
Novel All-in-One Vaccine Developed to Tackle Future Coronavirus Threats

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Up to \$30 million in funding has been announced by the Coalition for Epidemic Preparedness Innovations (CEPI) to bring a new nanoparticle vaccine offering protection against a range of coronaviruses to clinical trial.

As of July 2022, uncertainty persists as waves of SARS-CoV-2 continue to emerge. Over time, new virus variants arise and threaten to reduce the impact of existing vaccine efforts. There is a clear need for strategies to both tackle emerging variants, and to protect populations against potential future threats to human health such as related bat viruses.

A new consortium aims to address these issues by establishing the first-in-human clinical proof of concept for a new vaccine design. The vaccine will target both SARS-CoV-2 and a number of related bat viruses which have the potential to spread to humans. It builds on technologies developed by the Molecular Immunology Group at the [University of Oxford](#) and by the Bjorkman Group based at Caltech – led by Professor Alain Townsend at the MRC Human Immunology Unit and by Professor Pamela Bjorkman respectively.

The consortium brings together researchers from the University of Oxford and [Caltech](#) to work in collaboration with deep tech innovation organisation CPI, and industrial biotechnology company Ingenza Ltd (Caltech-CPI-Oxford-Ingenza).

The Coalition for Epidemic Preparedness Innovations (CEPI), will partner with the consortium and has announced up to US \$30 million to fund pre-clinical studies, GMP manufacturing and Phase 1 trial based on this technology.

In contrast to many existing vaccine designs that use mRNA or a viral vector to present

sections of the spike protein of a single type of virus to the immune system, this new vaccine will use protein nanoparticles containing a protein 'glue' to attach related antigenic sections of the spike proteins from eight different viruses. By incorporating a 'mosaic-8 vaccine' design created at Caltech these nanoparticles would favour immune responses to the shared parts of each of the different types of coronaviruses within a single vaccine.

Evidence published today in Science by the researchers demonstrates that this vaccine technology not only elicits protective immune responses against SARS-like viruses but also against some coronaviruses not presented in the trial vaccine. This suggests that the technology could provide protection against future novel SARS-CoV-2 variants and as-yet-undiscovered coronaviruses with the potential to spill over from animal populations.

Alain Townsend, Oxford Lead of the consortium, Professor of Molecular Immunology at the MRC Weatherall Institute of Molecular Medicine, University of Oxford, said:

'The evolution of this consortium is an example of collaborative science at its best. We had been deeply impressed by the power of the "glue" for sticking proteins together developed by Mark Howarth (Biochemistry Oxford), and derived from his beautiful basic science investigations of the Streptococcus pyogenes bacterium.

'Together we used this technology to make a prototype nanoparticle SARS-CoV-2 vaccine that induced highly potent responses in preclinical studies.

'Through connections made by Ian Wilkinson (Absolute Antibody), we joined with colleagues at Ingenza and CPI who succeeded in making a fully functional version of the vaccine produced in microbes, thus reducing the cost of production. We have been collaborating with Prof. Pamela Bjorkman and the Caltech team, who had independently developed the brilliant concept of the mosaic version of the vaccine and are excited to continue working with this world-class consortium.'

The consortium partners are committed to achieving equitable access to the outputs of the

project.

Dr Jack Tan, Project Manager (Oxford) of the consortium, Senior Postdoctoral Scientist at the MRC Weatherall Institute of Molecular Medicine, said:

‘We are delighted to be working with CEPI to further this nanoparticle technology with the goal of producing efficacious, low-cost, infrastructure-independent vaccine that will be accessible to low- and middle-income countries.’

Dr Richard Hatchett, CEO of CEPI, said: ‘There have already been three serious coronavirus epidemics or pandemics in the 21st century – and COVID-19 continues to have a devastating impact on the world’s health, society, and economy. The creation of vaccines that could provide broad protection against emerging COVID-19 variants and future coronavirus threats would not only help mitigate the damaging effects of another COVID-19-like pandemic, it could also help reduce the time taken and funding spent continually updating vaccine formulations.

‘That’s why we are delighted to today partner with this CPI-led research consortium to build on Wellcome Leap’s initial investment further advance this pioneering mosaic nanoparticle vaccine technology that, if successful, could work towards consigning the threat posed by coronaviruses to the history books.’

The consortium aims to commence a Phase 1 trial in 2024, led by the Oxford Vaccine Group.

Read the [original article](#) on University of Oxford.