RESEARCHABSTRACT

SWINE HEALTH

Title: Characterization of the Taiwanese strain of foot-and-mouth disease virus (FMDV) - **NPB #98-048**

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Abstract:

Evaluation of the genetic and antigenic properties of the highly swine-virulent strain of FMDV that devastated the Taiwanese pork industry (OTai) has helped us to understand this new virus. OTai is characterized by a porcinophilic nature (inability to cause disease in bovines), which may be related to its hyper-virulence in swine. Immunological tests on virus preparations and genetic analyses we performed on the virus capsid-encoding regions of OTai have revealed substantial differences from South American and European isolates of FMDV. These changes suggest that vaccine seeds specific for the Asian subtype will be needed for effective control of outbreaks it causes. In addition, we have determined that OTai contains a significant mutation in a non-structural protein 3A, which has not been observed in natural isolates of FMDV from Asia, Africa, or South America.

Using a combination of tissue culture and live bovine challenge, we were able to demonstrate that the altered 3A protein **is** responsible for the altered tropism of OTai. Specifically, we have tested the role of this mutated 3A protein in host-range in cells and in animals using genetically engineered forms of FMDV, which have exchanged 3A-encoding regions of their genomes. These experiments showed that the addition of a European 3A protein-encoding region to a genetically engineered OTai virus produced a virus that is able to replicate in bovine cells and bovines. Current studies are aimed at determining if the altered 3A gene is responsible for the hypervirulence of OTai in swine.

The research supported by this project has extended the USDA's research programs on FMD into studies of this particularly dangerous Asian subtype of FMDV. Furthermore, the information learned from these studies will contribute to our knowledge of host/virus interactions that cause disease and outbreaks, and could contribute to the development of better vaccines for FMD.