Do executive dysfunction and freezing of gait in Parkinson's disease share the same neuroanatomical correlates?

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Current hypotheses postulate a relationship between executive dysfunction and freezing of gait (FOG) in Parkinson's disease (PD). Hitherto, most evidence comes from entirely clinical approaches, while knowledge about this relationship on the morphological level is sparse. The aim of this study was therefore to assess the overlap of gray matter atrophy associated with FOG and executive dysfunction in PD. We included 18 PD patients with FOG and 20 without FOG in our analysis. A voxel-based morphometry approach was used to reveal voxel clusters in the gray matter which were associated with FOG and executive dysfunction as measured by the Frontal Assessment Battery, respectively. Conjunction analysis was applied to detect overlaps of the associated patterns. FOG correlated with different cortical clusters in the frontal and parietal lobes, whereas those associated with the FAB scores were, although widespread, widely confined to the frontal lobe. Conjunction analysis revealed a significant cluster of gray matter loss in the right dorsolateral prefrontal cortex. We could show that the patterns of neurodegeneration associated with FOG and executive dysfunction (as measured by the FAB) share atrophic changes in the same cortical areas. However, there is also a considerable number of cortical areas where neurodegenerative changes are only unique for either sign. Particularly, the involvement of parietal lobe areas seems to be more specific for FOG.

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