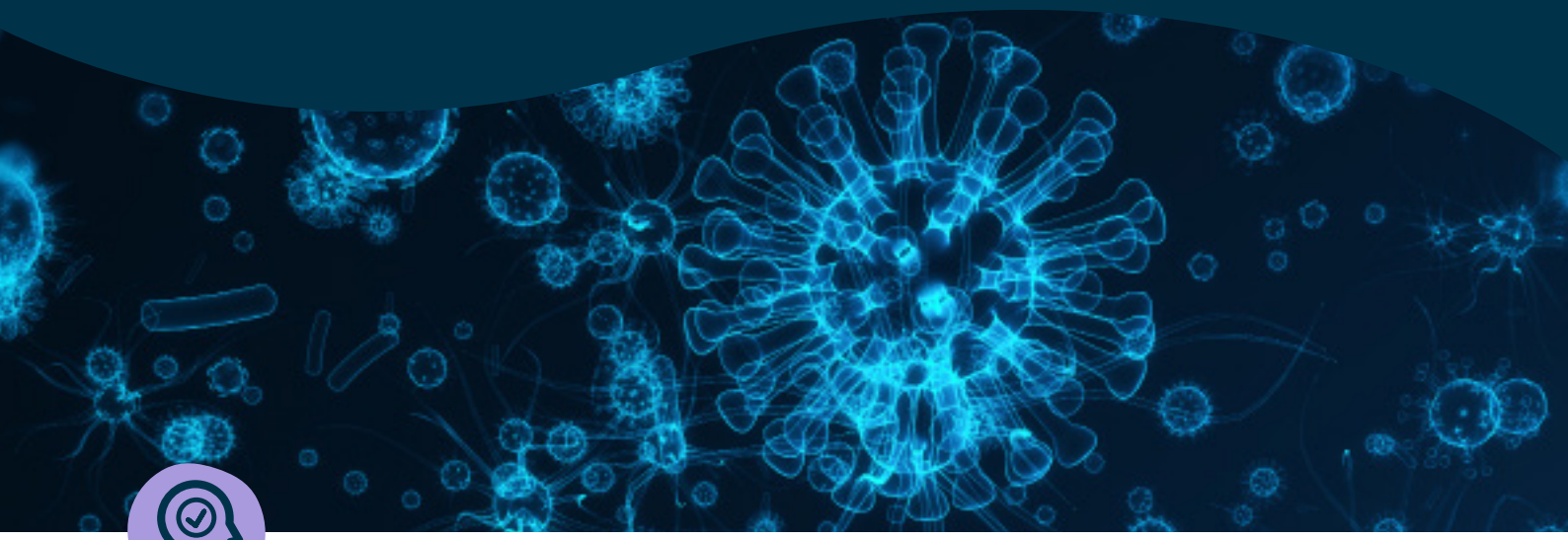
Research project by
Dr Sian Genoud

Dementia RESEARCH COMMUNITY

Dementia Australia Research Foundation



Understand

Investigating glial cells may help solve intricate dementia puzzle

What is the focus of the research?

Exploring how tropomyosins in the brain contribute to the spreading of a toxic protein that causes dementia.

Why is this important?

Dementia is a complex and fatal condition characterised by a variety of symptoms that impact memory and thinking.

Despite recent advances in dementia research, disease models that scientists use to study its underlying mechanisms and discover potential treatments are still too simple to truly investigate the complexities of the condition.

What researchers do know, is that dementia is caused by damage to brain cells. This damage starts in one part of the brain, then progressively spreads in a highly specific pattern. A key culprit in this is the malfunctioning of a protein called tau, which can be secreted by damaged brain cells and taken up by neighbouring healthy cells. It was also recently discovered that another type of cell, called glial cells, can also secrete toxic tau, actively contributing to the disease process.

What do tropomyosins do?

They take part in cellular processes involving our brain cells' cytoskeleton, which is the structural framework that gives cells their shape. This shape is essential for making connections that allow messages to be sent between brain cells. In tau-related dementias, the cytoskeleton can be altered, affecting cell signalling, overall cell health and brain function.

In exciting developments, Dr Genoud and her team identified that a group of important proteins, called tropomyosins, affect tau spread between brain cells. In this project, she will investigate if tropomyosins are involved in the uptake and release of toxic tau in glial cells.

Understanding this mechanism will significantly improve the research field's disease modelling, which may lead to new tropomyosin-focused treatments that could one day eradicate dementia.

How will this happen?

Stage 1: inject viruses that carry toxic tau into mice genetically modified to have tropomyosins removed from brain cells. Study how the absence of tropomyosins affects the spread of tau. Assess the mice for dementia symptoms by performing behavioural tests and examining their brains for dementia-related changes.

Stage 2: using advanced imaging techniques, observe how the presence or absence of tropomyosins affects glial cells in the uptake and release of tau.

What will it mean for dementia research?

- Understanding of how different brain cells contribute to disease.
- Knowledge of how tropomyosins contribute to tau-related dementias.
- Potential new treatment avenues that target tropomyosins.

What are glial cells?

A type of cell found in the central and peripheral nervous systems. There are three types of glial cell: astrocytes, oligodendrocytes and microglia. Together, they form a support network essential for proper nervous system functioning. They also play important roles in brain development, homeostasis and disease.

Who's undertaking the research?

Dr Sian Genoud, Macquarie University

Dr Genoud is a cellular and molecular neuroscience researcher, with a passion for investigating cellular mechanisms underlying neurodegenerative disease.

She completed her PhD in neuroscience and pharmacology at The University of Sydney in 2020, where she studied cellular mechanisms of Parkinson's disease. She is now a Post-Doctoral Research Fellow at the Dementia Research Centre, Macquarie University. Here, she investigates mechanisms causing cell damage in dementia using cell models of disease, genetic manipulation through viruses and advanced imaging techniques.

The title of Dr Genoud's project is Investigating mechanisms of abnormal tau uptake and release in glia.

Dr Genoud and Dementia Australia Research Foundation would like to acknowledge the Dementia Research Community for making this research possible.