RESEARCH ABSTRACT

SWINE HEALTH

Title: Development of an Antiviral and Vaccine Approach to Control Foot-and-Mouth Disease **- NPB #03-056**

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Abstract: We have tested the efficacy of a combined foot-and-mouth disease virus (FMDV) subunit vaccine and the antiviral molecule type I porcine interferon alpha/beta (pIFNα/β) as a method of enhancing the protection against FMD induced by a FMD subunit vaccine alone. Swine were inoculated with a low or high dose of replication-defective human adenovirus type 5 vector containing the capsid and 3C proteinase coding regions of FMDV (Ad5-A24 subunit vaccine) and/or an Ad5 vector containing pIFNα (Ad5-pIFNα) and challenged 42 days later with virulent FMDV. Inoculation of groups of swine with a high dose of Ad5-A24 protected 1 of 5 animals and the remaining animals had very limited disease. Four of 5 swine given both a high dose of Ad5-A24 and Ad5-pIFNα were protected from disease, while the fifth animal only had a lesion at the site of challenge. Swine given a 10-fold lower dose of Ad5-A24 developed severe disease, while the group given the low dose of Ad5-A24 and Ad5-pIFNα had delayed and less severe disease. Furthermore, the addition of pIFN-α to the low dose vaccine inoculated group reduced the level of viremia as compared to the group that received only low dose vaccine. These results indicate that IFN-α acts as an adjuvant to enhance the vaccine induced adaptive immune response. Further work to identify the mechanism of the IFN-induced enhancement of protection is essential and should aid in the development of improved disease control strategies for FMDV and potentially other acute infectious diseases.

We have also performed preliminary experiments to determine if pIFN-β can provide rapid protection against FMD. We showed that an Ad5-pIFNβ vector induces an antiviral response in swine, but have not yet tested the efficacy of this vector against challenge with FMDV. Furthermore, we are in the process of producing the reagents necessary to quantitatively detect the expression of pIFNβ.