

## Mozzie protein alert to invading viruses

**CSIRO scientists have discovered how mosquitoes develop viral immunity, potentially leading to improved vaccines, and other control measures, for mosquito-borne viruses such as dengue and West Nile virus that may expand their distribution in Australia under climate change.**



Credit: CSIRO

Through the [research](#), published in the *Proceedings of the National Academy of Sciences of the USA* (PNAS), the team from CSIRO's Australian Animal Health Laboratory showed that Vago, a protein previously identified in fruit flies, is released by infected mosquito cells and provides a warning to other cells to defend against the invading virus.

Mosquito-transmitted emerging viruses such as dengue, Japanese encephalitis and West Nile threaten the health of our people, livestock and wildlife. Globally, dengue infects 50-100 million people and results in around 22,000 deaths annually.

According to CSIRO's Professor Peter Walker, these insect vectors present a particular biosecurity risk for Australia as they are rapidly spreading into new areas driven by a number of factors including climate change and increased travel and trade.

'Difficulties in generating safe and effective vaccines for many of these pathogens present significant challenges due to their complex ecology and the range of hosts the viruses can infect,' Professor Walker said.

'Until now, very little was known about the defensive anti-viral response of insects. Unlike humans and other mammals, insects lack key components of the immune response including antibodies, T-cells and many important

cytokines, such as interferon,' he said.

Using West Nile Virus as their infection model, the research team has demonstrated that, although unrelated structurally, Vago acts in mosquitoes like human interferon.

'Mosquito cells can sense the presence of a virus by detecting its small genome, stimulating the secretion of Vago. The secreted Vago then binds to receptors on other cells, signalling an anti-viral defensive response to limit the infection,' Professor Walker said.

'This is the first demonstration that such a mechanism exists in mosquitoes or any other invertebrate.

'We are now looking at how viruses such as West Nile and dengue overcome the defensive response of the mosquito and how we can use this knowledge to increase resistance to infection and decrease the efficiency of disease transmission,' he said.

CSIRO will also use this new knowledge to explore the use of Vago for the control of viruses in invertebrate aquaculture species including prawns and abalone.

This work is part of CSIRO's ongoing commitment to protect Australia from the biosecurity problems and risks posed by serious diseases.

Source: CSIRO

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