Scientists identify potential vaccine candidate for pediatric malaria

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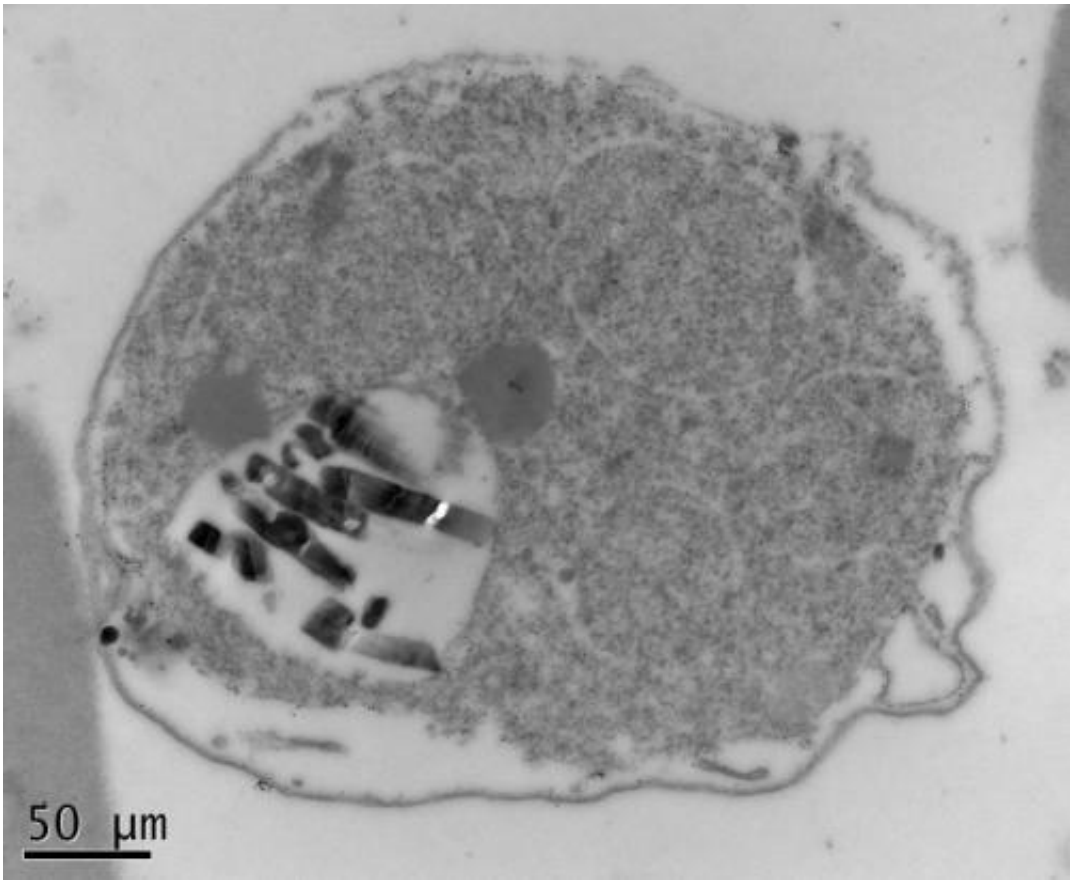

Electron micrograph of a Plasmodium falciparum schizont-infected red blood cell. Credit: J. Kurtis

Researchers have identified a substance, or antigen, that generates antibodies that can hinder the ability of malaria parasites to multiply,

which may protect against severe malaria infection.

The antigen, known as PfSEA-1, was associated with reduced parasite levels among children and adults in malaria-endemic areas. Mice exposed to PfSEA-1 in an investigational vaccine also experienced lower malaria parasite levels. The discovery of PfSEA-1 could be a critical addition to the limited pool of antigens currently used in candidate malaria vaccines. The findings, which appear in the May 23 issue of *Science*, result from a collaboration of scientists from the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health, and NIAID grantees.

An estimated 627,000 people die from malaria each year according to the World Health Organization, with most deaths from the mosquito-borne parasitic disease occurring among young children living in sub-Saharan Africa. People who live in areas where malaria is common frequently develop protective immune system responses that can limit malaria parasite levels in the blood and prevent the high fever and illness associated with malaria infection.

Using plasma samples from 2-year-old Tanzanian children who were either resistant or susceptible to malaria infection, researchers performed gene-screening experiments and a series of laboratory tests that identified PfSEA-1. Multiple tests confirmed that antibodies to PfSEA-1 halted malaria infection at the point when the parasite leaves one red blood cell to invade a new one. This stage offers a unique target for future malaria vaccines as previous vaccine candidates have tried to block the stage when parasites enter red blood cells, according to the authors.

Scientists then vaccinated five groups of mice with the novel antigen to evaluate its effects after the mice were exposed to malaria. In all groups, the vaccinated mice had lower levels of malaria parasites and survived

longer than the unvaccinated mice. Additionally, the researchers measured antibody levels in plasma samples from 453 Tanzanian children from the previous cohort and discovered that no cases of severe malaria occurred during periods when the children had detectable antibodies to PfSEA-1.

Further, the scientists evaluated plasma samples from 138 males ages 12-35 years living in a malaria-endemic area of Kenya and found that individuals with detectable antibodies to PfSEA-1 had 50 percent lower parasite densities compared to individuals with no detectable antibodies. Together, these findings support PfSEA-1 as a potential vaccine candidate that could work alone or together with other vaccines targeting different stages of malaria infection, the authors write.

More information: DK Raj et al. Antibodies to PfSEA-1 block parasite egress from RBCs and protect against malaria infection. Science DOI: 10.1126/science.1254417 (2014). DOI: 10.1126/science.1254417

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