

Malaria vaccine technology roadmap

Despite the major public health effect of the scale-up of available control measures, malaria remains the largest single cause of child mortality in many settings in Africa.¹ More than 3 billion people remain at risk of malaria infection, and roughly 1800 people die each day,² with children and women from poor communities being most affected. While continued innovations in diagnostic testing, antimalarial drugs, and vector control measures are likely to have an important role in accelerating progress, malaria vaccines also have great potential to contribute to defeating malaria—if they can be successfully developed.

The **malaria vaccine technology roadmap** was initially published in 2006. On Nov 14, 2013, WHO publishes the first comprehensive update to this global strategic research and development roadmap. It is the result of extensive consultations with scientists and public health experts from non-endemic and malaria-endemic countries, industry, non-governmental organisations, and funding agencies. The updated roadmap was reviewed and endorsed by WHO advisory committees for immunisation and malaria.^{3,4}

The **updated roadmap** includes two new strategic goals to develop by 2030: vaccines to achieve malaria elimination in multiple settings and vaccines that are highly efficacious against malaria disease. The roadmap also includes an updated set of priority areas in research, vaccine development, key capacities, policy, and commercialisation, where further funding and activities are likely to be critical to success. The original roadmap contained a 2015 landmark goal for a partially efficacious malaria vaccine yielding reductions in morbidity and mortality, which remains unchanged. One vaccine (RTS,S/AS01) might receive WHO recommendation for use in 2015,

depending on the final results from a phase 3 trial and on the outcomes of regulatory processes.⁵

We call for vaccine developers and funders to consider the updated malaria vaccine technology roadmap as a blueprint for second generation malaria vaccine development. The agencies that are members of the **Malaria Vaccine Funders Group** have all made major contributions within the framework of the malaria vaccine technology roadmap. As a further stimulus for malaria vaccine development, WHO will publish (by end of 2014) two preferred product characteristics documents specifying the preferred profiles of malaria vaccines to achieve the new strategic goals laid out in the roadmap. These preferred product characteristics will reduce risk and uncertainty for vaccine developers, clarify the priority applications for future malaria vaccines from WHO's perspective, and reduce the burden of future vaccines on immunisation programmes in low-income countries by increasing programmatic suitability for use.

We declare that we have no conflicts of interest.

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- 1 Kleinschmidt I, Schwabe C, Benavente L, et al. Marked increase in child survival after four years of intensive malaria control. *Am J Trop Med Hyg* 2009; **80**: 882–88.
- 2 WHO. World Malaria Report. 2012. http://www.who.int/malaria/publications/world_malaria_report_2012/en/index.html (accessed Oct 11, 2013).
- 3 WHO. Strategic Advisory Group of Experts on Immunization. 2013. <http://www.who.int/immunization/sage/en/> (accessed Oct 11, 2013).
- 4 WHO. Malaria Policy Advisory Committee. 2013. <http://www.who.int/malaria/mpac/en/> (accessed Oct 11, 2013).
- 5 PATH-malaria vaccine Initiative. RTS,S malaria vaccine candidate. <http://www.malariavaccine.org/rd-rtss.php> (accessed Oct 11, 2013).

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For the **Malaria Vaccine Funders Group** see http://www.who.int/vaccine_research/malariavaccine_funders/en/index.html

For the **2006 Malaria vaccine technology roadmap** see http://www.malariavaccine.org/files/Malaria_Vaccine_TRM_Final_000.pdf

For the **2013 malaria vaccine roadmap** see www.who.int/immunization/topics/malaria/vaccine_roadmap

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