

An Indian-Australian research partnership

Project title: **Modelling, design and optimization of novel stem cell bioreactors**

Project number: IMURA46

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Research Academy theme/s

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

1. **Advanced computational engineering, simulation and manufacture**
2. Infrastructure engineering
3. Clean energy
4. Water
5. Nanotechnology
6. **Biotechnology and stem cell research**

The research problem

Design, optimization and testing of novel stirred tank or perfusion bioreactors for suspension culture of embryonic stem cells and other progenitor cell types.

Project aims

The project aims to develop new bioreactors for stem cells production, in the following steps:

- Design based engineering modelling at the level of fluid mechanics and cell/tissue growth environments
- Incorporation of physiological parameters into the modelling (eg niches, nutrient flux, cell adhesion, etc)
- Construction of said design
- Biological testing of said design and comparison of outcomes against known / commercial designs

Expected outcomes

- Training of students in complex computational simulation methods
- Training in biotechnology applications and stem cell propagation procedures
- Creation of a novel bioreactor devices more closely addressing the physiological needs of stem cells in vitro

Which of the above Themes does this project address?

- Advanced computational engineering, simulation and manufacture
- Biotechnology and stem cell research

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

By using an interdisciplinary approach and state-of-the-art engineering resources to innovate an area of stem cell biotechnology of high importance to research, industry and some clinical areas.