RESEARCH ABSTRACT

SWINE HEALTH

Title: Immune correlates of clinical outcomes in maternal antibody-positive piglets vaccinated with attenuated or killed SIV and challenged with an antigenic variant. **NPB #11-061.**

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SCIENTIFIC ABSTRACT

Background. Vaccine-associated enhanced respiratory disease (VAERD) can occur in pigs given whole-inactivated virus (WIV) influenza vaccine upon infection with an antigenically divergent strain of swine influenza virus (SIV). VAERD was first characterized with H1 viruses, and later described in pigs vaccinated with H3N2 WIV and challenged with heterologous H3N2, whereas live-attenuated virus vaccine (LAIV) was protective. An additional factor predisposing to H3N2 VAERD was maternally-derived antibodies (MDA) present at immunization. The present study was aimed at identifying immune correlates of VAERD and cross-protection.

Experimental Design. Piglets that acquired H3N2-specific MDA from immunized dams, along with seronegative controls, were vaccinated with H3N2 WIV (2 doses) or LAIV (1 or 2 doses). Humoral and cellular immune responses to vaccines were monitored at the systemic level and locally in the respiratory tract, followed by challenge infection with heterologous H3N2.

Results. SIV-binding IgG was detected in serum after WIV vaccination, but hemagglutination inhibition antibody titers remained very low. WIV induced low IgA and moderate IgG levels in lungs, but both responses were inhibited by MDA. Systemic cellular responses following WIV were detected at modest levels, with evidence of MDA inhibition. LAIV elicited cross-reactive mucosal antibodies and T cells. While the presence of MDA at LAIV vaccination inhibited SIV-specific antibody production, it did not interfere with T cell priming. Piglets given 1 or 2 LAIV doses were protected against heterologous challenge. Lesions and clinical disease were more pronounced in WIV-vaccinated than non-vaccinated groups, and in contrast to the previous study, MDA did not accentuate H3N2 VAERD.

Conclusions. High levels of mucosal antibodies were associated with protection, but LAIV was also protective in MDA-positive LAIV vaccinees that had reduced mucosal antibody responses. Since T-cell responses were one immune component not inhibited by MDA, cellular immunity may have had a significant role in LAIV-mediated cross-protection. These data support LAIV as an SIV vaccine platform for the swine industry, as a single dose protected against heterologous challenge even when administered to MDA-positive piglets.

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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