# Henipaviruses (Hendra viruses) (Infection with)



## AETIOLOGY

### Classification of the causative agent

Henipaviruses are zoonotic, enveloped, negative-sense, single-stranded RNA virus within the family *Paramyxoviridae*. Hendra virus (HeV), historically referred to as "equine morbillivirus" due to its genetic similarity to morbilliviruses, was first isolated in 1944 during an outbreak within Australian humans and horses. Disease in non-natural hosts is severe and acute, but also rare.

### Resistance to physical and chemical action

Temperature: Not well determined; virus recovery in the environment decreases with increased temperature

pH: Generally tolerant to pH extremes; virus recovery is variable in experimental conditions ranging from pH 4-11

Chemicals/Disinfectants: No specific susceptibility testing for HeV has been conducted, but generally recommended agents believed to be efficacious include: soaps, detergents, hypochlorites, iodine compounds, biguanides, and quaternary ammonium compounds

Survival: Does not persist long in the environment and is vulnerable to dessication; mildly prolonged survival time in urine and in certain fruit juices/flesh

## EPIDEMIOLOGY

### Hosts

- Fruit bats (suborder *Megachiroptera*)
    - Flying foxes (*Pteropus* spp.) appear to be the predominant natural host
- Humans (*Homo sapiens*)
- Domestic horses (*Equus ferus caballus*)
- Domestic swine (*Sus scrofa*)
- Domestic dog (*Canis familiaris*)
    - Only one case of natural exposure has been documented
- Experimentally:
    - Domestic cat (*Felis catus*)
    - Guinea pig (*Cavia porcellus*)

### Transmission

- Ingestion of contaminated feed
- Inhalation of aerosols
- Close contact with infected horses or fluids originating from an infected horse, especially urine
- No human-to-human transmission has been documented to date
- The virus circulates enzootically in natural flying fox populations

### Sources

- Excretions and secretions from infected bats, especially urine

- Respiratory secretions
- Blood

### *Occurrence*

All 4 species of Australian flying foxes are considered natural hosts of HeV, and the virus is typically found within the northern and eastern regions of the continent. Seroprevalence is believed to be approximately 9%, and it is believed populations shed the virus intermittently and seasonally. Outbreaks in horses occur most frequently in the states of Queensland and New South Wales where there is abundant coastal and forested habitat.

Only 7 people have been infected with HeV. In addition, 84 Australian horses developed clinical disease due to HeV, all of which died or were euthanised before collapse.

Brazil and many countries within sub-Saharan Africa have detected henipavirus-specific antibodies in fruit bats. There is serologic data to suggest spillover to livestock and humans has occurred without causing overt signs of clinical illness. Henipaviruses have been unable to be isolated from African fruit bat hosts, but the genome of Ghanaian bat henipavirus (GhV) has been entirely sequenced from an infected *Eidolon helvum* bat. There is currently much need for continued investigation into African henipavirus prevalence, including HeV.

## *DIAGNOSIS*

Experimental infections in Pteropid bats are sub-clinical and produce low titres of neutralizing antibodies. Virus replication and shedding are short-lived; evidence suggests peak viraemia is at 7-10 days.

### *Clinical diagnosis*

Experimentally infected fruit bats do not show signs of disease, and HeV is believed to be generally nonpathogenic in these species. There is evidence to suggest that viral shedding occurs 3-17 days post-infection, not all infected bats shed virus or seroconvert, and that pregnancy does not influence the amount of time a female sheds.

Clinical disease in horses, pigs, cats, and humans is primarily respiratory and/or neurologic in nature. Dogs appear asymptomatic.

### *Lesions*

- No lesions are grossly apparent in experimentally infected fruit bats.
- Histopathologic lesions are uncommon in experimentally infected fruit bats and include arteritis with lymphocytic infiltrate and vessel wall degeneration. The presence of lesions is associated with higher virus titres.

### *Differential diagnoses*

- Nipah virus
- In horses, African horse sickness

### *Laboratory diagnosis*

**Samples**

*For isolation of agent*

HeV identification and isolation in experimental settings has been variable among tissues, and results may be influenced by the amount of time elapsed since infection.

- Spleen
- Kidney
- Liver
- Uterus, placenta, uterine fluid
    - Fetal tissues may also be used
- Lung
- Pharyngeal swabs
- Rectal swabs
- Urine

*Serological tests*

- Whole blood
- Serum

**Procedures**

*Identification of the agent*

- Immunohistochemistry (IHC)
- Virus isolation
- Reverse-transcriptase polymerase chain reaction (RT-PCR)
    - In bats, virus detection in rectal and throat swabs is best in early infection, whereas urine and blood have better yield in late infection

*Serological tests*

- Virus neutralisation assay
- IgG and IgM antibody capture enzyme-linked immunosorbent assay (ELISA)
- Antigen capture ELISA

**For more detailed information regarding laboratory diagnostic methodologies, please refer to Chapter 2.9.6 Hendra and Nipah virus diseases in the latest edition of the OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals.**

## *PREVENTION AND CONTROL*

### *Sanitary prophylaxis*

- Human disease has been associated with infected horses; avoid contact with ill or infected horses, and use appropriate personal protective equipment if contact is necessary.
    - Post-mortem examinations of infected horses are considered particularly high-risk and proper precautions should be taken.
- Quarantine and restrict movement of infected horses; minimise the number and frequency of visits by personnel and caretakers.
- Prevent contamination of horse feed with secretions/excretions from flying foxes by utilising proper storage and sanitation techniques.

### *Medical prophylaxis*

- A commercial HeV vaccine for horses is licensed for use in Australia.

## *POTENTIAL IMPACTS OF DISEASE AGENT BEYOND CLINICAL ILLNESS*

### *Risks to public health*

- Human disease is associated with close contact with infected horses; preventing horses from becoming infected - whether from bats or other horses - is likely the best mechanism to prevent human disease.
- The reported case fatatilty rate of HeV in humans is 57% (4/7)

### *Risks to agriculture*

- While it is speculative at this time, there is concern that due to the number of extant fruit bats present in certain regions of Africa, HeV could be introduced and establish itself in bat populations. This would have the potential to impact rural swine farming practices. Pigs produce non-neutralising antibodies in response to HeV exposure, but their susceptibility to disease and role in disease transmission is not understood.

## *REFERENCES AND OTHER INFORMATION*


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The OIE will periodically update the OIE Technical Disease Cards. Please send relevant new references and proposed modifications to the OIE Science Department (scientific.dept@oie.int). Last updated 2020. Written by Samantha Gieger with assistance from the USGS National Wildlife Health Center.