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A single-dose live-attenuated vaccine prevents Zika virus pregnancy transmission and testis damage

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Zika virus (ZIKV) infection during pregnancy can cause congenital abnormities or fetal demise. The persistence of ZIKV in the male reproductive system poses a risk of sexual transmission. Here, we demonstrate that live-attenuated ZIKV vaccine candidates containing deletions in the 3' untranslated region of the ZIKV genome (ZIKV-3'UTR-LAV) prevent viral transmission during pregnancy and testis damage in mice, as well as infection of non-human primates. After a single-dose vaccination, pregnant mice challenged with ZIKV at embryonic day 6 (E6) and evaluated at E13 show markedly diminished levels of viral RNA in maternal, placental, and fetal tissues. Vaccinated male mice challenged with ZIKV were protected against testis infection, injury and oligospermia. A single immunization of rhesus macaques elicited a rapid and robust antibody response, conferring complete protection upon challenge. Furthermore, the ZIKV-3'UTR-LAV vaccine candidates have a desirable safety profile. These results suggest that further development of ZIKV-3'UTR-LAV is warranted for humans.

Biography

Pei-Yong Shi, PhD, is I.H. Kempner Professor of Human Genetics, University of Texas Medical Branch, Galveston Texas, USA. He is also adjunct Professor of Emerging Infectious Diseases at the Duke-NUS Graduate Medical School in Singapore and Honorary Professor at the Wuhan Institute of Virology, Chinese Academy of Sciences. He received his Ph.D. in virology in 1996 from Georgia State University. After postdoctoral training at Yale University, he joined Bristol-Myers Squibb as a Principal Scientist to develop HIV and HCV therapeutics from 1998 to 2000. he served as Dengue Unit Head and Executive Director to lead drug discovery at Novartis Institute for Tropical Diseases. His group developed the first infectious clones of the epidemic strain of West Nile virus and Zika virus, discovered two RNA cap methylation activities of flavivirus NS5 protein, identified essential RNA elements for flavivirus replication, established various platforms for flavivirus vaccine and drug discovery, and pioneered therapeutics development for dengue virus. He has published over 210 peer-reviewed articles and served as Editor (ACS Infectious Diseases, Journal of General Virology, and Nature Vaccine) and Editorial Board member (Journal of Virology, Virology, and Antiviral Research). He is internationally recognized for his scholar and administrative accomplishments at leading research institution, public health sector, and pharmaceutical industry.

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