Journal of the American Mosquito Control Association, 23(3):294–298, 2007

COMPARISON OF BLOOD FEEDING RESPONSE AND INFECTION OF *AEDES AEGYPTI* TO *WUCHERERIA BANCROFTI* USING ANIMAL MEMBRANES AND DIRECT HOST CONTACT

JINRAPA POTHIKASIKORN,[1] MICHAEL J. BANGS,[2] THEERAPHAP CHAREONVIRIYAPHAP,[3] KOSOL ROONGRUANGCHAI[4] AND JANTIMA ROONGRUANGCHAI[5]

ABSTRACT. Comparison of an artificial, whole-blood membrane feeding procedure was performed by feeding *Aedes aegypti* (Liverpool strain) on the blood of patients infected with *Wuchereria bancrofti* microfilariae with the use of 3 types of membranes produced from chicken and mouse skin and swine intestine. Direct feeding of *Ae. aegypti* on the skin of infected human patients served as control. For all 3 types of membranes, mosquito survival, infection, and number of infective-stage larvae per mosquito did not differ significantly from the control. However, the blood feeding response between swine intestine layer (32%) compared to chicken skin (75.3%), mouse skin (70%), and direct feeding (84%) differed significantly. The response in direct feeding method was significantly higher than those in all membranes tested ($F = 18.89$; $df = 3$; $P < 0.05$) Chicken skin preparation was shown to be the preferred membrane for blood feeding *Ae. aegypti* and experimental infection with *W. bancrofti*.

KEY WORDS Animal membrane, artificial feeding, *Aedes aegypti*, *Wuchereria bancrofti*

INTRODUCTION

Artificial feeding methods for adult mosquitoes on blood or nutritive substances with synthetic or animal-derived membranes have been in use for decades (Yoeli 1938, Greenberg 1949, Behin 1967). These methods generally involve keeping defibrinated blood sufficiently warm inside a glass cylinder fitted with a clean membrane thin and taut enough so that the mosquitoes can easily probe through it and feed (Rutledge et al. 1964, Gerberg et al. 1994)

Several types of natural and artificial membranes have been used in experimental infection studies, including the Baudruche membrane (bovine large intestine casing), chicken skin, diverticulum and crop tissue, mouse skin, Saran Wrap™, and Parafilm®, a dialyzing bag, and various forms of rubber (Rutledge et al. 1964, Behin 1967, Ponnudurai et al. 1971). Use of membrane feeding systems has also proven invaluable for investigations on arthropod-borne viruses (Collins et al. 1964, Takahashi 1980, Takashima et al. 1983). Membrane feeding has also been routinely used in the study of vector-borne metazoan parasites, especially experimental infections of *Plasmodium* parasites (Collins et al. 1986). Although commonly used for investigations on malaria infectivity, only a few studies have compared the relative efficacy of the membrane feeding method with direct feeding on infectious (gametocytemic) patients (Bonnet et al. 2000, Awono-Ambene et al. 2001, Sattabongkot et al. 2003). Far fewer attempts have been reported using membrane feeding of mosquitoes for experimental filarial infections (Nelson 1962, Ponnudurai et al. 1971, Obiamiwe 1997).

Humans are the only natural definitive host for *Wuchereria bancrofti* (Cobbold), and attempts to develop experimental models with the use of relatively inexpensive laboratory rodents (mice, rats, and Mongolian jirds) have been unsuccessful. Although the direct-feeding method reflects epidemiological reality, the ability to feed mosquitoes on blood of patients infected with *W. bancrofti* through a membrane has some logistical as well as an inherent ethical advantage, particularly of sparing patients the often painful irritation and allergic reactions associated with the numerous bites normally required in the procedure (Graves 1980). We compared 3 types of animal-derived membranes (mouse and chicken skin, swine intestine) with direct feeding procedures for blood feeding response of *Aedes aegypti* (L.) and subsequent infection from ingestion of *W. bancrofti* microfilariae. This study protocol was conducted with the approval of the Animal and Human Use Committee, Faculty of Science, Mahidol University, Bangkok, Thailand.

[1] Department of Microbiology, Faculty of Science, Mahidol University, Bangkok 10400 Thailand.
[2] Public Health & Malaria Control, C/Freeport Indonesia, Kuala Kencana, P.O. Box 616, Cairns 4870 Australia.
[3] Department of Entomology, Faculty of Agriculture, Kasetsart University, Bangkok 10900 Thailand.
[4] Department of Parasitology, Faculty of Medicine, Siriraj Hospital, Mahidol University, Bangkok 10700 Thailand.
[5] Department of Anatomy, Faculty of Medicine, Siriraj Hospital, Mahidol University, Bangkok 10700 Thailand.