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PfSPZ vaccines: Developing a malaria vaccine to prevent infection, protect individuals and eliminate malaria in areas with intense transmission

Cases and deaths caused by malaria worldwide increased in 2016. Prevalence of *Plasmodium falciparum* (Pf) by RDT was ~11% in 2-14-year olds on Bioko Island, Equatorial Guinea (EG) in 2017 compared to ~45% in 2004. Between 2004 and 2017, a national and international team supported by a technical advisory group instituted intense malaria control measures funded by one of the largest per capita investments in malaria control in the world. Consistent with prevalence reduction, malaria related mortality was reduced by ~85% and the EIR and basic case reproduction number (R_0) by >90%. However, the prevalence as measured by RDT has remained stable recently (14% and 11% in 2012 and 2016), and qPCR studies in EG indicate prevalence is 3-fold higher. This situation is common in Africa. New tools are needed to move toward an R_0 <1 and elimination. R_0 has two components, vectorial capacity of mosquitoes and the chance an individual bitten by an infected mosquito will transmit: the majority of investment in malaria control is aimed at reducing vectorial capacity. Case management and other treatment strategies reduce the chance an exposed individual will transmit in the short term. A vaccine with significant efficacy against infection could have an enormous additional impact on the probability an exposed individual can transmit, directly protecting many and indirectly protecting many more through herd immunity if administered to an entire community. PfSPZ Vaccine induced sterile protection for 6 months against intense Pf transmission in 3 clinical trials in Mali and Burkina Faso. Protection by time to event and proportional analyses reached 52% and 38% respectively, opening the possibility of mass vaccination programs to regionally eliminate Pf. The results of clinical trials including >5,000 injections to >2,000 subjects of PfSPZ products and plans for Phase 3 and 4 trials and elimination campaigns will be presented.

Biography

Peter F. Billingsley PhD is Vice President of International Projects and Strategy at Sanaria Inc. He has over 25 years' experience working on malaria, in particular the biology of transmission of malaria through the mosquito from the molecular level in the laboratory right through to the ecology and epidemiology of transmission. He was awarded a prestigious Royal Society University Research Fellowship in 1988 which he held at Imperial College and then later was senior lecturer, head of Zoology and director of post-graduate studies for life sciences at the University of Aberdeen in Scotland. At Sanaria, Dr. Billingsley has been part of the core team taking the PfSPZ Vaccine and PfSPZ Challenge from R&D right through to major clinical trials in USA, Africa and Europe. Until recently, he was Senior Director of Quality Systems at Sanaria and retains a functional QA role with respect to international site visits and training, while stilll acting as PI on grants for vaccine R&D.

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