Vaccinating against dengue may increase Zika outbreaks

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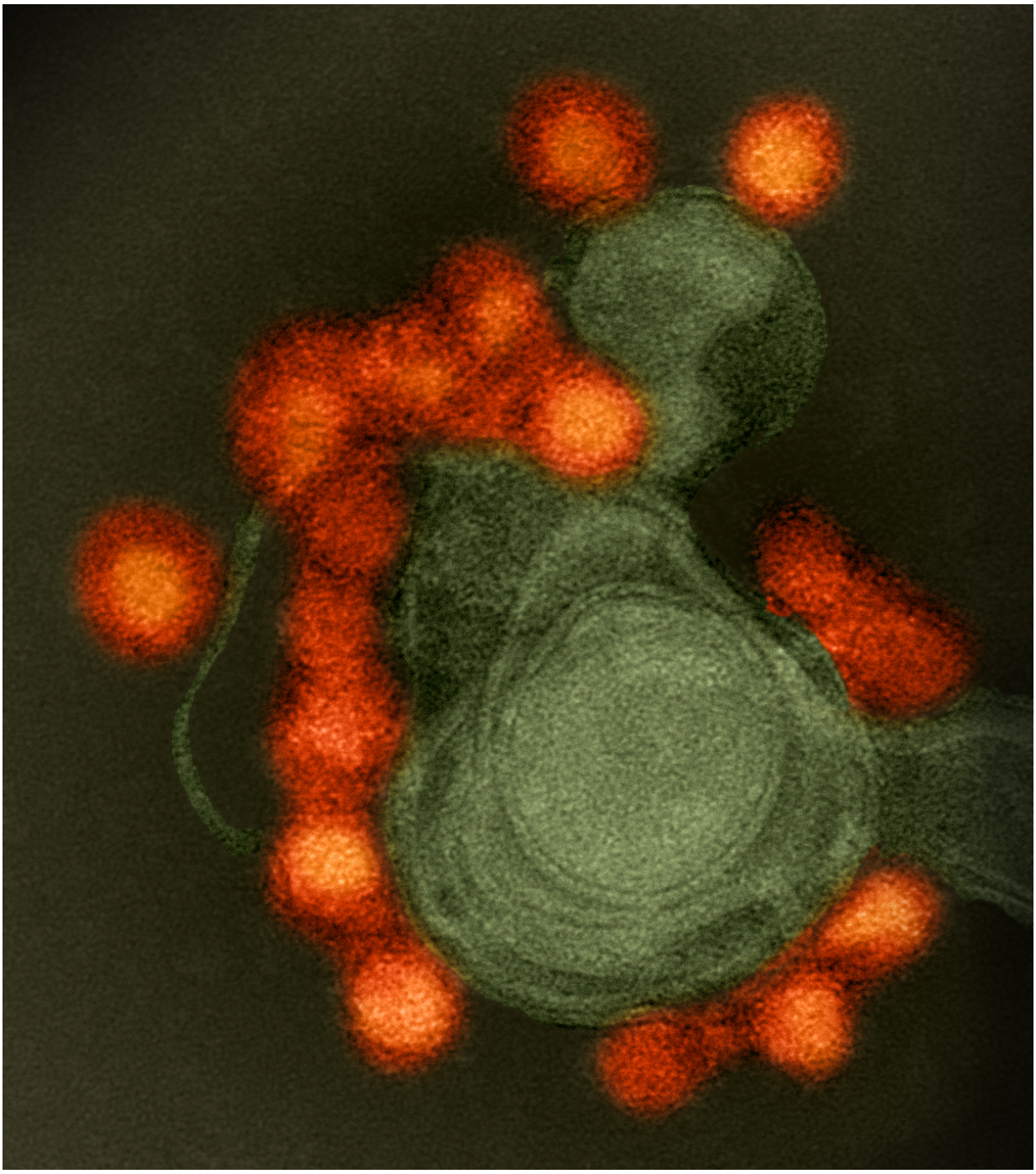

Transmission electron microscope image of negative-stained, Fortaleza-strain Zika virus (red), isolated from a microcephaly case in Brazil. The virus is associated with cellular membranes in the center. Credit: NIAID

Vaccinating against dengue fever could increase outbreaks of Zika, suggests new research out of York University and Xi'an Jiaotong University in China.

The research identifies a potentially serious public health concern. More than a third of the world's population lives in areas where dengue is endemic and cases of co-infection with Zika have already been reported.

Conducted at York University's Laboratory for Industrial and Applied Mathematics using mathematical modelling, the research was led by Biao Tang, an exchange PhD student from Xi'an Jiaotong University, in collaboration with York Professor Jianhong Wu and Tang's supervisor, Professor Yanni Xiao at Xi'an Jiaotong University. As dengue and Zika are both part of the Flaviviridae family transmitted through a common mosquito host, the researchers wanted to know how vaccinating for one would affect the incidence of the other.

"Vaccinating against one virus could not only affect the control of another virus, it could in fact make it easier for the other to spread," says Wu. "Recent evidence suggests that dengue virus antibodies can enhance the Zika virus infection. For that reason, we developed a new math model to investigate the effect of dengue vaccination on Zika outbreaks."

The paper, "Implication of vaccination against dengue for Zika outbreak," was published in *Scientific Reports*.

The team's model shows that vaccinations for dengue increase the number of people contracting Zika. It also shows that the more people in a particular population that are vaccinated against dengue, the earlier and larger the Zika outbreak. The research also found that the most effective way to minimize the unintended effect of dengue vaccinations on Zika outbreaks is through an integrated strategy that includes mosquito

control.

"We concluded that vaccination against dengue among humans can significantly boost Zika transmission among the population and hence call for further study on integrated control measures on controlling dengue and Zika outbreak," says Xiao.

The researchers note their findings do not discourage the development and promotion of dengue vaccine products, however, more work needs to be done to understand how to optimize dengue vaccination programs and minimize the risk of Zika outbreaks.

According to the World Health Organization, the global incidence of dengue has grown dramatically in recent decades, with about half of the world's population now at risk. In some Asian and Latin American countries, severe dengue is a leading cause of serious illness and death among children. Whereas the outbreaks of Zika have occurred in Africa, the Americas, Asia and the Pacific, and has been linked to microcephaly and Guillain-Barré syndrome. Although vaccines for dengue have been developed and are in use, there is no vaccine for Zika.

Provided by York University

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