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TURKEY ORIGIN REOVIRUS-INDUCED IMMUNE DYSFUNCTION IN SPECIFIC PATHOGEN FREE AND COMMERCIAL TURKEY POULTS

J. MICHAEL DAY,* ERICA SPACKMAN, AND MARY J. PANTIN-JACKWOOD

Southeast Poultry Research Laboratory, Agricultural Research Service, United States Department of Agriculture, 934 College Station Road, Athens, Georgia 30605 U.S.A.

Study Results

A marked effect on the cutaneous basophil hypersensitivity response and on the antibody response to Newcastle disease virus (NDV) exposure was noted in commercial and specific pathogen free (SPF) poults inoculated with the turkey-origin reovirus NC/SEP-R44/03 at three days of age. Commercial poults inoculated at three days of age had moderate to severe bursal atrophy similar to that noted previously in SPF poults inoculated with NC/SEP-R44/03. This immune dysfunction and bursal atrophy was not present in commercial poults inoculated at three weeks of age (Figure 1).

Significance of Study Results

Recently, pathogenesis studies using genetically distinct turkey-origin reoviruses (TRVs) revealed that poults infected with certain TRV isolates had moderate to severe bursal atrophy, suggesting virus-induced immune dysfunction. In order to characterize the effect of TRV infection on the turkey immune system, classical assays were undertaken to quantify the humoral and cell-mediated immune responses in small Beltsville and broad-breasted white poults infected the TRV isolate NC/SEP-R44/03. The reovirus-induced immune dysfunction in both the humoral and cell-mediated branches of the poult immune system may implicate certain strains of TRV as the first step in one of several paths to enteric disease.

Additional Information

The avian reoviruses are an economically important group of pathogens that have been implicated in or associated with a number of disease states in birds. These conditions are in many cases multifactorial enteric syndromes that involve other etiologic agents, such as runting-stunting syndrome (RSS) in broilers or poult enteritis complex (PEC) and poult enteritis mortality syndrome (PEMS) in turkeys. Further, the avian reoviruses have been implicated in several non-enteric diseases of poultry, including tenosynovitis, a condition with ample demonstrated reovirus etiology. Still, most avian reovirus infections remain asymptomatic.

*Corresponding author. E-mail: Michael.Day@ars.usda.gov

Recently, several novel TRVs have been described based upon their pathogenesis in turkeys and chickens, the unique sequences of their S1 and S3 genome segments, and their tissue distribution in infected poults. Two of these TRVs, isolates NC/SEP-R44/03 and NC/98, caused moderate to severe bursal atrophy in young poults, a condition that can result in permanent immunosuppression. In order to characterize the extent of the immune dysfunction caused by a TRV in commercial and SPF poults, experiments were designed to investigate the humoral and cell-mediated immune response in experimentally infected birds. The effect of TRV exposure on poults was evaluated using a cutaneous basophil hypersensitivity assay and by determining their antibody response to NDV. Further, the effect of TRV infection on poult lymphoid tissue was evaluated by histopathologic examination.

Based upon the marked bursal atrophy observed in SPF and commercial poults, the effect of TRV infection on the humoral immune response was not a surprise. The ability of TRV-infected poults to produce antibodies to NDV was markedly diminished at the 21 day post-NDV exposure time point; this inhibition was less striking at 42 days post-NDV exposure. The inhibition of the humoral immune response also appears to be age-dependent, as the TRV-infected three-week old commercial poults revealed no significant reduction in their ability to mount an antibody response at 21 and 42 days post-exposure. The extent of the damage noted in the bursas of Fabricius of infected poults at 8 and 15 days postinfection can result in permanent immunosuppression, a state of particular importance for a virus often associated with syndromes such as PEC that involve multiple viral and perhaps bacterial agents, particularly when coupled with an impaired cell-mediated response that may be unable to clear virus-infected cells properly. Further, the age-related differences noted in the NDV exposed poults suggest that the timing of exposure to an immunosuppressive agent like TRV may be important for the development of recognizable and consequential enteric syndromes in the field.

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