

New research shows vaccine protection against Zika virus

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Credit: National Cancer Institute

The rapid development of a safe and effective vaccine to prevent the Zika virus (ZIKV) is a global priority, as infection in pregnant women has been shown to lead to fetal microcephaly and other major birth defects. The World Health Organization declared the Zika virus epidemic a global public health emergency on February 1, 2016.

In a paper published today in the journal *Nature*, a research team led by scientists at Beth Israel Deaconess Medical Center (BIDMC), in collaboration with scientists at Walter Reed Army Institute of Research (WRAIR) and the University of Sao Paulo, demonstrates that two different ZIKV [vaccine candidates](#) provided complete protection in mice against a ZIKV strain from Brazil and suggest that a ZIKV vaccine for humans will likely be feasible.

ZIKV is a member of the flavivirus family of viruses. Transmitted by mosquitoes, ZIKV is responsible for an unprecedented epidemic in the Americas. This family of viruses also includes West Nile [virus](#), yellow fever virus, Japanese encephalitis virus, tick-borne encephalitis virus, and dengue viruses, for which successful vaccines have been developed.

"Our data demonstrate that a single dose of a DNA vaccine or a purified inactivated virus vaccine provides complete protection against the ZIKV challenge in mice," said senior author Dan H. Barouch, MD, PhD, Director of the Center for Virology and Vaccine Research at BIDMC, Professor of Medicine at Harvard Medical School, and Steering Committee member at the Ragon Institute of MGH, MIT and Harvard. "Importantly, we showed that vaccine-induced antibodies provided protection, similar to existing vaccines for other flaviviruses."

The researchers tested two vaccine candidates: a DNA vaccine developed in the Barouch laboratory at BIDMC, and a purified inactivated virus vaccine developed at WRAIR. The DNA vaccine used gene sequences from a ZIKV strain from Brazil to elicit immune responses.

Four weeks following vaccination, mice were exposed to the Brazilian strain of ZIKV, which had previously been shown to cause defects in fetal mice similar to those observed in ZIKV infected humans. All vaccinated mice were protected from ZIKV replication. Other mice

were vaccinated and exposed to infection eight weeks later and were also protected from infection.

"The explosion of the current ZIKV outbreak and the devastating clinical consequences for fetuses in pregnant women who become infected demand the urgent development of a ZIKV vaccine," said Barouch. "The effectiveness of these vaccines, the clarity of the antibody protection and the similarity to successful vaccines that have been developed for other flaviviruses provide substantial optimism for a clear path forward for the development of a safe and effective ZIKV vaccine for humans." Clinical trials to test these vaccine candidates are expected to begin later this year.

The studies described in this paper were conducted in under four months, and flexible philanthropic funding was critical to this effort.

"This exciting research proves the critical role that philanthropy can play in accelerating medical advances," commented Terry Ragon, founder of the Ragon Institute. "I am delighted that the flexible funding my wife Susan and I have provided has contributed to this incredibly timely and important demonstration of [vaccine](#) protection for this global health emergency."

More information: Rafael A. Larocca et al. Vaccine protection against Zika virus from Brazil, *Nature* (2016). [DOI: 10.1038/nature18952](#)

Provided by Beth Israel Deaconess Medical Center

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