
IDENTIFICATION OF LIKELY NATURAL HOSTS FOR EQUINE MORBILLIVIRUS

Kim Halpin, Peter Young and Hume Field, Animal Research Institute, Department of Primary Industries, Locked Bag 4, Moorooka, Queensland 4105

Abstract

We describe the isolation of a paramyxovirus from three species of flying fox in Queensland. The species are *Pteropus alecto* (black flying fox), *Pteropus scapulatus* (little red flying fox) and *Pteropus poliocephalus* (grey headed flying fox). The virus appears to be identical to the equine morbillivirus which was associated with acute equine respiratory syndrome and two human deaths in two Queensland outbreaks. The isolation of this new virus suggests that flying foxes may be the natural host for the virus that causes acute equine respiratory syndrome. **Comm Dis Intell 1996;20:476.**

Background

In September 1994, there was an outbreak of acute equine respiratory syndrome (AERS) due to a previously undescribed virus, equine morbillivirus (EMV), in south-east Queensland¹. Both humans and horses were infected. One of the two human cases died. A third human case was diagnosed in October 1995². In this case transmission had apparently occurred 12 months previously when the patient was exposed to two infected horses that died following a severe, acute respiratory illness. This human case also died after developing a recurring encephalitis.

Following the first outbreak, an investigation was begun to determine the natural host of the virus. Since 1994 over 5,000 animals throughout Queensland, including over 30 wildlife species, have been tested for the presence of antibodies to EMV. Only flying foxes have been found to have antibodies to this virus³. All other testing has failed to show any evidence of EMV infection.

Testing carried out at the Animal Research Institute in Brisbane revealed that about 15% of the flying foxes (comprised of four species) present in Australia had antibodies to EMV. This antibody reactivity to EMV confirmed that the bats had previously been infected by a paramyxovirus similar to EMV. It also suggested that the bat virus is closely related to EMV. However it was not possible to establish the degree of relatedness between the bat paramyxovirus (BPV) and EMV on the basis of antibodies alone. To do this it was necessary to isolate BPV and compare it with EMV.

Isolation of a bat virus

In September 1996, we isolated a paramyxovirus from the uterine fluids of a flying fox found in the Brisbane area. The injured female grey headed flying fox, *Pteropus poliocephalus*, had miscarried twin fetuses. We have since isolated an apparently identical virus from three other flying foxes, one *Pteropus alecto* (black flying fox), one *Pteropus scapulatus* (little red flying fox) and a second *Pteropus poliocephalus* (grey headed flying fox).

Using an immunofluorescent staining technique, we were able to show that the virus isolated from the injured female

reacts strongly with human and horse serum samples containing antibodies to EMV. Both BPV and EMV produce similar changes in cell culture. They also appear to be identical by electron microscopy. Preliminary studies have shown that a part of the genetic sequence of the newly isolated virus is identical to the corresponding sequence of the EMV isolates. These results indicate that BPV and EMV are likely to be the same virus. Thus flying foxes may be the natural host of the virus which has caused two serious outbreaks of disease in horses and humans.

Implications for human health

Flying foxes are native to Australia and are found widely throughout the country. As only two outbreaks of EMV have been recorded to date, it appears that spill-over of this virus to other species is a rare event. Current evidence indicates that flying foxes do not pose a significant risk to human health⁴. The three human cases all contracted the virus from horses.

Work on the natural history of this virus is continuing. The Animal Research Institute (funded by a new initiatives research program of the Animal and Plant Health Service) will investigate possible modes of transmission from bat to horse. We will also investigate whether the apparent seasonal occurrence of disease is related to breeding cycles in flying foxes or to pregnancy in the two mares which originally contracted the virus.

References

1. Selvey L, Sheridan J. Outbreak of severe respiratory disease in humans and horses due to a previously unrecognised paramyxovirus. *Comm Dis Intell* 1994;18:499.
2. Allworth T, O'Sullivan, Selvey L, Sheridan J. Equine morbillivirus in Queensland. *Comm Dis Intell* 1995;19:575.
3. Young PL, Halpin K, Selleck PW *et al*. Serologic evidence for the presence in *Pteropus* bats of a paramyxovirus related to equine morbillivirus. *Emerging Infect Dis* 1996;2:239-240.
4. Selvey L, Taylor R, Arklay A, Gerrard J. Screening of bat carers for antibodies to equine morbillivirus. *Comm Dis Intell* 1996;20:477-478.