

Theme: Imaging Research in Basic and Clinical Science: Neuroscience, Cardiology and Oncology

Mechanisms of Visual Hallucinations and Imagery in Parkinson's Disease – Preliminary Results

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Abstract:

Visual hallucinations (VH) are a common non-motor symptom of Parkinson's disease (PD), often resulting in the misattribution of internal experiences and incorrect interpretations of external stimuli. Despite this, the neural mechanisms underlying VH remain unclear. Prior research indicates that attention-related areas in the frontal and parietal cortex, as well as subcortical structures like the thalamus, play a role in visual imagery, conscious experience, and perception. In this study, we combine both recall and imagination on an individualised basis within an fMRI task and conduct a between-group comparison among participants with PD, both with and without VH. Using this personalised approach, we aim to provide novel insights into the neural mechanisms underlying VH in PD. Nine participants with PD and no dementia (4 PDVH, 5 PD nonVH) completed a block design fMRI task. The PDVH group were asked to imagine their most common VH (hallucination condition) as well as 2 other scenarios not based on past experiences (objects condition). The non-VH group recalled previously shown images of typical VH in PD and images from the same object condition. Participants also underwent a brief neuropsychological and ophthalmological assessment.

Preliminary results from the between-group general linear model suggest that the PDVH group showed a positive modulation when retrieving their VH in the left posterior parietal cortex (BA7, BA39, BA40), insula, the left anterior prefrontal cortex and the right putamen. For the object's condition, PDVH showed a positive between-group difference in the inferior frontal gyrus bilaterally, the left intralaminar nuclei of the thalamus, the right putamen, and the posterior parietal cortex. These differences between groups are a promising first step towards inferring the possible impact of attention, imagery and visual networks on VH, and whether these may relate to perceptual impairments.

Keywords: Parkinson's disease; Visual Hallucinations; Imagery; fMRI