

SWINE HEALTH

Title: Development of a live attenuated vaccine against swine influenza by reverse genetics - NPB #08-003,

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Scientific Abstract:

Influenza A viruses cause significant morbidity in swine, resulting in a substantial economic burden. Swine influenza virus (SIV) infection also poses important human public health concerns. Vaccination is the primary method for the prevention of influenza infection. Previously, we generated two elastase-dependent mutant SIVs derived from A/Sw/Saskatchewan/18789/02(H1N1): A/Sw/Sk-R345V (R345V) and A/Sw/Sk-R345A (R345A). These two viruses are highly attenuated in pigs, making them good candidates for a live vaccine. In this study, the immunogenicity and the ability of these candidates to protect against SIV infection were evaluated in pigs. We report that intratracheally administered R345V and R345A induced antigen-specific humoral and cell-mediated immunity characterized by increased production of IgG and IgA antibodies in the serum and in bronchoalveolar lavage fluid, high levels of hemagglutination inhibition titer in serum, an enhanced level of lymphocyte proliferation and higher numbers of IFN- γ secreting cells at the site of infection. Based on the immunogenicity results, the R345V virus was further tested in a protection trial in which pigs were vaccinated twice with R345V and then challenged with homologous A/Sw/Saskatchewan/18789/02, H1N1 antigenic variant A/Sw/Indiana/1726/88 or heterologous subtypic H3N2 A/Sw/Texas/4199-2/9/98. Our data showed that two vaccinations with R345V provided pigs with complete protection from homologous H1N1 SIV infection and partial protection from heterologous subtypic H3N2 SIV infection. This protection was characterized by significantly reduced macroscopic and microscopic lung lesions, lower virus titers from the respiratory tract and lower levels of pro-inflammatory cytokines. Thus, elastase-dependent SIV mutants can be used as live vaccines against swine influenza in pigs.

These research results were submitted in fulfillment of checkoff-funded research projects. This report is published directly as submitted by the project's principal investigator. This report has not been peer-reviewed.

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