



START-UP BUNYAVAX

New: creating vaccines faster

All the vaccinated mice in the lab test survived infection with a deadly influenza virus. So the start-up BunyaVax seems to have got hold of a successful technique for producing vaccines fast. ‘If the trial at the end of this year is successful, we can start talking to the big players.’

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Imagine there is an outbreak of a new viral disease somewhere in the world. To prevent it spreading, a vaccine is urgently needed, but currently it takes years to produce one. They can do it much faster in Lelystad – in just a few months, even. At least, that is what the start-up BunyaVax promises. This little company is a spinoff of Wageningen Bioveterinary Research (WBVR). When it was launched in 2017, a dream came true for virologist Jeroen Kortekaas. ‘This brings more dynamism to Lelystad. If you are not enterprising yourself, you miss out on knowledge about exactly what pharma companies want. Through BunyaVax we are learning what it takes to get a product, in our case vaccines, onto the market.’ Kortekaas, who is also professor by special

appointment at Wageningen, is scientific director at the new company. Jochem Bossenbroek was appointed as CEO. BunyaVax does not have facilities of its own. Partly thanks to grants from the Netherlands Organization for Scientific Research (NWO), the ministry of Economic Affairs and the EU, testing will start at the end of this year in the Lelystad laboratories with the aim of proving that the company really does have the technology to develop effective, safe vaccines fast. First for livestock, and then for people.

IMMUNE CELLS ON STAND-BY

The classic method of vaccination is over two centuries old: an injection with a weak form of a virus. The virus proteins provoke an immune response in the body and the

immune cells go on stand-by. If the actual virus gets into the body, the immune system is ready and knocks it on the head. Kortekaas is working on an alternative approach. The idea is relatively simple: only a piece of genetic material (DNA or RNA) from the pathogen is injected. That piece of genetic material – at BunyaVax it is RNA – settles into the body’s cells, causing those cells to produce a virus protein themselves, which puts the immune system on alert. Worldwide, this new approach has been attracting a lot of attention in recent years. The Bill & Melinda Gates Foundation invested tens of millions of euros in the German company CureVac, which uses this method to develop vaccines for diseases including flu and malaria.



The key to this approach to vaccination is to really get the RNA of the pathogen into the body's cells – which requires a delivery service of some kind. Each company looks for its own solution to this. Kortekaas uses a system found in nature: he works with 'bunyaviruses', which specialize in penetrating immune cells in mammals. The most promising candidate is the virus that causes Rift Valley Fever (RVF) in humans and ruminants.

That might sound scary, but Kortekaas starts by deactivating the dangerous virus in the lab. Once injected into a subject, the virus does not penetrate the body, but it cannot multiply there. What it does deliver, like an envelope, is a piece of the pathogen's RNA, which the virologist has built in.

Mice vaccinated in this way against a lethal form of influenza all survived an infection with the disease. So the idea works, although it hasn't been tested outside the lab yet. If the results are confirmed in a trial at the end of this year, in which pigs will be vaccinated against pig flu, commercial interest will be aroused, expects CEO Bossenbroek. 'Then we'll have delivered

TACKLING TUMOURS

BunyaVax's RNA vaccine technology is a potential weapon against cancer too. Tumour cells produce different proteins on their cell membrane to those of normal cells. With an RNA vaccine that targets one of those proteins, it is possible to stimulate the body's immune system to fight off tumour cells. An initial trial with BunyaVax showed that tumours stopped growing in mice with lymphoma.

the proof of concept. And then, in early 2019, we can start talking to the big players.'

VACCINES FOR HUMANS

To get vaccines on the market requires the help of venture capital and big pharma companies. In this case, we are not just

talking about pigs and other farm animals. BunyaVax's technology is most probably also suited to the development of human vaccines, a much more lucrative market. 'Our strategy is first to develop vaccines for the veterinary market and later for human application too,' says Bossenbroek. 'That generates income for the company and at the same time, through the research on animals we build up a portfolio of data that we also need for the human application.' The advantage of the BunyaVax technology is what Kortekaas and Bossenbroek call 'plug and play': swap a piece of RNA from one pathogen for that of another in a vaccine, and in no time you have a new vaccine. Proposed new legislation would seem to play into BunyaVax's hand in this. Once a vaccine based on a bunyavirus has been passed by the licensing agencies as safe and efficacious, Bossenbroek expects that similar vaccines will be approved for marketing without much additional safety research. Ideal when an unexpected epidemic threatens. ■

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