Removal of a N-linked glycosylation site of classical swine fever virus strain Brescia E\textsuperscript{Ems} glycoprotein affects virulence in swine

Advisor: Chia-Chin Yu
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Classical swine fever (CSF) is a highly contagious disease of swine caused by CSFV, which is a Pestivirus belonged to the Flaviviridae family. Structural components of the virion include the capsid protein and glycoproteins E\textsuperscript{Ems}, E1, and E2. All three envelope proteins contain N-linked glycosyl groups (4). N-linked glycosyl residues account for about half of the mass of an E\textsuperscript{Ems} homodimer (2). In general, glycosylation of enveloped virus structural proteins has been shown to be important for receptor binding, membrane fusion, penetration, virus budding, and infectivity as analyzed in cultured cells (1). A panel of virus mutants was constructed and used to investigate whether the removal of each of seven putative glycosylation sites in the E\textsuperscript{Ems} glycoprotein would affect viral virulence in swine (3). Only N269A/Q substitution rendered attenuated viruses (N1v/N1Qv) that, unlike BICv and other mutants, exhibited a lower rate of growth and a 5- to 10-fold decrease in the final virus yield and a reduction in plaque size in SK6 cell cultures. In animal infections, while BICv exhibited a characteristic virulent phenotype with animals dying by days 8–9 post-infection, animals inoculated with N1v survived the infection presenting a short period of mild fever and transient diarrhea. For protection studies, at 3 DPI or 21 DPI, animals were challenged with BICv along with mock-vaccinated animals. Mock-vaccinated animals developed CSF and died or were euthanized in extremis by 12 days post-challenge (DPC). In contrast, N1v induced complete protection by 3 and 21 DPI. All pigs survived infection and no virus was detected in samples obtained from animals challenged at 21 DPI. Additionally, no significant hematological changes were recorded in any of the challenged animals and remained clinically normal through the observation period. The effective protective immunity elicited by N1v suggests that glycosylation of E\textsuperscript{Ems} could be modified for the development of live-attenuated vaccines (3).

References: