

Wolbachia bacteria reduce parasite levels and kill the mosquito that spreads malaria

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Wolbachia are bacteria that infect many insects, including mosquitoes. However, *Wolbachia* do not naturally infect *Anopheles* mosquitoes, which are the type that spreads malaria to humans.

Researchers at the Johns Hopkins Bloomberg School of Public Health found that artificial infection with different *Wolbachia* strains can significantly reduce levels of the human malaria parasite, *Plasmodium falciparum*, in the mosquito, *Anopheles gambiae*. The investigators also determined that one of the *Wolbachia* strains rapidly killed the mosquito after it fed on blood. According to the researchers, *Wolbachia* could potentially be used as part of a strategy to control malaria if stable infections can be established in *Anopheles*. Their study is published in the May 19 edition *PLoS Pathogens*.

"This is the first time anyone has shown that *Wolbachia* infections can reduce levels of the human malaria parasite (*Plasmodium falciparum*) in *Anopheles* mosquitoes," said Jason Rasgon, PhD, senior author of the study and associate professor with the Johns Hopkins Malaria Research Institute and the Bloomberg School's W. Harry Feinstone Department of [Molecular Microbiology](#) and Immunology.

For the study, Rasgon and his colleagues infected [Anopheles gambiae](#) mosquitoes with two different *Wolbachia* strains (wMelPop and wAlbB). After infection, *Wolbachia* disseminated widely in the mosquitoes and infected diverse tissues and organs. *Wolbachia* also seemed to actively manipulate the mosquito's immune system to facilitate its own replication. Both *Wolbachia* strains were able to significantly inhibit malaria parasite levels in the mosquito gut. Although not virulent in sugar-fed mosquitoes, the wMelPop strain killed most mosquitoes within a day after the mosquito was blood-fed.

"These experiments show that *Wolbachia* could be used in multiple ways to control malaria, perhaps

by blocking transmission or by killing infected mosquitoes," said Rasgon.

Worldwide, malaria afflicts more than 225 million people. Each year, the disease kills nearly 800,000, many of whom are children living in Africa.

More information: "Wolbachia infections are virulent and inhabit the human malaria parasite *Plasmodium falciparum* in *Anopheles gambiae*", *PLoS Pathogens*.

Provided by Johns Hopkins University Bloomberg School of Public Health

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