Diverse novel Wolbachia strains could lead to the reduction in the transmission of malaria

Wednesday 19 December, 2018

The discovery of novel *Wolbachia* bacteria strains in *Anopheles* malaria vectors could lead to the reduction in the transmission of malaria, according to a study published in *Wellcome Open Research, Wellcome's open research publishing platform.*

Wolbachia, a common insect bacterium that can influence pathogen transmission and manipulate host reproduction, has historically been considered absent from the *Anopheles (An.)* genera, but has recently been found in *An. gambiae* s.l. populations in West Africa.

Since there are numerous *Anopheles* species that have the capacity to transmit malaria, the study analysed a range of species across five malaria endemic countries to determine *Wolbachia* prevalence rates, characterise novel *Wolbachia* strains and determine any correlation between the presence of *Plasmodium*, *Wolbachia* and the competing bacterium *Asaia*.

The research, funded by Wellcome and Royal Society, found novel *Wolbachia* strains in five species, increasing the number of *Anopheles* species known to be naturally infected. Variable prevalence rates in different locations were observed and novel strains were phylogenetically diverse, clustering with *Wolbachia* supergroup B strains.

Principle investigator and lead author of the study Thomas Walker of the London School of Hygiene & Tropical Medicine, said of the findings:

"This important discovery provides greater insight into the prevalence of resident *Wolbachia* strains in diverse malaria vectors. Novel *Wolbachia* strains (particularly high-density strains) are ideal candidate strains for transinfection to create stable infections in other *Anopheles* mosquito species, which could be used for population replacement or suppression control strategies."

"Further studies are needed to determine if these strains are impacting malaria transmission in field settings. Previous studies in other Sub-Saharan African countries have shown even low density *Wolbachia* strains in *Anopheles gambiae* mosquitoes have significant effects on the infectious sporozoite stages of malaria parasites."

The promising results follow the latest findings from the Annual World Malaria Report which reported that the number of cases of malaria in 10 of the countries worst affected by the disease has gone up over the last year, despite a huge global effort to tackle the mosquito-borne disease.

In response to the findings, Professor Scott O'Neill, Director, World Mosquito Program said:

"This work adds considerably to the growing appreciation that *Wolbachia* naturally infects anopheline mosquito species. However the low frequency of these infections in the *An. gambiae* complex is an intriguing puzzle and suggests that these infections are not behaving like *Wolbachia* in most other insects. A fuller understanding of these unusual infections will allow us to determine how best they might be used in future disease control programs."

The research aims to follow the lead from successful preliminary trials undertaken by the World Mosquito Program. Here, *Wolbachia*-infected *Ae. aegypti* mosquitoes were generated, by Dr Walker in earlier work, and released into wild mosquito populations in dengue endemic countries, preventing the replication of arboviruses such as dengue and Zika virus.

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Related Keywords:

Wolbachia :: Wellcome :: f1000 :: Malaria :: World Mosquito Program :: Wellcome Open Research :: Anopheles Species ::

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