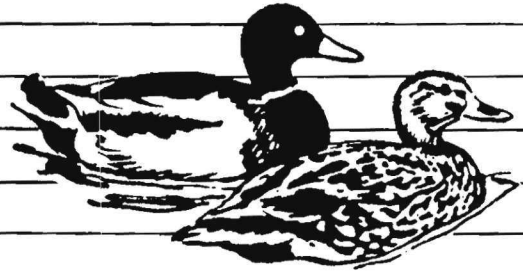


Research



Information bulletin

U.S. DEPARTMENT OF THE INTERIOR
NATIONAL BIOLOGICAL SERVICE

Number 05
1995

Transmission and Maintenance of Inclusion Body Disease of Cranes

The National Wildlife Health Center (NWHC) in Madison, Wisconsin, recently completed retrospective epidemiologic work on inclusion body disease of cranes (IBDC). Here we use a genomic comparison of three IBDC virus isolates and the antibody status of survivors of the 1978 die-off to illustrate virus transmission and maintenance. The results of this work support the contention that the IBDC virus can be maintained in a crane (*Grus* spp.) population for an extended period and that antibody-positive cranes have the potential for fecal shedding of the virus.

Three Key IBDC Isolates Were Obtained

In 1978, a die-off of captive cranes occurred at the International Crane Foundation (ICF) near Baraboo, Wisconsin. When deaths subsided, 18 cranes had died of an acute hepatitis caused by a previously unreported herpesvirus, which was named IBDC virus. The 18 included 7 sandhill (*Grus canadensis*), 5 red-crowned (*Grus japonensis*), 4 blue (*Grus paradisea*), and

2 hooded (*Grus monacha*) cranes. The first IBDC virus isolate was obtained from the tissues of the dead sandhill cranes.

During the second week of the die-off, cloacal swabs and sera were obtained from 11 live cranes in the ICF die-off area. Of the 11 cranes sampled, 1 sandhill and 3 red-crowned cranes (36%) were sick and 9 (82%) had evidence of exposure (antibody) to IBDC virus. The sick sandhill crane died while being sampled and necropsy revealed focal hepatic and splenic necrosis, necrotic enteritis and gastritis, and nephrosis. The second IBDC virus was isolated from a cloacal swab obtained from this IBDC-antibody-positive crane.

In November 1980, an adult sandhill crane—a resident of the original die-off area since 1978—died with a diagnosis of heart failure and hepatitis. Microscopic examination of the liver revealed cellular changes suggestive of a herpesvirus infection. The third "key" IBDC isolate was obtained from the liver and spleen. This crane did not have detectable antibody to IBDC virus when sampled in 1975, 1978, or 1979 (this specific

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crane was not available for sampling in 1976 or 1977), indicating that it was probably susceptible to IBDC. This was the last sandhill crane left in the die-off area. The other sandhill cranes either died of IBDC in 1978 or were moved out of the die-off area.

Each isolate was identified as IBDC virus by neutralization with crane sera having antibody to IBDC virus. The technique for genomic examination of IBDC virus DNA was recently used to compare these isolates. ICF crane sera were collected during routine health checks of the facility in 1976, 1978, and 1979 were screened for neutralizing antibody to IBDC.

Genomic Characterization and Serology Reveal New Information About IBDC

Between the 1978 die-off and 1980, IBDC virus did not undergo a major genomic change. Genomic characterization using restriction enzymes showed that the two virus isolates obtained in 1978 and the one obtained in 1980 were essentially the same virus. These results support the serological evidence that these three isolates are the same IBDC virus.

IBDC virus can be maintained at a facility for an extended period without being associated with mortality. Retrospective serology tests detected

antibody to IBDC virus in ICF cranes 2 years before the virus was isolated from dead cranes during the 1978 die-off. After the die-off, the virus was also maintained at ICF for roughly 2 years and 8 months (March 1978 to November 1980) before being associated with the death of the last surviving sandhill crane in the die-off area.

IBDC-antibody-positive cranes should be regarded as potential sources of the virus and therefore a risk to other cranes. Many of the survivors of the ICF die-off were infected with IBDC virus as indicated by the presence of antibody. The isolation of IBDC virus from the cloaca of an antibody-positive sandhill crane indicates that these individuals could transmit the virus to susceptible cranes. Large-scale IBDC die-offs at ICF were probably avoided after 1978 because many of the susceptible cranes died, biocontainment measures were instituted, and the large crane populations in the die-off area were substantially reduced.

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