



Development of mRNA Vaccines

The coronavirus pandemic has brought into stark realisation the vulnerability of the world's population and economy to major human infectious disease threats.

With the tragedy and suffering from over 5.6 million COVID-19 deaths and over 286 million cases globally as of January 2022 and estimates of US\$28 trillion in lost economic output by the end of 2025, we know that the potential scale of any future threat will be immense and devastating on many levels (WHO; World Bank).

Beyond the threat of viral diseases, the withdrawal of global pharmaceutical companies from antibiotic development in the 1980s, combined with the increasing prevalence of bacterial antibiotic resistance, has severely eroded the capacity to effectively prevent and treat infections caused by bacterial pathogens, leading to increasing numbers of infection-related deaths in the Australian population. Driven by antimicrobial resistance, infectious diseases will become the leading underlying cause of human mortality in Australia by 2050.

This scenario underscores the importance of programs such as UQ's mRNA vaccine development program which will combine UQ infectious diseases expertise with Moderna mRNA vaccine technology to target multiple infectious diseases. The program will provide investment in critical expertise focussed on mRNA technology, vaccine delivery, bacterial vaccine genomics and vaccine immunology.

Furthermore, we will additionally investigate the potential vaccine delivery to the skin using a key Australian invention, the high-density microarray patch (HD-MAP), in collaboration with the local UQ spin-out company, Vaxxas.

Through strategic partnership with Moderna, Vaxxas, BioNet Asia and Technovalia, and by closing existing technology gaps, the program will mobilise expertise and infrastructure, to build the technical proficiency, capacity, structures and systems needed to respond rapidly and effectively, to current and future global infectious disease emergencies.

Our Partners

Moderna: A global clinical stage biotechnology company focused on the discovery and development of messenger RNA therapeutics and vaccines. Moderna develops mRNA medicines for infectious diseases, immunology, rare diseases and cardiovascular diseases. Recognizing the broad potential of

mRNA science, Moderna employs a dedicated team of several hundred scientists and engineers focused on advancing Moderna's mRNA platform technology.

Through a newly launched program, mRNA Access, Moderna is sharing their platform technology with universities around the world, including UQ, to bring forward novel vaccines for infectious diseases.

Vaxxas: An Australian biotechnology company that aims to transform the vaccination field by avoiding the need for needles. The company's flagship product, the high-density microarray patch (HD-MAP), encompasses an array of micro projections that collectively deliver vaccines and immuno-therapeutics into the skin.

Vaxxas is commercializing novel technology that dramatically enhances the performance of existing and next-generation vaccines. The company believes its innovative needle-free technology will be fundamental to helping the world rethink what's possible with vaccines. Its approach has been validated in human clinical studies and can enhance the efficiency and effectiveness of a vaccine's immune response. The company uses proprietary dry-coating technology that can eliminate or significantly reduce the need for vaccine refrigeration during storage and transportation - easing the resource and logistics burden of maintaining the vaccine "cold chain".

Technovalia: Technovalia's mission to "Improve Health through Innovation" is achieved by technological innovation and developing new models and collaborative networks. Technovalia invests in developing new technology platforms that have the potential to bring significant breakthroughs in public health, particularly against infectious diseases.

Bionet-Asia: BioNet-Asia is a vaccine manufacturer focused on bio-innovation and access to genetically designed vaccines. BioNet manufactures the only licenced monovalent recombinant pertussis vaccine and have over 10 vaccines in clinical and preclinical development.

Further Queries

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Facts at a Glance

Through the Vice-Chancellor's Health Research Accelerator (HERA) initiative, the University of Queensland (UQ) is investing in a new health and medical research model and capabilities to address the most pressing health and medical research challenges of our time.



\$50M

UQ commitment to the HERA Programs to recruit outstanding researchers



115+

UQ researchers and collaborations



75+

Partner organisations involved in one or more HERA program



9

UQ Faculties and Institutes contributing expertise



7

HERA programs of Research and Innovation

