

Researchers determine how mosquitoes survive dengue virus infection

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Colorado State University researchers have discovered that mosquitoes that transmit deadly viruses such as dengue avoid becoming ill by mounting an immediate, potent immune response. Because their immune system does not eliminate the virus, however, they are able to pass it on to a new victim.

In a study published February 13 in the open-access journal *PLoS Pathogens*, the researchers show that RNA interference - the mosquito immune response -- is initiated immediately after they ingest blood containing dengue virus, but the virus multiplies in the mosquitoes nevertheless.

Dengue fever and dengue hemorrhagic fever are major global public health burdens, with up to 100 million cases occurring annually, yet no vaccines or specific preventative medicines are currently available. The *Aedes aegypti* mosquito transmits dengue virus. Determining how the virus evades the mosquito's defense is an important next step in research that aims to fight disease by interrupting the growth of dengue virus within the mosquito before it can be transmitted.

RNA interference is an evolutionarily ancient antiviral defense used by mosquitoes and other invertebrates to destroy the RNA of many invading arthropod-borne viruses. This team of researchers previously showed that ramping up the RNA interference response in mosquitoes prevented dengue infection, and now they show that temporarily impairing this immune response increased virus transmission.

The investigators analyzed RNA from adult mosquitoes, finding that both the trigger and initiator molecules for RNA interference were formed after infection, yet viral RNA could readily be detected in the same mosquitoes. They also measured infectious virus rates in the mosquitoes' saliva, which revealed levels whereby the mosquitoes could transmit the disease to humans.

These findings indicate that genetic manipulation of RNA interference could be a significant weapon in stopping dengue virus transmission by *Aedes aegypti*.

Sa'nchez-Vargas I, Scott JC, Poole-Smith BK, Franz AWE, Barbosa-Solomieu V, et al. (2009) Dengue Virus Type 2 Infections of *Aedes aegypti* Are Modulated by the Mosquito's RNA Interference Pathway. *PLoS Pathog* 5(2): e1000299. doi:10.1371/journal.ppat.1000299
[dx.plos.org/10.1371/journal.ppat.1000299](https://doi.org/10.1371/journal.ppat.1000299)

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