

JOINT EVENT

10th International Virology Summit
&
4th International Conference on Influenza & Zoonotic Diseases
July 02-04, 2018 | Vienna, Austria

Maternal immunization with a DNA vaccine candidate elicits specific passive protection against post-natal Zika virus infection in immunocompetent BALB/c mice

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Zika virus (ZIKV) infection is closely associated in the fetus with microcephaly and in the adults with Guillain-Barré syndrome and even male infertility. It is an urgent international priority to develop a safe and effective vaccine that offers protection to both women of childbearing age and their children. In this study, female immunocompetent BALB/c mice were immunized with a DNA-based vaccine candidate, pVAX1-ZME, expressing the prM/E protein of ZIKV, and the immunogenicity for maternal mice and the post-natal protection for suckling mice were evaluated. It was found that vaccination with three doses of 50 µg pVAX1-ZME via electroporation induced robust ZIKV-specific cellular and long-term humoral immune responses with high and sustained neutralizing activity in adult mice. Moreover, using a maternal immunization protocol, neutralizing antibodies provided specific passive protection against ZIKV infection in neonatal mice and effectively inhibited the growth delay. This vaccine candidate is expected to be further evaluated in higher animals, and maternal vaccination shows great promise for protecting both women of childbearing age and their offspring against post-natal ZIKV infection. The vaccinated mothers and ZIKV-challenged pups provide key insight into Zika vaccine evaluation in an available fully immunocompetent animal model.

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