

Equine influenza (wild equidae)

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AETIOLOGY

Classification of the causative agent

Equine Influenza (EI) is a highly contagious, though rarely fatal, acute respiratory infection of horses, donkeys, mules, and other equidae (domestic and wild) that replicates in respiratory epithelial cells. Outbreaks in domestic horses can severely impact agricultural industries, and outbreaks in wild horses can spread to domesticated horses if contact is permitted.

EI is caused by two subtypes of *Influenzavirus A* (family Orthomyxoviridae): H7N7 and H3N8. They are enveloped and have a segmented, negative-sense single-stranded RNA genome. They are related to, but are distinct from the viruses that cause human and avian influenza. Equine influenza viruses of both subtypes are considered to be of avian ancestry, and highly pathogenic avian H5N1 has been associated with an outbreak of respiratory disease in donkeys in Egypt.

EI is an OIE-notifiable disease in **domesticated equids** as indicated in the *Terrestrial Animal Health Code*, and voluntarily reportable in wildlife.

Resistance to physical and chemical action

Temperature:	Inactivated outside of equine core body temperature (39.16°C) using standard heat-sterilisation protocols, e.g., autoclaving
pH:	Not determined
Chemicals/Disinfectants:	Inactivated by most commercial detergents and disinfectants
Survival:	Unstable in the environment

EPIDEMIOLOGY

Hosts

- Donkeys (*Equus asinus*)
- Asiatic wild ass (*Equus hemionus*)
- Domestic ass (*Equus africanus asinus*)
- Horses (*Equus caballus*)
- Mules (*Equus mule*)
- Zebras (*Equus quagga*)
- Dogs (*Canis lupus familiaris*)
- Domestic pig (*Sus domesticus*)

Transmission

- Inhalation of respiratory secretions (aerosol transmission) and/or physical contact with infected animals, which create aerosols by coughing
 - Animals can begin to excrete the virus as soon as they develop a fever
- Contact with contaminated fomites such as personnel clothing, equipment, and brushes
- Risk factors include stress, e.g., crowding and transportation.

Sources

- Other infected equids
- Contaminated fomites (mechanical transmission)

Occurrence

EI is enzootic in most of the world, with the exceptions of Australia (where an outbreak occurred in 2007), New Zealand, and Iceland.

While normally confined to equidae, H3N8 influenza has crossed the species barrier to dogs in North America. Infection in dogs normally produces a mild fever and coughing but can cause fatal pneumonia. While equine influenza has not been shown to cause disease in humans, serological evidence of infection has been described primarily in individuals with occupational exposure to the virus. During 2004–2006 influenza surveillance in central China (People's Rep. of) two equine H3N8 influenza viruses were isolated from pigs.

DIAGNOSIS

EI has an incubation period of one to three days. Clinical signs are suggestive of EI, but definitive diagnosis is by serology or isolation of the virus according to procedures in the *OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals*. Once introduced into an area with a susceptible population, the disease spreads quickly and is capable of causing explosive outbreaks.

Clinical diagnosis

In susceptible animals, clinical signs include fever (39.44°C-41.11°C) and a harsh dry cough followed by prolific, watery nasal discharge. Depression, loss of appetite, muscle pain, enlarged lymph nodes, and weakness are frequently observed. Clinical signs generally abate within a few days, but complications due to secondary infections are common. While most animals recover in two weeks, the cough may linger and it may take as much as six months for some horses to return to full health.

While the disease is rarely fatal, complications such as pneumonia are common. This may cause long term debility of horses, and death can occur due to pneumonia, especially in foals. An animal's prognosis depends on the animal's immune status.

Lesions

- Destruction of respiratory tract, including bronchial epithelium and cilia
- Vasculitis
- Myositis
- Myocarditis

Differential diagnoses

- Bronchitis
- Equine herpesvirus infection
- Equine viral arteritis
- Exercise-induced pulmonary haemorrhage
- Hendra virus infection
- Inflammatory airway disease
- Laryngeal hemiplegia
- Pneumonia
- Pleuropneumonia
- *Rhodococcus equi* in foals

- Strangles (*Streptococcus equi*)

Laboratory diagnosis

Samples

For isolation of agent

- Nasopharyngeal swabs
- Endoscopy of nasal or tracheal washes
 - It is important to obtain samples as soon as possible after the onset of clinical signs, preferably within 3–5 days. Swabs may consist of absorbent cotton wool sponge/gauze on wire.
 - Swabs should be transferred to a tube containing transport medium immediately after use.
 - Utilise phosphate buffered saline (PBS) containing either 40% glycerol or 2% tryptose phosphate broth with 2% antibiotic solution (penicillin [10,000 units], streptomycin [10,000 units] in sterile distilled water [100 ml]), and 2% fungizone (250 mg/ml stock).
 - If the samples are to be tested within 1– 2 days they may be held at 4°C, otherwise they should be stored at –70°C or below. Samples should be kept cool during transport to the laboratory.

Serological tests

- Nasal mucous
- Serum sample

Procedures

Identification of the agent

- Virus isolation utilising embryonated hens' eggs and/or cell cultures from nasopharyngeal swabs or nasal and tracheal washes.
 - Isolates should always be sent immediately to an OIE Reference Laboratory.
- Reverse-transcription polymerase chain reaction (RT-PCR)
- Antigen capture enzyme-linked immunosorbent assay (ELISA) of respiratory secretions

Serological tests

- Diagnosis of influenza virus infection is usually only accomplished by tests on paired sera; the first sample should be taken as soon as possible after the onset of clinical signs and the second approximately 2 weeks later.
- Antibody levels are determined by haemagglutination inhibition (HI), single radial haemolysis (SRH) or ELISA.
- Paired (acute and convalescent) sera/serology allows for confirmation of infection even with a false negative virus isolation-
 - Acute sample taken as close to onset of clinical signs (max of 3–5 days)
 - Convalescent sample should be taken 2 weeks afterwards

For more detailed information regarding sampling and laboratory diagnostic methodologies, please refer to [Chapter 3.5.7](#) of the latest edition of the OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals.

PREVENTION AND CONTROL

Sanitary prophylaxis

- When EI appears, efforts are placed on movement control and isolation of infected horses, wild or domestic.
 - Since the disease is most often introduced by infected animals, isolation of new entries to captivity is paramount to preventing the introduction of disease to a premise.
 - The OIE sets the standards by which countries should control the import of domestic horses across international boundaries.
- EI is easily inactivated by common disinfectants, so thorough cleaning and disinfection should be part of all biosecurity measures taken in response to an outbreak in domestic animals. However in the wild, sanitary prophylaxis is unrealistic.

Medical prophylaxis

- Vaccination is practised in most countries with domestic horses and may be used as a tool for wild equids as well.
 - However, due to the variability of the strains of viruses in circulation and the difficulty in matching the vaccine strain to the strains of virus in circulation, vaccination does not always prevent infection. It can, however, reduce the severity of the disease and speed recovery times.
 - Vaccines are produced according to the guidelines in Chapter 2.5.7 of the OIE Terrestrial Manual.
 - Multiple vaccine types exist, including: killed (inactivated virus), modified-live (live, attenuated), or recombinant (utilising a canarypox vector)

POTENTIAL IMPACTS OF DISEASE AGENT BEYOND CLINICAL ILLNESS

Risks to public health

- There have been cases where people in contact with infected horses developed antibodies to equine influenza viruses, but there are no documented cases of illness in humans exposed to the virus.

Risks to agriculture

- If domestic, working equids are living in close proximity to wild free-ranging equids, additional precautions should be taken to prevent transmission.

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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 Scientific and Technical Department (scientific.dept@oie.int). Last updated 2019. Written by Marie Bucko and Samantha Gieger with assistance from the USGS National Wildlife Health Center.