

Bacteria block transmission of Zika and Dengue viruses

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Credit: Medical Research Council

Scientists at the University of Glasgow's MRC Centre for Virus Research (CVR) have found a bacterial strain which blocks dengue and Zika virus transmission from mosquitoes.

In a new study, published in *PLOS Pathogens*, the scientists show that a [novel strain](#) of the inherited bacteria, called Wolbachia, strongly blocks transmission of dengue and Zika virus in [infected mosquitoes](#). This finding could offer a potential alternative to strains already being tested as virus control tools.

The scientists have already carried out the research in the mosquito species *Aedes aegypti*, notorious for spreading several dangerous human viruses, including dengue, Zika and chikungunya.

Previous research in the scientific community has shown that transmission of these viruses among [mosquitoes](#) is stalled if the flies are deliberately infected with one strain of Wolbachia bacteria. With this knowledge, several countries are testing whether infecting local mosquito populations with Wolbachia could lead to lower rates of viral disease in humans.

This time, the MRC scientists in Glasgow found that a novel strain – called 'wAu' – is even more effective for virus transmission blocking than the strains currently being used. The effect is emphasised in hot, tropical climates where there is a high prevalence of these diseases.

Lead researcher, Professor Steve Sinkins, specialising in microbiology and tropical medicine at the MRC CVR, said: "The Wolbachia transmission blocking strategy shows great promise for the control of mosquito-borne viruses, and is now starting to be deployed on a large scale in a number of tropical countries.

"Our results with the wAu strain showed by far the effective transmission blocking for all the viruses we tested, and it provides an exciting new option to explore for disease control programmes."

Several Wolbachia strains have already been tested in the field, but there is evidence to suggest that some strains may not block transmission very effectively or may not be inherited efficiently at high ambient temperatures. In the new study, the research team performed laboratory experiments to test the potential promise of alternative Wolbachia strains.

The researchers introduced four Wolbachia strains into *Aedes aegypti* mosquitoes, which do not naturally carry these arthropod-infecting bacteria. Two of the strains, wMel and wAlbB had already been evaluated in prior studies, and the scientists wanted to compare their effects with those of two novel strains, wAu and wAlbA.

The analysis revealed particularly promising results for strain wAu. After feeding on blood infected with dengue or Zika [virus](#), mosquitoes infected with wAu had lower levels of viral RNA in their body tissue than did mosquitoes infected with the other [strains](#). wAu also showed very high rates of inheritance, including under high-temperature conditions.

Professor Sinkins holds a Global Challenges Research Fund (GCRF) grant, which is jointly awarded by the Biotechnology and Biological Sciences and Medical Research Councils (BBSRC and MRC). With the funding, he will lead a global network studying vector-borne diseases, such as malaria, dengue and Zika. The goal is to reduce and block the [transmission](#) of pathogens by releasing specific insect [disease](#) vectors.

Dr. Jonathan Pearce, Head of Infections and Immunity at the MRC, said: "This is incredibly relevant research with implications that can be applied to pressing issues on the ground in many parts of the world. These findings may be key to uncovering a new tool in the fight against the spread of mosquito-borne diseases.

"Meanwhile, the international network is pulling together experts from a wide range of scientific disciplines to exchange knowledge and brainstorm promising new ways to target vector-borne diseases."

Future research could explore strategies to maximize the effectiveness of wAu in the field, such as combining it with a second strain to help it spread throughout local mosquito populations.

More information: Thomas H. Ant et al. The Wolbachia strain wAu provides highly efficient virus transmission blocking in *Aedes aegypti*, *PLOS Pathogens* (2018). [DOI: 10.1371/journal.ppat.1006815](https://doi.org/10.1371/journal.ppat.1006815)

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