

Design and improve foot-and-mouth disease vaccine properties by reverse genetic system

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Foot-and-mouth disease (FMD) is a contagious disease of cloven-hoofed animals, it leads to enormous economic loss worldwide. One of the most important measures to control and prevent FMD is the whole-virus inactivated vaccines. Virus isolation from field and acclimation are the traditional methods to get virus seeds for FMDV vaccine, but it is very difficult and time wasting to select proper virus seeds for vaccine production. To solve the above problems and enhance FMD vaccine properties, An efficient viral recovery system based on RNA polymerase I was developed, it's an efficient tool that one plasmid express infective FMDV. There were many topologies within one FMDV serotype, only very low cross protection among them. In order to broaden antigen spectrum for FMD vaccine serotype O, we construct recombinant virus (Re-O/wide spectrum) which contains antigen site 4 (from Cathay topology), site 2 (from PanAsia1), site 3 (from PanAsia1) and site 1+5 (from SEA). Vaccine made of Re-O/wide spectrum virus can provide complete protection under the challenge of FMDV from topology of Cathay, PanAsia1 and SEA. FMD serotype A (A/WH/CHA/09) was outbreaked in China 2009, but TCID₅₀ of the virus isolated from field was very low, it can't be used as the seed of vaccine production. Results of sequence analysis indicated that mutants of SL structure in 3'UTR happened. Previous researches showed that SL play crucial role in the growth of FMDV and mutated SL lead to low replication in vivo and vitro. Based on previous researches, to increase growth properties SL reverse mutation virus (Re-A/WH/CHA/09) was constructed. Growth properties showed TCID₅₀ of Re-A/WH/CHA/09 was higher than wild type A/WH/CHA/09, it changed from 10^{7.5} to 10^{4.3}. Vaccine made of Re-A/WH/CHA/09 virus can provide complete protection with A/WH/CHA/09 FMDV challenge. On the basis of above results, conclusions can be made that reverse genetic technology was a powerful tool for FMD vaccine design and improvement.

Biography:

Keshan Zhang received his bachelor degree in animal medicine (2003) from Henan Agricultural University, obtained his Ph.D degree in preventive veterinary medicine (2008) from Huazhong Agricultural University. As a postdoctor in China animal disease control center (2011-2013), and a visiting scholar in Tufts Cummings School of Veterinary Medicine in MA USA (2013-2014). His research interest focus on the inflammatory signal pathways related to FMDV infection and FMD vaccine development. In recent 5 years, four monographs have been published, more than 60 scientific papers published, 13 of them were SCI papers (as first author or co-first author) which published in PloS one, Virus genes, Vector-borne and Zoonotic diseases, and Virology journal et al. 6 patents were applied, 4 of them have been authorized.