huts and cohorts of *Ae. aegypti* females were released into the outdoor environment to quantify diversion based on recapture rates by trap and hut location. Results from these experiments indicate similar total numbers of *Ae. aegypti* recaptured under screenhouse conditions for both non-exposed and chemical-exposed mosquitoes. Further, there was no evidence of significant diversion from treated to control (chemical-free) huts in outdoor trials. This information will serve to better understand the role of a trapping device to augment a SR and CI vector control strategy and guide the optimization of the BG-Sentinel™ trap to serve as a complementary component of a Push-Pull vector control strategy currently in the proof-of-principle stage of development in Thailand.

464

PRINCIPAL VECTORS OF MALARIA AND FILARIASIS IN PAPUA NEW GUINEA (*ANOPHELES PUNCTULATUS* SIBLING SPECIES) ARE SUSCEPTIBLE TO STANDARD INSECTICIDES USED IN LONG-LASTING INSECTICIDE-TREATED NETS

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Pyrethroids and dichlorodiphenyltrichloroethane (DDT) affect insects by interfering with voltage-gated sodium channel proteins in neurons. In many parts of the world, mosquitoes have developed resistance to these insecticides. This has threatened to impede insecticide-based vector control programs. The primary mechanism of resistance is the knockdown resistance (*kdr*) allele, a mutation in the insects' voltage-gated sodium channel gene (*vgsc*) that inhibits binding of DDT and pyrethroids to the protein channel. Physiological resistance to DDT causes cross resistance to pyrethroids. Papua New Guinea (PNG) has a history of both DDT and pyrethroid use for the control of malaria vectors. The Global Fund is currently supporting the distribution of long-lasting pyrethroid-treated nets in the country for disease control. However, the status of pyrethroid resistance in the local vectors has never been determined. This study investigated the status of pyrethroid resistance in the major malaria and filariasis vectors, the *Anopheles punctulatus* group, in areas of PNG where DDT or pyrethroids have been used. The study employed World Health Organization standard susceptibility bioassays to detect kdr phenotypes in 2 to 5 day old female *Anopheles*. In the cone assay, mosquitoes were exposed to deltamethrin-treated netting (55mg/m2) for 3 minutes and the rate of knock-down was measured within 60 min post exposure. In the tube assay, mosquitoes were exposed to lambdacyhalothrin-treated paper (18.35mg/m2) for 60 min during which time knock-down rate was measured. Mortality status was measured 24 hr post exposure for both assays. The *kdr* allele was diagnosed using a novel nested polymerase chain reaction amplification of a *vgsc* region that contains the mutation site. This was followed by a restriction digest using *Dde*I restriction enzyme. 100% knockdown and 100% mortality were observed in all populations. 100% mortality indicates a pyrethroid susceptible population according to the WHO percentage mortality index. All the mosquitoes that were genotyped were wild-type at the *kdr* locus.

465

RESISTANCE TO ORGANOPHOSPHORUS/CARBAMATES INSECTICIDES AND ACE-1 DUPLICATION IN *ANOPHELES GAMBIAE*: A CHALLENGE FOR MALARIA CONTROL

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Insecticide resistance is a rapid and recent evolutionary phenomenon with serious economic and public health implications. In the mosquito *Anopheles gambiae* s.s., main vector of malaria, organophosphates and carbamates resistance is mainly due to a single amino-acid substitution in acetylcholinesterase 1 (AChE1). This mutation entails a large fitness cost. However, a resistant duplicated haplotype (ace.1D) of the gene encoding AChE1 (ace-1) recently appeared in *A. gambiae*. In an upstream study, the duplicated haplotype was detected at molecular level in a framework of distribution study of ace.1R allele (resistant allele against carbamate and organophosphate) in natural populations of *A. gambiae* from West Africa. Using molecular phenotype data collected from natural populations from West Africa, we investigated the frequency of this duplicated haplotype by statistical inference. This inference is based on the departure from Hardy-Weinberg phenotypic frequency equilibrium caused by the presence of this new haplotype. The duplicated allele, Ag-ace-1D, reaches a frequency up to 0.65 in Ivory Coast and Burkina Faso, and is potentially present in Benin. This allele was recorded in both M and S molecular forms of *Anopheles gambiae* s.s. in different West Africa countries. It was generated by a single genetic event and present distribution suggests that this new allele is currently spreading. Unfortunately, the spread of this less costly resistance haplotype is potentially a major threat to public health, as it may impede *A. gambiae* control strategies, and thus increases the risk of malaria outbreaks.

466

ACUTE FEBRILE ILLNESS SURVEILLANCE IN A TERTIARY HOSPITAL EMERGENCY DEPARTMENT: COMPARISON OF INFLUENZA AND DENGUE INFECTIONS

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Dengue infections are often difficult to distinguish clinically from other acute febrile illnesses (AFI), including influenza. In 2009, an increased proportion of suspected dengue cases reported to the passive surveillance system in Puerto Rico were laboratory-negative in dengue-specific assays. As a result, enhanced AFI surveillance was initiated at the Emergency Department of a tertiary care hospital in southern Puerto Rico. From September to December 2009, 284 patients who presented with fever for 2-7 days and no identified source of infection were tested for influenza, leptospirosis, and enteroviruses, in addition to dengue. Thirty-one patients were confirmed as having dengue, 136 had influenza, 1 had leptospirosis, 3 had enterovirus, and 2 had dual infections; 111 had no infectious etiology identified. Median patient age was 17.9 years (range 0.5-82) and 55% were female. The majority were from Ponce (128, 45%) or neighboring Villalba (40, 14%) and Juana Diaz (38, 13%). Dengue patients were more likely than influenza patients to be residents of Villalba (58.1% versus 6.6%) and less likely to be from Ponce (3.2%