Early study finds antibody that 'neutralizes' Zika virus

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A researcher holds a tray of Zika virus growing in animal cells at Washington University School of Medicine in St. Louis. There is no treatment available to block Zika virus in a pregnant woman from infecting her fetus and potentially causing severe birth defects. But researchers have identified a human antibody that prevents, in pregnant mice, the fetus from becoming infected and the placenta from being damaged. The antibody also protects adult mice from Zika disease. Credit: Huy Mach

Researchers at Vanderbilt University Medical Center and Washington University School of Medicine in St. Louis, Missouri, have isolated a human monoclonal antibody that in a mouse model "markedly reduced" infection by the Zika virus.

The antibody, called ZIKV-117, also protected the fetus in pregnant mice infected with the virus, the researchers reported today in the journal *Nature*. Zika is believed to cause microcephaly, unusually small heads, and other congenital malformations in children born to infected women.

Similar protection studies in primates are warranted, and if the findings hold up, ZIKV-177 could be developed as a protective antibody treatment for pregnant women at risk of Zika infection, the researchers concluded.

The findings may also aid efforts to develop an effective anti-Zika vaccine, said James Crowe Jr., M.D., director of the Vanderbilt Vaccine Center and co-corresponding author of the paper with Michael S. Diamond, M.D., Ph.D., at Washington University.

"These naturally occurring human antibodies isolated from humans represent the first medical intervention that prevents Zika infection and damage to fetuses," said Crowe, who also is Ann Scott Carell Professor in the Departments of Pediatrics and Pathology, Microbiology & Immunology in the Vanderbilt University School of Medicine.

"We're excited because the data suggests we may have antibody treatments in hand that could be developed for use in pregnant women," he said.

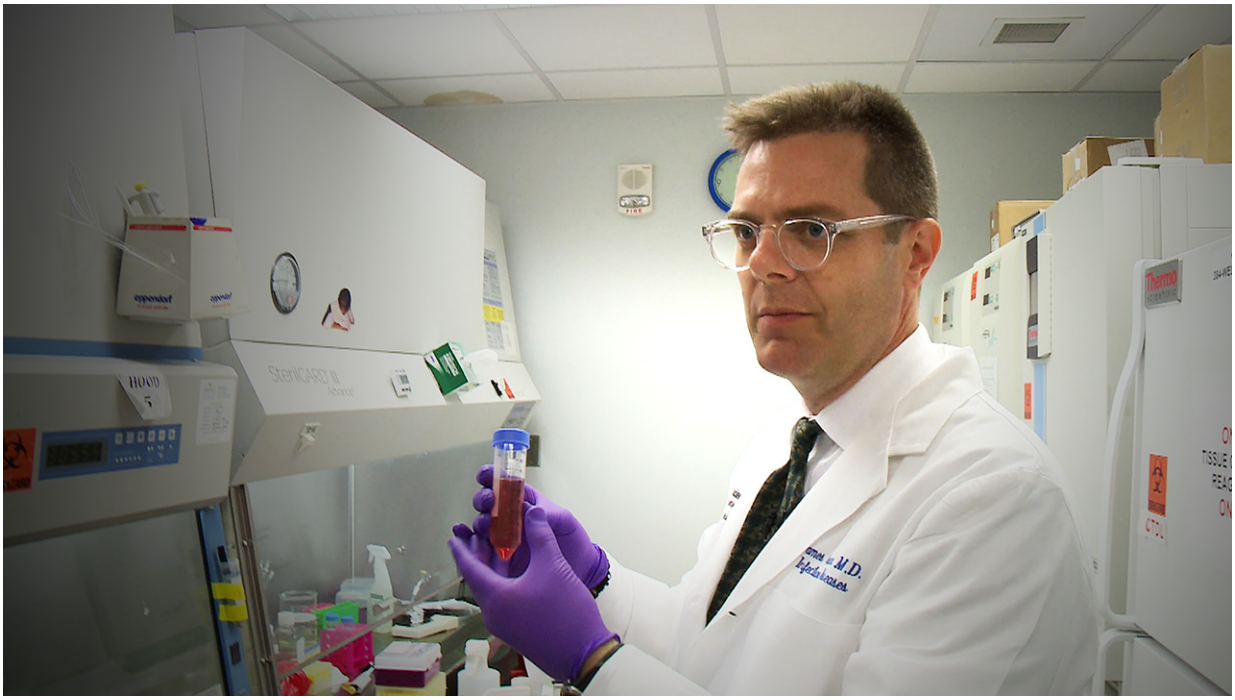
"The remarkable potency and breadth of inhibition by ZIKV-117 has great promise," Diamond said, "as it was able to inhibit infection by

strains from both Africa and America in cell culture and in animals, including during pregnancy."

Diamond is associate director of The Andrew M. and Jane M. Bursky Center for Human Immunology & Immunotherapy Programs at Washington University.

Zika is a mosquito-borne virus that has emerged as a global public health threat. In addition to its association with congenital birth defects, Zika has been linked to Guillain-Barre syndrome, a neurological disorder that can lead to paralysis and death.

Since a major outbreak was reported in Brazil last year, Zika infections transmitted by mosquitoes have been reported throughout Africa, Asia, the Pacific, and the Americas, including Miami-Dade County, Florida.



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James Crowe Jr., M.D., director of the Vanderbilt Vaccine Center. Credit: Vanderbilt University Medical Center

During the past 15 years, Crowe and his colleagues have developed a high-efficiency method for isolating human monoclonal antibodies that has enabled to them identify neutralizing antibodies against a wide range of viral infections, from Ebola to HIV.

The Crowe and Diamond laboratories have collaborated recently on several projects including the generation of protective human monoclonal antibodies against Dengue, West Nile, Chikungunya and now Zika viruses.

Monoclonal antibodies are made from a single clone of B cells, a type of white blood cell, that have been fused to myeloma (cancer) cells to form fast-growing "hybridomas." This allows researchers to quickly generate large quantities of antibodies against specific viral targets.

In the current study, the researchers isolated antibodies from the blood of people who'd been previously infected with the Zika virus in different parts of the world. The antibodies reacted to the envelope or "E" protein on the surface of the virus.

The researchers then generated a variety of monoclonal antibodies. In cell culture studies, they identified one, ZIKV-117, which broadly neutralized several different strains of the virus. In mice infected by the Zika virus, injection of the antibody markedly reduced disease and mortality, and reduced transmission from mother to fetus.

More information: Gopal Sapparapu et al. Neutralizing human antibodies prevent Zika virus replication and fetal disease in mice,

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