

Controlling Infection of Dengue Virus with Wolbachia

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Dengue fever cases are often found in Indonesia. The tropical climate and the poor sanitation in the country made the case annually happen, even in 2011 Indonesia topped the rank in South East Asia with 10,000 cases. Unfortunately, vaccines have not been found to prevent dengue transmissions. Many efforts that have been done cannot yet work out well.

“Due to this condition, we carried out a research to minimise dengue transmissions in humans using natural Wolbachia bacteria,” said Eggi Arguni, Ph.D., main researcher of Eliminate Dengue Project (EDP) -Yogyakarta on Tuesday (7/5) in Faculty of Medicine UGM in a briefing.

EDP-Yogyakarta is a collaboration between Faculty of Medicine UGM, Yayasan Tahija and Monash University, Australia. It is part of EDP-Global, a multi-national collaborative research between Australia, Vietnam, Indonesia, Thailand, Brazil, and China to address dengue disease with Wolbachia bacteria that can replicate the virus in *Aedes aegypti* vector. The programme adopts the method in Australia in the local context of Yogyakarta.

Eggi said that Wolbachia is a natural bacterium that can inhibit dengue virus in *Aedes aegypti* mosquito so the virus cannot transmit into humans. Wolbachia is present naturally in 70 percent of insects, including those that bite humans. The bacteria live in the insect cells and inherited from one generation to another through the eggs.

“Wolbachia is safe for humans and environment. People have been interacting with insects that contain Wolbachia such as rice insects, butterflies, spiders and fruit flies,” said the lecturer in the Faculty.



Now, EDP-Yogyakarta is focusing to produce *Aedes aegypti* mosquitoes with *Wolbachia* through cross-bred. They imported eggs of the *Aedes aegypti* mosquitoes from Australia that has been successful in breeding and releasing mosquitoes with *Wolbachia* to the wild. “Now we’re trying to cross-breed Australian *Aedes aegypti* mosquitoes containing *Wolbachia* with *Aedes aegypti* from Yogyakarta to get 100 percent *Aedes aegypti* *Wolbachia* Yogyakarta,” he said.

Research done since 2010 has produced eight strains of *Aedes aegypti* with *Wolbachia*. The ones used now are WPOPYOG(wMelPop) and WMELYOG (wMel) strains. The other six are cultures. “Research showed *Wolbachia* bacteria can inhibit replications of dengue virus in the *Aedes aegypti* vector. Without *Wolbachia*, as much as 20,000 copies of virus are produced, while with *Wolbachia* 500 copies,” he explained.

How *Aedes aegypti* mosquito with *Wolbachia* is able to inhibit dengue virus in human is explained by Eggi as the mosquito biting a person with dengue virus will absorb the blood and inhibit the growth of the virus by biting another person. This person will not transmit the disease.

“It is planned that in September local *Aedes aegypti* mosquitoes will be released to the wild in selected areas of Yogyakarta. When they copulate with regular mosquitoes, the *Wolbachia* will be inherited to the next generation until all mosquitoes in that area are all containing *Wolbachia*. If all is already, they cannot transmit the virus into humans,” Eggi said. The selected areas are Jomblangan and Singosaren of Banguntapan sub-district in Bantul regency, Kronggahan 1, Kronggahan 2, Karang Tengah, Ponowaren, Mlangi, Nusupan and Biru areas of Sleman regency. “We’re currently awaiting a permit from the local government to release the local mosquitoes into the wild,” he added.

Meanwhile, Prof. Scott O’Neill from EDP Global said that research had been done in Australia since 2000. The *Wolbachia* bacteria were taken from fruit flies through micro-injection. “We had been able to release those mosquitoes in two locations in North Australia and they survived,” he explained.

The success triggered EDP Global to try to transfer the findings to dengue potentially infected regions. “We hope to be able to control dengue transmissions around the world,” he concluded.



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