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Generation of a new classical swine fever marker vaccine candidate by selective antibody pressure

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Classical swine fever (CSF) is a major threat for the pig industry worldwide. Despite having caused tremendous costs, CSFV outbreaks are not controlled by vaccination in the EU. Since decades, safe and effective live vaccines exist, and were used for eradication campaigns throughout the world. Unfortunately, serological differentiation of infected from vaccinated animals (DIVA) is not possible following this type of vaccination.

Numerous marker vaccine candidates like the recombinant constructs CP7_E2alf, vFlcΔPTa1, and FlagT4v are under research. However, all these candidates are genetically modified Pestiviruses and despite their virtues, licensing has to follow additional regulations.

Here, a different approach for the generation of a CSF marker vaccine candidate without genetic engineering is presented. The C-strain "Riems" vaccine virus was multiply passaged on pk15 cells in the presence of different neutralizing antibodies and antisera that specifically interact with the conserved so-called "TAV-epitope" (TAVSPTTLR) in the E2 protein.

Characteristics of isolated escape variants were investigated both in vitro and in vivo. Promising candidates with up to three amino acid substitutions in the "TAV-epitope" induced full protection after intramuscular immunization of weaner pigs in challenge experiments. For the selected vaccine candidates with exchanges in the TAV-Epitope, the DIVA principle can be based on E2 antibody detection in ELISA systems depending on TAV-Epitope-specific monoclonal antibodies. Moreover, direct virus differentiation is possible using a newly developed real-time RT-PCR system (genetic DIVA) or using differential immunofluorescence staining. Thus, for the first time, a non genetically modified live marker vaccine candidate against CSF is presented.

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