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U.S. Poultry & Egg Association
Harold E. Ford Foundation
1530 Cooledge Road
Tucker, GA 30084-7303

(770) 493-9401
(770) 493-9257 (Fax)
research@poultryegg.org

www.poultryfoundation.org
FOUNDATION

**Contact the researcher or USPOULTRY for more information**

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# Further Characterization of an Adenovirus-Like Virus Identified as the Cause of Transmissible Viral Proventriculitis

James S. Guy, D.V.M., Ph.D.

and

H. John Barnes, Ph.D.
Fred Fuller, Ph.D.
Department of Population Health and Pathobiology
College of Veterinary Medicine
North Carolina State University
Raleigh, NC 27606

## "New Findings on Transmissible Viral Proventriculitis"

Transmissible viral proventriculitis (TVP) is an important cause of production losses in broiler chickens, resulting in impaired growth, poor feed conversion, and impaired feed digestion. Additionally, this disease results in enlargement of the proventriculus and a tendency of the organ to rupture at processing. Rupture of the proventriculus at processing results in increased processing costs, and a loss to the United States broiler industry of millions of dollars each year.

Until recently the etiology of TVP was unknown; however, our previous studies (funded by U.S. Poultry & Egg Association) identified the cause of this disease to be a new, previously unrecognized virus of chickens (Rll/3 virus). Rll/3 virus was isolated from proventriculi of TVP-affected chickens, and TVP was experimentally reproduced by infection of chickens with laboratory-derived virus.

The present study was to further characterize Rll/3 virus, determine its relationship to other viruses, and develop specific molecular diagnostic procedures for detection of the virus in diseased chickens. Physical and biological properties of Rll/3 virus initially suggested identification as an adenovirus; however, the present studies provide evidence that Rll/3 virus is a birnavirus. Rll/3 virus was shown to possess a bisegmented RNA genome, a feature that by itself strongly indicates classification as a birnavirus. Rll/3 virus was shown to be antigenically and genetically distinct from other birnaviruses, including the well-characterized chicken birnavirus, infectious bursal disease virus, based on antigenic analyses and nucleic acid sequence analyses. These findings indicate that Rll/3 virus likely will be classified as a distinct, new member of the Birnaviridae virus family.

A reverse transcriptase-polymerase chain reaction (RT-PCR) procedure was developed for detection of Rll/3 virus in TVP-affected chickens. This diagnostic procedure is highly specific and sensitive. The virus was readily detected by RT-PCR in proventriculi and feces of chickens with experimentally-induced TVP. Additionally, we have adapted the RT-PCR for detection of Rll/3 virus in formalin-fixed, paraffin-embedded tissues.

These findings will aid future research aimed at elucidating the epidemiology and economic effects of TVP, the pathogenesis and ecology of Rll/3 virus, and the role of Rll/3 virus in other poultry diseases. Additionally, they will have direct application

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to TVP control: nucleic acid sequence information provides the basis for development of recombinant vaccines, and the RT-PCR procedure provides a sensitive and specific diagnostic method for epidemiologic studies and control based on eradication.

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