

Scientists find bacterium can halt dengue virus transmission

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Dengue fever -- caused by a virus transmitted by mosquitoes -- threatens 2.5 billion people each year and there is no vaccine or treatment. New research by Michigan State University entomologists has found that a bacterium can stop dengue viruses from replicating in the mosquitoes.

"In nature, about 28 percent of mosquito species harbor Wolbachia bacteria, but the mosquitoes that are the primary transmitters of dengue, *Aedes aegypti*, have no Wolbachia in them," said Zhiyong Xi, MSU assistant professor of entomology and study author. "We found that Wolbachia is able to stop the [dengue virus](#) from replicating. If there is no virus in the mosquito, it can't spread to people, so disease transmission can be blocked."

The research is published in the April 1 issue of the journal [PLoS Pathogens](#).

In earlier work, Xi and colleagues introduced the Wolbachia bacterium into *Aedes aegypti* mosquitoes by injecting [embryos](#) with this parasite. They have maintained the bacterium in the mosquitoes in the lab for nearly six years because it is passed from mothers to offspring.

When a Wolbachia-infected male mates with an uninfected female, the bacterium causes a reproductive abnormality that triggers early embryo death. Wolbachia doesn't affect embryo development when a female contains the same Wolbachia as a male, so the bacterium can spread quickly, infecting an entire mosquito population.

The Wolbachia bacterium can't be passed from mosquitoes to humans.

Another report with similar results was recently published by Australian researchers, though the groups used different strains of the Wolbachia bacterium.

"The strain we used has a 100 percent maternal

transmission rate and causes the mosquitoes to live slightly longer," Xi explained. "The strain the Australian researchers used causes the mosquitoes to die a bit sooner. There are advantages to both. The longer the mosquitoes live, the more likely they are to pass on the Wolbachia infection to their offspring and infect the entire population in a shorter timeframe. But if the mosquitoes die earlier, they can't bite people and transmit the dengue virus.

"In both instances, the results demonstrate the potential using the Wolbachia bacterium as a control method for dengue virus."

Xi and colleagues, including Guowu Bian, a post-doctoral research associate in Xi's lab who conducted much of the research for this study, are now working to understand how the Wolbachia [bacterium](#) stops the dengue virus from replicating in [mosquitoes](#).

"Only when we know the mechanisms underlying Wolbachia-mediated viral interference, will we be able to why it's happening and further improve the efficiency of the viral interference," he said.

While dengue fever is rare in the continental United States, Hawaii was the site of a dengue epidemic in 2001. Overall, about one-third of the world's population is at risk of contracting dengue fever and up to 100 million people are infected each year. While most people recover in about two weeks, the infection can turn into dengue hemorrhagic fever, which causes bleeding from the nose and gums and can be fatal.

Provided by Michigan State University

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