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Malaria vaccines targeting the pre-erythrocytic stage: a scoping review

Malaria is a deadly infectious parasitic disease that causes devastating morbidity and mortality globally. Despite being a public health concern, an effective vaccine for prevention of the disease remains elusive. Global efforts are exploring possible ways of developing and improving vaccines to counteract the complex nature in which Plasmodium falciparum evades the immune system. A number of vaccines have been developed in the past targeting the various parasitic life cycle stages. Transmission blocker vaccines, such as PpPf S25, target the parasite stages in the mosquito vector. However, these herd vaccines only protect the immunized population. Vaccines targeting blood-stage forms, such as the AMA-1 and MSP-1 vaccines, are challenged by the complex metabolic pathways of erythrocytes and merozoites. Vaccines targeting the pre-erythrocytic sporozoite stage remain the most promising approach thus far. Here, we systematically review the literature on pre-erythrocytic stage vaccines and on-going work in the field. Furthermore, we highlight gaps in current knowledge and point to potential areas of future work. Articles on pre-erythrocytic malaria vaccines were obtained from Google scholar, PubMed and Cochrane starting from the year 2010. Ten papers were reviewed. A number of vaccines were reviewed highlighting; the vaccine type, clinical phase of trial, population demographics, vaccine immunogenicity, efficacy and safety. The RTS,S vaccine is reportedly the most advanced, having been rolled out for phase III clinical trials in a number of malaria-endemic African countries. The pre-erythrocytic vaccines discussed have made milestones in clinical trials. Some of the challenges elicited may be addressed via screening for novel antigens, exploring suitable vaccine administration vehicles, ¬ as well as using a combined multi-stage vaccine approach.

Primary authors: Ms CHEPKIRUI , Carolyne (Kabarak University); Dr WAMBUGU , Esbon (Kabarak University); Dr NDUBI , Ferdinand (Kabarak University); Dr MAIYO , Fiona (Kabarak University); Mr TONUI , Josephat (Kabarak University); Dr MOMANYI , Lydia (Nakuru Level V Hospital); Ms MURITHI, Mary (Kabarak University); Dr WALEKHWA , Michael (Kabarak University); Dr KAGIA, Richard (Kabarak University); Ms OGETO, Teresa (Kabarak University); Dr SUGE , Titus (Kabarak University)

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