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Efficacy of vaccination with Newcastle disease virus recombinants expressing influenza virus neuraminidase N1 against highly pathogenic avian influenz

*Daniela Deckers (1), Angela Römer-Oberdörfer (1), °Jutta Veits (1), Thomas C. Mettenleiter (1)

(1) Friedrich-Loeffler-Institut, Federal Research Institute for Animal Health, D-17493 Greifswald – Insel Riems, Germany

Recurrent outbreaks of highly pathogenic avian influenza virus (HPAIV) subtype H5N1 in several geographic areas led to an increased implementation of vaccination in controlling HPAI. In several countries inactivated whole virus vaccines have been used, which have to be administered individually by injection and, furthermore, interfere with serological identification of infected animals. To solve these problems, vectored vaccines typically expressing the protective hemagglutinin protein are being developed with the promise of permitting easy mass application and/or the implementation of the "differentiating infected from vaccinated animals" principle. However, even if highly protective in experimental settings, none of theses vaccines are capable to confer sterile immunity against AIV, especially under field conditions. We already have shown that an H5 hemagglutinin expressing Newcastle disease virus (NDV) vector vaccine confers protection against an homologous HPAIV infection (Veits et al., 2006, PNAS 103(21):8197-202). Here, we present an NDV recombinant expressing the N1 neuraminidase of H5N1 HPAIV A/duck/Vietnam/TG24-01/2005. Expression of the N1 protein was verified by Northern blot, Western blot and immunofluorescence analyses. A single immunization of chickens with the recombinant NDV-N1 induced N1-specific antibodies in all animals. Nevertheless, the birds died after a subsequent challenge infection with the homologous H5N1 HPAIV. However, the survival time of immunized chickens was considerably prolonged compared to non-vaccinated controls indicating a contribution of the expressed neuraminidase to protective immunity. Thus, an NDV recombinant coexpressing H5 and N1 of AIV might further increase the protective efficacy against HPAIV H5N1.

Corresponding author:
Veits, Jutta
jutta.veits@fli.bund.de
Phone: ++49 38351 7139
Fax: ++49 38351 7275