Live-Attenuated Vaccine Against Porcine Reproductive and Respiratory Syndrome Virus

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INTRODUCTION

Porcine reproductive and respiratory syndrome (PRRS) is a highly economically important diseases of swine, costing the United States industry over $600 million dollars annually. Clinical signs of the disease include pneumonia in young pigs and abortion in pregnant sows. PRRS is caused by an RNA virus named porcine reproductive and respiratory syndrome virus (PRRSV).

Vaccines against PRRS have been used since 1994. There are two types of PRRS vaccines including live-attenuated vaccine and inactivated vaccines. Live-attenuated PRRS vaccines confer superior protection when compared to the inactivated vaccine. Even so, current live-attenuated PRRS vaccines fail to protect swine against divergent PRRSV stains circulating in the field.

Recently, Dr. Vu at Nebraska Center for Virology has constructed a synthetic PRRSV strain (designated as PRRSV-CON) that confers exceptional levels of cross-protection against divergent PRRSV strains. This PRRSV-CON strain is a promising candidate to produce a broadly protecting live-attenuated PRRS vaccine.

We will attenuate the PRRSV-CON by following the tradition method for viral attenuation which involves continuously growing the virus in a cell-line derived from a non-natural-host species. The principle behind this attenuation method is that the virus will acquire random mutations during its adaptation to replication in a non-natural host cell-line. After certain levels of mutation are acquired, the virus will lose its capacity to cause disease in its natural host.

OBJECTIVE

To prepare an attenuated PRRSV strain that can be used to formulate a live-attenuated vaccine for PRRS

EXPERIMENTAL DESIGN

1. INFECTION

- Consecutively passing the PRRSV-CON 100 times in cell culture
- Sequencing PRRSV-CON will perform at different passage levels to monitor the occurrence of mutations in the viral genome

2. PRRSV-CON TITRATION

- Waiting for 5 days to read the CPE and calculate the titer of PRRSV-CON.

3. SEQUENCING PRRSV-CON VIRUS

- ORF4: 1
- ORF3 start
- ORF5a start
- ORF5 end
- ORF7 start
- ORF6 start
- ORF6 end
- ORF7 end

TIMELINE

Summer 2015

Passage 0

Academic Year 2015 – 2016

Passage 0

Passage 30

Passage 100

Passage 60

CONCLUSION

- The PRRSV-CON viruses infected concentrations are getting lower as the virus adapted to the host cell (MAR-C145) when going to the higher passages.
- There are mutants of the PRRSV-CON viruses. The titer is getting higher along with the higher passage of PRRSV-CON.
- There are four nucleotide changes when passing the PRRSV-CON viruses for 60 passages.

ORF3: 1
ORF4: 1
ORF5: 2

CONTACT INFORMATION

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