



## Developing a Variant-Proof SARS-CoV-2 Vaccine: a CEPI-funded ExcellGene Partnership with Bharat Biotech and the University of Sydney

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Monthey, Switzerland -PRESS RELEASE- ExcellGene SA, privately held and founded 2001, offers services in research, development and manufacturing for the biopharmaceutical industry. The Company announces today its role in the recently approved consortium funding through the Coalition for Epidemic Preparedness Innovations (CEPI), a global partnership of public, private, philanthropic and civil society organisations founded to develop vaccines against future epidemics. The consortium partnership strives to advance **a new vaccine concept that confers highly cross-reactive protection against numerous SARS-CoV-2 variants of concern (VoCs) as well as other *Betacoronaviruses*** (Link: [CEPI Partners with Consortium of Bharat Biotech, University of Sydney and ExcellGene to Develop 'Variant-Proof' Covid-19 Vaccine](#)). ExcellGene will produce complex chimeric Spike antigens using its engineered CHOExpress®-cell based technology. The Swiss company will use insights from several scientific and technical disciplines along with artificial intelligence to identify the most promising antigenic structure.

### **Novel vaccine designed for cross-reactive protection against SARS-CoV-2 Variants of Concern**

ExcellGene is a recognized leader in the development and manufacturing of complex proteins (DNA to product) for therapeutic or prophylactic applications, an example being trimeric spike proteins of SARS-CoV-2 (1). Together with Bharat Biotech, and Prof. Jamie Triccas and his team at the University of Sydney, Australia, ExcellGene will generate and screen a large and diverse library of chimeric spike proteins to identify highly cross-reactive antigen structures that recall past and possibly future variants. CEPI will provide up to US\$19.3 million in funding to develop a **'variant-proof' SARS-CoV-2 vaccine candidate** for phase I clinical trials.

With this new funding, ExcellGene expands on a collaboration with the team of Prof. Jamie Triccas that started in early 2020. ExcellGene began to produce Wuhan trimeric SARS-CoV-2 spike proteins in March 2020, and subsequently Alpha, Beta, Delta and, recently, Omicron variants. The Company delivered these antigens to its partners as highly purified, stabilised, trimeric spike proteins that had been engineered for high-yield production. By April/May 2021, the Sydney group had verified that such trimeric adjuvanted spike preparations were highly immunogenic in preclinical models [2]. Blocking virus infection was shown in-vitro and in preclinical models with virus variants different from the immunizing antigen. Earlier, ExcellGene had conducted research in an EU-Horizon 2020 funded project on an Ebola candidate antigen molecule that resulted in sterilizing immunity in pre-clinical challenge



models (<https://www.excellgene.com/2022/02/ebola-research-enables-sars-cov-2-trimeric-spike-proteins>).

## **Finding and testing the ideal antigen: with AI mediation analysis and structure-function insights**

An entirely new “chimeric” spike antigen complex, different from any protein of existing SARS-CoV-2 variants, will be generated. It is expected that such a trimeric spike protein, composed of combined mutations that characterise virus variants of concern from 2020-2022 (VoCs), will induce a wider range of cross-reactivity against historic or future variants than any of the individual virus variants did before.

To do so, the ExcellGene team will produce complex chimeric proteins using its engineered CHOExpress®-cell based technology, and Prof. Triccas and his team will assess the range of immune responses in various animal species and undertake a Phase 1 trial to assess safety and immunogenicity of the lead candidate. Theoretically, a near infinite number of such chimeric molecules can be designed. ExcellGene will reduce the diversity of such structures through artificial intelligence mediation analysis in combination with structure-function insights gained in examining the evolution of spike versions that resulted in the emergence of VoCs. Variable immune responses in vaccinated people with different strains will also be taken into consideration. Thus, a more manageable number of putative antigens can be tested in ExcellGene’s high-throughput transient gene and stable pool CHO-based expression system for development and manufacturability.

## **A modern approach to developing vaccines for the world**

Maria Wurm, Dr. es. sci., CEO of ExcellGene, thinks the Company’s technology shows the value of using a CHO-based technology platform to produce optimized antigens for vaccine production.

“This new CEPI partnership is a great opportunity to showcase what is possible in the manufacturing of highly complex antigen structures, consisting of computer-designed individual monomers, for a potential variant-proof Covid-19 vaccine. We are excited to work closely with our consortium partners to reach this goal, and we hope it will contribute towards the science for this and other novel protein-based vaccines. Ultimately, we wish to contribute to solving major health care challenges, as most strikingly exposed by COVID-19, using technology and scale-up approaches that successfully provided tons of protein therapeutics made in cultivated animal cells in bioreactors.”

Prof Jamie Triccas, Sydney Institute for Infectious Diseases, The University of Sydney said: “We are delighted to partner with ExcellGene, Bharat Biotech and the CEPI organisation to progress our platform for the development of broadly protective COVID-19 vaccines. Our mission is to deliver safe, affordable and highly effective vaccines to combat existing and future SARS-CoV-2 variants, and our international consortium is well placed to achieve this goal. The University of Sydney will provide a framework for pre-clinical assessment of



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vaccine candidates, together with access to Australia’s world-class early phase clinical trial community.”

Dr. Krishna Ella, Chairman and Managing Director, BBIL said: “The global threat of SARS-CoV-2 is continuing with new infections over and over again, irrespective of prior infections or vaccinations. Thus, more applied research has to be done, both in laboratories like those of Prof. Triccas, and in a company like ExcellGene, that can provide entirely new antigen concepts that combine insights into SARS-CoV-2 gained over the last two and a half years. Being a successful vaccine producer, particularly in the COVID-19 field, does not allow us to rest. We are therefore very pleased in having convinced the CEPI organization that our partnership over three continents is a robust solution that promises to open a new door for a future cross-reactive vaccine.”

## About ExcellGene

ExcellGene SA, a privately-owned company, offers high quality research, development, and manufacturing services in three key areas: recombinant therapeutics, vaccines, and diagnostics. The Company, spun off from the Swiss Federal Institute of Technology in Lausanne (EPFL), recently celebrated 20 years of helping academic and industry partners. ExcellGene focusses on manufacturing sciences offering services that include difficult to manufacture protein therapeutics and the development of gene therapy products (AAV). Host cells to generate these incorporate **CHOExpress®** and **HEKExpress®** systems, which have delivered products for clinical use from bioreactors at scales of 100 to 2500 Liter. The Company has pioneered many innovations utilizing recombinant animal cells in bioreactors and has shared insights and know-how through numerous scientific publications (3, 4). Recently, with SARS-CoV-2, ExcellGene has delivered milligram to gram quantities of CHO-produced spike protein preparations of the Wuhan, Alpha, Beta, Delta, and Omicron variants (5).

See <https://www.excellgene.com/> for further information, or find us on [LinkedIn](#) or [Twitter](#).

## About the University of Sydney

As Australia’s first university – founded in 1850 – the University of Sydney has a proud history of global leadership in education and research and inspiring people from all backgrounds to contribute to positive real-world change. The University is a world-renowned teaching and research institution – their research combines the expertise and talents of scholars from many disciplines.

## About Bharat Biotech

Bharat Biotech has established an excellent track record of innovation with more than 145 global patents, a wide product portfolio of more than 16 vaccines, 4 bio-therapeutics, registrations in more than 123 countries, and the World Health Organization (WHO) Prequalifications. Located in Genome Valley in Hyderabad, India, a hub for the global biotech industry, Bharat Biotech has built a world-class vaccine & bio-therapeutics, research & product development, Bio-Safety Level 3 manufacturing, and vaccine supply and distribution.

Having delivered more than 5 billion doses of vaccines worldwide, Bharat Biotech continues to lead innovation and has developed vaccines for influenza H1N1, Rotavirus, Japanese Encephalitis (JENVAC®), Rabies, Chikungunya, Zika, Cholera, and the world’s first tetanus-toxoid conjugated vaccine for Typhoid. Bharat’s commitment to global social innovation programs and public-private partnerships resulted in introducing path-breaking WHO pre-qualified vaccines BIOPOLIO®, ROTAVAC®, ROTAVAC 5D®, and Typbar TCV® combatting polio, rotavirus, typhoid infections, respectively.

As a leader of pandemic vaccines, Bharat Biotech has successfully delivered COVAXIN®, India’s 1st indigenous vaccine against COVID-19. In November 2021, COVAXIN® has received WHO EUL. The acquisition of Chiron Behring Vaccines has positioned Bharat Biotech as the world’s largest rabies vaccine manufacturer with Chirorab® and Indirab®. To learn more about Bharat Biotech, visit [www.bharatbiotech.com](http://www.bharatbiotech.com).

## About CEPI

CEPI is an innovative partnership between public, private, philanthropic, and civil organisations, launched at Davos in 2017, to develop vaccines against future epidemics. Prior to COVID-19, CEPI’s work focused on developing vaccines against the Ebola



Virus Disease, Lassa virus, Middle East Respiratory Syndrome coronavirus, Nipah virus, Rift Valley Fever virus and Chikungunya virus. It has over 20 vaccine candidates against these pathogens in development. CEPI has also invested in new platform technologies for rapid vaccine development against unknown pathogens (Disease X).

During the COVID-19 pandemic, CEPI initiated multiple programmes to develop vaccines against SARS-CoV-2 and its variants with a focus on speed, scale and access. These programmes leverage the rapid response platforms developed by CEPI's partners prior to the emergence of COVID-19, as well as new collaborations. The aim is to advance clinical development of a diverse portfolio of safe and effective COVID-19 candidates and to enable fair allocation of these vaccines worldwide through COVAX.

CEPI's 5-year plan lays out a \$3.5 billion roadmap to compress vaccine development timelines to 100 days, develop a broadly protective vaccine against COVID-19 and other Betacoronaviruses, and create a "library" of vaccine candidates for use against known and unknown pathogens. The plan is available at <https://endpandemics.cepi.net/>.

Follow our news page for the latest updates. Follow us via @CEPIvaccines, @DrRHatchett, and on LinkedIn.

## References

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