

Scientists unlock the secret behind a decades-old dengue mystery

September 3 2024



Allyson Choi examining cell cultures in the lab. Credit: Duke-NUS Medical School

Like many good detectives, Duke-NUS Integrated Biology and Medicine Ph.D. Program candidate Allyson Choi was undaunted when she was handed a decades-old cold case: a 1970s outbreak of dengue in the South Pacific.

The outbreak had started with a large cluster of severe cases that had initially been concentrated in Tahiti, New Caledonia, Fiji and the Niue islands. But by the time it spread to Tonga, the majority of patients were asymptomatic, with many experiencing only mild or no illness.

Determined to get to the bottom of the mystery, Choi set out to analyze the batch of wild-type [dengue](#) virus 2 isolates collected by Duke-NUS Emeritus Professor Duane Gubler.

"I wanted to investigate the [genetic mutations](#) that might have led to such drastic changes in epidemic outcome," she explained.

Working under Professor Ooi Eng Eong's supervision at the Duke-NUS Emerging Infectious Diseases Program, she pinpointed a mutation in the dengue virus' genome as the root cause, which impaired the virus' ability to replicate in [human cells](#), resulting in a low virus load and asymptomatic infections in patients.

The very same mutation however, greatly enhanced the virus' ability to infect the *Aedes aegypti* mosquitoes, which enabled the virus to be transmitted in Tonga without triggering an outbreak.

"The finding shows that even as little as a single mutation can have profound effects on virus transmission and infection outcome in terms of disease," explained Prof Ooi.

This study, which forms Choi's Ph.D. project earned her a [publication](#) in *Science Translational Medicine*.

"It is a great honor. As a student, the learning curve to becoming a competent researcher was steep. Fortunately, my colleagues in Prof Ooi's lab were tremendously helpful. Prof Ooi was also patient and gave me valuable guidance throughout my project. I am thankful for all the

opportunities, people and blessings that have come my way.

"Building on the contributions of many others, I hope this study offers additional value and insight to our understanding of dengue [virus](#) evolution," says Choi.

More information: Allyson N. X. Choi et al, A prM mutation that attenuates dengue virus replication in human cells enhances midgut infection in mosquitoes, *Science Translational Medicine* (2024). [DOI: 10.1126/scitranslmed.adk4769](https://doi.org/10.1126/scitranslmed.adk4769)

Provided by Duke-NUS Medical School

Citation: Scientists unlock the secret behind a decades-old dengue mystery (2024, September 3) retrieved 5 September 2024 from <https://medicalxpress.com/news/2024-09-scientists-secret-decades-dengue-mystery.html>

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