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COMMERCIALISATION STORIES

UNIQUEST HELPS START-UP DEVELOP NEEDLE-FREE VACCINE DELIVERY

Nanopatch™ technology developed by Professor Mark Kendall could have a global impact by improving vaccines in overcoming key limitations of the needle and syringe. These include reducing a vaccine dose – by targeting to the skin's immune system rather than a needle into muscle – and removing the need for vaccine refrigeration, because the vaccine is formulated in dry form.

When Professor Mark Kendall came to The University of Queensland (UQ) in 2006 as a Queensland Smart State Senior Fellow, he brought with him knowledge gained during many years working at the University of Oxford in the UK to develop a biolistic particle "gene gun" for gene and drug delivery, working with PowderJect which was then acquired by Novartis and Pfizer.

UQ'S RESEARCH EXCELLENCE TO EXCELLENCE PLUS WITH UNIQUEST

UQ Research Strength:	Nanotechnology and Bioengineering
UQ Innovator(s):	Professor Mark Kendall
UQ Faculty or Institute: Bioengineering and	Australian Institute for Nanotechnology
UQ Research Outcome:	A needle-free pain-free vaccine delivery system which could be more efficient, requiring less vaccine for the same immune response
UniQuest IP Position:	A number of patent applications
UniQuest Partnering:	Pitch product opportunity to end-users and investors
UniQuest Commercialisation:	License IP to Vaxxas Pty Ltd to develop and commercialise the technology

THE NANOPATCH™

After moving to UQ, the focus of Professor Kendall's work shifted to develop a next-generation delivery platform to target vaccines to the abundant immune cells immediately below the surface of the skin.

The underlying platform of this technology is the Nanopatch™ which is a one centimetre square patch covered with thousands of vaccine-coated microprojections. While the projections are invisible to the naked eye, they are long enough to breach the outer skin layer and reach the next layer of skin which is rich in immune-cells; while being short enough to avoid the the deeper nerve cells in the skin that feel pain.

This innovative technology is in stark contrast to traditional vaccine delivery using needles injected into muscle, which has few immune cells. The Nanopatch™ delivers the vaccine more effectively and directly to the site of the immune cells means that less vaccine is required for the same immune response. Tests in animal models indicate that only one hundredth of a regular dose, delivered by needle or syringe, is required for a similarly protective immune response. It is delivering vaccine more effectively, while also being pain-free.

ADDITIONAL NANOPATCH™ ADVANTAGES

Other advantages of the Nanopatch™ vaccine delivery system include:

- Unlike traditional vaccines, the Nanopatch™ should not require refrigeration as it is dry coated. This makes it cheaper and easier to transport and store, especially in developing countries.
- Being needle-free, there is no risk of needle stick injuries to health workers.
- Being pain-free, the Nanopatch™ is ideal for children and people who have a phobia to needles.

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The potential of this exciting new technology was immediately recognised by UniQuest, the main commercialisation company of UQ. As Professor Kendall, and his team at the Australian Institute for Bioengineering and Nanotechnology at UQ, continued to work on this technology through 2007 and 2008, six patent applications were prepared, lodged and filed as complete patent applications by UniQuest to protect this ground breaking work.

With the global potential of this technology becoming clear to all, UniQuest helped to drive the commercialisation process by coordinating over 45 presentations between 2008 and 2010, to both industry groups and potential investors around the world. As early as 2009, Professor Kendall's Nanopatch™ was already receiving strong interest from large pharmaceutical companies keen to use the technology with their vaccines.

AN AUSTRALIAN RECORD INVESTMENT

With a compelling business case and strong market interest in the Nanopatch™ technology, UniQuest was able to secure funding and establish the start-up company – Vaxxas Pty Ltd in 2011 to develop the technology towards the market.

The UniQuest commercialisation experts brought together a syndicate of investors – OneVentures, Brandon Capital Partners, HealthCare Ventures (based in Boston USA) and the Medical Research Commercialisation Fund – and managed the due diligence complexity necessary for the business to secure an investment of $15 million in equity financing to advance the Nanopatch™ towards human clinical testing and product development.This was Australia's second largest first round investment in a university start-up company.

EXPANSION

In 2012, Vaxxas announced a research collaboration with Merck & Co., Inc. with an option to license the technology for the commercial production of up to three of their vaccines.

Separately, Vaxxas has established a commercialisation office in Boston, US, to facilitate access to global pharmaceutical partners and complement the company's research and development operations based in Brisbane, Queensland.

ACCOLADES FOR VAXXAS IN 2012

- Vaxxas received the 2012 Janssen AusBiotech Emerging Company of the Year Award.
- Professor Mark Kendall is one of only five global recipients of a prestigious Rolex Laureate in 2012, recognising pioneering efforts to expand knowledge and improve human life.
- Vaxxas judged the Best Venture Capital Investment at the 2012 World Vaccine Congress in Washington.
- Vaxxas amongst the 2012 BRW 10 best start-ups.
- In 2014, Vaxxas named a Technology Pioneer by the World Economic Forum, and secured funding from the World Health Organisation to devcelop the Nanopatch to improve polio vaccines.

PARTNER WITH UNIQUEST

UniQuest is one of Australia's leading research commercialisation companies. It specialises in global technology transfer and facilitates access for all business sectors to the world class expertise, intellectual property and facilities at The University of Queensland, Australia.

OUR TRACK RECORD

UniQuest enters into over 400 research contracts per year – many repeat clients from industry.

UniQuest has created over 70 companies from its intellectual property portfolio, and since 2000 UniQuest and its start ups have raised more than $490 million to take university technologies to market. UQ technologies licensed by UniQuest – including UQ's cervical cancer vaccine technology and image correction technology in magnetic resonance imaging machines – have resulted in combined sales of final products in the order of $10 billion net sales between 2007-2013.

If you want to know more about this commercialisation story or other offerings from Health and UniQuest then contact Dr Mark Ashton, Senior Director – Health in IP Commercialisation by mobile +61 (0)410 601 970, email m.ashton@uniquest.com.au or visit www.uniquest.com.au

THEN VAXXAS JOURNEY SO FAR

Professor Mark Kendall
Australian Institute for Bioengineering & Nanotechnology

- The Nanopatch™ is a novel vaccine delivery technology to target vaccines to the abundant immune cells immediately below the surface of the skin.
- The Nanopatch™ is a needle-free, pain-free vaccine delivery technology with early animal data indicating that decreased quantities of a regular dose delivered via a syringe and needle is required for the same immune response.
- With UniQuest's help, Vaxxas raised $15 million investment from a syndicate of investors including prestigious Boston-based HealthCare Ventures, representing Australia's second largest first round investment in a university start-up company.
- In 2012, Vaxxas entered into a research collaboration and license agreement with the pharmaceutical company Merck & Co., Inc.
- In 2014, Professor Kendall was recognised as a UQ Innovation Champion and Vaxxas was named a Technology Pioneer by the World Economic Forum.