

Title: Evaluation of immunodominant B- and T-cell epitopes as inducers of protective immunity against porcine reproductive and respiratory syndrome virus (NPB #14-214)

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Scientific Abstract:

The goal of this study was to evaluate the role of PRRSV B- and T-cell epitopes as inducers of protective immune responses against PRRSV. Several immunodominant PRRSV B and T-cell epitopes have been described, however the contribution of these epitopes for protection against remains unknown. The most direct way to assess the of these epitopes for protection would be to immunize pigs with these antigenic determinants and challenge the animals with PRRSV. In this study we used two different approaches to deliver immunodominant B- and T-cell epitopes in pigs and assess their role on protection against PRRSV infection. First we designed polyepitope minigenes encoding 16 and 17 PRRSV B and T-cell epitopes, respectively and inserted those minigenes into the genome of a poxviral vector. The recombinant poxvirus was purified and used to immunize pigs. The second approach involved a combination of recombinant protein (pB) and plasmid DNA (pT) delivery systems. Animals were immunized with recombinant purified pB and a plasmid DNA encoding the pT proteins. Following immunization with the recombinant vector or with recombinant pB plus plasmid DNA, animals were challenged with virulent PRRSV strains (FL12 or NADC20, respectively). Immune responses elicited by immunization were assessed by ELISAs and lymphocyte proliferation assays. Parameters of disease and PRRSV infection including rectal temperature, lung pathology and viremia levels were monitored after challenge infection. Immunization of pigs with the viral vector expressing pB and pT did not elicit detectable immune responses against the PRRSV epitopes. This occurred inspite of efficient immunization with the vector, as evidenced by high levels of antibodies detected against an internal control protein (GFP) that was co-expressed by the viral vector. Immunization with the recombinant purified pB in combination with a water in oil adjuvant, on the other hand, elicited robust antibody responses against pB and against 11 out of the 16 epitopes that composed the B cell polyepitope protein. Notably, following challenge infection with PRRSV no evidence of protection was observed, as animals from the immunized groups presented similar levels of lung pathology and viremia when compared to control non-immunized pigs. Results of this study indicate that immunodominant B and T-cell epitopes of PRRSV have a low immunogenicity when delivered outside the context of PRRSV infection. Additionally, results from the immunization study using the recombinant pB protein suggest that the levels of antibodies elicited against the peptides were not sufficient for protection against PRRSV or perhaps, that these epitopes do not play a role on PRRSV protection.

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