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Determination of Organ Tropism of Newcastle Disease Virus (Strain I-2) by Virus Isolation and Reverse Transcription–Polymerase Chain Reaction

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Abstract

The vaccines I-2 and V4 are avirulent strains of Newcastle disease virus. Organ tropism of strain V4 has been determined and the virus has a predilection for the digestive tract. Tropism of strain I-2 has not yet been determined. The objective of this study was to determine the distribution of strain I-2 in various body organs and fluids following vaccination in comparison with V4. Four-week-old chickens were vaccinated by eye drop separately with these two avirulent strains. Virus isolation and the reverse transcription–polymerase chain reaction technique were employed to detect I-2 and V4 viruses in various tissues and body fluids for 7 days following vaccination. Tissues from the respiratory tract showed earlier positive signals than tissues from other organs for chickens vaccinated with strain I-2. Conversely, tissues from mainly digestive tract produced earlier positive signals than from respiratory tract and other organs from chickens vaccinated with strain V4. In early infection, strain I-2 had preferential predilection for the respiratory tract and strain V4 for the digestive tract. Later after vaccination, other organs showed positive results from chickens vaccinated with both I-2 and V4 strains. The differences in organ tropism observed in this study suggest that I-2 may perform better than V4 as a live vaccine strain.

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ABSTRACT

The vaccines I-2 and V4 are avirulent strains of Newcastle disease virus. Organ tropism of strain V4 has been determined and the virus has a predilection for the digestive tract. Tropism of strain I-2 has not yet been determined. The objective of this study was to determine the distribution of strain I-2 in various body organs and fluids following vaccination in comparison with V4. Four-week-old chickens were vaccinated by eye drop separately with these two avirulent strains. Virus isolation and the reverse transcription–polymerase chain reaction technique were employed to detect I-2 and V4 viruses in various tissues and body fluids for 7 days following vaccination. Tissues from the respiratory tract showed earlier positive signals than tissues from other organs for chickens vaccinated with strain I-2. Conversely, tissues from mainly digestive tract produced earlier positive signals than from respiratory tract and other organs from chickens vaccinated with strain V4. In early infection, strain I-2 had preferential predilection for the respiratory tract and strain V4 for the digestive tract. Later after vaccination, other organs showed positive results from chickens vaccinated with both I-2 and V4 strains. The differences in organ tropism observed in this study suggest that I-2 may perform better than V4 as a live vaccine strain.

Keywords: chickens, Newcastle disease, reverse transcription–polymerase chain reaction, strain I-2, strain V4, tropism, vaccine

Abbreviations: EID₅₀, median embryo infective dose; HI, haemagglutination inhibition; HA, haemagglutination; NDV, Newcastle disease virus; NP, nucleoprotein; HN, haemagglutinin-neuraminidase protein

INTRODUCTION

Newcastle disease (ND) is caused by Newcastle disease virus (NDV), designated avian paramyxovirus serotype 1 (APMV-1), which belongs to the genus *Avulavirus*, within the family *Paramyxoviridae* (Mayo, 2002). NDV is a single-stranded negative-strand RNA virus. Its genome codes for six structural proteins: nucleoprotein (NP), phosphoprotein (P), matrix protein (M), fusion protein (F), haemagglutinin-neuraminidase protein (HN) and large protein (L). The virulence of NDV strains is related to the cleavability of the F protein. The F₀ protein of virulent strains is cleaved into subunits F₁ and F₂ by ubiquitous host proteases found in most tissues. These enable virulent strains to spread faster and widely within the host, whereas the F protein of avirulent strains is cleaved only in cells containing

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