

Virus-like particle vaccine protects monkeys from chikungunya virus

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(PhysOrg.com) -- An experimental vaccine developed using non-infectious virus-like particles (VLP) has protected macaques and mice against chikungunya virus, a mosquito-borne pathogen that has infected millions of people in Africa and Asia and causes debilitating pain, researchers at the National Institutes of Health have found.

Scientists at the National Institute of Allergy and Infectious Diseases (NIAID) developed the vaccine because there is no vaccine or treatment for chikungunya [virus infection](#). Details about the vaccine were published today in the online version of [Nature Medicine](#).

"Increases in global travel and trade, and possibly climate change, may be contributing to the spread of disease-carrying mosquitoes into new areas," says NIAID Director Anthony S. Fauci, M.D. "Finding safe and effective human vaccines for chikungunya virus and other insect-borne pathogens is an important global health priority."

To develop the vaccine, scientists in NIAID's Vaccine Research Center (VRC) identified the proteins that give rise to chikungunya VLPs. The VLPs mimic actual [virus particles](#) but cannot cause infection, so they can be used safely as a vaccine to elicit immune responses. The researchers immunized rhesus macaques with the VLPs, waited 15 weeks before exposing the animals to chikungunya virus, and observed that the vaccine provided complete protection from infection.

When the group found that antibodies were responsible for [immune](#)

[protection](#), they transferred antibody-containing serum from the vaccinated macaques to mice with deficient immune systems. The mice then were exposed to a lethal dose of chikungunya virus, but the immune serum protected them from infection.

"This virus-like particle vaccine provides a promising way to protect against an emerging infectious disease threat," says VRC Director Gary Nabel, M.D., Ph.D. "This same approach could possibly extend to viruses related to chikungunya that cause fatal diseases such as encephalitis." Dr. Nabel says his group plans to seek approval for clinical trials to further evaluate the safety and efficacy of the vaccine in humans.

There are two VLP vaccines for other diseases approved by the Food and Drug Administration: one for hepatitis B and one for human papillomavirus. This study marks the first time that scientists have used VLPs in a [vaccine](#) to protect against chikungunya virus, which is in the genus Alphavirus. The group plans to determine whether VLPs will work against other alphaviruses, such as Western and Eastern equine encephalitis virus found in the United States and o'nyong-nyong [virus](#) found in Africa.

More information: W Akahata et al. A VLP vaccine for epidemic Chikungunya virus protects non-human primates against infection. *Nature Medicine*. [DOI: 10.1038/nm.2105](https://doi.org/10.1038/nm.2105) (2010)

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