Immunization of Swine with Virus-like Replicon Particles: Proof of Concept

A.S. Leaflet R2174

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Summary and Implications

Pigs were inoculated with virus-like replicon particle (VRP) vaccines expressing the influenza hemagglutinin (HA) protein. A robust antibody response was present following the inoculation. These results indicate that VRP vaccines can successfully express a foreign antigen in the pig and induce high antibody titers. This proof of concept work supports the further *in vivo* evaluation of VRP expressing swine influenza virus (SIV) HA protein as well as VRP co-expressing porcine reproductive and respiratory syndrome virus (PRRSV) GP5 and M proteins as novel vaccines for swine.

Introduction

Virus-like replicon particles (VRP) derived from the alphavirus Venezuelan equine encephalitis (VEE) is a single cycle vector not capable of propagating past the initial cell infected (Figure 1). VRP have been previously used to show that co-expression of the G_L and M proteins of equine arteritis virus are required for protection. We have recently developed VRP co-expressing GP5 and M proteins of PRRSV3, however there are no previous reports of immunizing swine with VRP vaccines. The purpose of this study was to determine the potential for using VRP vaccines in pigs.

Materials and Methods

Pigs were obtained at 3 weeks of age and divided into 3 groups of 4. On Day 0 (prime) and again on Day 14 (boost), pigs were vaccinated IM with 10^8 VRP/ml expressing the HA protein from A/Wyoming/03/2003 H3N2 (groups 1-2) or a control VRP (group 3). The VRP in group 1 were derived from VEE 3014 (wt strain) and group 2 from VEE TC-83 (vaccine strain). Serologic response to the HA protein was determined by hemagglutination-inhibition (HI) assay.

Results and Discussion

Prior to vaccination all pigs were HI negative with a geometric mean titer (GMT) of 12 (Figure 2). Negative control pigs in group 3 remained negative through necropsy (GMT=20). An HI response was detected in group 1 (GMT=67) and group 2 (GMT=56) following the priming dose. After the booster dose a strong HI response was detected in group 1 (GMT=2985) and group 2 (GMT=2985) with maximum titers reaching 1:5120. No difference in response was seen between groups 1 and 2 indicating that VRP derived from the non-select TC-83 vaccine strain can be used in future trials. These results indicate that VRP vaccines can successfully express a foreign antigen in the pig and induce high antibody titers. This proof of concept work supports the further *in vivo* evaluation of VRP expressing swine influenza virus (SIV) HA protein as well as VRP co-expressing PRRSV GP5 and M proteins as novel vaccines for swine.

Figure 1. VEE VRP vaccine and packaging system.

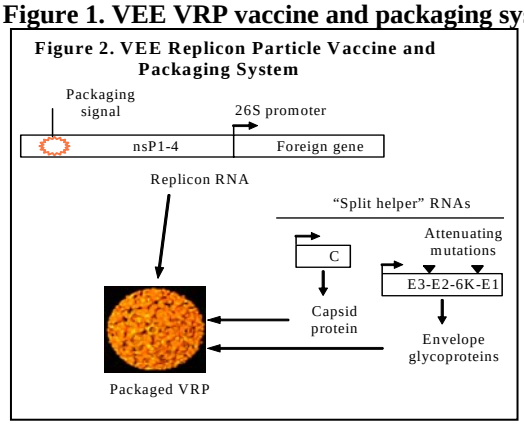
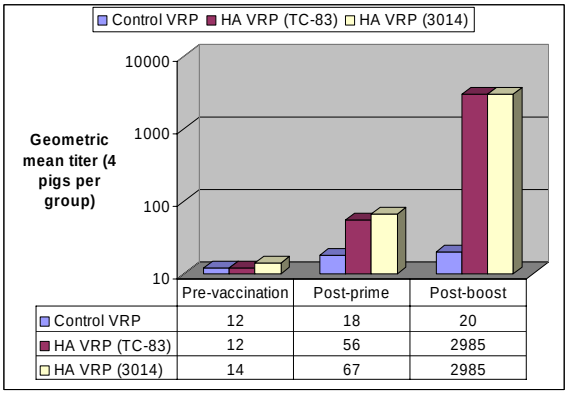


Figure 2: HI response of pigs to VRP expressing the influenza HA protein. A titer greater than 20 is considered protective.



Acknowledgements

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