WHO/IVB/17.10

Group B Streptococcus Vaccine Development Technology ROADMAP

Priority activities for development, testing, licensure and global availability of Group B streptococcus vaccines

2017

World Health Organization

GROUP B STREPTOCOCCUS VACCINE TECHNOLOGY ROADMAP

This document was produced by the
Initiative for Vaccine Research (IVR)
of the Department of Immunization, Vaccines and Biologicals

Ordering code: WHO/IVB/17.10
Published: 2017

This publication is available on the Internet at:
http://www.who.int/immunization/documents/en/

Copies of this document as well as additional materials on immunization, vaccines and biologicals may be requested from:
World Health Organization
Department of Immunization, Vaccines and Biologicals
CH-1211 Geneva 27, Switzerland
• Fax: + 41 22 791 4227 • Email: vaccines@who.int •

Suggested citation. Group B Streptococcus Vaccine Development Technology Roadmap. Priority activities for development, testing, licensure and global availability of Group B streptococcus vaccines. Geneva: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO.

Cataloguing-in-Publication (CIP) data. CIP data are available at http://apps.who.int/iris.

Sales, rights and licensing. To purchase WHO publications, see http://apps.who.int/bookorders. To submit requests for commercial use and queries on rights and licensing, see http://www.who.int/about/licensing.

Contents

Acknowledgments

This work was built on critical input from the WHO Group B Streptococcus Vaccine Advisory Group members (Carol J. Baker (Baylor College of Medicine, Houston, USA), Paul T. Heath (Vaccine Institute, St Georges, University of London, London, UK), Kirsty Mehring-Le Doare (Imperial College Faculty of Medicine, London, UK), Shabir A. Madhi (National Institute for Communicable Diseases, Johannesburg, South Africa), Samir Saha (Institute of Child Health, Dhaka, Bangladesh), Stephanie Schrag (Centre for Disease Control and Prevention, Atlanta, USA) and observers (Mark Alderson (PATH, Seattle, USA), David Kaslow (PATH, Seattle, USA), Ajoke Sobanjo-Ter Meulen (Bill & Melinda Gates Foundation, Seattle, USA)). We are grateful to all individuals and represented institutions who attended a WHO consultation meeting on group B Streptococcus vaccine development on 27–28 April 2016 in Geneva and contributed to the discussions, and to the members of the WHO Product Development for Vaccines Advisory Committee (http://www.who.int/immunization/research/committees/pdvac). The document was available for public consultation in December 2016/January 2017 and we are grateful to the individuals and institutions who provided feedback.

WHO secretariat

Martin Friede, Birgitte Giersing, Vasee Moorthy, Johan Vekemans.

Funding

This work was supported by the Bill & Melinda Gates Foundation, Seattle, WA [Global Health Grant OPP1134011].

Credits

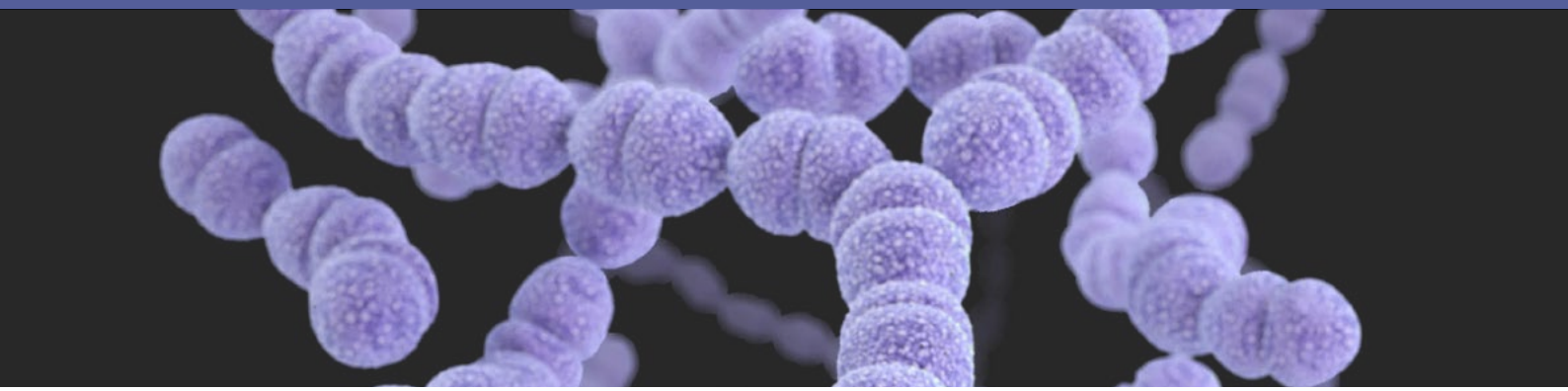
Page 5, left to right: CDC/Jessie Blount, WHO TDR/Andy Craggs, WHO PAHO, CDC/ National Center for Emerging and Zoonotic Infectious Diseases (NCEZID)
Page 6: CDC/James Archer
Page 7: CDC/Hsi Liu, James
Page 8: CDC/Minnesota Department of Health, R.N. Barr Library; Librarians Melissa Rethlefsen and Marie Jones
Page 9: WHO/Pallava Bagla
Page 10: WHO/Garry Smyth
Page 11: CDC/Amanda Mills

Background on Technology Roadmaps

Vaccine development technology roadmaps produced by the World Health Organisation (WHO) aim to provide a strategic framework underpinning priority activities for vaccine researchers, funders and product developers, with the goal to address globally unmet medical needs.

The present roadmap states the vision and strategic goals for Group B streptococcus (GBS) vaccine development from WHO, with input from public health agencies, academia, industry, regulators, ethicists and financing bodies amongst others. The GBS vaccine 'Vision' articulates the prioritized public health need, and the 'Strategic Goal' describes a vaccination strategy that will enable realization of that vision. The roadmap also lays out priority activities in the categories of research, product development, key capacities and policy, commercialization and delivery. The objective of this comprehensive framework is for the global GBS vaccine research and development community to accelerate timelines to licensure and use of GBS vaccines, especially in in low- and middle-income countries where they are most needed. The present document is not intended to be product- or product type-specific.

WHO will encourage implementation of the finalised roadmap by the GBS vaccine community. Progress in the field will be monitored and if there are significant changes that warrant reassessing the vision, strategic goals or priority activities, the roadmap will be updated.



Introduction

GBS colonization during pregnancy occurs in some women in all geographical settings evaluated. GBS is a leading cause of sepsis and meningitis in neonates and young infants. The neonatal and infant disease incidence varies by country but can be as high as 3 cases per 1000 live births, with the case fatality rate ranging between 10% and 50% even when modern intensive care is available. GBS is also a cause of stillbirth, premature delivery, maternal and elderly disease, but precise disease burden estimates are lacking. The vast majority of the disease burden lies in low- and middle-income countries.

In high income countries, risk- or screening-guided intra-partum antibiotic prophylaxis reduces the incidence of early onset GBS disease, but not late onset GBS disease. Not all women at risk are reached, and a significant disease burden remains. This prevention strategy is not available or practical in most resource-limited countries.

Currently, no vaccine exists for prevention of GBS disease, but maternal immunization with multiple serotypes of protein-conjugated GBS capsular polysaccharides may reduce the disease risk in neonates and young infants through trans-placental passage of protective immunoglobulins. Protein-based vaccine candidates are also under evaluation.

» Vision

A safe, effective and affordable vaccine available for global use, to prevent GBS-related stillbirths and invasive GBS disease in neonates and young infants.

» Strategic Goal

To develop and license safe, effective and affordable GBS vaccines for maternal immunization during pregnancy to prevent GBS-related stillbirth and invasive GBS disease in neonates and young infants, appropriate for use in high-, middle- and low-income countries.

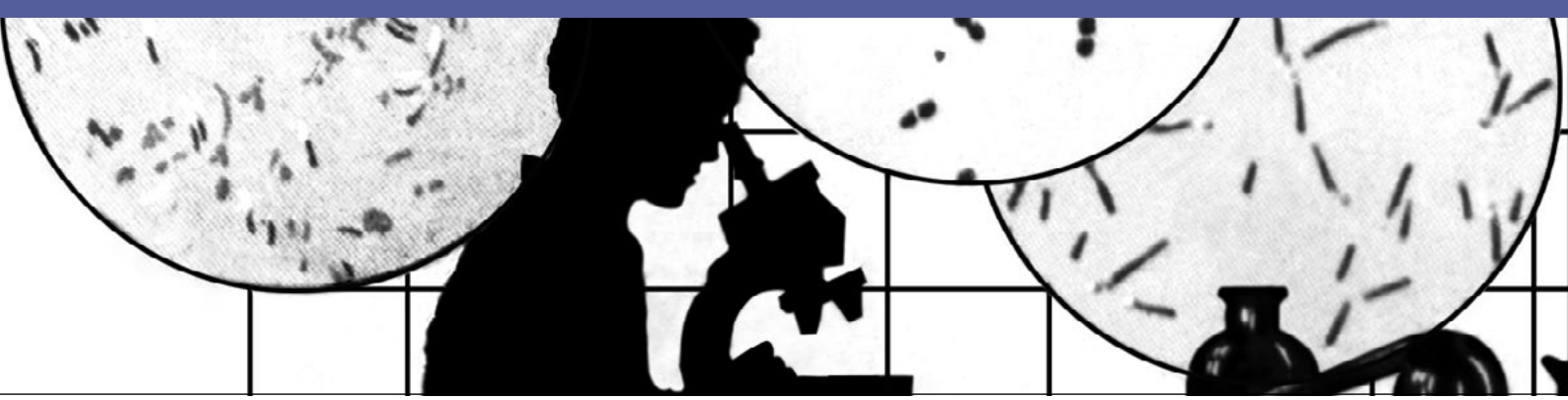
Research

Further quantify the unmet medical need for a GBS vaccine and its potential public health impact.

The global disease burden needs to be better defined, with characterization of serotype-specific distribution, especially in some geographical areas including South and South-East Asia, to guide required vaccine composition in terms of serotype diversity coverage. In addition to early- and late-onset disease, the burden of GBS-related stillbirth, preterm birth and maternal disease needs to be further investigated. Rates of colonization recurrence, strain replacement, capsular switching, multiplicity of infection, and potential implications of vaccine introduction should be assessed. The potential impact of vaccine introduction on perinatal antibiotic use is a critical aspect and needs to be estimated, given the global problem of antimicrobial resistance and emerging data on the importance of preserving the neonatal microbiome.

Pursue efforts towards the development of vaccines with the potential to overcome serotype diversity and serotype-specificity of protection.

Protein-based vaccine candidates with the potential to induce protection independently of the capsular polysaccharide serotype are under development. Sequence polymorphisms in the target protein(s) also need to be considered.



Vaccine development

Develop quality-assured immunologic correlate(s)/surrogate(s) of protection.

The evidence base for correlates of protection can be derived from efficacy trials with nested immunogenicity evaluation or from the study of the association between maternal antibodies acquired following natural exposure and risk of neonatal and infant GBS disease in sero-epidemiologic studies, using quality-assured antibody capture and quantitative functional assays, with standardized procedures and reagents. Standard assays using reference reagents facilitate comparability assessments. Conservation of trial samples in anticipation of potential future use with innovative new platforms may be valuable.

The respective role of clinical efficacy estimation and immune correlate(s)/ surrogate(s) of protection in the pathway to licensure and recommendation for use should be defined, in consultation with regulators and policy makers.

Characterize key candidate vaccine immunogenicity parameters.

Serotype-specific vaccine immunogenicity in pregnant women should be characterized, including determination of the evolution of antibody titres over time in vaccinated