



# Investigating the links between obstructive sleep apnoea and dementia



## What was the focus of the research?

Exploring ways to prevent brain cell death caused by obstructive sleep apnoea that can lead to dementia.



## Why was this important?

Dementia is the second-leading cause of death in Australia, and there is no cure. With more than 100 forms of dementia, the causes of this devastating disease are vast. Whilst a silver bullet for all kinds of dementia will be some time in the making, treatments and preventatives for some types of dementia are much closer. With sufficient research, we may be able to provide some level of relief to tens of thousands of

Australians and their families soon. In the case of Dr Qian's research, targeting obstructive sleep apnoea-related dementias means hope that there will be treatment available in their lifetime.

The repeated lack of oxygen (intermittent hypoxia) in the brain of someone with obstructive sleep apnoea during sleep appears to increase their risk of developing dementia. It is vital that we find a way to reduce this risk. If Dr Qian can build more knowledge about the molecules involved in causing and preventing brain cell death as a consequence of this lack of oxygen, he will significantly advance the development of drugs that protect the brain and reduce the risk of dementia in people with obstructive sleep apnoea.



## How did this happen?

**Stage 1:** use mice models to test two new drugs for their ability to prevent OSA-induced cell death and dementia.

**Stage 2:** investigate proteins in CBF neurons that are regulated by OSA-induced intermittent hypoxia and use surrogate amino acids to tag and label them.

**Stage 3:** dissect and analyse the basal forebrain region of the mice to determine the role of the identified proteins in cell death during OSA.

**Stage 4:** identify those proteins that may be responsible for the cell death of CBF neurons, and use cell cloning to validate whether they are required for CBF neuronal death in OSA.



## What will this mean for people with OSA?

- Potential preventative measures to stop CBF neuronal degeneration and the resulting cognitive impairment.
- Reduced risk of developing dementia.



## What will this mean for the medical industry?

- Greater knowledge about how intermittent lack of oxygen affects brain cell death.
- A new therapeutic target to assist with development of effective brain-protective drugs.



## What is obstructive sleep apnoea?

Obstructive sleep apnoea (OSA) is a condition where the upper airways collapse during sleep and breathing stops involuntarily for brief periods of time.

It affects more than 50% of the elderly adult population and is associated with more rapid cognitive decline and an earlier age of dementia onset. Many people with OSA who attend sleep clinics for the first time, already exhibit cognitive impairment.

The reason behind the increased risk of dementia with OSA is unclear. High comorbidity rates of other risk factors such as obesity, diabetes and cardiovascular disease make it difficult to determine in humans. However, Dr Qian has developed a method of modelling OSA in mice that may allow researchers to study this link between sleep apnoea and dementia.



## Who's undertaking the research?

### Dr Lei Qian, The University of Queensland

Dr Qian is a postdoctoral research fellow in the School of Biomedical Sciences and affiliate research fellow at Queensland Brain Institute.

The title of Dr Qian's project is '*Mechanism and potential treatment of obstructive sleep apnoea induced alzheimer's pathology*'.