Objective: The major neutralizing epitope of PRRSV is mainly located on glycoprotein GP5. Immunization with exogenous GP5 or exposure to native GP5 by means of DNA immunization can provide some degree of immune protection to PRRSV infection in pigs. However, during PRRSV infection in pigs, the production of neutralization antibodies induced by GP5 is delayed or suppressed. This suggests that the synthesis of GP5 is late than some PRRSV proteins or other PRRSV proteins interfering with the function of GP5 in inducing host responses during virus infection. The objective of this study was to exclude the impacts of the other PRRSV proteins and determine the role of GP5 in the replication of PRRSV in Marc-145 cells.

Methods: A Marc-145 cell line stably expressing GP5 (Marc-145-GP5Flag) was constructed by lentiviral transduction. Cell viability was tested by cell proliferation and cell apoptosis measurement. PRRSV infective to Marc-145, Marc-145puro and Marc-145-GP5Flag cell lines was analyzed by real time RT-PCR, TCID50 and flow cytometry assay. Type I interferon mRNA and protein level, promoter activity were detected by real time RT-PCR, indirect ELISA and luciferase activity assay. To confirm beta interferon induced by GP5 expression reduced PRRSV infection siRNA was introduced into Marc-145-GP5Flag cell following the PRRSV infective to this cell was analyzed by real time RT-PCR and Western bolting.

Results: Cell proliferation and cell apoptosis measurements indicated that the expression of GP5 in Marc-145 cells did not disturb the cells’ viability. Following infection with different PRRSV strains PRRSV replication in Marc-145-GP5Flag cells was inhibited significantly. Type I interferon assay results showed that beta interferon in the Marc-145-GP5Flag cells were increased in both mRNA and protein level. When introduced siRNA into cells to knock down beta interferon mRNA, PRRSV infection to the cells was recovered.

Conclusion: These data suggest that early GP5 expression is not favorable for further infection by PRRSV, because it not only stimulates production of neutralization antibodies in pigs, but also induces beta interferon production in host cells. Therefore, GP5 is an important protein in the induction of self-protection responses from the host.

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