

SWINE HEALTH

Title: Structural characterization of the PRRSV glycan shield - **NPB #09-227**

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Scientific Abstract:

The infectious virion of porcine reproductive and respiratory syndrome virus (PRRSV) consists of a protein-encapsidated RNA, enveloped in a lipid bilayer membrane studded with glycosylated proteins and nonglycosylated matrix protein. The surface of the virion is comprised primarily of protein-linked carbohydrates (glycans) since very little amino acid sequence projects out of the lipid envelope. The abundance of glycans on the virion surface suggests they may have important roles in virus-cell interactions, infection of permissive cells, and as targets of viral neutralization. Thus, we characterized the glycan structures by physical, biochemical and cell biological methods. The glycans of highly purified PRRSV virions are located primarily on major envelope glycoprotein 5 (GP5), are structurally complex, and contain terminal sugars that are primarily sialic acid, glucosamine and lactosamine. Pokeweed mitogen (PWM) and *Lycopersicon esculentum* agglutinin (LEA), lectins that have a specific affinity for N-acetyl- β -D-glucosamine (GlcNAc) oligomers, bound to virions and decreased PRRSV infection of porcine macrophages and MARC-145 cells in a dose-dependent manner. Poly(GlcNAc)-lectins were slightly less inhibitory than lectins specific for sialic acids, but co-operated to inhibit infection to a higher level. The mechanism of inhibition may have been due to interference with protein-protein interactions, since enzymatic removal of glycans on the viral envelope did not alter viral infectivity. These findings not only advance the current knowledge of the molecular mechanisms of PRRSV infection in permissive cells but also provide an improved understanding of PRRSV structure that will aid in design of improved vaccines.

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 This report has not been peer-reviewed.

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