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RETHINKING WHAT'S POSSIBLE WITH VACCINES

David Hoey, CEO
Bioshares

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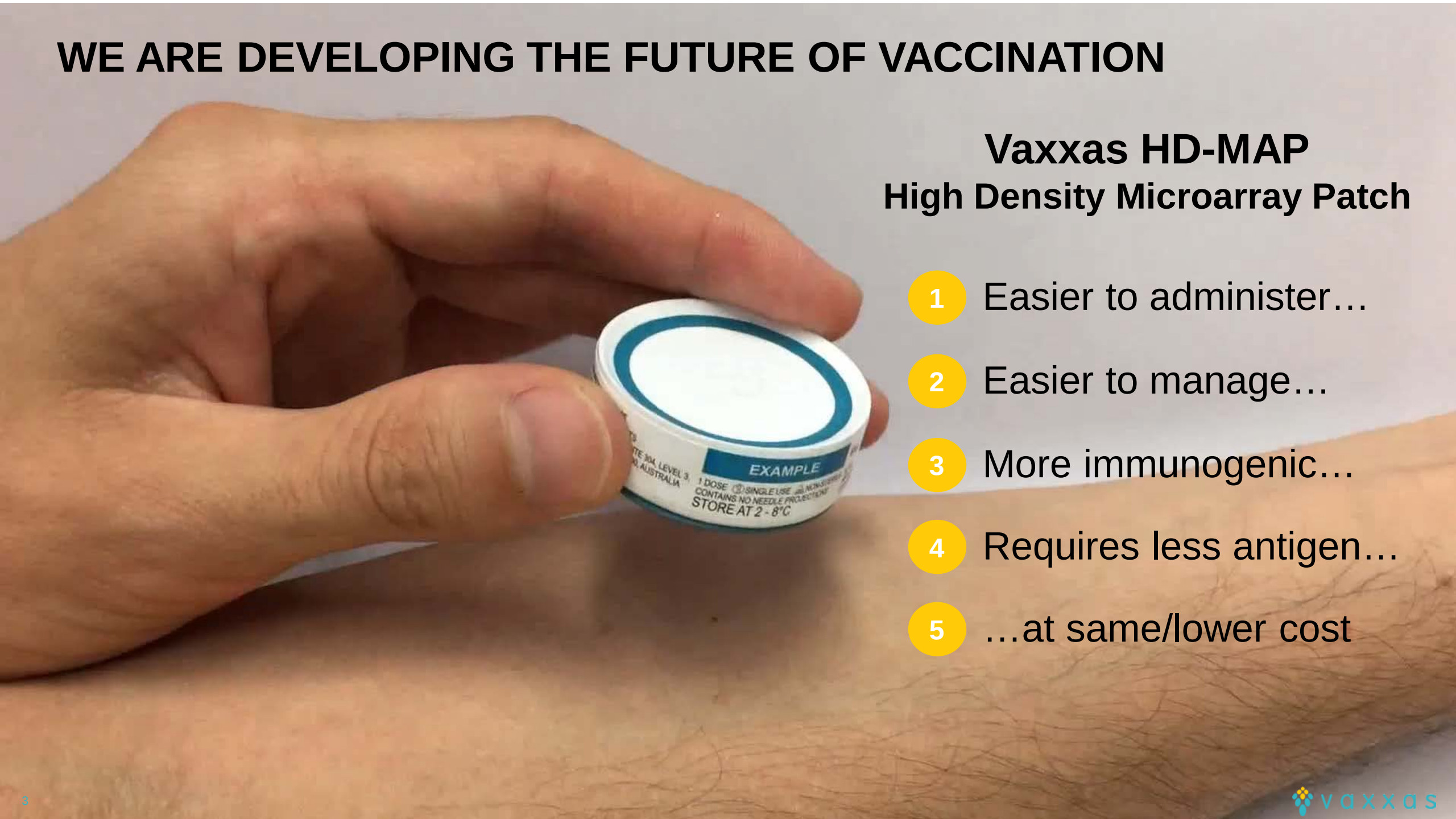
WE ARE DEVELOPING THE FUTURE OF VACCINATION



Vaxxas HD-MAP
High Density Microarray Patch

1. Easier to administer…
2. Easier to manage…
3. More immunogenic…
4. Requires less antigen…
5. …at same/lower cost

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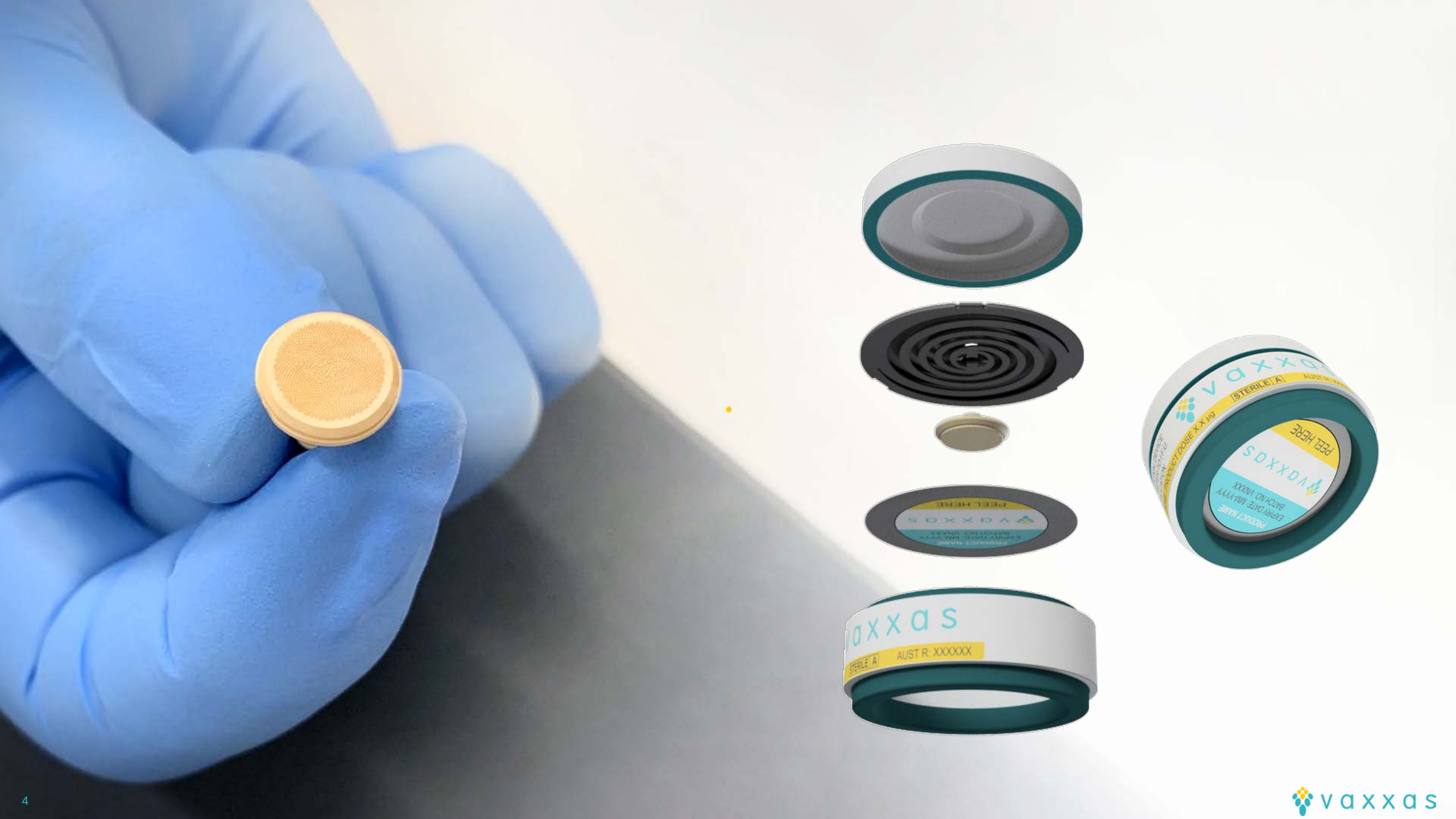
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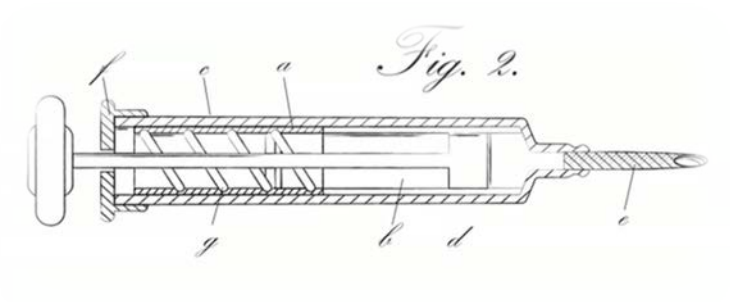
VAXXAS SNAPSHOT

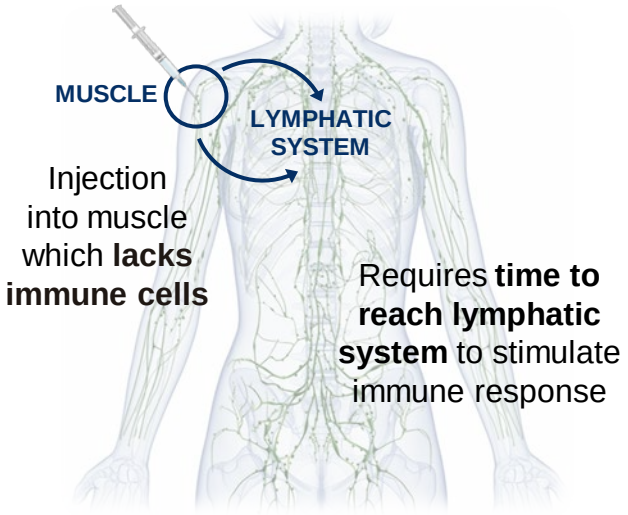
- Founded 2011 around technology out of UQ
- $100M venture funding, $140M non-dilutive funding
- Team 130 strong (Australia & USA)
- Partnered with global leaders in vaccination
- Completed 3 Phase I vaccine studies >300 participants
- 2 Phase I studies, 200 participants underway
- 8 development programs advancing
- Establishing high-volume, low-cost manufacture

THE PROBLEM: NEEDLE AND SYRINGE

170 Year-old Technology



Untargeted Science



Slow onset of immune response

CHALLENGES

Patient Dissatisfaction

Patients

- Painful injection
- Slow immune response

Lower Profitability

Pharma

- High dosing
- High COGS/system costs

Inefficient Distribution/ Protection

Global Health

- Cold chain storage/distribution
- Skilled administration required

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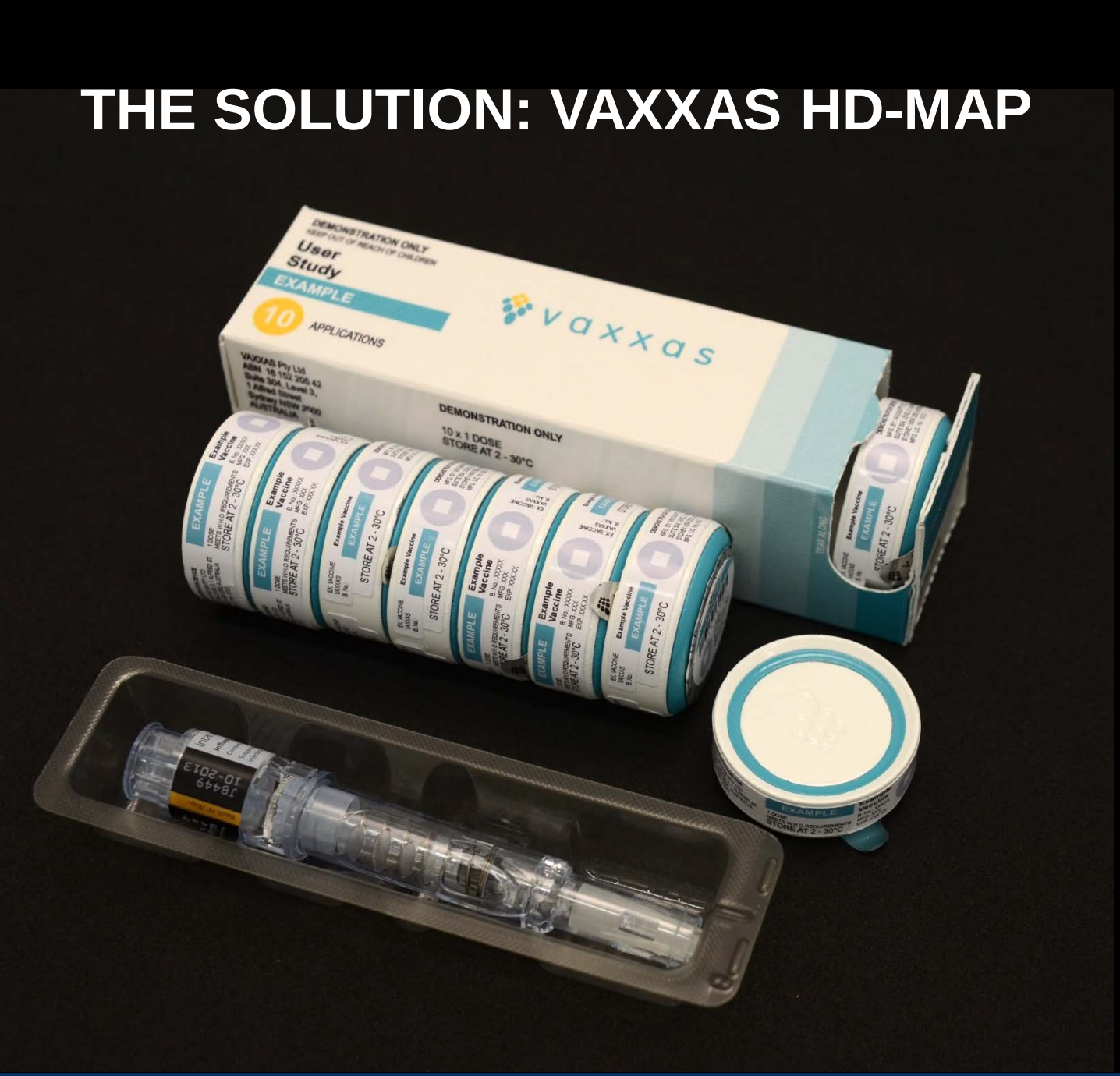
THE SOLUTION: VAXXAS HD-MAP



BENEFITS

Patient Preference

- No fear of needle pain
- Faster immune response

Higher Profitability

- Demonstrated (6x) dose sparing
- Lower COGS, more revenue

Improved Distribution/ Protection

- Thermostable with easy distribution
- Easy to administer/self-admin potential

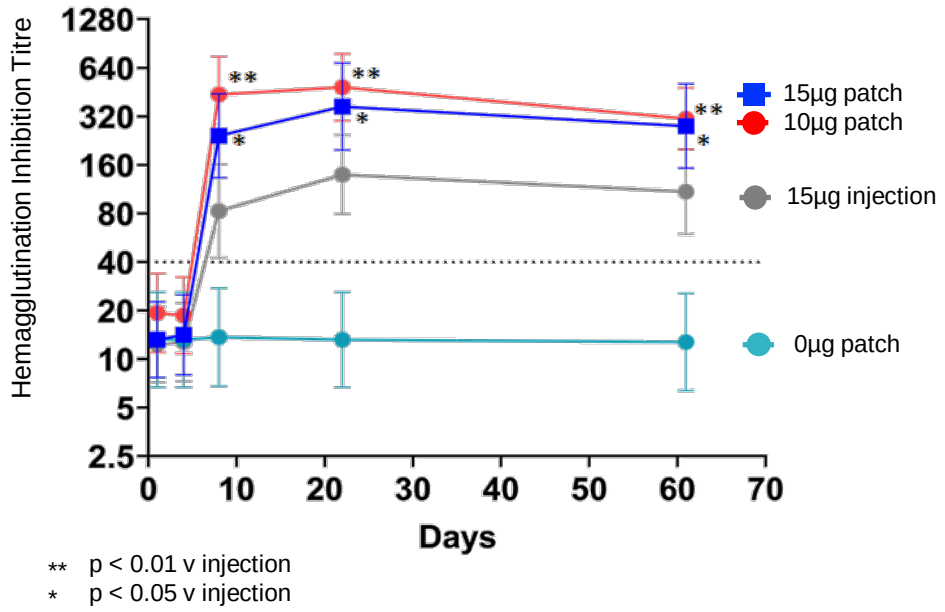
SUPERIOR IMMUNE RESPONSE AND LOWER DOSING POTENTIAL

PLOS | MEDICINE

Results from a Randomized Controlled Phase I Influenza Vaccine Clinical Trial in 210 Subjects †

Superior Immune Response

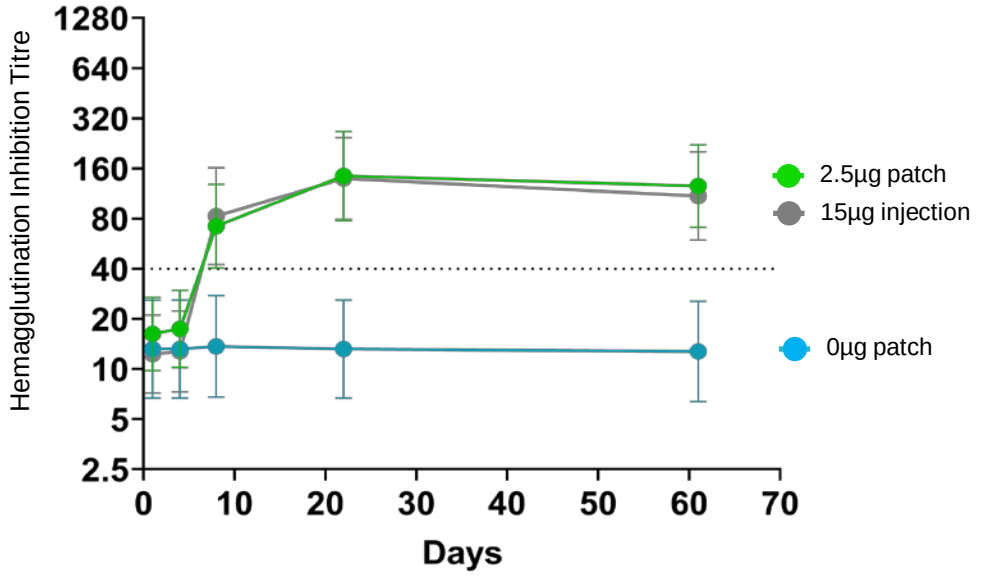
Patch induces higher titre than injection



** p < 0.01 v injection
* p < 0.05 v injection

Lower Dose of Vaccine Required

1/6th dose by patch equivalent to full dose by syringe



† Safety, tolerability, and immunogenicity of influenza vaccination with a high-density microarray patch: Results from a randomized, controlled Phase I clinical trial: A.H. Forster et al (2020) http://doi.org/10.1371/journal.pmed.1003-24

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EIGHT PROGRAMS UNDERWAY WITH LEADING PARTNERS

INDICATION	PARTNER	FORMULATION	PRECLINICAL	PHASE I	PHASE II
COVID-19	vaxxas				
Pandemic Influenza	BARDA				
Undisclosed	MERCK				
Seasonal Influenza	Undisclosed Pharma				
Measles/Rubella	Bill & Melinda Gates foundation				
Typhoid	wellcome, SK				
Immuno-oncology	vaxxas				
mRNA delivery	CEPI New vaccines for a safer world				

HD-MAP IS THE MOST CLINICALLY TESTED VACCINE PATCH

Completed Vaccine Clinical Trials

Vaccine	Completed	Subjects
Influenza (monovalent)	2016	60
Influenza (monovalent)	2018	210
Measles & Rubella	2022	60
TOTAL SUBJECTS		**330**

Completed Development Clinical Trials

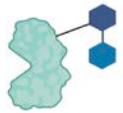
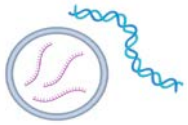
Endpoint	Completed	Subjects
Safety	2015	18
Safety & performance	2017	60
Safety & performance	2020	41
Safety & performance	2021	44
TOTAL SUBJECTS		**163**

Current and Upcoming Clinical Trials

Vaccine	Planned	Subjects
Safety & performance	***In progress***	**20**
COVID – Phase 1 (dosing complete)	***In progress***	**44**
Influenza (QIV) – Phase 1 (dosing complete)	***In progress***	**150**
Influenza (pandemic) – Phase 1	2024	250
Measles & Rubella – Phase 1	2025	135
Measles & Rubella – Phase 2	2026	400
TOTAL SUBJECTS		**999**

HD-MAP IS A PLATFORM FOR VACCINATION

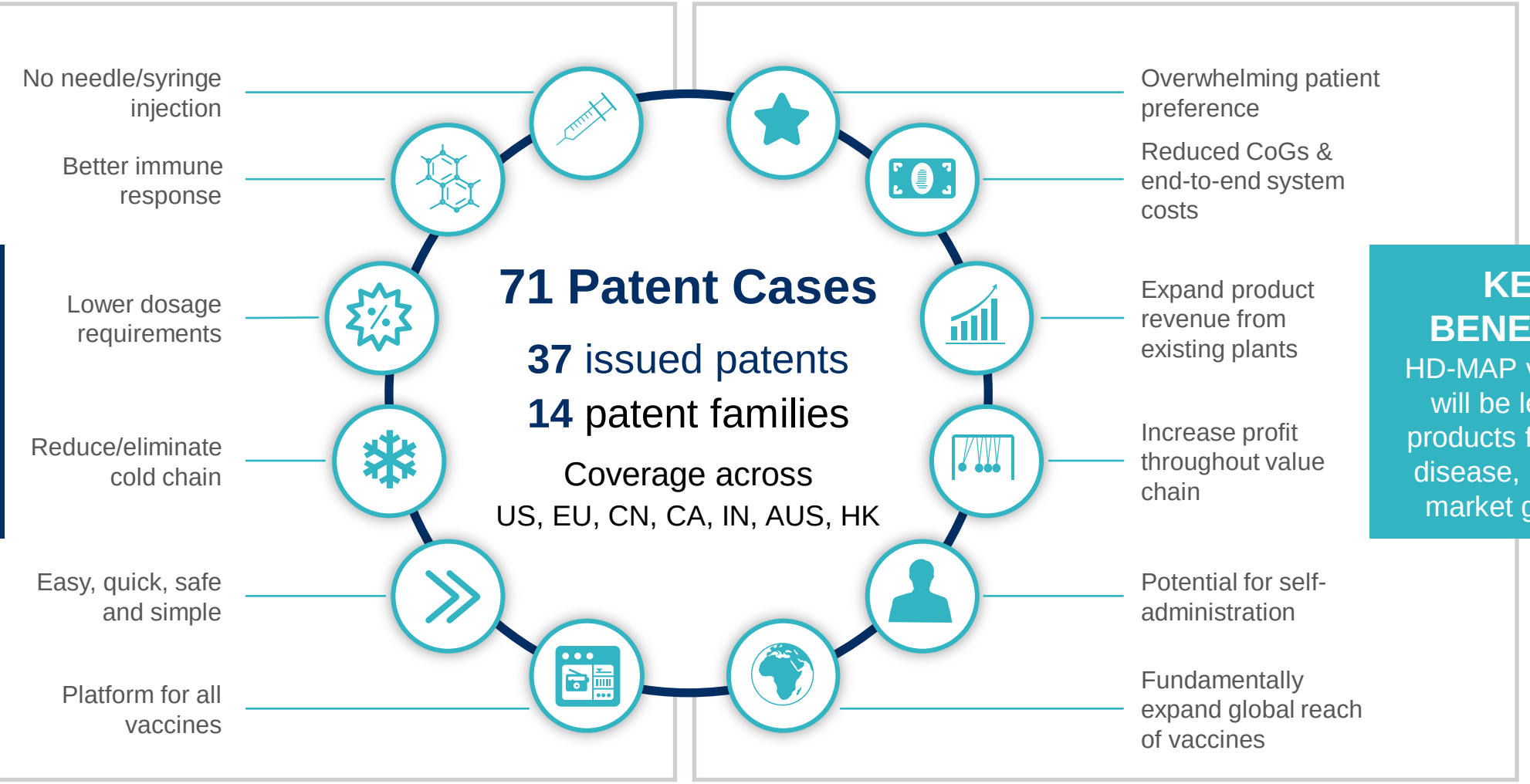
Demonstrated Preclinically Across All Major Vaccine Formats

Type of vaccine		Vaccines	Preclinical delivery demonstrated using Vaxxas' HD-MAP technology
Live attenuated virus		Measles, mumps, rubella, yellow fever, influenza, typhoid,BCG Japanese encephalitis, rotavirus	• Seasonal influenza • Pandemic influenza • Measles rubella
Killed whole organism		Whole-cell pertussis, polio, influenza, Japanese encephalitis, hepatitis A, rabies	• Poliovirus • Chikungunya virus
Protein subunit		Pertussis, influenza, hepatitis B, meningococcal, pneumococcal, hepatitis A	• Dengue • SARS-CoV-2
Virus-like particle		Human papillomavirus	• Human papillomavirus
Polysaccharide conjugate		*Haemophilus influenzae* type B, pneumococcal, meningococcal, typhoid	• Pneumococcus • Group A streptococcus
Nucleic acid vaccine		SARS-COV-2	• West Nile virus • Herpes simplex virus • siRNA

adapted from: *A guide to vaccinology: from basic principles to new developments*: AJ Pollard & EM Bijker (2021), Nature Reviews in Immunology **21**:83-100

STRONG INTELLECTUAL PROPERTY PROTECTION

KEY FEATURES
Protected & proprietary platform to replace needle/syringe



KEY BENEFITS
HD-MAP vaccines will be leading products for every disease, in every market globally

GROWTH STRATEGY SPANS MAJOR COMMERCIAL SEGMENTS

Vaxxas HD-MAP

VAXXAS PRODUCT PORTFOLIO

In-licensing best-in-class vaccine assets

COVID-19

TEXAS The University of Texas at Austin

NIH

PANDEMIC/ BIODEFENSE

Modernizing preparedness

BARDA Biomedical Advanced Research and Development Authority

CEPI New vaccines for a safer world

PHARMA PARTNERING

Differentiation, increasing reach and profitability

MERCK

Undisclosed

GLOBAL HEALTH

Revolutionary impact for those most in need

World Health Organization

wellcome

SK

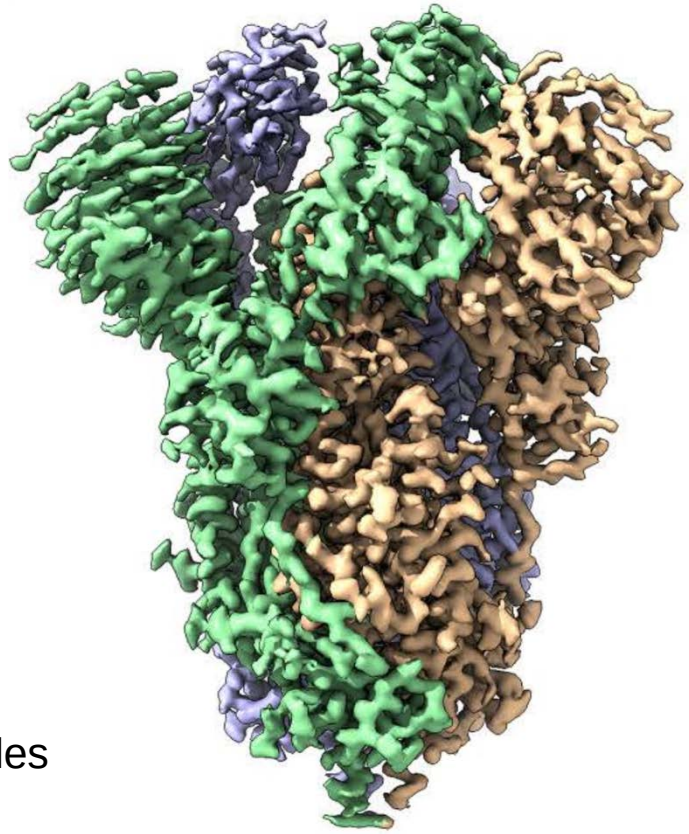
Bill & Melinda Gates foundation

SEASONAL ‘FLU IN PHASE I – CO-DEVELOPMENT WITH PHARMA

- Commercially available vaccine for seasonal influenza currently administered using needle & syringe
- Quadrivalent vaccine (2 strains ‘flu A, 2 strains ‘flu B) with appropriate strains selected each season
- Estimated up 25% adults affected by fear of needles which may result in up to 16% people skipping routine vaccination
- Needle-free HD-MAP format → easier transport and storage
- Phase I clinical trial (150 subjects) underway to assess safety, tolerability and immunogenicity; dosing complete
- Data from Phase I clinical trial expected to be available in Q4 2023

COVID HD-MAP USES NEXT-GENERATION PROPRIETARY ANTIGEN

- HexaPro antigen exclusively licensed from University of Texas at Austin along with background technology from NIH
- From lab of Jason McLellan, inventor of central construct (S-2P) spike in four main COVID-19 vaccines on the market
- 100 structure-guided spike designs were characterized to identify 26 individual substitutions that increased yield and stability
- Used to create HexaPro - a next-generation SARS-CoV-2 spike protein[1] ideal for HD-MAP delivery:
  - Retains pre-fusion spike conformation
  - Stable at room temperature, withstands heat stress, and multiple freeze-thaw cycles
  - Excellent HD-MAP preclinical data - 20X more immunogenic preclinically, neutralization of variants-of-concern.



Space-filling model of the COVID HexaPro antigen

[1] *Structure-based design of prefusion-stabilized SARS-CoV-2 spikes*: CL Hsieh et al (2020), Science **369**:1501-05

TEXAS
The University of Texas at Austin

NIH
National Institutes of Health

DURABLE MULTI-BILLION MARKET FOR COVID VACCINES

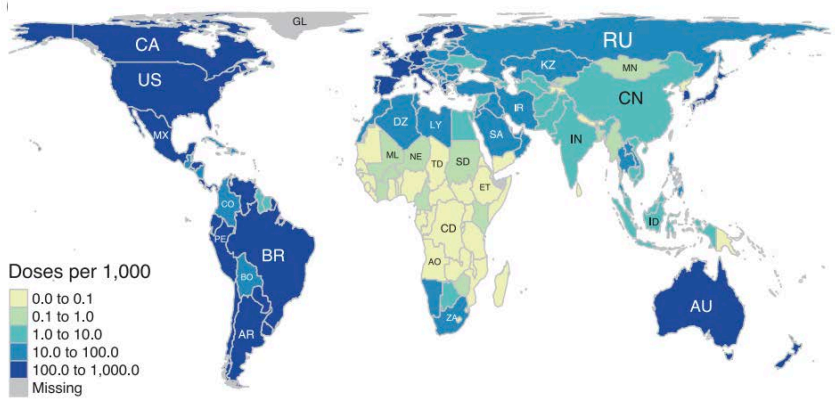
- Vaccination will remain the cornerstone for management of COVID for the foreseeable future

- Expect long-term COVID vaccination rates will be similar to community adoption of vaccination for seasonal influenza:
  - Approximately 500 million doses per year worldwide
  - US market alone is 170 million doses per year (~50% coverage)
  - Higher adoption in >65yrs and other at-risk groups

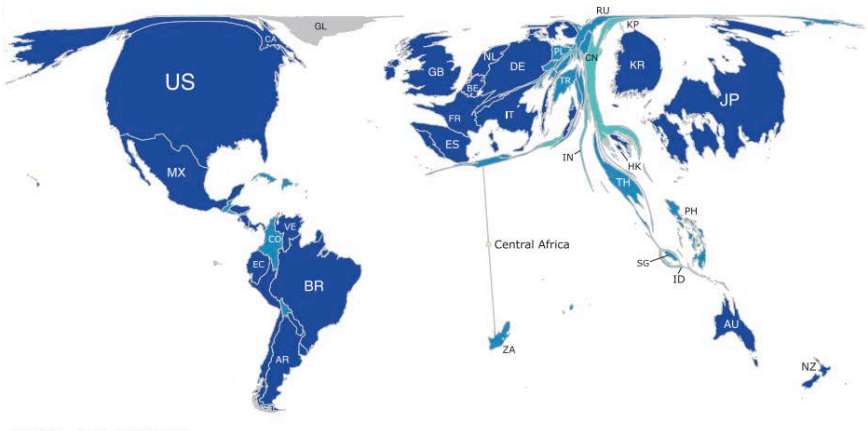
- Benefits of HD-MAP COVID vaccine expected to attract market share:
  - The only patch-based COVID vaccine, easy to use, stable at elevated temperature
  - Addresses needle-fearful/phobic which prevents many people getting a ‘flu vaccine
  - Uses better understood protein antigen rather than RNA/DNA
  - Unique structure of antigen has potential for broader cross-protection

- Pricing of vaccines expected to normalise to higher levels post pandemic:
  - Likely to be US$110 – $130 per dose once government purchase programs expire
  - Will support US wholesale price to insurers of US$40 – $60 per dose for MAP-COVID

Influenza vaccine doses – heat map



Influenza vaccine doses – proportional



Mapping the inequality of the global distribution of seasonal influenza vaccine (2021); YC Yau & MT Gastner, Economy and Space 53(6): 1249-1252; DOI: 10.1177/0308518X21998356

PANDEMIC RESPONSE

WHAT'S WRONG WITH THIS…

- Inefficient
- Needs refrigeration
- Skilled administration …
  and in pandemic … everything

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MODERNIZING PANDEMIC RESPONSE

MORE
doses

MORE
quickly

NO
cold chain

EASIER
administration

Potential Impact if HD-MAPs Were Used in USA During SARs-CoV-2 Pandemic

Analysis through Delta variant

16.4 million
fewer cases

200,000
fewer deaths

Reduced duration by **150** days

>$500 billion reduction
in 2-year US economic impact

Source: Estimating the Economic and Public Health Impact of Microarray Patch (MAP) – Administered Vaccines in Pandemic. Avalere, March 2022

US$65B OVERHAUL OF USA PANDEMIC PREPAREDNESS CAPABILITIES WITH $24B ALLOCATED FOR VACCINES

(1) Transforming our Medical Defenses

1. Vaccines: Rapidly make effective vaccines against *any* human virus family

- Design, test, and review by 100 days after pandemic threat appears (for COVID-19 = May 2020)
- Produce enough vaccine for the U.S. by 130 days and entire world by 200 days
- Simplify vaccine distribution (e.g., eliminate need for cold storage)
- Simplify vaccine administration (e.g., replace sterile injection, with skin patches and nasal sprays)

American Pandemic Preparedness: Transforming Our Capabilities

The work is organized across five pillars: (1) Transforming our Medical Defenses (2) Ensuring Situational Awareness, (3) Strengthening Public Health Systems, (4) Building Core Capabilities, and (5) Managing the Mission.

Achieving these capabilities will require a systematic effort and shared vision for biological preparedness across our government that is akin to the nation's Apollo mission. The mission will require program management with the seriousness, commitment, and accountability of the Apollo Program, overseen by a dedicated program office.

Eric S. Lander
Assistant to the President for Science and Technology

Jacob J. Sullivan
Assistant to the President for National Security Affairs

PANDEMIC/BIODEFENSE

Selected by Global Leader

- Contract from US Government – BARDA/HHS (Biomedical Advanced Research and Development Authority)
- Initial A$30M investment for technology advancement and phase I clinical validation/demonstration
- Central focus, pandemic influenza
- Foundational program for select expansion and replication in Europe (HERA) and Asia
- Opportunities for additional pandemic and emerging disease vaccines

GLOBAL HEALTH

'Biting the Doctor's Arm' by Mathias Kauage, 1990
Museum of Archaeology and Anthropology
Cambridge (MAA 2010.364)

Global health

We can get vaccines to places needles and syringes cannot

Revolutionary impact in Low-Medium Income Countries (LMICs)

Thermostable

Easy/self administration

Addresses multiple unmet disease needs

World Health Organization

wellcome

Bill & Melinda Gates foundation

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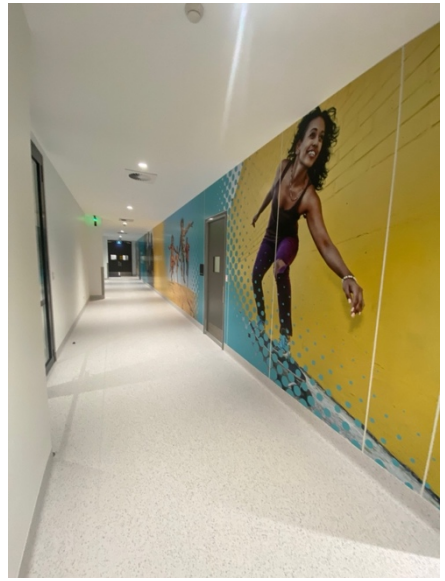
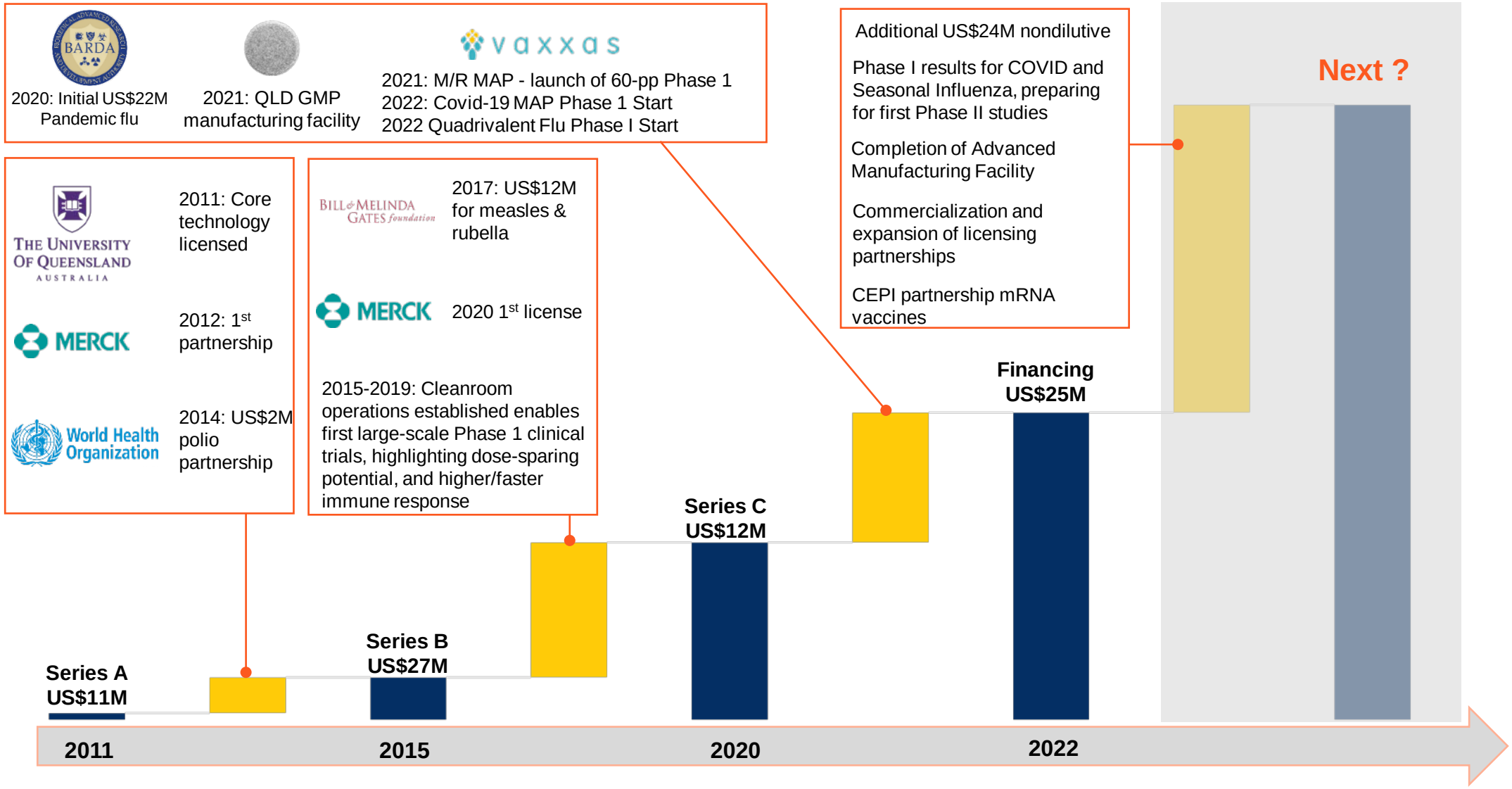
R&D & PILOT MANUFACTURING FACILITY ESTABLISHED

- Vaxxas Biomedical Facility
- 5,500 m^2 officially opened in June 2023, with support from State and Federal govt.
- Capable of housing 150 staff and includes:
  - R&D/core science and engineering development
  - Clinical labs/cleanroom suites, offices
  - Manufacturing areas for all device components
  - Aseptic finished goods manufacturing
- TGA manufacturing license program underway for manufacture of clinical trial products (PII / III)
- Capacity to produce up to 10s million units per annum with first commercial production line expected to be operational in 2026



GROWTH: TECHNOLOGY→VALUE→PARTNERSHIPS (REPEAT)
~US$75M Equity + ~US$100M Non-Dilutive Funding



NEWS FLOW

Timing	Development
Q2 - 2023	Vaxxas Biomedical Facility at Northshore opens for operations
Q3 – 2023	Data from HD-MAP Covid vaccine Phase I clinical trial
Q3 – 2023	Data from HD-MAP quadrivalent ’flu vaccine Phase I clinical trial
Q4 – 2023	Preclinical data from study of HD-MAP delivery of vaccine for cancer indication
Q1 – 2024	Initiate Phase I clinical trial for HD-MAP delivered pandemic ‘flu vaccine
Q1 – 2024	Commence preclinical studies for CEPI using HD-MAP delivered mRNA vaccine

Vaccine + Vaccination = Protection

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