Vaccination of SPF turkeys with a recombinant HVT expressing the HA from H5N1 highly pathogenic avian influenza protects against lethal challenge

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Introduction

Vaccination is an important tool in the protection of poultry against avian influenza (AI). For field use, the overwhelming majority of AI vaccines produced are inactivated whole virus formulated into an oil emulsion and to a lesser degree recombinant vectored vaccines (e.g. virus expressing AI genes).

In these studies, protection against lethal challenge with a H5N1 highly pathogenic AI (HPAI) isolate was determined in SPF turkeys vaccinated with a USDA-licensed recombinant Herpes Virus of Turkeys (rHVT) expressing the hemagglutinin (HA) gene from a recent H5N1 HPAI virus. HVT is a serotype 3 herpes virus in the family of Marek’s Disease Virus, which most poultry are vaccinated against. These viruses have a large genome that allows for genetic manipulation.

Materials and Methods

The HA gene from A/swan/Hungary/4999/2006 H5N1 cloned into HVT FC-126 (99.3 % similar to challenge strain A/WS/Mong/2005).

SPF turkeys were vaccinated at day of age with 1500 pfu via SQ route in 0.2 ml. Two groups of birds: Sham (NV/C) and rHVT-AI.

Birds were challenge at 4 weeks of age with 2 x 10⁶ EID50 per bird via IN route. All birds were monitored for clinical signs, serology and virus shedding from oral and cloacal swabs.

Figure 1. Phylogenetic comparison of HA sequence of isolates used in these studies

Conclusion

- 96% rHVT-AI vaccinated birds were protected against morbidity and mortality following H5N1 HPAI challenge.
- Few birds (11/50) seroconverted with prechallenge HI titers > 4. Most birds had titers < 3. Antibody titers do not appear to be best correlate of protection with recombinant vaccines.
- Incidence of viral shedding was significantly decreased in vaccinated birds at 2 dpi from both swabs. Few vaccinated birds shed virus at day 4 post-challenge.
- Viral titers were significantly reduced in vaccinated birds.
- The role of T-cell mediated immunity against HA following application of recombinant vectored vaccines remains to be determined.

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