RESEARCH ABSTRACT

PUBLIC HEALTH/WORKER SAFETY

Title: Development of an epitope-based vaccine against swine influenza A virus using a non-toxic enterotoxin as the carrier-adjuvant - **NPB#09-163**

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Scientific Abstract

Influenza A virus causes a highly contagious respiratory disease in a variety of avian and mammalian hosts, including humans and pigs. Pigs as an intermediate host facilitate the genetic reassortment between avian and human influenza viruses, which results in the emergence of new, human-proficient viruses. The primary means for controlling influenza virus epidemics is vaccination. However, the efficacy of vaccination towards influenza virus is limited by frequent modifications and antigenic variations of its glycoproteins. In addition, unlike the human vaccine, which is updated annually based on the prediction of circulating stains, funding is not currently available to the swine industry to update swine influenza vaccines annually. In order to develop a vaccine that can be broadly effective against the various strains of the virus, the objective of this study is to develop an epitope-based vaccine using a set of influenza A subtype consensus swine influenza virus (SIV) epitopes. To enhance the immunogenicity of the epitope-based vaccine, a detoxified bacterial heat-labile enterotoxin mutant (LT_{192}) was used to construct the epitope-toxin chimeric antigen. The recombinant SIV epitope-toxin antigen was expressed in *E. coli*. The potential application of this epitope-toxin chimera in SIV vaccine development was determined in a pig model. Pigs were immunized with epitope-toxin chimeric antigen, and challenged with H1N1 or H3N2 virus. In comparison to the non-vaccinated pigs, vaccinated pigs showed protection from H1N1 virus challenge, with significant reduction of H1N1 induced fever and pneumonic lesions. In addition, significant reduction of the viral load in nasal secretion was observed in vaccinated pigs that challenged with H1N1 virus. This study established a model system for future construction of peptide-based vaccines against swine pathogens.