RESEARCH ABSTRACT
SWINE HEALTH

Title: Role of All of the PRRSV Glycoproteins in Protective Immune Response - **NPB # 08-253**

Investigator: Asit K. Pattnaik

Co-PI: Fernando A. Osorio

Institution: Department of Veterinary & Biomedical Sciences,
University of Nebraska-Lincoln, Lincoln, Nebraska.

Date Submitted: March 4, 2010

Scientific Abstract:

Porcine reproductive and respiratory syndrome virus (PRRSV) contains the major glycoprotein, GP5, as well as three other minor glycoproteins, namely, GP2a, GP3, and GP4, on the virion envelope, all of which are required for generation of infectious virions. To study their interactions amongst each other and with the cellular receptor for PRRSV, we have cloned each of the viral glycoproteins and CD163 receptor in expression vectors and examined their expression and interaction with each other in transfected cells by co-immunoprecipitation (co-IP) assay using monospecific antibodies. Our results show that strong interaction exists between GP4 and GP5 proteins, although weak interactions among the other minor envelope glycoproteins and GP5 have been detected. Both GP2a and GP4 proteins were found to interact with all the other GPs resulting in the formation of multiprotein complex. Our results further show that GP2a and GP4 proteins also specifically interact with the CD163 molecule. The carboxy-terminal 223 residues of CD163 molecule are not required for interactions with either the GP2a or the GP4 protein, although these residues are required for conferring susceptibility to PRRSV infection in BHK-21 cells. Overall, we conclude that the GP4 protein is critical for mediating interglycoprotein interactions and along with GP2a, serves as the viral attachment protein that is responsible for mediating interactions with CD163 for virus entry into susceptible host cell. Additionally, using a series of glycosylation-site mutants of GPs, we have examined the ability of the hypoglycosylated forms of the protein to generate infectious PRRSV. Our results show that mutations at certain sites in various GPs are critical for production of infectious virus. Using several mutant PRRSVs with hypoglycosylated minor GPs on the envelope, we have found that these viruses do not induce higher titers of neutralizing antibody response, contrary to our previous observations with the major glycoprotein, GP5.