Using multi-domain cognition, fMRI, and PET to detect early AD deficits

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In Alzheimer's disease (AD), people experience subtle cognitive decline very early, sometimes decades before the clinical symptoms. These early deficits are predictive of future dementia and associated with the accumulation of two AD pathologies, Aß and tau. This "incubation" period of AD, where people have AD pathology but no symptoms yet, is crucial for early identification of at-risk individuals before they show symptoms. This is also when AD pathologies just begin to affect brain function, ideal to study the earliest neural changes underlying cognitive decline in AD. This proposal focuses on these exact two aims. First, using comprehensive cognitive tests and advanced modeling approach, we aim to identify sensitive and specific behavioral indicators that can signal the presence of earliest AD pathology in cognitively-normal older people. This knowledge can help to develop better clinical assessment specifically designed for detecting pre-clinical AD before dementia. Second, using multi-modal neuroimaging including two fMRI-tasks and Aß and tau PET, we aim to identify vulnerable brain networks that are affected in cognitively-normal older people harboring AD pathology and examine how they contribute to different cognitive deficits in early AD.