Advances in Singapore’s Zika and dengue fight

Scientists’ success in mapping out structure of viruses crucial for developing treatments

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Singapore scientists have succeeded in mapping out the structures of the dengue and Zika viruses, providing a crucial step for the development of treatments for the potentially deadly diseases.

Researchers from A*Star’s Agency for Science, Technology and Research (ASTAR) Genome Institute of Singapore (GIS), together with the University of Oxford and the National University of Singapore, have succeeded in mapping the long genetic material of four dengue and four Zika viruses.

They studied the viruses’ activities and viral parts to identify proteins that could be targeted for treatments.

Professor Ng Kwok Yung, principal investigator at GIS and lead author of the study, said: “One needs to understand the shape and mechanism of a virus in order to design drugs that will stop it from replicating.”

An understanding of the shapes and structures of the dengue and Zika viruses will aid in designing drugs to stop the viruses from replicating.

Dr. Ng said the structures of dengue and Zika are flaviviruses spread by the Aedes mosquito. There are no effective treatments for either disease.

Singapore is a major dengue hot-spot, and 3,437 dengue fever cases were reported in the first three months of the year, while dengue-related deaths were reported in the same period.

Worldwide, the incidence of dengue has grown dramatically, with some researchers estimating 300 million dengue infections a year.

Zika hit the headlines during an epidemic in 2015 and 2016, with reports of above health effects including birth defects.

These included irreversible birth defects such as microcephaly, when a baby is born with a skull that is smaller than normal. Researchers also found that in areas where climate change is warming up the tropics, up to a billion more people could be exposed to mosquito-carrying vectors, including dengue, Zika and yellow fever.

In addition, the A*Star researchers are working to develop vaccines and to control the virus by using genetic engineering to stop the virus from spreading.

In another effort that will help control dengue and other mosquito-borne diseases, the scientists at A*Star are collaborating with the Environmental Health Institute of the National Environment Agency, and the National Institute of Agrobiological Resources, Japan, to develop a vaccine that will stop the spread of the virus in elderly people.

The vaccine has the potential to stop the spread of the virus in a single shot, and the researchers have started a trial involving several thousand people in the country.

The researchers also created a genetic engineering vaccine that can be used to produce multiple flavivirus infections using a small volume of blood in a single test, the results of which are clear within a week.

The vaccine works by attacking a particular protein, called E1, which is covered by flavivirus proteins and is unique to each virus.

Currently, each flavivirus requires a specific vaccine, but A*Star has succeeded in combining several of them into a single vaccine.

Dr. Ng said: “This will make it easier to develop vaccines against multiple flaviviruses, including dengue and Zika, at the same time.”

The vaccine has been approved by the WHO and is undergoing trials in Singapore.

Globally, there are about 200 million cases of dengue every year, with 2.5 million cases of severe dengue and 29,000 deaths.