

An Indian-Australian research partnership

Electrospinning of amyloids and their *in vivo* implantation for the treatment of Parkinson's Disease.

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Research Academy theme/s

List only the research academy theme/s that is relevant to the project

1. Nanotechnology
2. Biotechnology and stem cell research

The research problem

Diseases of the nervous system will affect over 50% of people at some time in their life. Many of these conditions are currently progressive and untreatable. A recent report completed by Access Economics on behalf of the Victorian Neurotrauma Initiative (VNI), shows that the lifetime costs of diseases and injury of the nervous system, occurring in 2008 alone is \$10.5 billion, presenting a significant social and economical problem. Symptoms of neurological disorders, exemplified by Parkinson's Disease, become apparent when the majority of nerve cells are lost and currently we have no way of regenerating these cells. This project aims at using advanced scaffolds to regenerate these cells.

Project aims

- 1) Engineer nanofibrous scaffolds from amyloids that have the added capacity of self-assembly from implantation within the brain for the treatment of Parkinson's Disease. This will involve the fabrication of niche cellular microenvironments that encourage the elongation of endogenous axons.
- 2) Enhance the morphological and chemical features of the scaffolds to; provide contact guidance; growth factor support; favourable cellular interactions and provide mechanical support for directed axon growth *in vivo*.
- 3) Use a Parkinson's Disease animal model to assess the effect of the scaffold *in vivo* and use these results to optimise the scaffolds promoting axonal guidance and reducing inflammation.

Expected outcomes

This scaffold is fabricated to improve the current treatment strategies for Parkinson's Disease. Ultimately it is anticipated that it will be used in clinical applications.

Which of the above Theme does this project address?

This project will address 2 of the Themes. 1) Nanotechnology and 2) Biotechnology and stem cell research.

How will the project address the Goals of the above Themes?

Here we will use bionanotechnological principles to attempt to treat Parkinson's Disease. We will generate scaffolds with nano-architecture that mimic the morphological features of the natural extra cellular matrix within the human body (nanotechnology). We will then implant these within animals that have had Parkinson's Disease induced to and optimise these with the long term goal of using such scaffolds to treat some of the symptoms of Parkinson's Disease in humans (biotechnology and stem cell research).