch3) using VH and MCI as independent variables, while covarying for dopaminergic medication. Using Mann-Whitney U tests, we compared the performance of individuals with MCI-VH versus that of individuals with MCI-noVH on tasks of semantic verbal fluency and of visuoperceptual skills (e.g., judgement of line orientation, object decision, and silhouettes).
Results: There were two major findings: (1) atrophy of the Ch4 region in the BF was associated with MCI with VH while Ch1-2 was associated with MCI regardless of VH status, and (2) patients with both MCI and VH had poorer performance than individuals with MCI without VH on tasks measuring object recognition but not on tasks of visuospatial perception or semantic verbal fluency. These results remained stable regardless of whether or not dopaminergic medication was included in the model.
Conclusions: PD is a heterogeneous disease with different subtypes reflecting both dopaminergic and cholinergic dysfunction. Our findings suggest further dissociations within the cholinergic system. First, atrophy in Ch4, which projects to the cortical mantle, was preferentially associated with VH symptoms and object-based visuoperception deficits. This is consistent with proposals that VH are real-world manifestations of visuoperceptual deficits. Second, Ch1-2 atrophy, which projects primarily to the hippocampus, was associated with MCI regardless of VH. Future research will extend this work to other cognitive abilities such as memory, to analyses of brain networks that implicate the BF, and to the investigation of the relationship between anti-cholinergic medications and symptom presentation in PD.

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Keyword 2: psychosis
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66 Association of Executive Functions and Instrumental Activities of Daily Living in Parkinson's Disease

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Objective: Executive function (EF) abilities tend to decline with age, and disproportionately so for people with neurodegenerative disorders such as Parkinson's Disease (PD), where EF deficits are commonly seen in the early stages of the disease. Due to their nature, EF are essential for performing tasks of daily life, particularly for the more complex instrumental activities of daily living (IADL), and deficits can impair the ability to execute IADL in PD participants. The aim of this study was to examine how EF impairments relate to IADL deficits in both healthy elderly controls and PD participants.
Participants and Methods: Seventy-four participants with idiopathic PD and 66 elderly controls were recruited. All participants were non-demented. A comprehensive neuropsychological assessment was administered including the following measures of EF: Hayling Sentence Completion, Brixton Spatial Anticipation, Trail Making Test A and B, Stroop Color-Word Test, Symbol Span (Wechsler Memory Scale-III), Digit Span (Wechsler Adult Intelligence Scale-III), F-A-S test, and Semantic Fluency (Animals and Actions). Z scores were calculated from respective test manuals. Independence was measured using the 8-item Lawton IADL Scale where items are coded from 0 (dependent) to 1 (independent) and the total score ranges from 0 to 8. Motor impairments were assessed using Part III of the Movement Disorder Society Unified Parkinson's Disease Rating Scale. Regression models were run with each cognitive measure as the dependent variable, with group (control vs. PD), age, sex, education, and motor severity as predictors, to examine the effect of group on each cognitive variable. Correlations were then run between the total IADL score, demographic variables, and cognitive variables for each participant group separately to identify the relationship between IADL and EF measures.
Results: PD participants were predominantly males (n=51, 68.9%), with an average age of 70.64±6.03 and 15.22±2.78 education years. Controls were predominantly female (n=34, 51.5%) and had an average age of 71.19±7.75 and 15.85±2.82 education years. Regarding IADL function, all participants were relatively independent in their IADLs (PD: 7.72±0.69, range 4-8, Controls: 7.98±0.13, range 7-8). The most difficult IADL items for PD participants were shopping (8.2% dependent) and food preparation (12.2% dependent). When correcting for age, education, sex, and motor severity, only the Stroop Interference z-score was significant for participant group (b=0.44, t=2.14, p=0.034), where controls had slightly lower scores (-0.33±0.77) than PD participants (-0.31±0.91). Correlations in controls were significant between IADL total score and Hayling trials 1 (r=0.35, p=0.005) and 2 (r=0.33, p=0.008), and semantic fluency actions trial (r=0.34, p=0.006). In PD participants, IADL total score was only correlated with semantic fluency (animals trial, r=0.26, p=0.028).
Conclusions: There were only weak associations between EF abilities and IADL in both healthy controls and PD participants, suggesting that impairments in EF do not necessarily translate into worse ability to execute IADL in PD. More correlations were found in the control group, which may be confounded by the inclusion (in both groups) of participants who already had cognitive impairment. This highlights a further need to examine whether EF impairments in people with PD influence IADL functioning above and beyond normal aging and whether specific deficits have more real-life consequences not attainable through IADL questionnaires.

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