Fiber-specific white matter reductions in Parkinson hallucinations and visual dysfunction

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Study objective and summary result
This study tested the hypothesis that white matter atrophy is present in patients with Parkinson disease (PD) who experience visual hallucinations, and the results showed that such patients do have white matter tract degeneration.

What is known and what this paper adds
Visual hallucinations and visual processing abnormalities are recognized risk factors for dementia in patients with PD. This investigation’s results provide insights into the possible neural substrates of these associations.

Participants and setting
The investigators recruited 105 patients with PD, including 19 who experienced visual hallucinations (32% male; mean age, 64.6 ± 8.2 years) and 86 who did not (57% male; mean age, 64.5 ± 7.9 years), through University College London. The investigators also recruited 35 age-matched healthy controls.

Design, size, and duration
The participants underwent diffusion MRI scans, and the investigators used whole-brain fixed-based analysis to test for differences between patients with and without hallucinations in terms of fiber density (FD), fiber bundle cross-section (FC), and a combined FD and FC metric (FDC) across all white matter fibers. The investigators also conducted a tract-of-interest analysis for a between-group comparison of FDC values within 11 white matter tracts involved in visual processing.

Primary outcome measures
The primary outcomes were the comparisons of the patients with and without hallucinations in terms of FD, FC, and FDC values across the whole brain.

Main results and the role of chance
Relative to patients with PD who did not experience hallucinations, those who did experience hallucinations had reduced FC values within the splenium of the corpus callosum and the left posterior thalamic radiation and reduced FDC values within the splenium. The analyses revealed no differences in FD values.

Bias, confounding, and other reasons for caution
The investigators did not exclude patients with comorbidities that can affect white matter structures.

Generalizability to other populations
The present study’s single-center nature may limit the generalizability of the results.

Study funding/potential competing interests
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A draft of the short-form article was written by M. Dalefield, a writer with Editage, a division of Cactus Communications. The corresponding author(s) of the full-length article and the journal editors edited and approved the final version.

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