A STANDARDIZED DIRECT CONTACT CHALLENGE METHOD FOR FMDV IN SWINE

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INTRODUCTION

Pigs are excellent viral amplifiers of Foot-and-mouth Disease Virus (FMDV) and play an important role in the airborne transmission and spread of FMDV to other species and among different premises. Thus protection of pigs either by vaccination or biotherapeutic treatment could be essential to control FMD outbreaks.

Currently the challenge method for pigs consists of direct virus inoculation in the heel bulb. A swine challenge model that better reflects natural infection of FMDV is necessary in order to accurately assess the effectiveness of vaccine and biotherapeutic candidates. There is ample evidence in the literature that pigs are highly resistant to natural aerosol infection of FMDV while direct contact transmission is more common. In order to develop a successful swine challenge model, first we must define the parameters determining infection in pigs during direct exposure.

MATERIALS AND METHODS

In this study we describe a methodology for direct contact transmission in pigs for two FMDV strains (serotypes A and O). For each strain experimental groups containing 4 pigs were exposed to directly inoculated pigs that had received 100 pig heel infectious doses 50 (PHID50) each by heel-bulb inoculation. In each case we controlled the ratio of inoculated to naïve pigs (1:2) and time of exposure (4 h and 18 h). After contact exposure pigs were housed two per room but separated from direct contact. The criteria for deciding when the donor pigs were infectious were based on viral RNA detection in serum, saliva and nasal swabs. We utilized a standardized FMDV real-time RT-PCR to monitor viral infection in clinical samples as well as in air samples collected from animal rooms housing donors and recipients throughout the studies utilizing dry filters. Clinical observations were done and samples obtained at 24h intervals for 10 days.

RESULTS AND DISCUSSION

For both serotypes directly inoculated animals had viral RNA in saliva a nasal swabs at 48hpi and were considered infectious and moved to the contact room at that time. For serotype A (subtype A24) both 4h and 18h exposure resulted in infection of all contact animals. In contrast for serotype O (O1- Manisa) 4h exposure time was insufficient and none of 4 contact pigs became infected but 18h exposure resulted in infection of all animals. Viral RNA was readily detectable in air samples and was consistent with the transmission results.

CONCLUSIONS

We have established a consistent direct contact exposure methodology for FMDV in pigs for two FMDV strains. Each strain demonstrated different transmission characteristics and required different exposure times for successful contact transmission. The data emphasize the need for a thorough evaluation of each viral strain in a well defined contact challenge methodology. We are currently testing this methodology in vaccine efficacy trials.