RESEARCH ABSTRACT

SWINE HEALTH

Title: A candidate swine influenza virus vaccine: *in vivo* evaluation of novel chimeric hemagglutinins expressed by parainfluenza virus 5 (PIV5) vector; **NPB#15-020**

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Scientific Abstract:

Vaccination remains our best method of protection against influenza virus infection, and vaccines are used to limit spread of these viruses in both pigs and humans. Unlike the human situation, multiple clusters of influenza A viruses co-circulate within pigs, with as many as four clusters identified in pigs. This makes the vaccine selection process more difficult for pigs than it is for humans, and current vaccines include multiple hemagglutinins (HAs) representing these distinct clusters in an effort to induce broad immunity. We recently demonstrated that chimeric HA constructs created using DNA shuffling could induce broad immunity against HAs within the H1N1 subtype. Specifically, two of these HAs, HA-111 and HA-113, induced broad immunity within the H1N1 subtype. In this study, we used a parainfluenza virus 5 (PIV5) vector to express HA-111 and HA-113 as candidate vaccines. Immunogenicity of the PIV5-111 and PIV5-113 vaccines was tested in mice as well as in nursery pigs. Serum ELISA results showed that mice immunized with the PIV5-111 and PIV5-113 candidate vaccines produced antibody responses against genetically diversified influenza virus H1N1 strains, including parental viruses and heterologous viruses. In PIV5-111 and PIV5-113 vaccinated pigs, both vaccines were able to induce antibodies against parental HAs, as detected using hemagglutination inhibition. More importantly, PIV5-111 and PIV5-113 vaccinated pigs were protected from virulent virus challenge, as demonstrated by reductions in virus load in both nasal swab and bronchoalveolar lavage fluid samples. Our data suggest that PIV5-vectored chimeric HA vaccine candidates can induce broad, protective immunity in vaccinated animals. This study provides a new vaccine platform for development of broadly protective vaccines for other important swine pathogens.