

ESTIMATES OF *PLASMODIUM VIVAX* GAMETOCYTE FERTILITY AND OOKINETE TRANSFORMATION IN *ANOPHELES DIRUS*, *AN. MINIMUS* AND *AN. SAWADWONGPORNI* MOSQUITOES

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Current efforts to develop transmission-blocking vaccines (TBV) for *Plasmodium vivax* aim to disrupt early sporogonic stages of the malaria parasites in the lumen of the anopheline midgut. However, the correlation between *P. vivax* ametocyte densities and their infectiousness to mosquitoes based on oocyst densities is unclear. We calculated transitional efficiencies between early parasite lifestages (macrogametocyte, ookinete, oocyst) and estimated the successive losses in parasite abundance. We examined early sporogonic development of natural strains of *Plasmodium vivax* in laboratory-reared *An. dirus*, *An. minimus* and *An. sawadwongporni* mosquitoes fed on gametocytemic blood drawn from uncomplicated, symptomatic patients reporting to a malaria clinic in Mae Sot, Thailand. Relative densities of macrogametocytes per mosquito were estimated based on blood meal volume, RBC density and patient macrogametocytemia. Absolute densities of ookinetes were determined using immunofluorescent staining with a monoclonal antibody against Pvs25, a protein expressed on the surface of post-fertilization stages. Additional mosquitoes were dissected for oocysts on day 7. Transitional efficiencies between parasite lifestages were calculated and the successive losses in parasite abundance estimated. Parasite populations incurred a 100- to 600- fold loss in abundance during the transition from macrogametocyte to ookinete, and a 10-fold loss from ookinete to oocyst. Quantitative studies of *P. vivax* macrogametocyte fertility and ookinete transformation are crucial to understand the efficacy of TBV in *An. dirus* and other important malaria vectors.

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EVALUATION OF THE VECTEST MALARIA ANTIGEN PANEL ASSAY FOR THE DETECTION OF *PLASMODIUM FALCIPARUM* AND *P. VIVAX* CIRCUMSPOROZOITE PROTEIN IN ANOPHELINE MOSQUITOES IN THAILAND

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We evaluated the performance of the VecTest Malaria Antigen Panel (V-MAP) assay for the detection of *Plasmodium falciparum* and *P. vivax* (variants 210 and 247) circumsporozoite protein in anopheline mosquitoes in Thailand. The V-MAP assay is a rapid, one-step procedure using a 'dipstick' wicking test strip. The circumsporozoite (CS) ELISA was used as the reference standard. Mosquitoes evaluated in the study included field-collected specimens ($n = 930$) and laboratory-reared specimens that had been fed on blood collected from patients with and without *Plasmodium* gametocytes ($n = 4,110$) or on cultured *P. falciparum* gametocytes ($n = 262$). Field-collected mosquitoes were triturated individually or in pools of 2-5 and tested using 613

V-MAP assays. Laboratory-reared specimens were tested individually using 4,372 V-MAP assays. Assay performance depended on the species of *Plasmodium* and the number of sporozoites used as the cut-off. For *P. falciparum*, optimal performance was achieved using a cut-off of 150 sporozoites (sensitivity = 100%, specificity = 99.2%, and accuracy = 0.99). For *P. vivax* variant 210, optimal performance was also achieved using a cut-off of 150 sporozoites (sensitivity = 94.8%, specificity = 94.5%, and accuracy = 0.95). We were unable to develop a standard-curve for the CS-ELISA using *P. vivax* variant 247 because of a lack of sporozoites; however, using a cut-off of 30 pg *P. vivax* 247 antigen (mosquitoes with less than this amount of antigen were considered negative), assay performance (sensitivity = 94.3%, specificity = 99.2%, and accuracy = 0.99) was comparable to that achieved for *P. falciparum* and *P. vivax* 210. These results clearly demonstrate that the V-MAP assay performs at an acceptable level and offers practical advantages for field workers needing to make rapid surveys of malaria vectors.

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HEMATOLOGIC AND CLINICAL INDICES OF MALARIA IN A SEMI-IMMUNE POPULATION OF WESTERN THAILAND

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This study examines hematologic profiles of persons with acute *Plasmodium falciparum* or *P. vivax* infection in Maesod on Thailand's western border with Myanmar compared with febrile, non-parasitemic persons also reporting to malaria clinics. Nine hundred seventy-nine subjects were malaria-negative, 414 were infected with *P. falciparum*, and 646 were infected with *P. vivax*. Persons with patent parasitemia tended to have significantly lower white blood cell, red blood cell, platelet, and hemoglobin levels than those who were malaria-negative. For the first time, a parallel trend in thrombocytopenia with parasitemia was found to be associated with both *P. falciparum*, and *P. vivax* infection. Using logistic regression, persons with platelet counts < 150,000/ μ L were 12-15 times more likely to have malaria than persons with platelet counts \geq 150,000/ μ L. This study supplements previous literature on the hematologic effects of malaria and helps define those alterations for a semi-immune population. Thrombocytopenia is identified as a key indicator of malaria in these febrile patients.

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HUMAN ANTI-SALIVARY GLAND PROTEIN ANTIBODIES: A NATURAL DEFENSE AGAINST MALARIA INFECTION

Waitayakul A, Somsri S, Prachumsri J, Looareesuwan S and Udomsangpetch R

Mosquito's salivary proteins can elicit antibody response in human. We demonstrated that anti-*Anopheles* salivary protein antibodies occurred strictly in the villagers living in malaria endemic area. Healthy persons from non-malaria endemic area had no antibody to the *Anopheles* salivary