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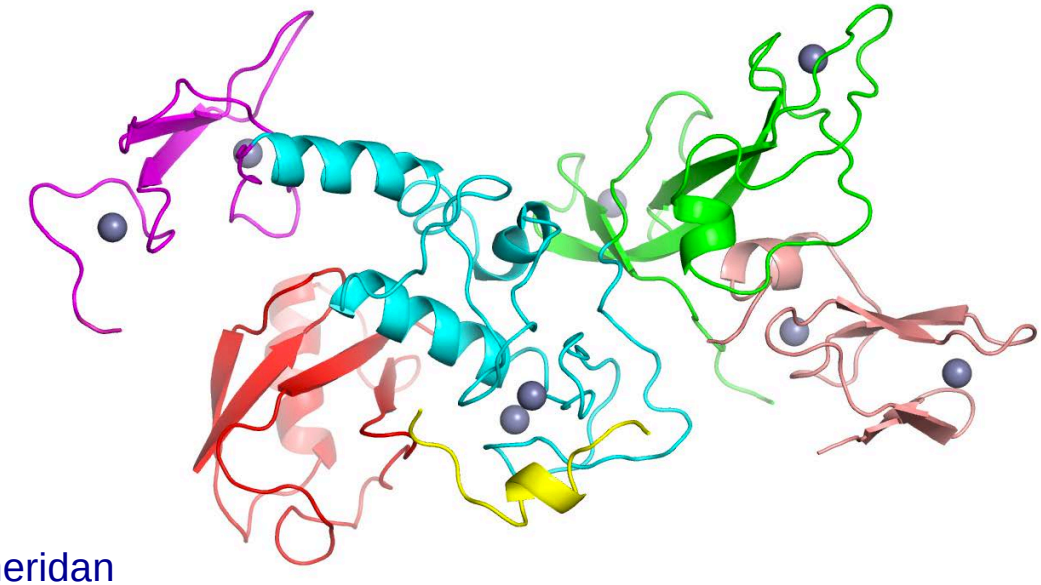
Classifying cognitive impairment in idiopathic Parkinson's disease

Callum Smith



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Parkinson's disease

Tremor

Rigidity

Akinesia (slow movement)

Postural instability

(Removed as a cardinal feature by the MDS in 2015)

Illustration of Parkinson's disease in "A Manual of Diseases of the Nervous System" (Gowers, 1886)

Psychiatric Features

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Mood disorders (depression, apathy, anxiety)

Impulse control disorders

Sleep problems

Perceptual dysfunction

Hallucinations

Cognitive Impairment

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Dementia can occur in late Parkinson's disease

Mild cognitive impairment (MCI) generally precedes dementia

Typical diagnosis: Parkinson's disease dementia (PDD)

Mainly executive dysfunction with psychiatric features

Neuropathology of PDD

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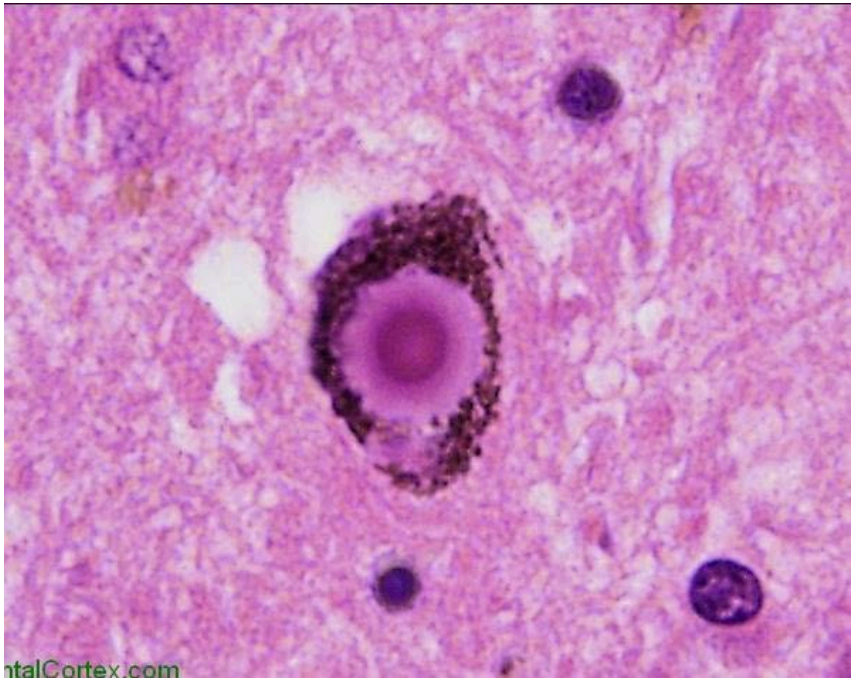
Parkinson's disease is an α-synucleinopathy

Neuronal aggregates of α-synuclein (Lewy bodies) are characteristic of Parkinson's disease

The extension of Lewy bodies to the cortex is seen in PDD, as well as dementia with Lewy bodies



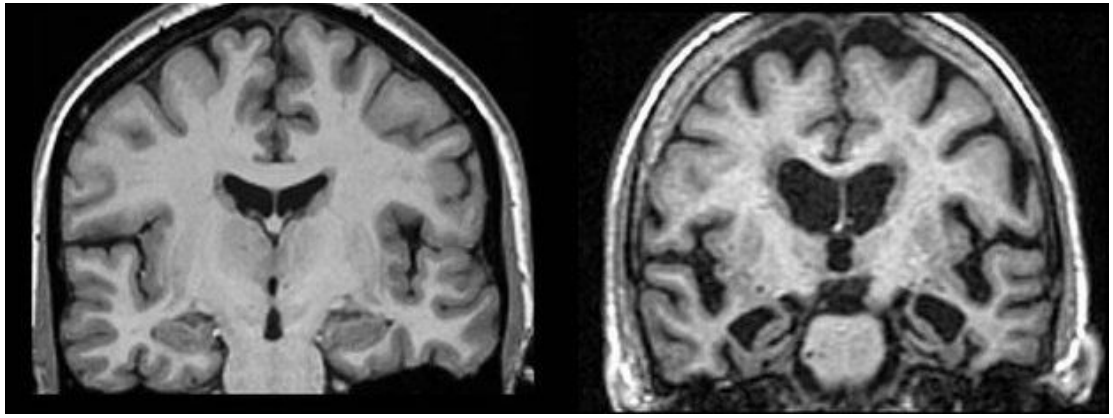
A Lewy body under a microscope

Other Dementias

Tauopathies (Alzheimer's disease, progressive supranuclear palsy)

Cerebrovascular pathology (vascular dementia)

Most of these have an equivalent MCI stage



MRI comparison of healthy (left) versus Alzheimer's disease (right) brains

"Mixed" Pathologies

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Criteria demand exclusive disease processes

Mixed pathology occurs in at least 50%

Post-mortem studies by Hughes et al., 1992; Irwin et al., 2013

Becomes more prevalent with age (Jellinger & Attems, 2010)

This is important for treatment:

Parkinson's: levodopa (e.g. Sinemet), enzyme inhibitors (e.g. MAOB-I)
dopamine agonists (e.g. Ropinirole)

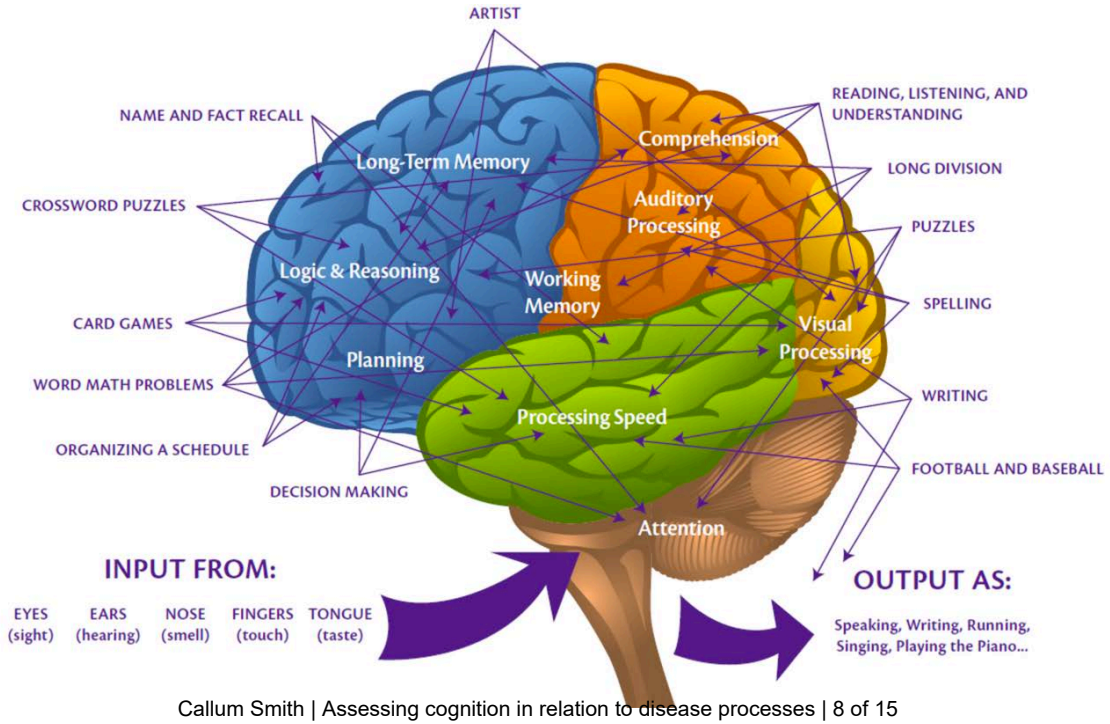
Alzheimer's: cognitive enhancers (e.g. Rivastigmine, Donepezil)

Vascular cognitive impairment: vascular medications and management of risk factors

Distinguishing Dementias

Different dementias affect different brain areas

Thus, different aspects of cognition are impaired



Distinguishing Dementias

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Different dementias have a different clinical profile

	Parkinson's disease dementia	Dementia with Lewy bodies	Alzheimer's disease	Vascular cognitive impairment
Main cognitive domain affected	Executive	Executive	Memory	Attention and executive
Manner of decline	Gradual; develops within PD	Gradual; precedes parkinsonism	Gradual	Variable: can be sudden and rapid
Associated clinical features	Depression, apathy; hallucinations, REM sleep disorder	Depression, apathy; hallucinations, REM sleep disorder	Depression, apathy	Depression, apathy

Objectives

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- To determine the prevalence of each cognitive type in Parkinson's disease
- To determine the prevalence of "mixed" cognitive profiles
- To assess how well each patient's current medication plan fits their cognitive profile
- Two stages to the project

Tracking Parkinson's

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This is the first half of the project

Mainly uses MoCA

Also uses medical history and questionnaires (e.g. NMSS)

Variable	Recent onset $n=1987$	Young onset $n=260$
Non-motor symptom severity		
Mild	37.1%	19.7%
Moderate	34.5%	19.1%
Severe	19.6%	27.3%
Very severe	8.8%	33.9%
Restless legs	23.6%	28.3%
Depression	23.6%	43.0%
Anxiety	24.0%	50.0%
Excessive daytime sleepiness	24.5%	49.0%
REM sleep behaviour disorder	43.7%	60.0%
Montreal cognitive assessment		
Normal	53.4%	55.5%
Mild cognitive impairment	36.8%	36.2%
Dementia	9.8%	8.3%

(Malek et al., 2015)

Initial results

The MoCA is useful for screening, but is not as effective at distinguishing cognitive domains

This is in contrast to previous research

More detailed neuropsychological testing is needed

The Cognitive Study

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120 patients, with one visit each

More detailed assessment battery focused on:

- Cognition (executive function, memory, language, etc.)
- Relevant psychiatric variables (sleep disorder, depression, hallucinations, etc.)
- Medication plan, medical history, and brain scan data will also be accessed

Diagnosis by expert panel

Progress

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RECENT

Ethics approval obtained (July)

Study collection begun (October)

Tracking analysis started (November)

FUTURE

Data collection to be completed this year

Tracking analysis to be presented to INS in July

Thesis completed and published by October 2019

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Any Questions?