

Novel system for directed evolution in mammalian cells



THE UNIVERSITY OF
SYDNEY

[2023-063]

Platform technology



> TRL 3

Problem

Directed evolution (DE) is a technique for evolving biomolecules with novel functions by iteratively diversifying, selecting, and amplifying them. While DE has been effective in simple biological systems, these systems do not fully replicate the complexity of mammalian cells, which is crucial for proteins intended for mammalian use.

Current methods for DE in mammalian cells are flawed; mutations in the host genome can impact cell-based methods, while virus-based approaches raise safety concerns, suffer from low mutation rates, or lack necessary functionality. Hence, there is a need for improved DE systems that operate effectively within mammalian cellular environments.

Solution

Our team have developed a novel system designed to harness the power of directed evolution within mammalian cells, a more relevant environment for human applications than previously used simple organisms. The system uses virus-like particles VLPs to drive the evolution of target molecules, which could be proteins or other genetic elements, in mammalian cells.

It involves different pieces of genetic material that work together to produce these particles, which change and adapt through a cycle of error-prone replication. This process allows us to create biomolecules with desirable traits more efficiently and effectively than existing methods, which could have significant benefits in medical and scientific research. Ultimately, this could lead to breakthroughs in developing new drugs, and diagnostic tools, with the potential for significant positive impacts on healthcare and biotechnology.

Intellectual Property Status

Provisional patent application.

Commercial Opportunity

This is an opportunity to acquire a novel directed evolution platform for mammalian cells. This technology can be used for enhancing the development of biomolecules for novel drugs, treatments, and diagnostics.

Inventors

Dr Daniel Hesselson, Professor Gregory Neely, Dr Alexander Cole, Christopher Denes

Potential Commercial Applications

This platform for directed evolution in mammalian cells can be used for:

- Evolution of biomolecules with specific traits for drug development.
- Generation of targeted genetic therapies.
- Creation of novel proteins or genetic elements for medical research.
- Potential applications in diagnostics, therapeutics, and personalised medicine.
- Toolkits for research and development in virology and gene therapy.

Contact Commercialisation Office

Name: Emma-Louise Hunsley
Commercialisation Manager - Sydney Biomedical Accelerator
Email: emma-louise.hunsley@sydney.edu.au
sydney.edu.au/innovation-and-enterprise