

**Dementia Australia Research Foundation – Yulgilbar Innovation Grant
Awarded December 2018**

LEAD INVESTIGATOR	PROJECT TITLE	INSTITUTION
Professor Perminder Sachdev	Nanotechnology for the diagnosis and treatment of neurodegenerative disorders*	University of New South Wales
Professor Simon Bell	An international common data model for improving medicine management for people with dementia and comorbid conditions^	Monash University
Professor Chennupati Jagadish AC	Use of brain organoids and artificial intelligence for understanding dementia^	Australian National University

* Valued at \$1 million over 3 years. Funding to commence in 2019.

^ Valued at \$500,000 over 3 years. Funding to commence in 2019.

Professor Perminder Sachdev, University of New South Wales

Project Title: Nanotechnology for the diagnosis and treatment of neurodegenerative disorders

Summary: There is currently no treatment to prevent or modify the course of Alzheimer’s disease (AD) and other neurodegenerative dementias. Of the many obstacles to achieving the goal of prevention and cure of AD, we have identified two that can potentially be overcome with the latest developments in nanoscience. Firstly, the challenge of an easily available early diagnostic test can be met by the use of nanoparticles with superparamagnetic properties as imaging agents, tagged with appropriate ligands, for MRI and the newly emerging magnetic particle imaging (MPI). Secondly, nanoparticles, because of their ability to cross the brain’s protective barriers, can be harnessed as drug-delivery systems to deliver novel therapeutic agents directly to the site of pathology in the brain. This collaboration between clinical neuroscience and nanoscience therefore has the potential to transform the diagnostics and therapeutics of neurodegenerative disorders.

Professor Simon Bell, Monash University

Project Title: An international common data model for improving medicine management for people with dementia and comorbid conditions

Summary: Australia’s Clinical Practice Guidelines and Principles of Care for People with Dementia highlight the importance of providing evidence-based care to improve quality of life, maintain function and maximise comfort. However, clinicians do not necessarily prescribe the same guideline-recommended medicines for people with and without dementia. Indeed, people with dementia are

often excluded from randomised controlled trials. Fortunately, recent and widespread availability of electronic prescribing and dispensing data are transforming medicine safety and effectiveness research. We propose to develop the first large-scale international common data model (CDM) specifically for people with dementia. A CDM is a data platform that supports secondary use of linked health data through standardising definitions, terminologies, vocabularies and coding schemes. Using the CDM, we will conduct analyses of linked Australian, Hong Kong, UK and US data to generate new evidence regarding medicine safety and effectiveness for people with dementia. This will help fill a critical evidence gap.

Professor Chennupati Jagadish AC, Australian National University

Project Title: Use of brain organoids and artificial intelligence for understanding dementia

Summary: In this project, we present a novel strategy for diagnosis and treatment of Alzheimer's disease (AD) using an innovative approach that combines technologies in stem cell research with artificial intelligence (AI). The stem cell component of this project is to develop 'brain organoids' or 'mini-brains' from stem cells taken from people living with AD as well as individuals unaffected by the disease. The stem cell derived brain organoids will essentially model brain function 'in-the-dish'. We will then apply computational and AI-based analyses to identify key functional differences between normal and AD brain organoids and predict stimulation parameters that may promote 'normal' brain function. These studies are the first of their kind in combining cell biology and AI computational approaches to study and find treatments for AD.