Dementia
RESEARCH COMMUNITY

Research by:
Dr Richard Lobb
The University of Queensland

Project title
A new window into the brain: a simple blood test to spot chronic traumatic encephalopathy (CTE) related dementia early.

About the researcher

I lead the extracellular vesicle (EV) diagnostic and therapeutic research theme within the Centre for Personalised Nanomedicine at the Australian Institute for Bioengineering and Nanotechnology (AIBN). My expertise spans EV biology and hypoxia research and I have made significant conceptual contributions in the field through new analytical techniques and optimal isolation methodologies for EVs.

Project summary
This project will establish a novel blood-based test to detect dementia-related changes associated with CTE, a condition with no current means of diagnosis in living individuals.

By profiling brain-derived extracellular vesicles (EVs) from well-characterised clinical cohorts, the study will enable early detection and monitoring of neurodegeneration linked to repetitive head trauma.

This approach has the potential to transform dementia care by providing a minimally invasive tool for timely diagnosis, disease tracking, and risk assessment, supporting clinical decision-making and accelerating research into therapeutic interventions for trauma-related dementias.

Project detail
Chronic Traumatic Encephalopathy (CTE) is a progressive brain disease caused by repeated head impacts, often seen in contact sports, military service, and accidents. While CTE is well known for causing mood and behavioural changes, in many people it also progresses to severe memory loss, confusion, and dementia. These dementia-related changes have devastating effects on individuals and families.

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Yet today, CTE can only be diagnosed after death. This inability to detect CTE early means clinicians cannot identify who is at risk of dementia, track how the disease unfolds in the brain, or intervene before irreversible damage occurs.

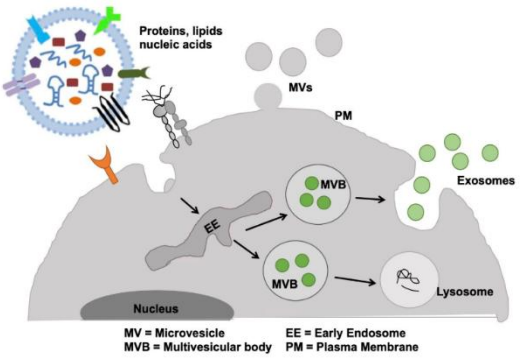
This project will develop a simple blood test to detect the specific brain changes in CTE that are linked to dementia. The test will analyse tiny particles called extracellular vesicles (EVs), which are released by brain cells and travel into the bloodstream. These EVs carry signals about brain health, including markers of neuroinflammation and neuronal damage, that drive dementia in CTE.

An accurate and affordable blood test would provide doctors with a window into the brain to identify individuals at risk of dementia earlier, guide lifestyle and treatment decisions, and monitor brain health over time. For athletes, veterans, and others exposed to repetitive head injury, routine testing could also support safer return-to-play decisions and protect long-term brain health.

Importantly, this research could lay the foundation for blood tests to detect dementia in other neurodegenerative diseases, such as Alzheimer's and Parkinson's, where similar processes of neuroinflammation and cell damage are at play.

Extracellular vesicles

Extracellular vesicles (EVs) are tiny, membrane-bound sacs released by nearly all types of cells that transport proteins, lipids, and genetic material to other cells, acting as a crucial system for cell-to-cell communication.



They are a heterogeneous group, broadly classified into exosomes and microvesicles (ectosomes), and play roles in normal physiology, disease progression, and potentially as therapeutic tools for diseases like cancer and dementia.