

# Avian Bornavirus in Keas

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## ABV

- Avian Bornavirus
- Proventricular dilatation disease
  - Described in 1970s
- Over 80 species of psittacines
- Waterfowl, passerines

Avian bornavirus is the causative agent of proventricular dilatation disease (PDD). PDD was first described in the 1970s and is now widespread affecting over 80 species of psittacine. PDD has also been reported in other healthy and clinically affected avian species including waterfowl and passerines.



## ABV

- Causal association of ABV and PDD demonstrated experimentally
- Widespread in captive populations
- Has been identified in free-ranging psittacines in Brazil

While some may still question the link between avian bornavirus and proventricular dilatation disease, several experiments have demonstrated a direct causal association between the virus and classic disease. The disease has a worldwide distribution and is widespread in captive populations. It has also been identified in clinically healthy, free-ranging parrots in Brazil.



## ABV

- Virus shed in urine and feces
- Fecal-oral transmission most likely
- Epidemiology remains unknown
- Healthy carriers common

ABV is shed in urine and feces, therefore fecal-oral transmission is most likely. The virus has also been detected in the shafts of feathers and in the lung indicating other forms of transmission may be possible. Evidence also suggests vertical transmission occurs. However, the epidemiology of the disease remains unknown. It is common to find infected and uninfected individuals in the same population and healthy carriers are common.



## ABV

- Clinical signs include:
  - Weight loss
  - Crop stasis
  - Regurgitation
  - Maldigestion
  - Ataxia
  - Seizures

Avian bornavirus causes disease that primarily affects the neurologic and gastrointestinal systems. Clinical signs include chronic weight loss, crop stasis, regurgitation, maldigestion, proventricular and intestinal dilation, ataxia, seizures and blindness.



## ABV

- Classic lesions:
  - Lymphoplasmacytic inflammation
  - Brain, peripheral nerves
  - Gastric ganglia and enteric nerve plexuses

The virus causes inflammation of the central and peripheral nervous system most notably the brain, gastric ganglia and enteric nerve plexuses. Inflammation is characteristically lymphoplasmacytic and noted in the brain, crop, and proventriculus.



## ABV

- Diagnosis
  - Histopathology
  - Real time RT-PCR
  - Blood, choanal/cloacal swabs, tissues

Historically, diagnosis was been made histologically on biopsy of crop tissue or at necropsy. Crop biopsy is not sensitive and false negative tests can be common. Antemortem tests are now available to help better diagnose the disease. Real time RT-PCR can detect viral antigen in blood, choanal/cloacal swabs and tissues. PCR has been shown to be more sensitive than other antemortem tests.



## ABV in Keas

- Several cases presenting with signs consistent with ABV
- Several birds have been treated for suspected ABV
  - Some have recovered
  - A few have died

Recently, some kea in the SSP population have shown clinical signs consistent with PDD. Initial testing of these birds has shown positive result for ABV. Several birds have been empirically treated with anti-inflammatory medication and supportive care with some recovering and a few progressing to death. This prompted a more in depth study of the kea population to see the prevalence of ABV and if disease is associated with infection.

## ABV testing

- 69 birds total evaluated
  - 36 currently alive
  - 33 are deceased
- 48 birds have been tested antemortem
  - 30/48 tested positive (62.5%)

Sixty-nine birds in the population were evaluated. Thirty-six of these birds are still living and thirty-three are deceased. Since sending the SSP request to test all kea, forty-eight birds have been tested. Thirty of the forty-eight have tested positive for a rate of 62.5%.

## ABV Testing

- 11/12 holding institutions completed testing
  - 6 institutions all negative
  - 3 institutions all positive
  - 2 institutions mixed results

Eleven out of the 12 holding institutions completed testing of kea in their collection. Six institutions had 100% negative results, three institutions had 100% positive results and two institutions had mixed positive and negative results.

## ABV Testing

- 33 deceased birds
  - 15 tested for ABV antemortem
  - 18 not tested for ABV antemortem
- 15 antemortem tested deceased birds
  - 8 tested positive
  - 3 tested negative
  - 3 had mixed results
  - 1 result not reported

Of the thirty-three deceased birds from the population, fifteen were tested antemortem for ABV and 18 had not been tested prior to death. Of the fifteen that had been tested antemortem, 8 tested positive, 3 tested negative, 3 had mixed results and 1 result was not reported.

# Necropsy

- 16 necropsy reports reviewed
  - 2 tested antemortem for ABV
  - 14 untested at the time of death
- Additional necropsy results pending

Necropsy records from 16 birds were reviewed to look at causes of death. Two of these birds had been tested antemortem for ABV and 14 were untested prior to death. Additional necropsy results are still pending from more recent deaths.



## Necropsy Findings

- No definitive deaths due to ABV
- 3 cases with either neurologic signs or lesions
  - Presumed Baylisascaris migration
  - Fungal pneumonia with mild meningitis
  - CS: Lameness, stumbling, no brain lesions

In reviewing necropsy records that have been submitted, there have been no deaths definitively due to ABV. Three cases showed either clinical signs or histologic lesions of the nervous system. One bird had presumed Baylisascaris parasite migration resulting in ataxia prior to death and non-suppurative inflammation in the brain on histology. A second bird died due to fungal pneumonia and also had a mild meningitis noted on histology. A third bird showed lameness, and stumbling prior to death but had no lesions noted histologically in the brain. The remainder of tissues in this case were not submitted. Neither of the two cases that had positive ABV tests prior to death had any lesions consistent with ABV infection.

## Necropsy Findings

- Neoplasia (3 cases)
- Conspecific trauma (3 cases)
  - 2 chicks, 1 adult
- Bacterial sepsis (2 cases)
- Parasitic myocarditis
- Yolk coelomitis
- Pulmonary hemorrhage

Other necropsy findings include neoplasia, conspecific trauma, bacterial sepsis, parasitic myocarditis, yolk coelomitis and pulmonary hemorrhage.



## ABV Testing/Future Work

- Tissue testing for ABV
  - Antemortem positive birds
  - Antemortem negative birds
- Samples from 2 institutions pending
- Results may help guide future management of the population

To further investigate ABV in the kea population, tissue samples have been requested for PCR testing. Tissues from both ABV positive and ABV negative birds will be evaluated to see if it can be determined if the virus is resulting in clinical disease and death. Samples from two institutions have been received and results are pending. These results may help guide future management of the kea population.

Questions?

