

NOVEL CONSENSUS DNA VACCINE INDUCES PROTECTIVE IMMUNITY AGAINST ZIKA VIRUS

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Significant concern has been raised over the past two years from the increased global spread of the mosquito-borne flavivirus, Zika (ZIKV). Accompanying this spread has been an increase in cases of the devastating birth defect microcephaly as well as cases of Guillain-Barre syndrome in adults in many affected countries. Additional concerns have been raised by recent findings indicating that ZIKV can also be sexually transmitted which increases the exposure risk for a virus without a vaccine or current therapy. Here we describe the development of a novel synthetic DNA consensus antigen-based vaccine targeting the pre-membrane + envelope proteins of ZIKV.

Following construct expression confirmation, we found that mice and non-human primates generated ZIKV-specific cellular and humoral immune responses, including neutralization antibody responses, following electroporation-enhanced delivery of the vaccine. Immunization of mice lacking receptors for interferon (IFN)- α/β immunization with this DNA vaccine provided 100% protection against weight loss, death, and pathology in brain tissue following ZIKV challenge. Additionally, passive transfer of non-human primate anti-ZIKV immune serum protected IFNAR^{-/-} mice against subsequent viral challenge.

This initial study in NHPs and in a pathogenic mouse model supports the importance of immune responses targeting prME in ZIKV infection and suggests that additional research on this vaccine approach may have relevance for ZIKV control in humans. This represents the first ZIKV vaccine approved for human trials.