



Exotic Animal Diseases Bulletin

Australian Bat Lyssavirus (ABLV)

INTRODUCTION

Australian bats carry a number of disease agents that may be transmitted to people. Two of these, ABLV and Hendra virus, have caused human fatalities in Australia. ABLV, now considered endemic within Australian bat populations, was first reported in bats in 1996 and has caused the deaths of two Queensland women, one in 1996 and one in 1998. Positive cases in bats continue to be reported every year and hundreds of potential human exposures have been reported. Since January 1996, the Australian Wildlife Health Network database has reported 34 confirmed positive cases of ABLV in bats in New South Wales, 1 in Northern Territory, 123 in Queensland, 7 in Victoria and 5 in Western Australia.

BACKGROUND

ABLV is from the genus lyssavirus (family Rhabdoviridae), in its own genotype (genotype 7). It is closely related to the classical rabies (serotype 1) and the European bat lyssavirus (serotype 5).

Infection with ABLV has been confirmed in all major species of flying fox in mainland Australia. The frequency of infection, and therefore risk to people, differs between clinically normal bats and sick, injured and rescued bats. The prevalence of ABLV infection in clinically normal, wild-caught Australian bats is very low. From 1996 to 2001, of a total of 475 wild-caught Megachiroptera from northern Australia, none showed serological evidence of ABLV infection. This is consistent with a prevalence of infection in the wild-caught study population of less than 1% (at a 95% confidence level, assuming 100% test

sensitivity). In sick, injured and rescued bats, seroprevalence of ABLV in megachiroptera varies depending on the species: 7.8% in black flying fox (*P alecto*), 16.9% in little red flying fox (*P scapulatus*), 4.6% in grey-headed flying fox (*P poliocephalus*), and 1.0% in spectacled flying fox (*P conspicillatus*). One study found that the microchiropteran yellow-bellied sheath-tail bat (*S flaviventris*) had seroprevalence of up to 62.5%, suggesting its important role in ABLV ecology.

How is ABLV transmitted?

Based on overseas and limited Australian experience, it is assumed that lyssaviruses are transmitted by contamination of a fresh wound, usually a bite or scratch with infected saliva, or bodily fluid contact with broken skin (for live or dead bats). Lyssavirus has been isolated in the salivary glands of both *S flaviventris* and *Pteropus sp.*, although this is not a consistent finding.

There have been human cases of classical rabies in the US without known bites, and aerosol dispersal of infected saliva has been implicated. Aerosol spread has been demonstrated in laboratory workers dealing with rabies virus culture. Further studies are needed to confirm modes of transmission for ABLV in Australia.

What are the clinical signs?

Clinical signs are so variable that lyssavirus infection should be considered when handling any sick bat. Affected bats are usually found on the ground or low in a tree and are unwilling or unable to fly. They may appear either depressed or

demonstrate abnormal aggressive behaviour. Some bats appear partially paralysed, display weakness, seizures or have a fine tremor. Abnormal function or movement of the mouth or larynx or a change of vocalisation should also be considered suspicious. Similar nervous signs have been seen in cases of lead poisoning, trauma, parasitic encephalitis and other unknown causes of encephalitis. Precautions need to be taken when examining any bat.

The two fatal human cases of ABLV in Australia had the clinical signs and course of disease clinically identical to rabies. Infection with ABLV has not been demonstrated in other native or domestic animals to date and the natural end point of ABLV infection in dogs and cats is unknown. Clinical signs of ABLV infection in other species of animal appear similar to those of any non-specific or neurological disease including behavioural changes, depression, ataxia, convulsing, paralysis, or any other neurological signs.

What do I ask the client?

To better define the risk of ABLV in a bat presented to a veterinarian, or to a query regarding a bat, record a detailed history, including the place, time and circumstances under which the bat was found, the clinical signs, the clinical progression (if known), and any possible contact with humans or other animals. If there is a risk of transmission (bites, scratches, saliva) then the names and contact details of the persons and animals involved should be recorded. The bat should be identified to species level wherever possible.

Who do I tell?

Bat lyssavirus is a notifiable disease in all jurisdictions. Veterinarians who diagnose or suspect ABLV in any animal must advise a government veterinary officer as soon as possible.

How is ABLV diagnosed?

Lyssavirus infection should be excluded whenever a bat is submitted that has



Restraint of an adult Flying Fox using a towel – courtesy of Andrew Breed

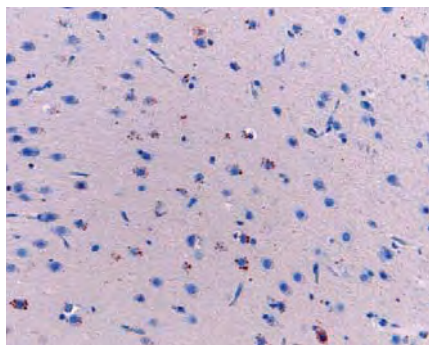
bitten or scratched a person or is displaying clinical signs indicative of ABLV.

Diagnosis is based on history, clinical signs and diagnostic tests. Serological tests are not suitable for risk assessment or diagnosis of ABLV and no consistent macroscopic lesions have been seen in infected bats post mortem.

Diagnostic tests are carried out on fresh impression smears of brain. The bat should be euthanased with diluted Lethobarb via intraperitoneal injection and the severed heads or whole animal should be forwarded chilled (not frozen) to the appropriate laboratory. Animals should not be shot through the head. Where no brain is available trigeminal ganglion or spinal cord including ganglia,

formalin-fixed stomach, intestine and adrenal should be submitted.

After discussion with the State Veterinary Service, animal specimens, along with appropriate clinical history, human contact information and submission forms, should be sent directly to Australian Animal Health Laboratory (AAHL) in Geelong, or for Queensland, to the State Veterinary Diagnostic



Lyssavirus antigen in neuron cell bodies and neuropil, Pteropus brain (immunoperoxidase)
Courtesy of CSIRO, AAHL (John Bingham)

Laboratory or Queensland Health Scientific Services (QHSS), from where they may be forwarded to AAHL for confirmation of a positive or suspicious test result.

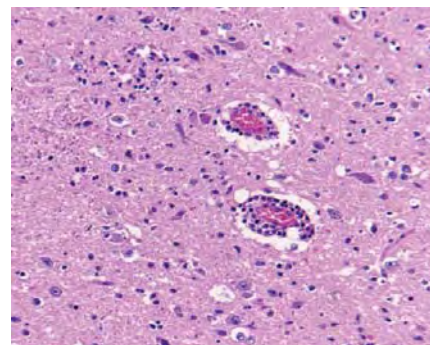
The standard initial diagnostic test for ABLV is the Fluorescent antibody test, and results are usually available within 4 hours of receipt of appropriate samples at diagnostic laboratories. Confirmation and typing to distinguish ABLV from rabies and other lyssaviruses may be done using polymerase chain reaction, immunohistochemistry and virus isolation.

Safety precautions

Human and animal rabies vaccines are experimentally cross protective against ABLV. This has not been verified in other species, but some level of cross protection is likely. The deaths of two Queensland women led to recommendations for use of rabies vaccine to protect people occupationally exposed to the virus.

The NHMRC vaccination handbook states that pre-exposure prophylaxis with rabies vaccine is strongly recommended for people in Australia liable to receive

bites or scratches from bats and that post-exposure treatment should be considered whenever a bite, scratch or mucous membrane exposure to saliva from any Australian bat has occurred. This is regardless of the extent of the scratch/bite, time lapsed the species of bat, or the presence of any clinical signs of ABLV. It is recommended that treatment begin as soon as practicable. No



Non-suppurative encephalitis caused by ABLV, Pteropus brain (Hematoxylin and eosin)
Courtesy of CSIRO, AAHL (John Bingham)

personnel should handle bats unless they have been vaccinated, and have demonstrated a rabies neutralising antibody titre of at least 0.5IU/ml within the past 2 years.

Animals that are potentially infected with ABLV should be approached with extreme caution using appropriate protective clothing and gloves. Only appropriately trained and experienced people should handle bats. Examination of a bat is a two-person job.

Where a bat has bitten or scratched a person, the wound should be washed immediately and thoroughly with soap and water and a virucidal preparation such as povidone iodine applied. The person should immediately contact their public health authority for urgent medical advice and seek treatment as soon as possible. If it is possible to do so in a safe manner, the bat should be captured and confined away from other animals and people in a stout cage or container and retained for ABLV testing.

More information on human health implications can be obtained from the Department of Human Health and Ageing or your local Public Health Unit.



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If a pet is suspected of being bitten or scratched by a suspected ABLV positive bat, or if the status of the bat is unknown, a variety of management options could be considered. These options are being updated and will be available shortly in the updated version of the ABLV Ausvetplan. Veterinarians should contact their relevant state department for animal health advice in the interim.

Acknowledgements

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Further reading

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