

## Malaria vaccination: a major milestone

“Zero Malaria Starts With Me” was a theme of this year’s World Malaria Day on April 23. It echoes the African Union campaign and Sustainable Development Goal 3 to eliminate malaria by 2030. The number of malaria cases has fallen from an estimated 262 million in 2000, to 219 million in 2017, and widespread use of bednets along with the introduction of intermittent chemotherapies are credited with this success. However, improvements in malaria control have stagnated, with the 2018 WHO World Malaria Report stating that “no significant progress” has been made between 2015 and 2017. Malaria is still a major global health problem with 435 000 deaths in 2017, of which children younger than 5 years accounted for 61%. The recent faltering of progress and the risk to young children mean it is imperative that new control measures be introduced. The launch of the pilot RTS,S vaccination programme in April marks a major milestone that could make a substantial difference in the push for malaria elimination in sub-Saharan Africa.

The RTS,S vaccine has been in development since 1987 by GlaxoSmithKline (GSK) and is designed to stop the *Plasmodium falciparum* malaria parasite from entering the liver, preventing the subsequent deadly blood stages. The phase 3 trial of RTS,S was carried out between 2009 and 2014, involving around 15 000 children and infants across seven sub-Saharan African countries. It showed that the vaccine could prevent four in ten cases of malaria and three in ten severe cases among children who received all four doses. This modest efficacy means that the vaccine is not a panacea, but applying these figures to the overall burden of malaria suggests that it would prevent tens of thousands of childhood deaths. The integration of the RTS,S vaccine into the national immunisation programmes of Malawi, Ghana, and Kenya over the next 5 years is therefore an exciting moment for public health.

The feasibility of a new health intervention is determined by accessibility. A key question about the RTS,S programme is whether participants will receive the full four doses needed for maximum protection. Children require three doses at 1-month intervals with a final dose 20 months after the first. If a child fails to receive the final dose, the protective efficacy of the vaccine is reduced to 0.1% within 3 years, whereas the

full regimen would provide the partial protection for up to 4 years from the final dose. Delivering the full vaccine schedule in a timely manner will be a major challenge as logistics, migration, and access to rural regions make following up childhood vaccinations notoriously difficult. Therefore, the programme will require coordination from government bodies down to the community level.

International and local cooperation has been integral to the development of RTS,S. By the end of the pilot roll-out in 2024, funding for RTS,S is estimated to exceed US\$1 billion with \$700 million coming from GSK, who have donated 10 million doses for the pilot. Questions of funding vaccination beyond the pilot programme, assuming it is successful, remain. Thomas Breuer, chief medical officer at GSK, has said that the pharmaceutical giant would like to “hand over the funding baton to others”. Competition could emerge as others seek to develop a fully protective malaria vaccine. For example, Sanaria have developed the PfSPZ vaccine, which had a protective efficacy of 48.3% in an early phase 2017 clinical trial and will be trialled on the island of Bioko, Equatorial Guinea, in 2020. It will be a challenge for PfSPZ and other pre-clinical vaccines to receive the level of funding and fanfare of RTS,S, since a recent paper published by *The Lancet Infectious Diseases* showed that spending on malaria is far from funding targets and donor funding decreases as regions approach elimination. However, the launch of the RTS,S pilot scheme provides a framework for institutions to take their vaccine candidates from laboratory to the field.

The announcement of the first child vaccinated with RTS,S in Malawi marks a step in the right direction for the elimination of malaria. However, the partial protection RTS,S offers means that vaccination will be supplementary and not superior to existing malaria control campaigns such as the use of bednets and indoor residual spraying. Therefore, the RTS,S project should support ongoing malaria interventions in the target countries by integrating bednet distribution and malaria education. Malawi, Ghana, and Kenya are now cemented in the history of malaria control and the data these countries produce over the next 5 years will be invaluable to securing elimination.

■ *The Lancet Infectious Diseases*



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For more on **Zero Malaria Starts With Me** see <https://zeromalaria.africa/>

For **WHO’s World Malaria Report 2018** see <https://www.who.int/malaria/publications/world-malaria-report-2018/en/>

For more on **the RTS,S pilot programme** see <https://www.who.int/malaria/media/malaria-vaccine-implementation-qa/en/>

For the **clinical trial of PfSPZ** see **Articles** *Lancet Infect Dis* 2017; 17: 498–509

For more on **malaria funding** see **Articles** *Lancet Infect Dis* 2019; published online April 25. [https://doi.org/10.1016/S1473-3099\(19\)30165-3](https://doi.org/10.1016/S1473-3099(19)30165-3)