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Development of malaria vaccine based on recombinant SERA protein.

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Our ultimate goal is to develop an effective malaria vaccine by utilizing recombinant malaria antigens. The *Plasmodium falciparum* SERA (126kDa), one of the vaccine candidate antigens, is an asexual blood stage antigen produced in large amounts specifically during late trophozoite and schizonts stages (ref. 1, 2). The primary SERA polypeptide is secreted into the lumen of the parasitophorous vacuole, then a large fraction of 126kDa SERA protein is proteolytically processed into three fragments coincident with the release of merozoites.

We expressed N-terminal domain (SE47'), central domain (SE50A) and C-terminal domain (SE18) of SERA protein in *E. coli* by synthesizing the genes with a changed codon usage fit for the *E.coli* system. Antisera against the purified gene products prepared in rats and mice were examined their inhibitory effect on malaria parasite growth *in vitro* (ref. 3). The anti-SE47' serum was significantly more inhibitory than the other sera. Affinity-purified mouse IgG specific to the recombinant SE47' protein inhibited the parasite growth at the stage from schizont to ring. Immunofluorescence assay (IFA) revealed that the IgG molecules were surround the rupturing schizonts and the released merozoites cross-linked together (ref. 4). The specific IgG to SE47' is, therefore, solely responsible for the parasite growth inhibition. In addition, *saimiri sciureus* monkeys immunized with the SE47' protein increased antibody ELISA titers against SE47' after *P. falciparum* challenge infection, resulted in significant reductions in parasitemia (ref. 5). These results demonstrate that protective immune responses primed with an *E. coli*-produced recombinant SE47' SERA protein can be boosted by *P. falciparum* challenge infection, presumably due to native SERA molecules produced by challenge parasites.

The current data supports the feasibility of *E. coli* produced SE47' protein to be an effective malaria vaccine.

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