Working Group on New TB Vaccines Open Meeting

New TB Tools Summit: Towards a World Free of TB

14 November 2023

Paris, France
Agenda

Introduction to WGNV
  • David Lewinsohn, Ann Ginsberg, Shaun Palmer, Simon Mendelsohn

State of the Field of TB Vaccine R&D
  • Ann Ginsberg

Panel Discussion
  • Moderators: Richard White, Gopa Kumar
  • Panelists: Birgitte Giersing, Michele Tameris, Shaun Palmer, Elly van Riet

Summary and Closing
  • David Lewinsohn
Introduction to the Working Group on New TB Vaccines

David Lewinsohn
Shaun Palmer
Simon Mendelsohn
Ann Ginsberg

WGNV Open Meeting | 14 November 2023, Paris, France
About Us

Our mission
The mission of the Working Group on New TB Vaccines is to facilitate research and development of new TB vaccines by providing an inclusive forum for stakeholders to engage in scientific exchange, build consensus on key issues, and advocate for greater support and investment in TB vaccine R&D.

How we work
The WGNV is an informal network of stakeholders engaged in all aspects of TB vaccine R&D and from all constituencies, including academics, product developers, clinicians, advocates, funders, policymakers, and affected communities. Membership is open to anyone who is interested in being engaged and involved in TB vaccine R&D.
Who we Are - Leadership

Chair
David Lewinsohn (Oregon Health & Science University, USA)

Core Group

- **Academic Institutions**: Richard G. White, London School of Hygiene and Tropical Medicine (UK)
- **Affected Communities**: Vacant, in process of being filled
- **Clinical Trial Sites**: Michele Tameris, South African Tuberculosis Vaccine Initiative (South Africa)
- **Developed Country NGOs/Advocacy Networks**: Shaun Palmer, TB Vaccine Advocacy Roadmap (TB Vax ARM) (Netherlands)
- **Early Career Researchers**: Puck Pelzer, IAVI (Netherlands); Paul Ogongo, University of California San Francisco (USA)
- **Funders**: Ann Ginsberg, Bill & Melinda Gates Foundation (USA)
- **Global TB Vaccine Partnership**: Michael Makanga (Netherlands)
- **IAVI**: Lewis Schrager (USA)
- **TBVI**: Elly van Riet (Netherlands)
- **Public Sector**: Katrin Eichelberg, National Institute of Allergy and Infectious Diseases/National Institutes of Health (USA)
- **Private Sector/Industry**: Eileen Foy, Vir Biotechnology (USA)
- **World Health Organization**: Brigitte Giersing, Vaccine and Product Delivery Research, WHO (Switzerland)

Secretariat

Hosted by IAVI
Jennifer Woolley, Head of Secretariat
Erick Auma, Intern
Who We Are – Members

423 members from 69 countries

132 members identify as Early Career Researchers

WGNV Members by Area of Interest

- Community engagement: 231
- Advocacy, Policy, Resource...: 156
- Basic research: 170
- Clinical research: 123
- Epidemiology: 114
- Early-stage/preclinical: 102
- Access: 67
- Regulatory issues: 39
- Other: 32
- Manufacturing: 9

WGNV Members by Area of Work/Focus

- Academic Research Institute
- Public Sector Agency
- NGO/Not-for-Profit
- Pharmaceutical/Biotech
- Philanthropic Foundation
- Other

As of 6 November 2023
WGNV Resources

Website (newtbvaccines.org)
- Publications, fact sheets, and other resources
- Upcoming meetings and events
- Global TB Vaccine Pipeline
- Jobs, funding, opportunities
- Take Action!

Email updates to members and subscribers

Active social media presence
- X (@newtbvaccines)
- LinkedIn (Stop TB Partnership Working Group on New TB Vaccines)

Online workshops, webinars, and discussion sessions

Online TB Research Curriculum (in collaboration with Working Groups on New Drugs and Diagnostics, and Affected Communities and NGO Delegations)
Advocacy

Fostering discussion

Supporting early career researchers

Sharing knowledge

Addressing issues in product development
WGNV Priority: Advocacy

The Need
- Meeting the global goal to develop new TB vaccines will require significantly increased funding and political will
- Preparing for equitable access to new TB vaccines will require collaboration and engagement with countries and communities way in advance of implementation

WGNV Contribution
- Participates in TB Vaccine Advocacy Roadmap (TB Vax ARM) for global efforts
- Develops and shares fact sheets and materials for advocacy, research literacy, and community engagement

How to Get Involved
- Join WGNV and indicate your interest in advocacy
- Join the TB Vax ARM to get information and be involved in global advocacy efforts
- Visit the “Take Action” page of the WGNV website
- Participate in WGNV/TB Vax ARM events related to advocacy
The Need
• Developing and implementing new TB vaccines is complex; success will require alignment and coordination on key issues, concepts, and gaps in TB vaccine R&D

WGNV Contribution
• Virtual workshops on identified gaps in knowledge
  • June 2023: Recognition of the Mtb infected cell: From basics to the clinic
  • Oct 2023: Generating Key TB Vaccine Epidemiological, Impact, Feasibility and Acceptability Data to Support the Introduction of New TB Vaccines at the Country Level
  • Planned 2024: Fit for Purpose Animal Models

How to Get Involved
• Join WGNV and indicate an interest in Fostering Discussions
• Review resources on the WGNV website; if you are aware of additional resources, share them with us
• Participate in WGNV workshops and online discussions on key topics in TB vaccine R&D
WGNV Priority: Sharing Knowledge

The Need
• A platform for compiling and sharing information about TB vaccine R&D, from basic and discovery research through to access and implementation

WGNV Contribution
• Sharing resources about TB vaccine R&D through our website, including journal articles, reports, and other publications
• Compiling a global pipeline of TB vaccines in development
• Convening the Global Forum on TB Vaccines series

How to Get Involved
• Join WGNV and indicate your interest in Sharing Knowledge
• Review resources on the WGNV website; if you are aware of additional resources share them with us
• If you are developing a TB vaccine, let us know (from proof of concept in animal models stage)
• Participate in the Global Forum and other WGNV events related to sharing knowledge
The Need
• Encourage and support the next generation of TB vaccine researchers
• Assist Early Career Researchers in navigating career paths, building critical skills, and providing a network of support

WGNV Contribution
• Supports an Early Career Researcher Network,
• Organizes virtual discussion sessions for ECRs, most recently a series on career paths and opportunities in TB research
• Other activities for ECRs being planned for 2024

How to Get Involved
• Join WGNV and indicate that you are an ECR or a support of ECRs
• Participate in ECR Network activities
• Suggest activities to WGNV and ECR that would benefit ECRs
The Need
• Translating concepts for novel TB vaccines into potential products is a challenging process unfamiliar to many researchers
• The vaccine product development pathway is lengthy and complicated

WGNV Contribution
• Compiling resources on product development (available on newtbvaccines.org)
• Organizing informational webinars and workshops on key issues (planned for 2024 and beyond)

How to Get Involved
• Join WGNV and indicate your interest in Issues in Product Development
• Review resources on the WGNV website; if you are aware of additional resources share them with us
• Participate in WGNV events related to Product Development
Get Involved!

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TB VACCINE R&D: STATE OF THE FIELD

Ann M. Ginsberg
Stop TB Working Group on New Vaccines Annual Meeting
Paris, France
November 14, 2023
WHY ARE BETTER TB VACCINES URGENTLY NEEDED?
In 2022: 10.6 million new cases of TB and 1.3 million deaths

- 8-9% of TB cases and ~13% of TB deaths are in persons living with HIV

TB incidence increased by ~3.9% from 2020-2022

- follows ~2% per year declines from 2010-2020

BCG helps protect young children from severe forms of TB

- but does not reliably protect adolescents and adults and is not controlling the epidemic

ADOLESCENTS AND YOUNG ADULTS ARE THE HIGHEST PRIORITY TARGET FOR TB VACCINES because they are the main source of M.tb transmission

Global estimates of TB incidence (black outline) and case notifications of people newly diagnosed with TB disaggregated by age and sex (female in purple; male in orange), 2022

Nyabadza et al, South African J Science 2013;109(9/10)
THE GLOBAL CLINICAL PORTFOLIO OF TB VACCINE CANDIDATES
17 CANDIDATES IN CLINICAL DEVELOPMENT

**TB Vaccine Pipeline**

**Vaccine candidates under clinical development**

There are 16 vaccine candidates in the pipeline as of September 2023, of which 11 are in active trials. The candidates are placed under the phase which corresponds to the most advanced ongoing or completed trial.

**Platform**
- Mycobacterial - Live attenuated
- Mycobacterial - Inactivated
- Viral vector
- Protein/Adjuvant
- RNA

**Candidate target population**
- Elderly
- Adults
- Adolescents
- Children
- Infants
- People living with HIV
- -mTB: People without mTB infection
- +mTB: People with mTB infection
- aTBd: People with active TB disease
- MDR: People with MDR-TB
- cTB: People cured of active TB

**Primary candidate indication**
- POI: Prevention of Infection
- POD: Prevention of Disease
- POR: Prevention of Recurrence
- Thp: Therapeutic

**Trial status**
- Active trials
- No active trials

**Information reported by vaccine sponsors or found in clinical trial registries or other public sources.**

For the full list of completed trials for each candidate, visit [www.newtbvaccines.org/tb-vaccine-pipeline/](http://www.newtbvaccines.org/tb-vaccine-pipeline/)

*BCG appears twice in the pipeline to distinguish between the investigation of its use in BCG-naive individuals (traveler vaccination) and in individuals who have previously been vaccinated with BCG (revaccination).*
BNT164
BioNTech
mRNA

Active clinical trials of TB vaccine candidates

There are 11 active clinical trials across nine candidates as of October 2022.

Platform
- Mycobacterial - Live attenuated
- Mycobacterial - Inactivated
- Viral vector
- Protein/Adjuvant

Primary trial indication
- SF: Safety
- POI: Prevention of Infection
- POD: Prevention of Disease
- POR: Prevention of Recurrence
- Thp: Therapeutic

Trial target population
- Elderly
- Adults
- Adolescents
- Children
- Infants
- People living with HIV
- +mTB: People with mTB infection
- -mTB: People without mTB infection
- aTBd: People with active TB disease
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- cTB: People cured of active TB

Trials in planning:
- H107/CAF10b Ph1a/b
- MTBVAC Ph2b (adolescents/adults)
- M72/AS01E Ph 3

Information reported by vaccine sponsors or found in clinical trial registries or other public sources.

For the full list of completed trials for each candidate, visit www.nexttbvaccines.org/tb-vaccine-pipeline/
A ROBUST DEVELOPMENT PIPELINE
### TB Vaccine Pipeline

**Active clinical trials of TB vaccine candidates**

There are 11 active clinical trials across nine candidates as of October 2022.

#### Platform

- **Mycobacterial - Live attenuated**
- **Mycobacterial - Inactivated**
- **Viral vector**
- **Protein/Adjuvant**

#### Trial target population

- Elderly
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#### Primary trial indication

- **SF**: Safety
- **POI**: Prevention of Infection
- **POD**: Prevention of Disease
- **POR**: Prevention of Recurrence
- **Therapeutic**

#### Proposed Trials in planning:

- H107/CAF10b Ph1a/b
- MTBVAC Ph2b (ados/adults)
- M72/AS01E Ph 3

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**WARNING: INVERTED PIPELINE**

Information reported by vaccine sponsors or found in clinical trial registries or other public sources.

For the full list of completed trials for each candidate, visit [www.nexttbvaccines.org/tb-vaccine-pipeline/](http://www.nexttbvaccines.org/tb-vaccine-pipeline/)

Last update: 02 February 2023

Stop TB Partnership

Working Group on New TB Vaccines
### ANTICIPATED BOLUS OF EFFICACY RESULTS 2024-2028

<table>
<thead>
<tr>
<th>Vx candidate</th>
<th>Trial endpoint</th>
<th>Trial phase</th>
<th>Trial population</th>
<th>Results due</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPM1002, also IMMUVC (MIP)</td>
<td>POD</td>
<td>Ph3</td>
<td>HHC (~13,000)</td>
<td>2024</td>
<td></td>
</tr>
<tr>
<td></td>
<td>POR</td>
<td>Ph2/3</td>
<td>Adults on rx (~2000)</td>
<td>2024</td>
<td></td>
</tr>
<tr>
<td></td>
<td>POI</td>
<td>Ph3</td>
<td>Infants (~6900)</td>
<td>2026</td>
<td>Non-inferiority to BCG</td>
</tr>
<tr>
<td>MTBVAC</td>
<td>POD (infants)</td>
<td>Ph3</td>
<td>Infants (~7100)</td>
<td>4Q 2028</td>
<td>Superiority to BCB</td>
</tr>
<tr>
<td></td>
<td>POD (adol/adult)</td>
<td>Ph2b</td>
<td>Adol/adult (14-45; ~4300)</td>
<td>IA:2027?</td>
<td>In planning – starting mid-2024-T</td>
</tr>
<tr>
<td>BCG revac</td>
<td>POI</td>
<td>Ph3</td>
<td>Adol/adult (15-44; ~26,000)</td>
<td>IA: 2027-8?</td>
<td>Powered on HIV-IGRA+ T-starting 1Q 2024</td>
</tr>
<tr>
<td>M72/AS01E</td>
<td>POD</td>
<td>Ph3</td>
<td>Adol/adult (15-44; ~26,000)</td>
<td>IA: 2027-8?</td>
<td></td>
</tr>
<tr>
<td>H56:IC31</td>
<td>POR</td>
<td>Ph2b</td>
<td>Cured adults</td>
<td>2023-4</td>
<td></td>
</tr>
<tr>
<td>ID93+GLA-SE / QPT101</td>
<td>POD</td>
<td>Ph2b/3</td>
<td>Adol/adult in S. Korea</td>
<td>?</td>
<td>In planning - Starting 4Q2023-T</td>
</tr>
<tr>
<td></td>
<td>Rx-shortening</td>
<td>Ph2b</td>
<td>Adults on rx</td>
<td>?</td>
<td>In planning</td>
</tr>
<tr>
<td>RUTI</td>
<td>Adjunct to rx (improved outcomes)</td>
<td>Ph2b</td>
<td>Adults on rx</td>
<td>4Q 2025</td>
<td></td>
</tr>
<tr>
<td>GAMTBVAC</td>
<td>POD</td>
<td>Ph3</td>
<td>HIV-, Mtb- adults 18-45 (~7100); TB incid. &gt;30/100,000</td>
<td>4Q 2025</td>
<td>Substantially under-powered?</td>
</tr>
</tbody>
</table>
GAPS AND CHALLENGES
MAJOR CHALLENGES AND GAPS IN TB VACCINE R&D

- Complex pathogen expressing ~4000 antigens; protective epitopes/antigens largely unknown
- To date, no identified vaccine-induced Correlate(s) of Protection in humans
- Human protective immune responses only partially understood
- No reproducibly predictive animal model(s) human challenge model established
- Pipeline of candidates not adequately robust – inverted pipeline
- Effects of HIV status, infection (IGRA/TST) status, age and geography on vaccine efficacy must be determined for each vaccine
- Inadequate capacity for multiple, overlapping registration-quality efficacy trials
- Preparation for access, adoption and delivery to end users just beginning
- Inadequate funding and political will
BUILDING A MORE ROBUST “NEXT GENERATION” PIPELINE

- Novel Platforms - mRNA; nanoemulsions; viral vectors
- New Formulations
- Routes of administration - mucosal (intranasal, aerosol)
- Novel Adjuvants
- Human protective antigen identification
- Discover Correlates of Protection
- Optimizing animal models
- Human Challenge Model
END-TO-END DEVELOPMENT OF TB VACCINES

Groundwork being laid:

Selected examples:
- Preferred Product Characteristics
- R&D Roadmap to Phase 3 (AIGHD, EDCTP)
- Roadmap from Licensure to Implementation (WHO)
- Investment Case for a New TB Vaccine (full value assessment) (WHO)
- Evidence Considerations for Vaccine Policy (WHO)
- TB Vaccine Market Analysis (Wellcome Trust)
- National TB Vaccine Policy Project (BMGF)
- TB Vx Implementation Planning Landscape and Gap Analysis (underway with WHO)
THANK YOU!

ann.ginsberg@gatesfoundation.org
Panel Discussion

Richard White
Gopa Kumar
Birgitte Giersing
Shaun Palmer
Michele Tameris
Elly van Riet

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7th Global Forum on TB Vaccines

8-10 October 2024
Rio de Janeiro, Brazil

An international convening of the

Organized in collaboration with

Stop TB Partnership
Working Group on New TB Vaccines

Follow us on @GlobForumTBVax
tbvaccinesforum.org/rio-de-janeiro
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