Veterinary Microbiology

Volume 137, Issues 1-2, 28 May 2009, Pages 10-17

Synthesis of empty capsid-like particles of Asia I foot-and-mouth disease virus in insect cells and their immunogenicity in guinea pigs

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Received 20 September 2008;

revised 1 December 2008;

accepted 5 December 2008.

Available online 11 December 2008.

Abstract

The assembly of foot-and-mouth disease virus (FMDV) requires the cleavage of the P12A polyprotein into individual structural proteins by protease 3C. In this study, we constructed a recombinant baculovirus that simultaneously expressed the genes for the P12A and 3C proteins of Asia I FMDV from individual promoters. The capsid proteins expressed in High Five™ insect cells were processed by viral 3C protease, as shown by Western blotting, and were antigenic, as revealed by their reactivity in an indirect sandwich-ELISA, and by immunofluorescent assay. The empty capsid-like particles were similar to authentic 75S empty capsids from FMDV in terms of their shape, size and sedimentation velocity, as demonstrated by sucrose gradient centrifugation. Both empty capsid-like particles and some small-sized particles (about 10 nm in diameter) were also observed using immunoelectron microscopy. Furthermore, the empty capsid-like particles or intermediates induced high levels of FMDV-specific antibodies in guinea pigs following immunization, and neutralizing antibodies were induced in the second week after vaccination. These recombinant, non-infectious, FMDV empty capsids are potentially useful for the development of new diagnostic techniques and vaccines.

Keywords: Asia 1 FMDV; Empty capsid-like particles; Immunogenicity