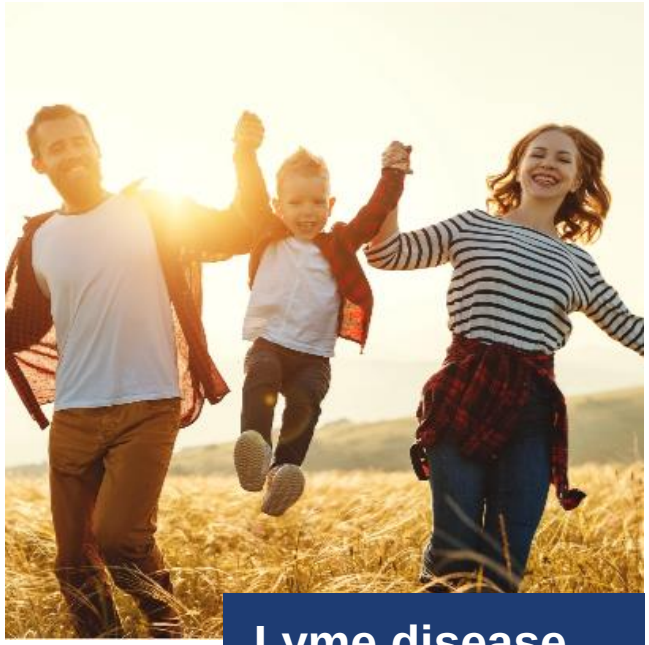
Advancing Vaccines for Better Lives

VLA2001 - SARS-CoV-2 inactivated vaccine

15th September 2020

valneva

Valneva is a specialty vaccines company focusing on three unique programs



Lyme disease

Chikungunya

COVID-19

VLA2001 – SARS-CoV-2 inactivated adjuvanted vaccine

valneva

Inactivated vaccines have been successfully developed and marketed for decades

Selected inactivated vaccines

- **Japanese Encephalitis** - IXIARO (Valneva)
- **Hepatitis A** - Healive (Sinovac)
- **Flu** - AFLURIA (Seqirus)
- **Polio** - IPOL (Sanofi Pasteur)
- **Rabies** - IMOVAX (Sanofi Pasteur)

New vaccine classes

No preventive RNA or DNA vaccines for human licensed

“Nanoparticles” – no licensed vaccine

Adenovirus envelope – unlicensed

Any one of these could revolutionise the vaccines field

VLA2001 is an inactivated, adjuvanted vaccine that follows proven approaches

Approach

- VLA2001 is a Vero-cell based**, highly purified inactivated vaccine candidate against the SARS-COV-2 virus**
- The **approach leverages the manufacturing technology for Valneva's Japanese Encephalitis Vaccine**
- This includes **inactivation with BPL to preserve the native structure of the S protein**
- The combination with CpG 1018 is **expected to induce a strong immune response** and has the potential to generate high titers of neutralizing antibodies
- VLA2001 will **conform with standard cold chain requirements** (2 degrees to 8 degrees centigrade).
- VLA2001 will **enter clinical studies at the end of 2020**
- Following successful clinical development, **regulatory approval expected in the second half of 2021**

An inactivated SARS-CoV-2 vaccine has a high PoS

Inactivated vaccines class

- Inactivated viral vaccines have been shown to be **highly effective in humans** (e.g. JEV) in 2-dose regimens, generating long-lasting and broad immune responses
- **Inactivated vaccines in general have a very good safety profile,** with many vaccines already licensed
- **Pre-clinical and clinical paths are straight forward for inactivated vaccines,** in contrast to some other technologies
- **Inactivated vaccines can be produced at high purity and large scale** with current manufacturing capability
- Inactivated vaccines have been shown to be **effective when combined with licensed adjuvant**

Inactivated vaccines for SARS-CoV-2

- An inactivated SARS-CoV-2 vaccine would be **suitable for wide deployment including at risk groups** (elderly, immuno-compromised etc)
- Inactivated SARS-CoV-1 vaccines have already been **shown to be safe and immunogenic in animals** (Baxter, Sinovac and others) **and humans** (Sinovac)*
- Inactivated SARS-CoV-2 vaccine adjuvanted with alum (Sinopharm) have **been shown to be safe and immunogenic in humans** **

* **Source:** Qin et al. 2006, Vaccine 24:1028-34; Spruth et al. 2006, Vaccine 24:652–61; See et al. 2006, J Gen Virol 87, 641–50; Roberts et al.2010, Viral Immunology 23:509–19; Lin et al. 2007, Antiviral Therapy 12:1107-13
** **Source:** Xia et al. 2020, JAMA. doi:10.1001/jama.2020.15543

VLA2001 – development pathway

Antigen

- Valneva will leverage its **Vero based JEV platform** (basis for IXIARO® and ZIKA vaccine candidate) to develop a highly-purified, inactivated, whole virus SARS-CoV-2 vaccine
- Valneva will use **Beta-propiolactone inactivation** in order to preserve the native surface structure of the S protein

Adjuvant

- Valneva will include a **licensed adjuvant**, with the aim of inducing a strongly biased Th1 immune response generating high titers of neutralizing antibodies
- Valneva has announced a **collaboration with Dynavax** to access its CpG 1018 adjuvant (contained in U.S. FDA-approved HEPLISAV-B vaccine)

Preclinical and clinical development

- Valneva has identified the best strategy, that will allow **safe human trials to begin in 2020**
- Valneva will **assess immune pathology and/or ADE in suitable models in parallel** to pre-clinical development and Phase 1

VLA2001 - manufacturing summary

Drug Substance	Drug Product	Adjuvant	Timelines
• Valneva is **scaling up bulk production in Livingston,** Scotland • Valneva's **facilities have already been refitted for CTM**, with commercial supply starting 2021 • Valneva's **second facility was recently acquired** and will be fully operational from June 2021	• Valneva's **fill/ finish operations will take place in Solna**, Sweden • Valneva is currently **carrying out a facility upgrade** and installing a new high speed filling line for fill/finish of VLA2001	• Valneva now has a **supply agreement in place with Dynavax** for CpG 1018 • **Formulation will be taking place in Livingston**, Scotland	• Valneva is expected to **commence commercial manufacturing early 2021** • Valneva's VLA2001 SARS-CoV-2 inactivated vaccine product is expected to be **available at time of regulatory approval**, which is **expected in the second half of 2021**

Improvements to and expansions of current sites are now underway to allow for the required capacity

Livingston, Scotland

Solna, Sweden

VLA2001 – SARS-CoV-2 inactivated vaccine

UK deal overview

valneva

Background to UK government deal

A central priority of the UK Government in tackling the Covid-19 pandemic is fast-tracking the development of potential treatments and vaccines for the disease.

The UK government's vaccine taskforce is responsible for driving forward, expediting and co-ordinating efforts to research and then produce a coronavirus vaccine.

The taskforce are aiming for deals across each of the four vaccine technologies (genetic vaccines, viral vectors, inactivate whole virus and protein based virus) that gives them a 'broad and diverse portfolio'.

VLA has secured a deal with HMG that supports the expansion of the Livingston and UK based clinical trials

Quantity and payments

- UK Government has secured supply of **60 million doses at a cost of €470 million**
- UK government also has **options for another 130 million doses between 2022 and 2025*** which would **add up to €900 million to the deal**
- Vaccine expected to have a **two dose regimen**

Upfront investment

- UK Government is also **investing up-front in the scale up and development of the vaccine**, with the investment being recouped against the vaccine supply later in the partnership

* Up to 40m doses in 2022 and a further 30-90m up to 2025

Thank you.

valneva