Establishment of *Wolbachia* strain wAlbB and maintenance of dengue inhibition capacity in *Aedes aegypti* population

Noor Afizah A[1], Cheong YL[1], Nur Zatil Aqmar MZ[1], Muhammad Kamarul Ridhuan G[1], Muhd Nizam MN[1], Mohd Irwan S[1], Mohd Arif AK[1], Nazni WA[1], Ary A Hoffmann[2], Steven P Sinkins[3]

[1]Medical Entomology Unit, Institute for Medical Research, Kuala Lumpur, [2]University of Melbourne, Bio21 Institute and the School of BioSciences, Australia, [3]MRC-University of Glasgow Centre for Virus Research, University of Glasgow, UK

ABSTRACT

Introduction: wAlbB has been introduced into wild *Ae. aegypti* populations in several sites in Klang Valley, with the aim to assess whether wAlbB can be established and maintained at high frequency in urban settings. It is also to ensure wAlbB *Ae. aegypti* can maintain a good dengue inhibition capability after long establishment in the field. **Materials and methods:** Four generations of back-crossing to field-collected local material were carried out to ensure a fit, locally adapted, and competitive *Ae. aegypti* wAlbB line were released. Ovitraps were used to collect mosquitoes from the release sites (Section 7 Shah Alam). qPCR-HRM was performed to screen for the presence of *Wolbachia*. A year after the release cessation, wAlbB *Ae. aegypti* were collected and fed with and DENV-1 using patient blood via artificial feeding. Midgut and salivary gland tissues were dissected, and the viral load was quantified by multiplex RT-qPCR and normalized against the RpS17 mosquito genes. *Wolbachia* density from the mosquito carcasses of the dissected mosquitoes was quantified by multiplex qPCR. **Results and conclusion:** *Wolbachia* frequency increased rapidly to over 80% in the release site and subsequently fluctuated following cessation of release. Releases were resumed at a lower release rate whereby *Wolbachia* frequencies rapidly rise up again and maintained stable without further releases for more than 3 years. No reduction in *Wolbachia* density and a significant blocking of virus dissemination to the salivary glands were observed. Our findings demonstrate the capacity of wAlbB strain to become established and maintained itself at high frequency with unattenuated dengue inhibition capacities. These findings support the sustainability of interventions using wAlbB to control dengue transmission. It is also anticipated the Wolbachia spread is negatively affected by the immigration of wild mosquitoes from the surrounding areas, suggesting good natural boundaries to be considered for the design of release strategy.