Application number/Title: **45258** - Neural correlates of Parkinson's disease dementia

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**Keywords provided by the Applicant PI to describe the research project:** connectomics, dementia, graph theory, parkinson’s disease, visual hallucinations

**Application Lay Summary:**

Parkinson's disease is a common brain disorder that causes slowness of movements and tremor. Problems with thinking and memory are often seen in Parkinson's disease and most patients will develop dementia as their disease progresses. For many patients, this is the symptom they most fear. Visual hallucinations are common in Parkinson's dementia and are particularly distressing for patients and their families. They are linked to reduced quality of life and are the single best predictor of nursing home placement. Despite this, we do not have a clear understanding of how hallucinations develop and there is currently no method to predict which individuals with Parkinson's will develop visual hallucinations or dementia.

Scientists have shown that changes in the brain networks, or the connections between different regions, occurs earlier in the course of Parkinson's disease. Network changes could be a useful method of predicting who will develop dementia or hallucinations. Studies in Parkinson's so far have been limited because too few people have taken part, and by researchers using differing techniques. The UK Biobank dataset will enable us to overcome these limitations. With brain scans from over 900 people with Parkinson's disease and detailed information on other symptoms of disease, the UK Biobank provides an unparalleled opportunity to study this important aspect of Parkinson's.

We will examine the structure and wiring of the brains of people with Parkinson's disease with and without symptoms of dementia, and those of healthy adults of similar age. We will also compare networks of patients with Parkinson's who experience hallucinations, with those of patients who do not. This will help us gain a deeper understanding of how dementia and visual hallucinations happen in Parkinson's. It will also help us identify which individuals with Parkinson's are at higher risk of developing dementia and hallucinations. This will be of great
importance for improving how we design and recruit to clinical trials.