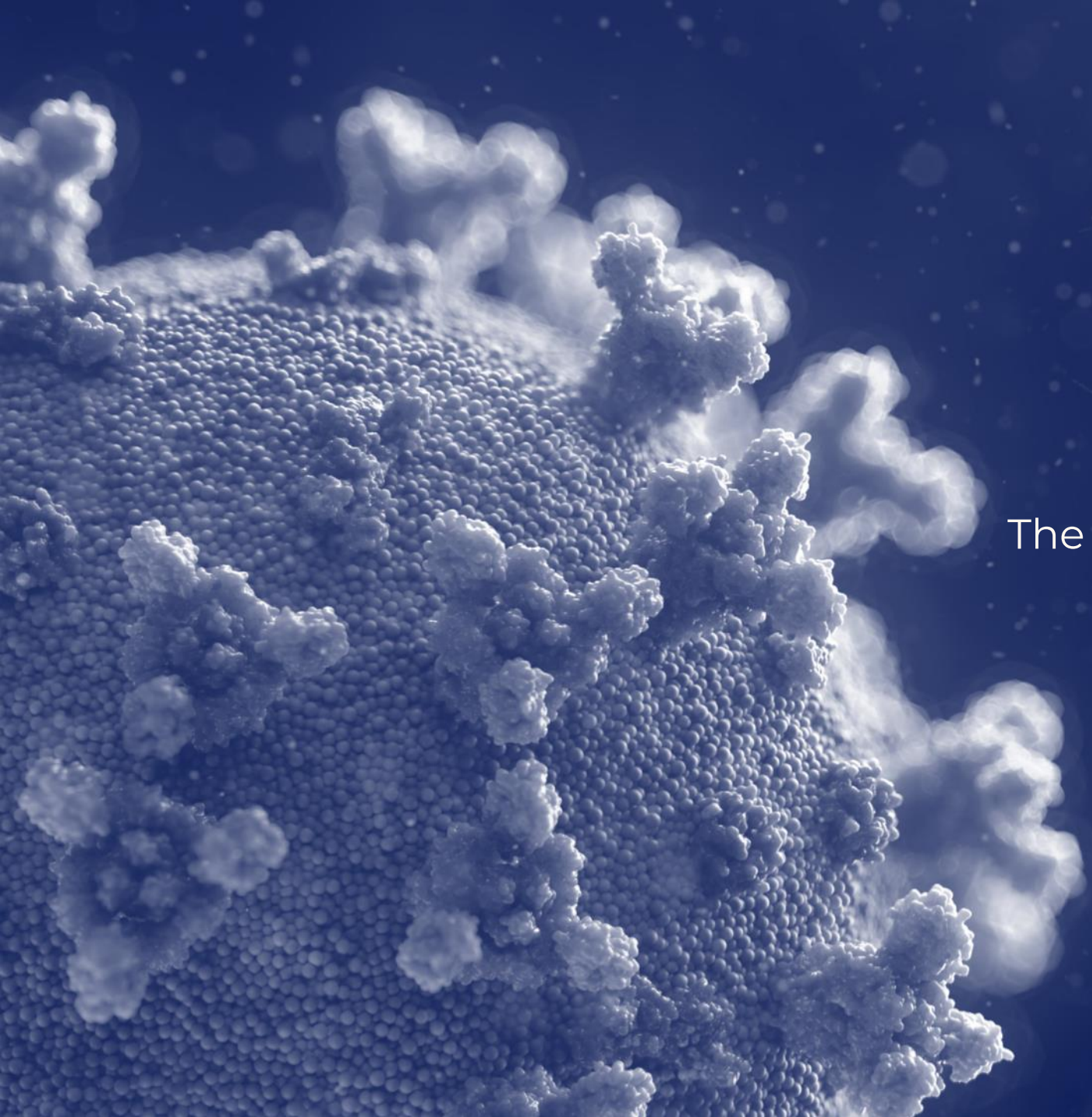


Abera Bioscience

The world leading mucosal vaccine company

Maria Alriksson
CEO, Abera Bioscience
2026

A disruptive technology to revolutionize the vaccine industry

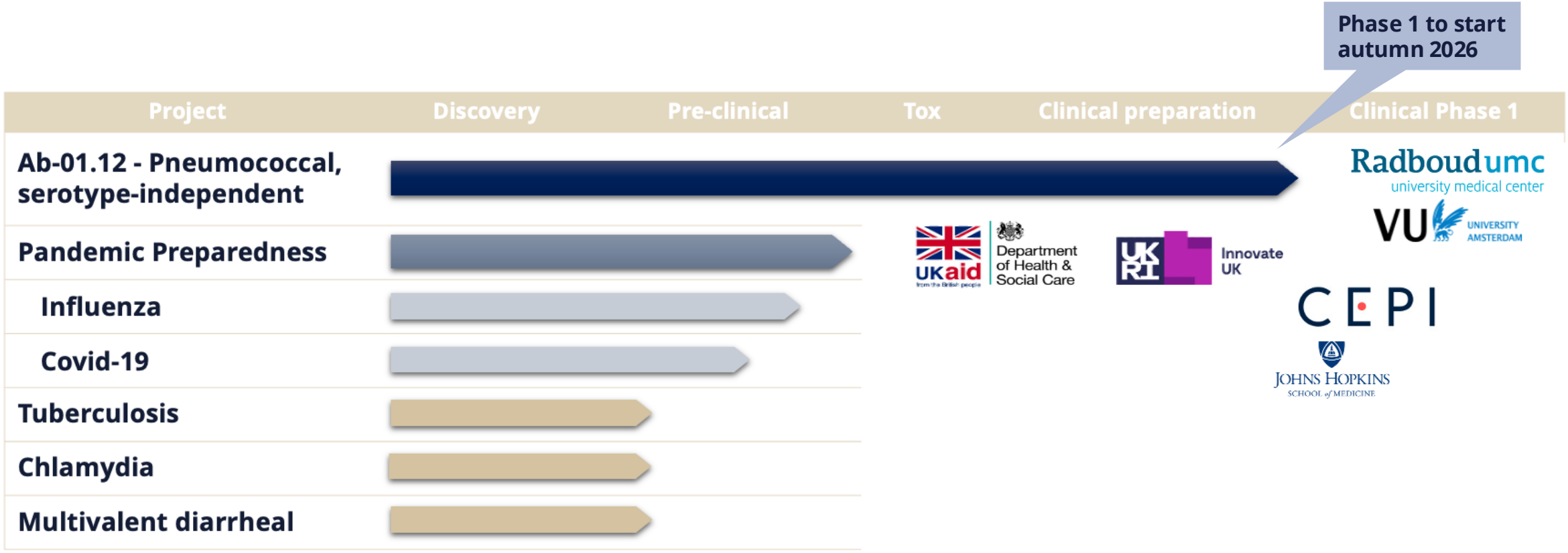
Abera develops mucosal vaccine candidates based on our innovative and proprietary platform technologies

Backed by large grants from prominent organizations

Next step - from preclinical to clinical stage company 2026

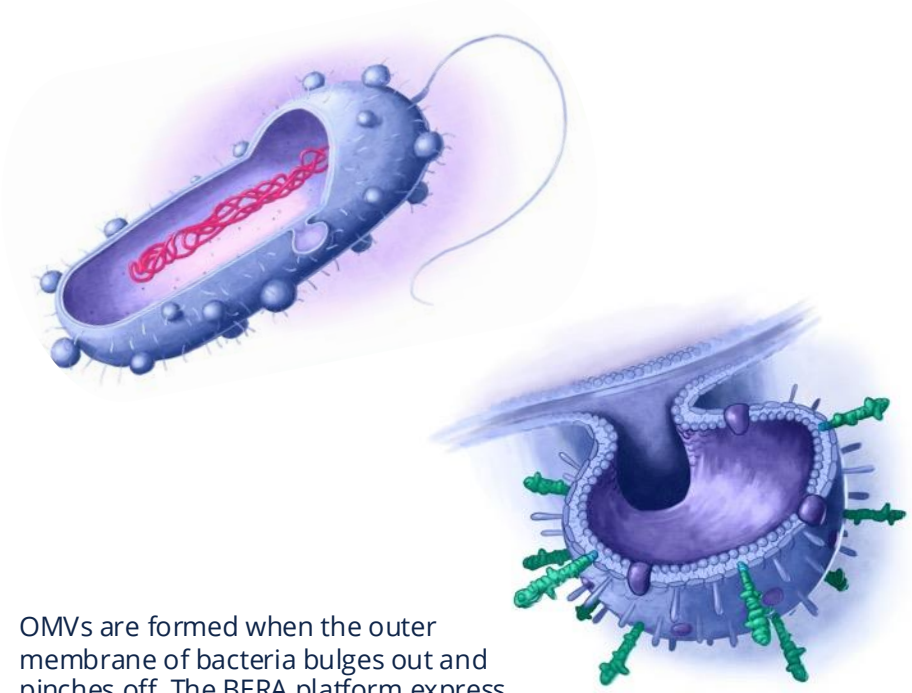
Significant interest from big pharma with Phase 1 data

Pipeline of mucosal vaccine candidates



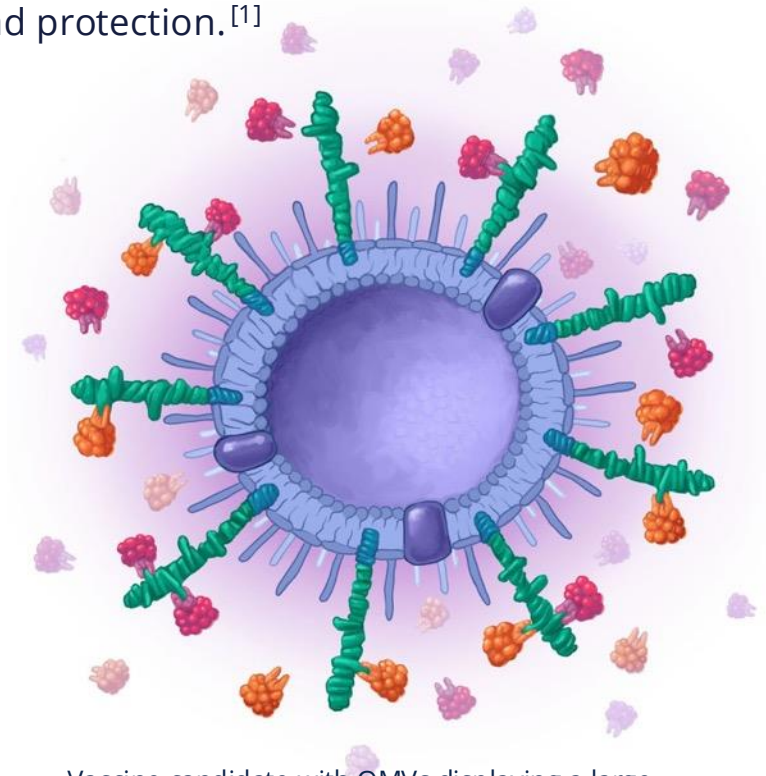
BERA platform – OMVs decorated with large amounts of antigen for new vaccine candidates

Abera can decorate OMVs with large amounts of antigen of one or more varieties. The carrier of antigen enhances the immune response and antigen provides strong and broad protection. [1]



OMVs are formed when the outer membrane of bacteria bulges out and pinches off. The BERA platform express and display the Autotransporter Hbp on the surface (green stem). [1]

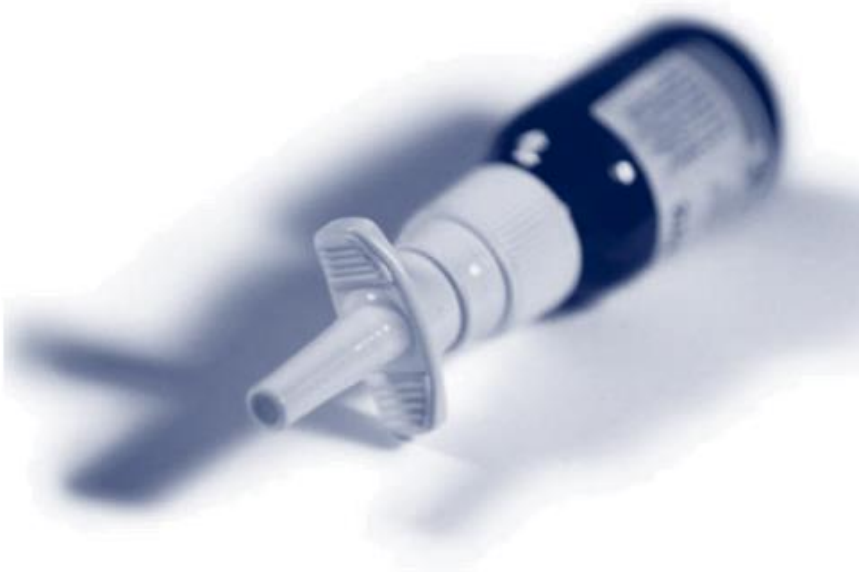
Disease specific antigens are produced separately and covalently binds to the Hbp through a Tag/Catcher system. [2]



Vaccine candidate with OMVs displaying a large amount of multivalent antigens. The OMVs have immunostimulatory properties through its bacterial components [3] and the final particle has size and pattern similar to a virus which enhance the immunogenicity further.

Advantages with mucosal vaccines

- multiple observed and inferred advantages



Double protection

Mucosal delivery with the BERA platform elicits both local (IgA) and systemic (IgG) protection, mimicking protection after natural transmission

Broader protection

Secretory IgA can exhibit cross-reactivity, neutralizing not only the vaccine strain but also variant strains of a pathogen

Local protection

IgA in nose and Lungs, stopping infection at point of entry

Lower transmission rates

Lower or no viral load/colonisation correlates with lower likelihood of transmission

Faster and safer rollout in pandemic settings

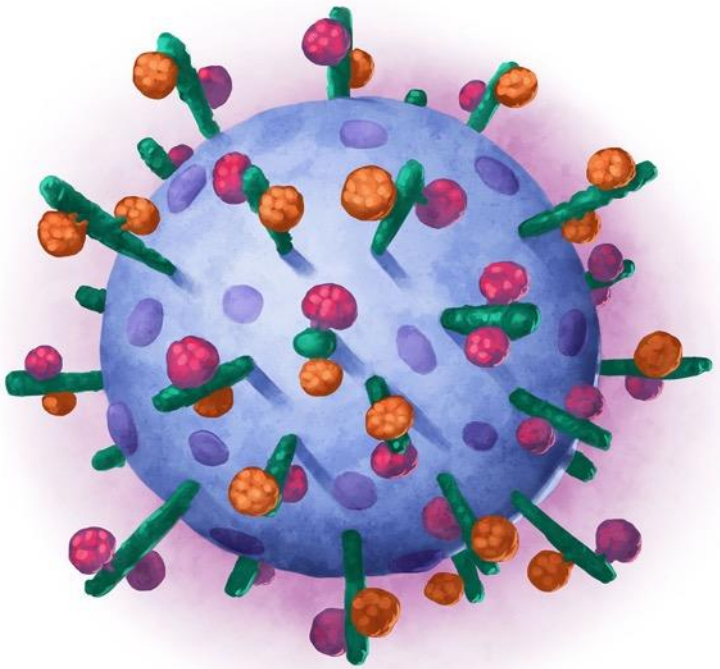
FDA has allowed for nasal vaccines to be administered at home by a non skilled user. No queuing at vaccine centres during pandemic

Higher acceptance with needle-free administration

The absence of a needle generally makes for better acceptance and no risk for injection site infection

A ready to use mucosal vaccine platform

- immunogenic & safe, ready for industrial production



- **Highly immunogenic**
  No added adjuvant needed
- **Safe in Tox study**
- **Cost-efficient and consistent production**
- **Analytical package validated**
- **First candidate ready to enter clinical phase**

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The “virus like” bacterial mucosal platform

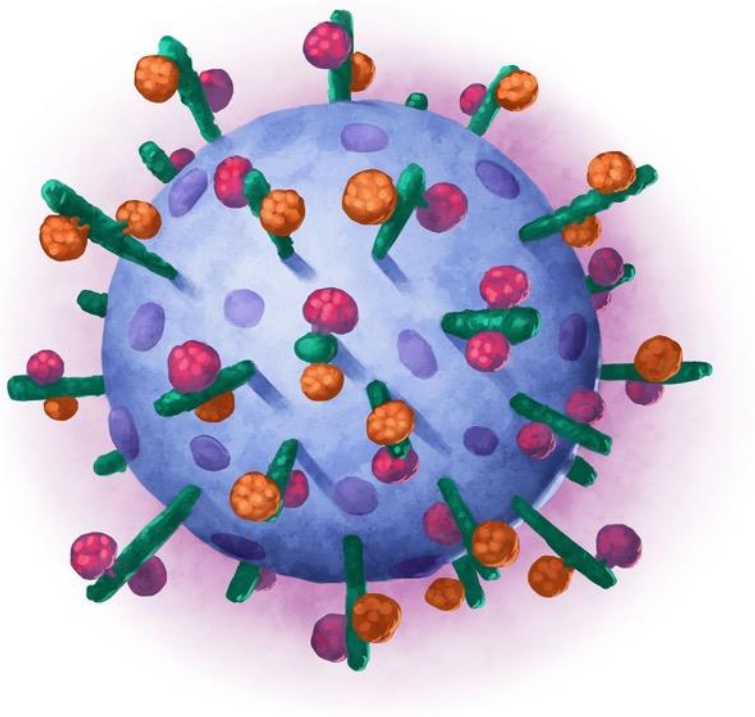
- induce both local and systemic immune response

Hinder colonization and viral load
Prevent disease & transmission

Strong mucosal immune response
High IgA & T cell response

Humoral systemic immune response
Significant IgG titers

Innate response
Kicks in early due to bacterial origin of OMV [5, 6]



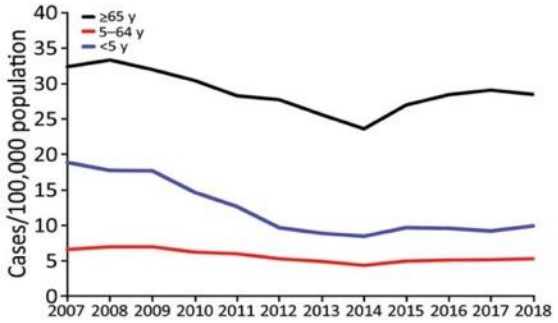
Covalent antigen binding to OMVs
Antigen decoration on OMV surfaces elicits up to a 100-fold increase in immunogenicity compared to physical mixtures of OMVs and soluble antigens. [4]

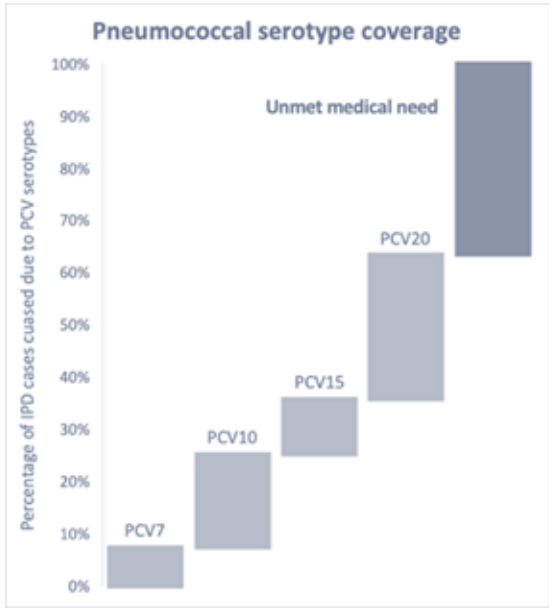
Abera's Serotype-independent Pneumococcal Vaccine

The Challenge

- Limitations of current pneumococcal vaccine paradigm

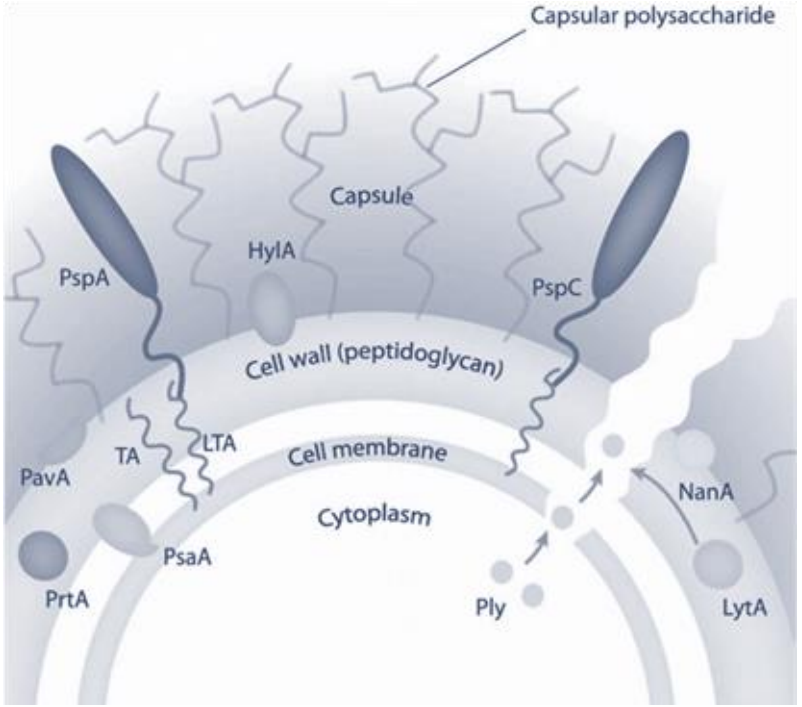
Prevalence of invasive pneumococcal disease





- **Existing vaccines are all serotype specific**
- **Serotype replacement makes current vaccines only temporarily effective**
  Example: When Prevnar 13 was introduces in Sweden the 13 serotypes accounted for 75% of invasive diseases, in 10 years it has decreased to 30% with same level of incidence. [7]
- **Serotype-specific cannot solve long term challenges**
  Reaching the limit of added serotypes due to conjugate chemistry limitations, diluted antibody titers making slip-through cases increase and increased manufacturing complexity and cost [8, 9]
- **Intramuscular administration limited to prevent invasive disease but not infection or transmission**

Ab-01.12 - a broadly protective nasal vaccine



- **Serotype-independent vaccine protecting against all serotypes, hinder serotype replacement**
  Based on the OMV's decorated with conserved antigens (antigens presented among all variants)[10]. Serotype prevalence differ extensively from region to region. A universal vaccine is effective worldwide and hinder serotype replacement problems

- **Nasal spray vaccine inducing strong protection**
  Works upstream of PCV vaccines to prevent colonization
  Protects against colonisation of bacteria in the nose, hence protects against infection, prevents against transmission and creates systemic protection

- **Cost effective to produce**
  Traditional bacterial fermentation and simple process. Estimated costs less than 10% of traditional vaccines' costs.

- **Enter clinic trials Phase 1 autumn 2026**

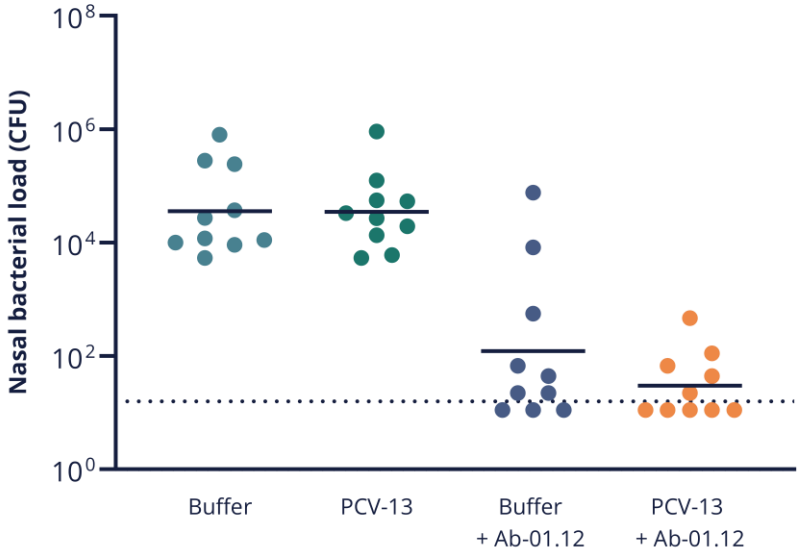
Serotype-independent pneumococcal vaccine hinders colonization

- prevents disease AND transmission

Our vaccine is administered as a **nasal spray**, utilizing intranasal immunization to replicate natural immunological processes and trigger a mucosal immune response, specifically targeting the *S. pneumoniae* carrier state.

This approach **protects against bacterial colonization** in the nose, thus **guarding against infection, preventing transmission, and creating systemic protection**. The use of conserved antigens results in **broad protection.**

Protection against pneumococcal colonization



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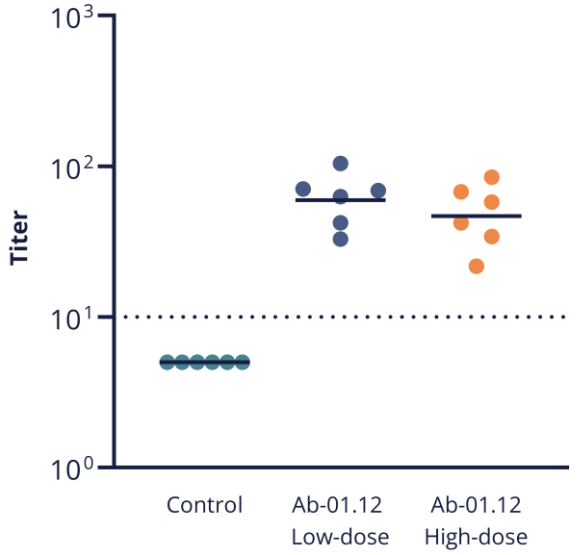
Universal pneumococcal candidate induces humoral responses

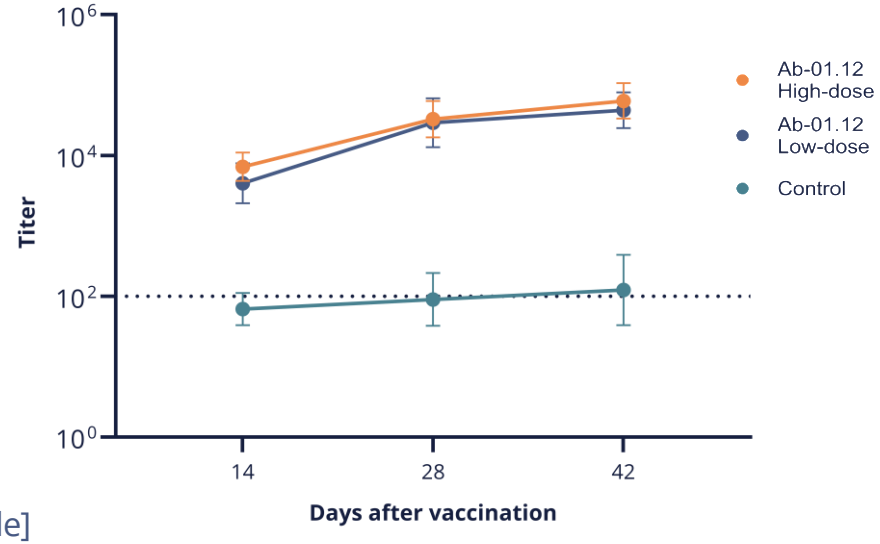
– Mucosal and systemic antibodies

- OMV vaccine induces IgA in mucosa
- IgG systemic antibodies
- Significant Th17 responses

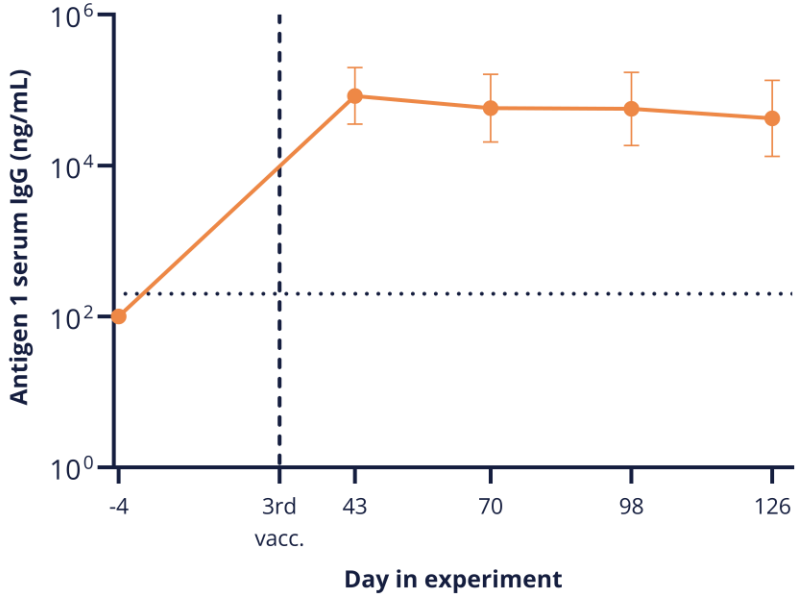
IgA in mucosa for Antigen 1 (rat)



Significant IgG response against the antigens



Sustained antibody response over time



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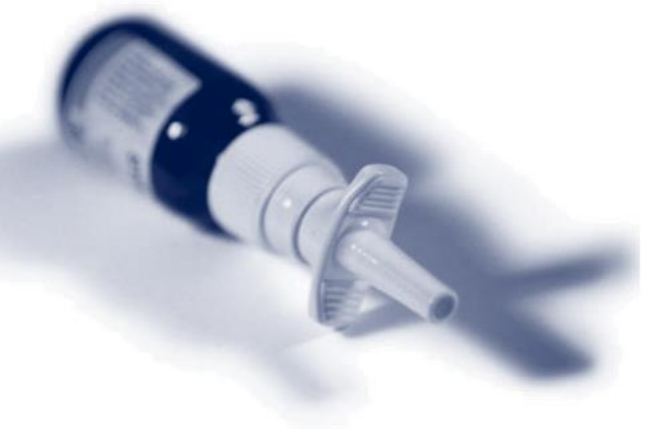
Progress towards clinic with early efficacy indications

- [x] **Extensive pre-clinical program** in collaboration with Radboud UMC, the Netherlands.
- [x] **Successful GLP tox study** performed on vaccine with no toxicological findings noted.
- [x] **GMP batch produced** and released from NorthX Biologics.
- [ ] **Clinical phase 1 planned to autumn 2026** at Radboud University Medical Centre.
  FIH, Dose ascending study, Healthy adults 18-49 years, one dose + booster arm.
  Primary endpoints: Safety. Secondary endpoints: immunological markers
- [ ] **Established Human Challenge model** to be used in phase 2a. Human Challenge models enable efficacy indication at early phase and decrease minimum sample size in studies throughout the clinical development. Enable both risk reduction and large costs savings.



According to scientific advice with Swedish Medical Product Agency, Feb 2025:
The MPA expressed support for Abera's overall strategy and confirmed that the preclinical documentation is considered sufficient to proceed to human studies. The agency also agreed that the analytical methods developed to control the product's quality are in line with regulatory expectations. Furthermore, Abera received support for the overall design of the initial clinical study that was presented.

Extensive market and valuable clinical candidates

Market size

Pneumococcal vaccine market sales of $ 8.4b in 2023. Projected to reach $13b at CAGR 7,5% by 2026

$ 8.4 b

GSK acquisition of Affinivax

In may 2022 GSK acquired Affinivax for $2.1b in up-front payments plus $1.2b in milestones. Affinivax has a 24-valent pneumo vaccine candidate with positive phase 2 data

$2.1b + $1.2b

Vaxcyte market cap

Vaxcyte with a 24-valent PCV pneumo vaccine candidate in phase 2 has a market cap of $7 b

$7 b

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Source: www.medgadget.com

Abera's Intranasal Influenza Vaccine

Fast-to-adapt intranasal influenza vaccine

The challenge

High disease burden with estimated 1 billion cases of seasonal influenza per year

3-5 million sever cases[11]

Yearly adaptions needed, low efficacy in many seasons

Long production time lines force early decision on seasonal strains
→ lower efficacy due to changes in strains over season

According to CDC the average flu vaccine efficacy < 40 %[12]

Influenza may cause the next pandemic due to high mutation rates

Influenza market exceeds USD 7.7 billion in 2023

Growing market due to increase of influenza incidence

Abera's solution

Intranasal vaccine to hinder both disease and transmission

Fast production and easy strain adaption – later point to choose included strains

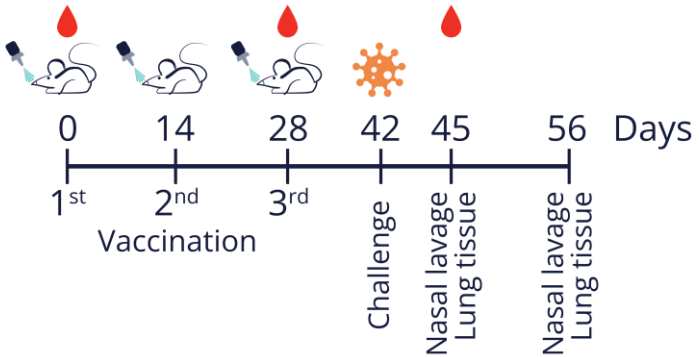
Fast, cost-efficient and egg-free production

Strong pre-clinical data package in multiple models. Supported by CEPI

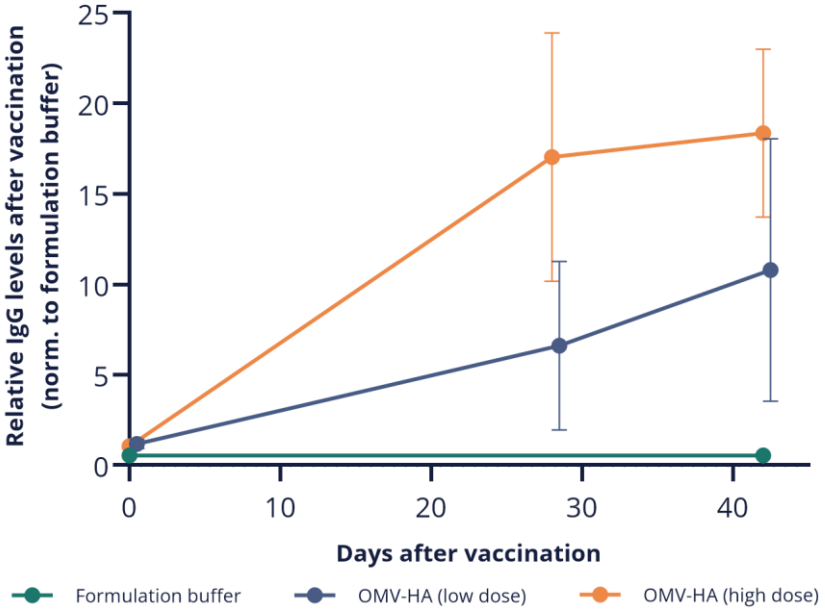
Ready to accelerate development to tox & clinical development

Promising results in first *in vivo* study

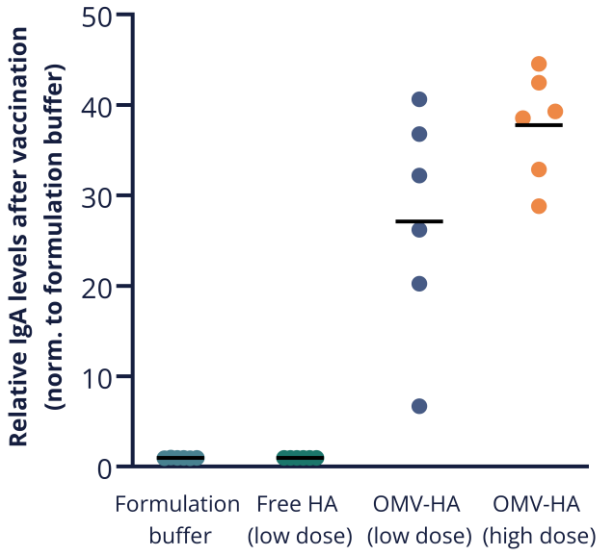
- High IgG and IgA titers[13]
- No disease symptoms in vaccinated mice[13]



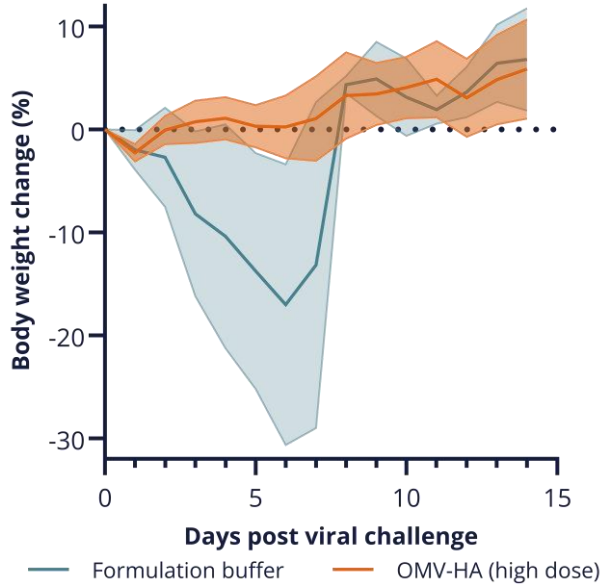
High systemic IgG antibody titers



High mucosal IgA antibody titers in both nose and lung



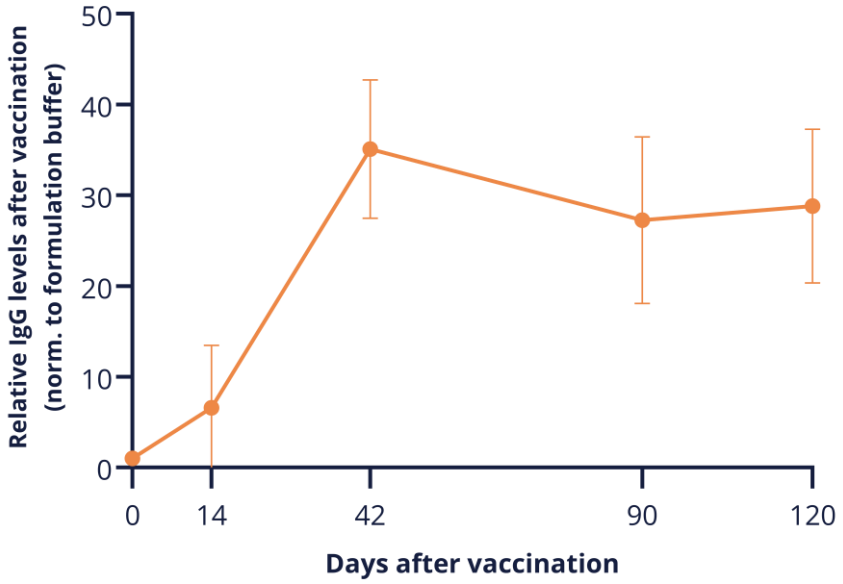
Weight change after virus challenge



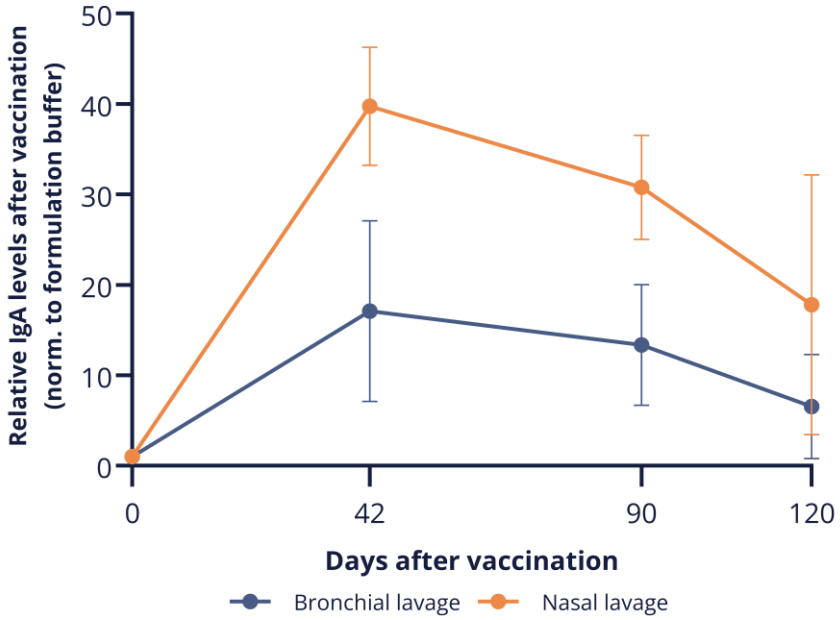
Sustained antibody responses over time

Significant and sustained IgG and IgA titers over time in longevity study (mice) [13]

Sustained systemic antibody levels (IgG)



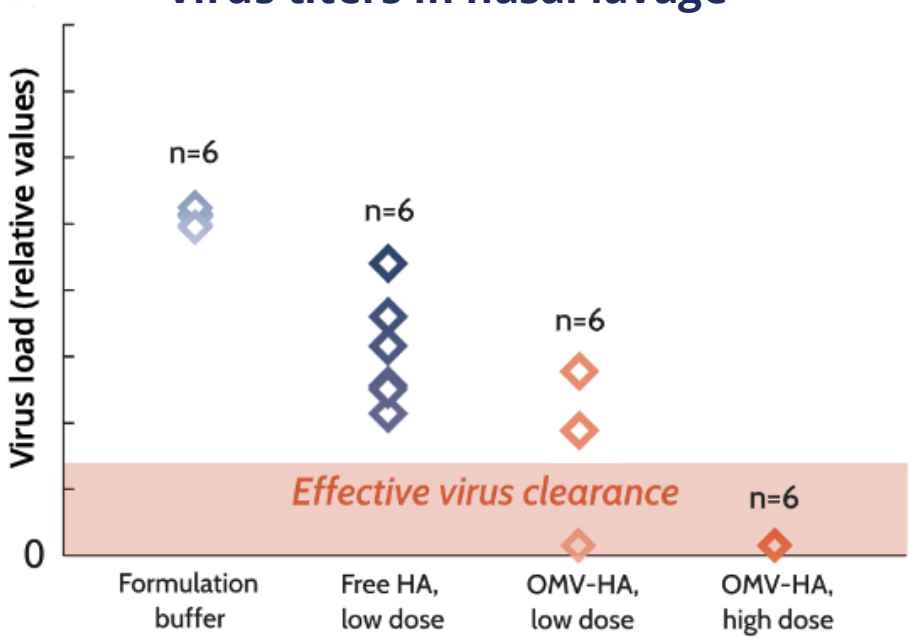
Local, nasal & bronchial, antibody titers (IgA) still after 120 days



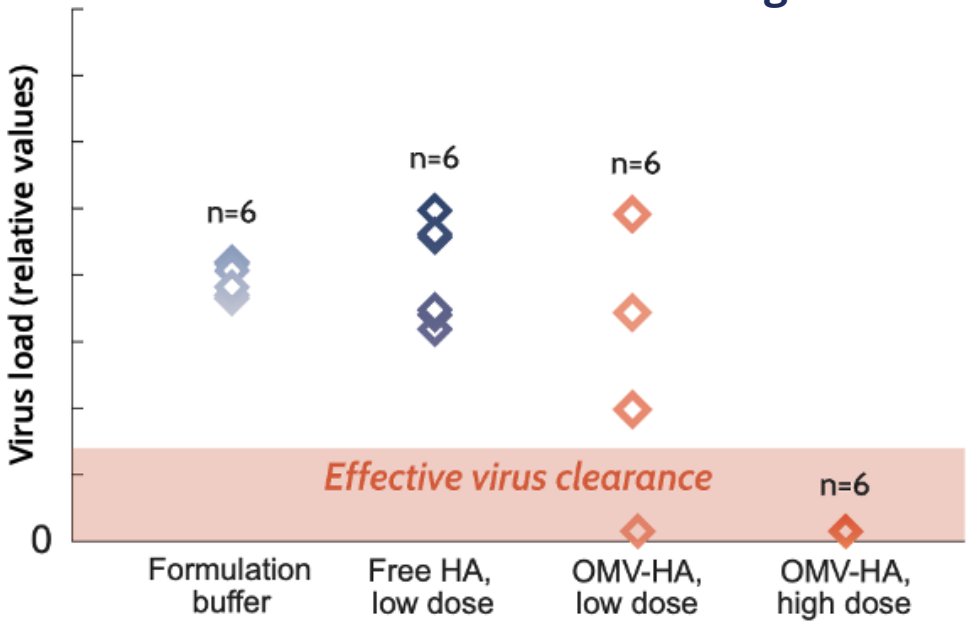
Vaccination reduce viral load

- No detectable virus in nasal nor bronchial lavage in high dose group (mice) [13]

Virus titers in nasal lavage



Virus titers in bronchial lavage



Confirming data in ferrets

Available under CDA

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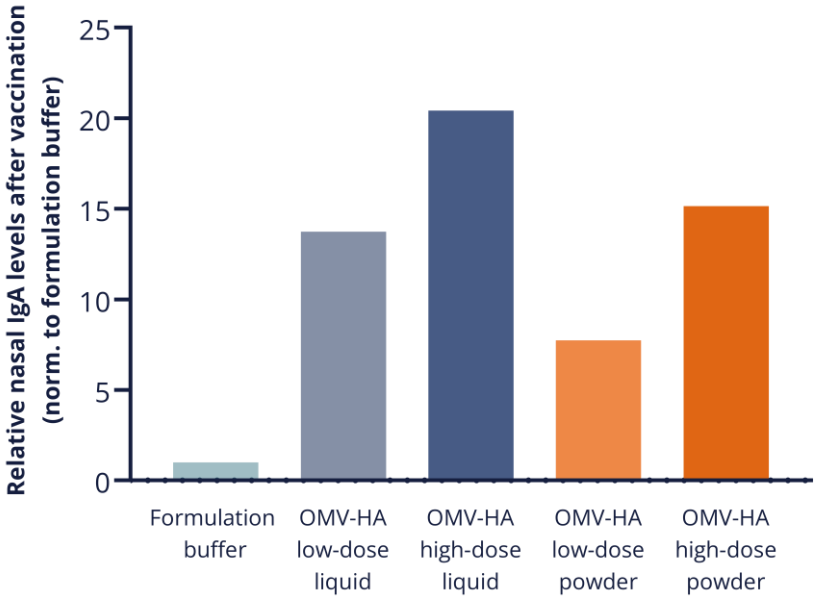
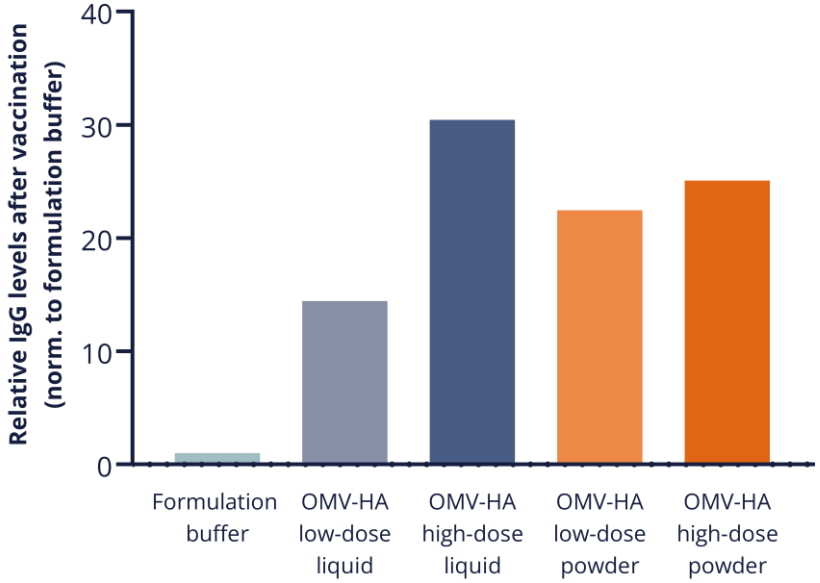
Powder and liquid formulations works equal well

- Similar IgG and IgA data in rats for both formulations

High local antibody levels (IgA) in nasal lavage for both powder and liquid



High systemic antibody levels (IgG) in serum for both powder and liquid



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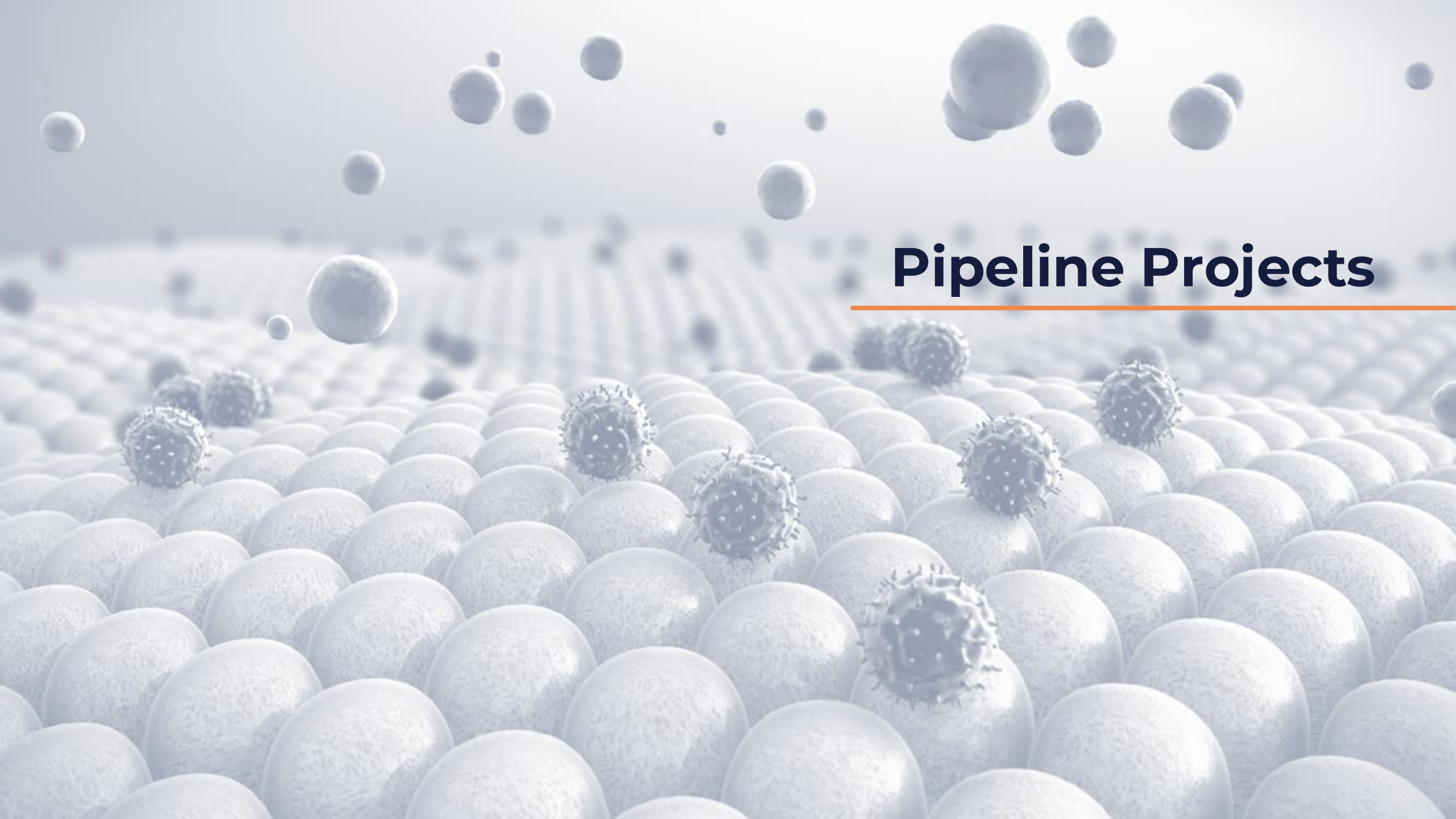


Pipeline Projects

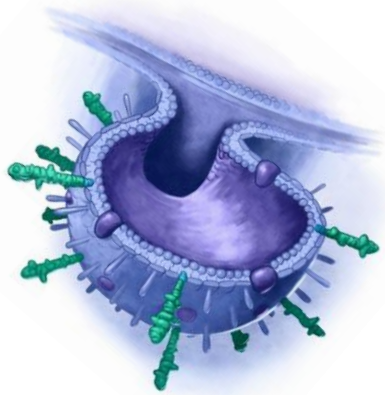
Fast design & development of new candidates

- enabling multiple discovery projects and rapid-response possibilities

In advance of project
3 weeks → **2-10 weeks** → **1 day** → **1-2 weeks** → **Ready for testing!**

Stockpile of OMVs

Abera's OMVs are stable, with long shelf-life enabling bulk production in advance.

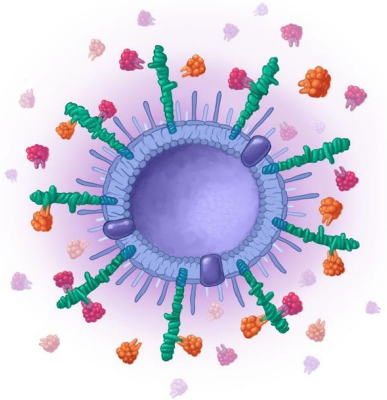


Antigen production

Antigens produced separately in optimal systems depending on antigen properties. Bacterial, mammalian and cell-free systems are verified.

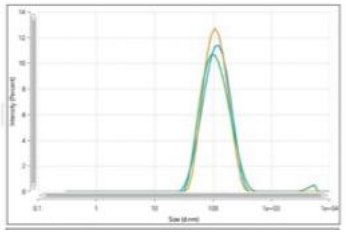
Decoration of OMVs

When mixing antigens and OMVs, antigens covalently bind to OMVs to high density decoration. No chemicals involved.



Purification & Quality control

Stable and easy to scale production process with few process steps enable fast and cost-effective production in both lab and industrial scale. Verified analytical package. Candidate ready for testing.



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Abera OMV stockpile - future pandemic preparedness

Abera's BERA platform offers significant advantages as a pandemic preparedness tool – validated for stockpiling of OMVs and enabling rapid development of vaccine candidates in weeks.

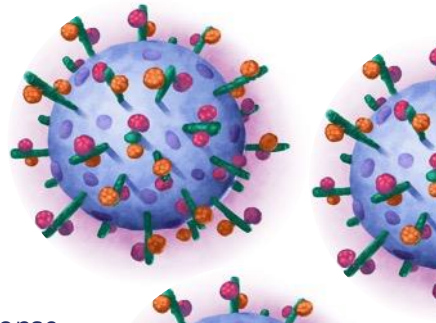
The platform utilises affordable, simple production methods possible to scale out. Stable products for easy distribution. Mucosal administration enable rapid mass vaccination and self-administration.

Mucosal immunization has the potential to both prevent disease and block transmission – stopping an emerging pandemic before it becomes a global outbreak.

Abera's platform development has been supported by significant grants from the UK Vaccine Network and CEPI.

Pandemic preparedness through stockpiling of BERA OMVs

Disease X
Antigen discovery and production as quick response to outbreak



Fast response vaccine candidate

A nasal COVID-19 vaccine candidate

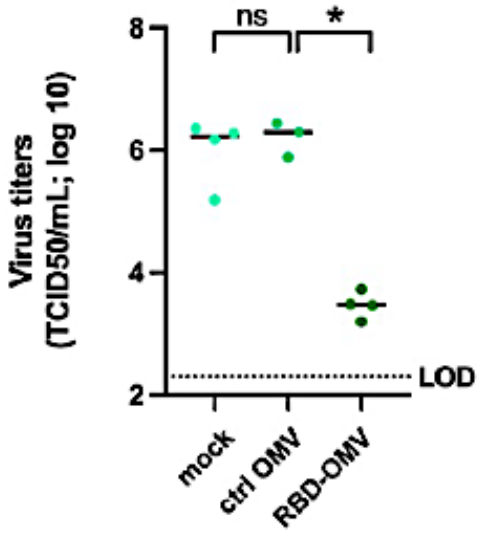
- Developed with Johns Hopkins University School of Medicine

BERA platform with OMVs decorated with the spike protein from SARS-Cov-2

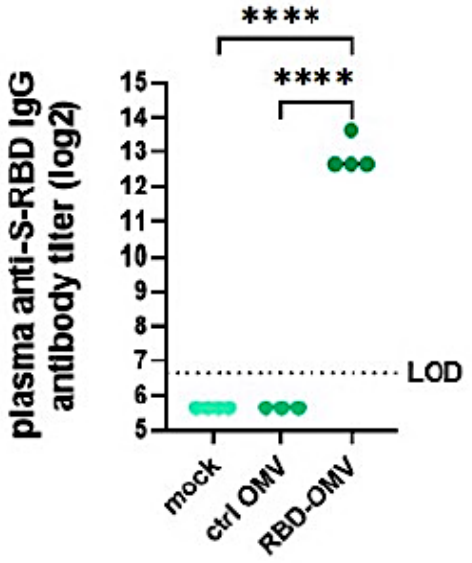
Successful In vivo challenge study [14]

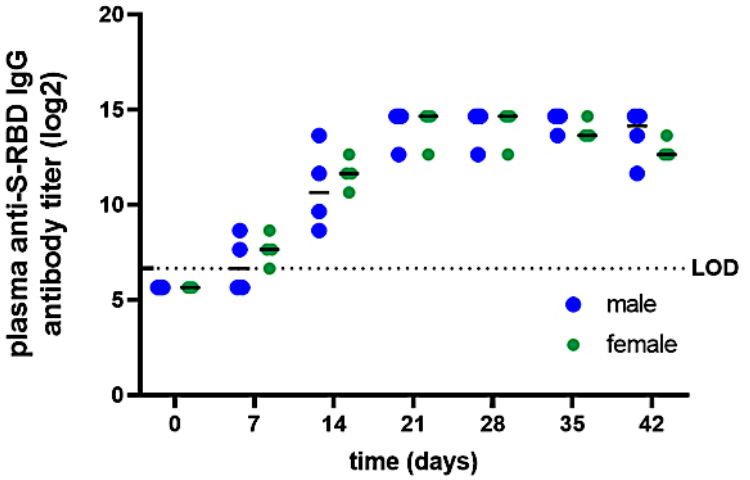
- Reduction of viral load in lungs and mucosal fluids
- Antigen-specific antibodies in the blood and mucosal fluids
- Virus neutralizing antibodies against SARS-CoV-2
- IgA could be detected in BAL

Reduction of viral load



Induce long-lasting antigen-specific antibodies, IgG





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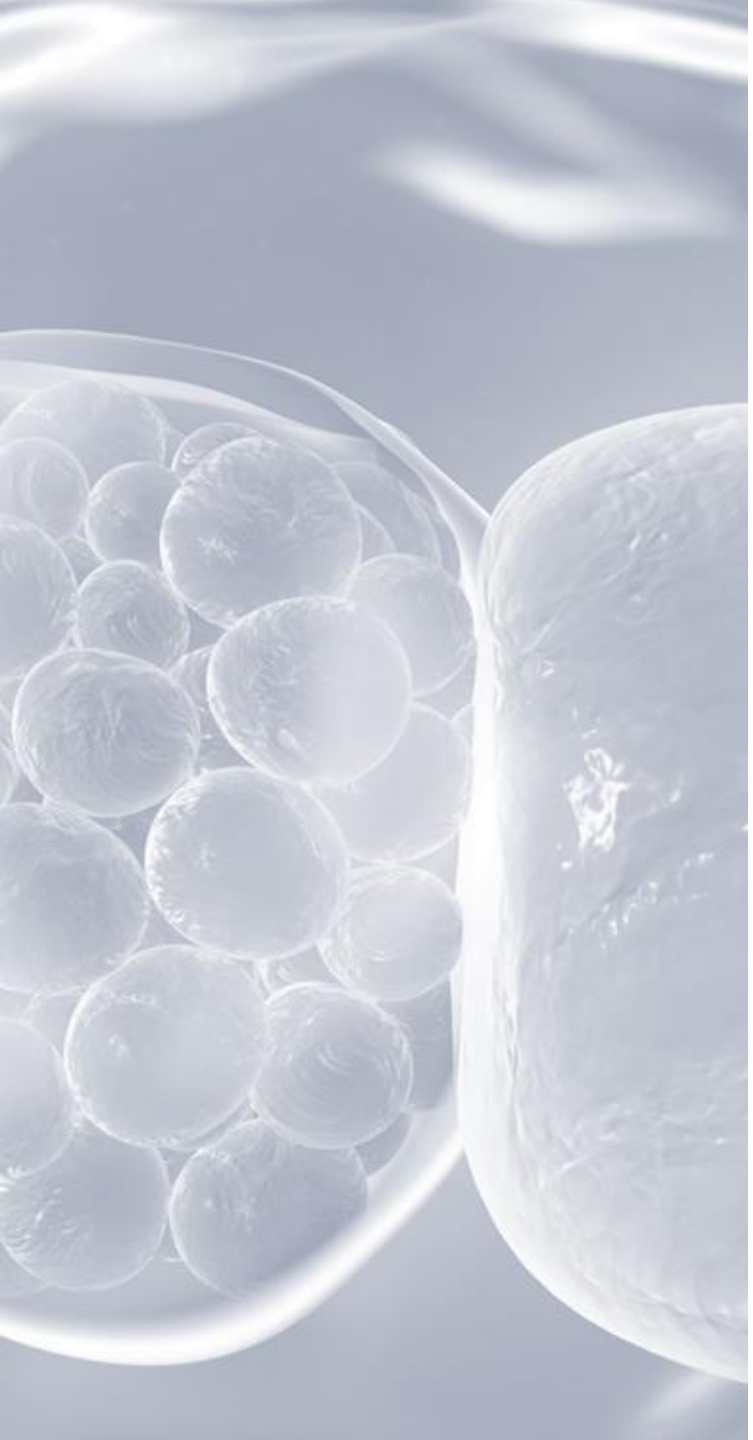

Chlamydia vaccine candidate

- early promising results developed through Horizon grant

Chlamydial infection, caused by Chlamydia trachomatis, is the most prevalent bacterial sexually transmitted infection.
Over 3.2 million cases diagnosed 2021

No existing vaccine against Chlamydia on market
Potential size of market estimated to $600m and growing

PhD work in VacPath – Horizon-financed vaccine development project

Different platforms, approached, administrations routes and more are tested. Challenge studies *in vivo* on promising prototype vaccines at SSI in Denmark showed significant immune response for Abera's candidate. [15]

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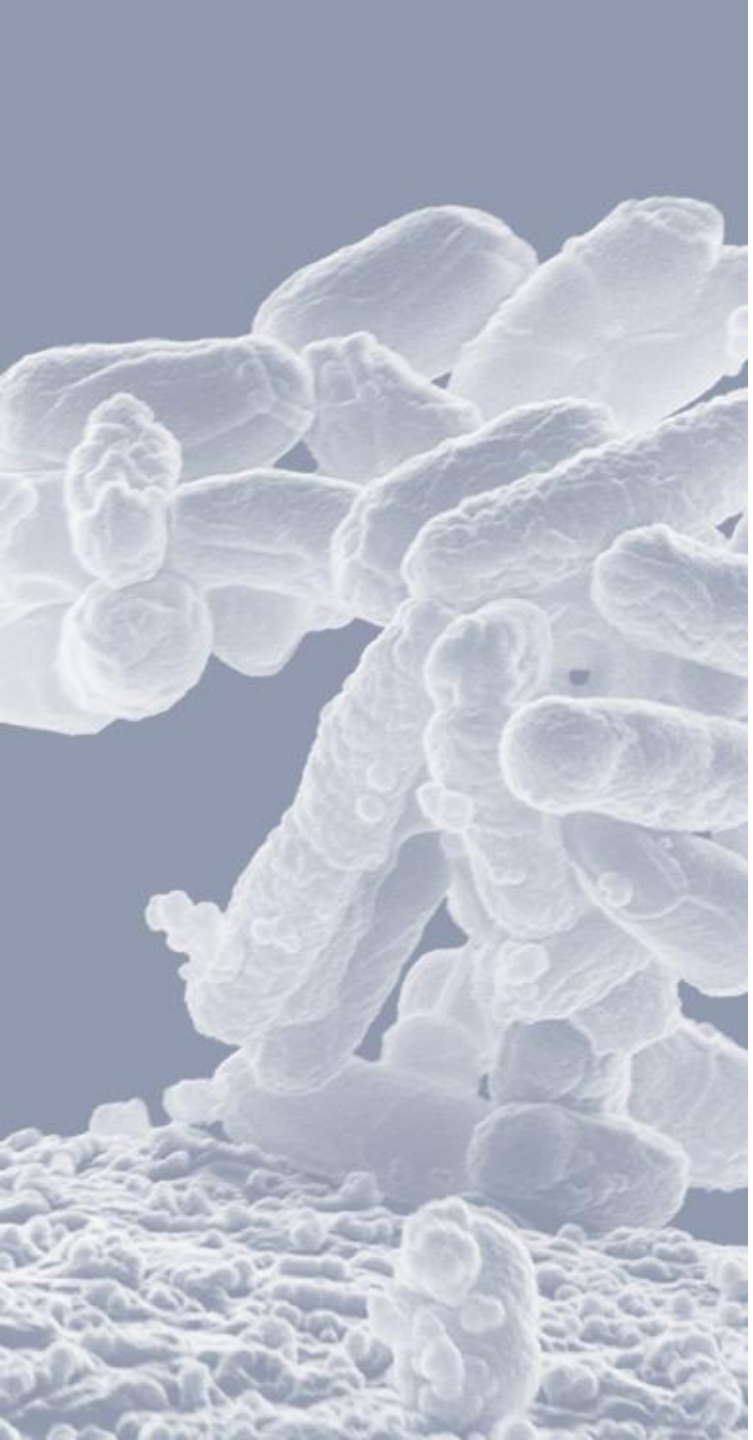


ETEC vaccine candidate

- promising start for broad diarrheal vaccine

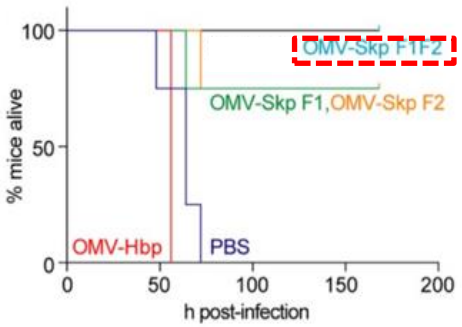
Diarrheal diseases account for **over 1.7 million deaths** each year and 800 000 of those are children. **1 in 9 child deaths worldwide is caused by diarrheal.**

Escherichia coli (ETEC) bacteria and **Rotavirus** are the most common causes but also **Shigella, Salmonella and Campylobacter**

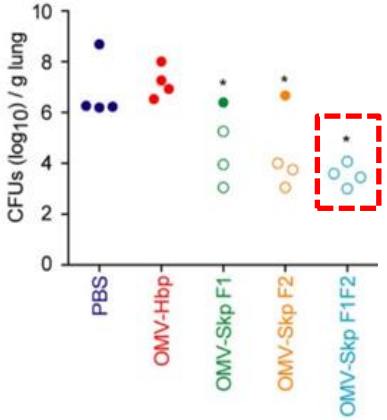
Promising ETEC vaccine candidate based on BERA platform decorated with novel antigens shows promising results in *in vivo* challenge studies [16]

Searching partnerships for development of **broader diarrheal vaccine**/ tourist vaccine by adding antigens against e.g Shigella and Salmonella

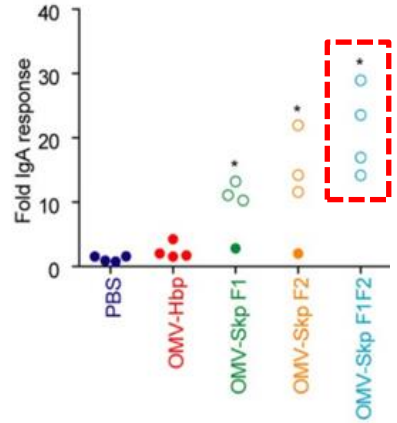
Survival



ETEC load in lungs



Fecal IgA



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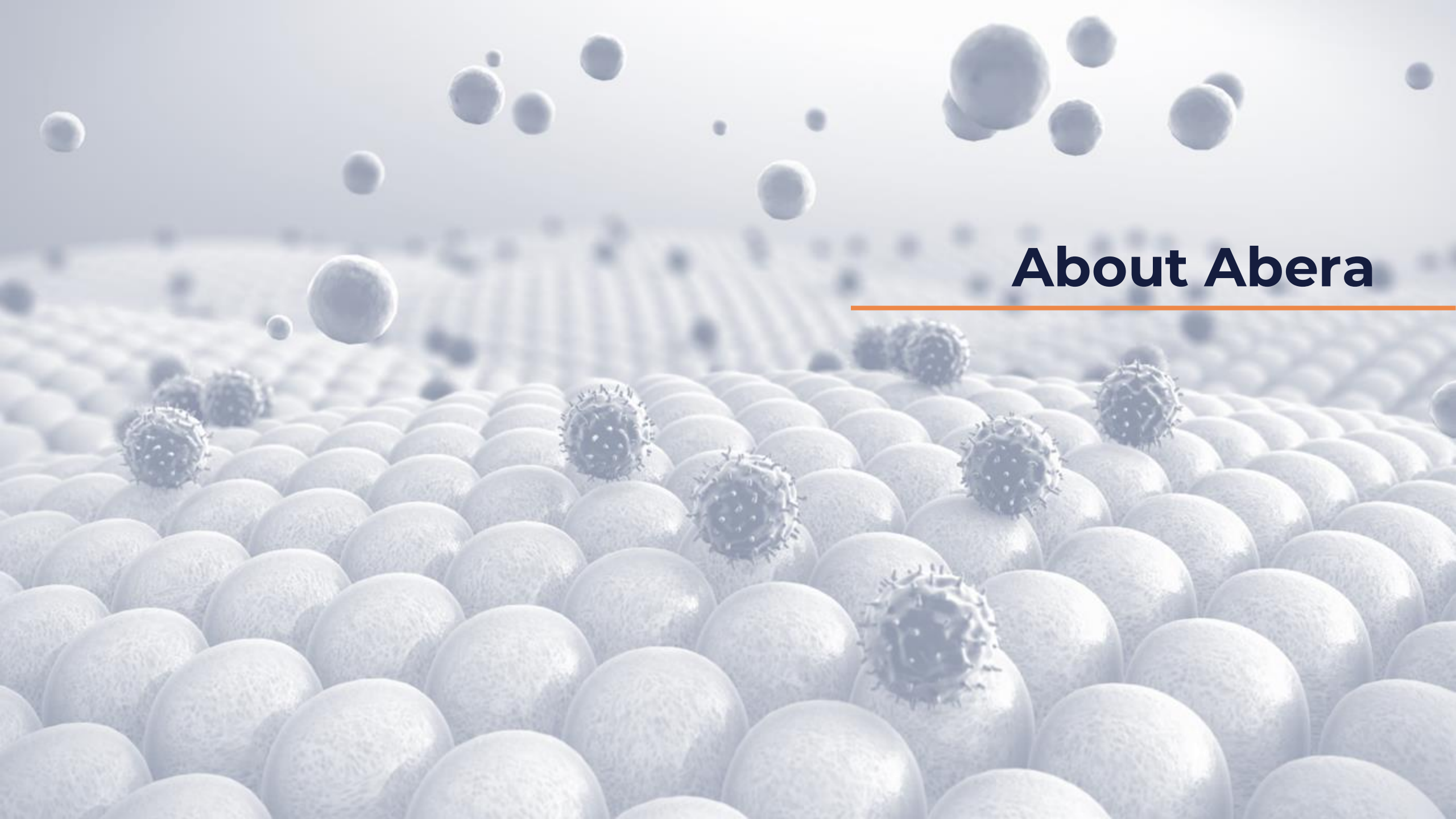


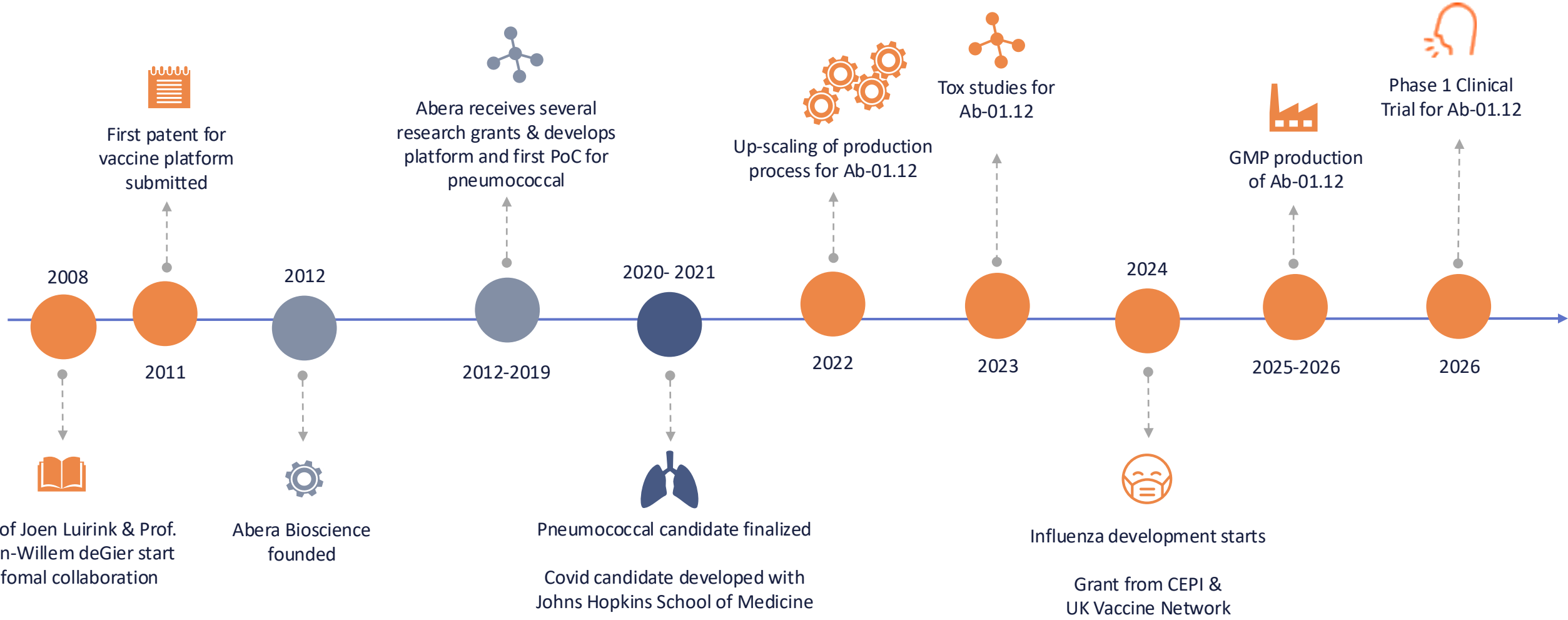
About Abera

Science-centric spin-out advancing to clinical stage company

Strong IP portfolio and extensive pipeline with first clinical trials planned

Abera is a innovative vaccine platform company with strong scientific background. It was founded 2012 as a spin-off from Stockholm University and Vrije Universiteit, Amsterdam. Today it has operations in both Sweden and the Netherlands with a experienced management team. Abera is listed on Spotlight Stock Market since 2021.
Successful grant history – of totally €22m invested in Abera, over €15m is soft money.

Abera Bioscience from lab bench to today



Major development has been funded through research projects

More than SEK 250 million has been invested in Abera's technology and vaccine candidates, mainly through grants

2012 & 2015: SWT, Dutch government
Direct grant of SEK 4.1 million to Abera for the development of the platform

2012: EU, Additec
Large project within Tuberculosis where Abera received SEK 4.3 million + indirect grants

2015: EU, PneumoVac
Project in Pneumococci where Abera received SEK 1.5 million + indirect grants

2015: EU, OptifemVac
Project within infectious diseases where Abera received SEK 2 million + indirect grants

2017: EU, OptifemVac
Project within infectious diseases with several indirect grants

2019: EU, VacPath
Project within Chlamydia where Abera received SEK 3.5 million + indirect grants

2020: Covid-19
Indirect grants through several collaborative projects in early phase

2022 & 2024: Vinnova
Project for upscaling of large scale production process where Abera got SEK 2 million in direct grants

2023: UK Vaccine Network
Pandemic preparedness project to prepare platform production & analytics for rapid response against Disease X.
£1.8 million in direct grants

2024: CEPI
Pandemic preparedness project to generate PoC for platform with Influenza as example vaccine.
$1 million in direct grants

2025: BactiVac
Device verification in advance of Phase 1 for pneumo vaccine.
£70 k in direct grants

Experienced and versatile team

MSc. Maria Alriksson
CEO

PhD. Mats Lundgren
CSO

AssProf. Joen Luirink
CTO

Prof. Marien de Jonge
Radboud UMC

MSc. Anders Ericson
Executive Chairman

MSc. Ann-Christin Magnusson
Lab manager

PhD. Bart van den Berg
Senior Scientist

PhD. Calle Niemi
Scientist

PhD. Jessica Pettersson
Scientist

PhD. Lucille van Beek
Clinical Trails (RUMC)

PhD. Emma Ispasanie
Translational Project Scientist

Abera is located in fully equiped development labs in Uppsala, Sweden.
Experienced and diverse team including expertise in molecular microbiology, mucosal *in vivo* studies, clinical trials, CMC and management.

Business oriented Board of Directors with diverse expertise

Anders Ericson
Chairman of the board
Former CEO Abera. Professional investor and analyst. Experienced Board member of Nordic Life Science SME

Fredrik Juserius
Board member
25+ years of mgmt positions in Big Pharma incl. Country Director, Commercial Director Vaccines et al.

Harry Råstedt
Board member
Ex. Head of GSK Vaccine Europe
20 years of mgmt. positions in Big Pharma

Cristina Glad
Board member
Former CEO and VP at BioInvent. Professional Board member in LifeScience

Mats Wahlström
Board member
Headed US-divisions of several global medtech companies. Investor and professional board member

World-leading experts in active Scientific Advisory Board

Dr Camille Lochte
Inserm, Inventor of Intranasal Bordetella Pertussis vaccine

Dr Mats Wahlström
Experienced investor and former director in multiple global life science companies

Prof. Marien de Jonge
Radboud UMC, Pneumo expert

Prof Samuel Wagner
University of Tübingen, Infection Biology

Prof Jan-Willem de Gier
Stockholm University, Protein expert

Dr Lucille van den Beek
Radboud UMC, Clinical trails and Human challenge model expert

Eco-system of experienced partners

VU VRIJE UNIVERSITEIT AMSTERDAM
Radboudumc
NorthX Biologics
truly labs
RegSMART Life Science AB
scantox
Bio-Works
Artemis Bioservices

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