Outline Information on H5N1 in cats

FACT

In February 2006 highly pathogenic avian influenza (HPAI), caused by the H5N1 virus was detected in a domestic cat found dead on the northern island of Ruegen, Germany. Until now never a human case of HPAI has been associated with exposure to cats. There is no indication that domestic cats can be considered a reservoir of the virus.

Introduction

The recent case of a cat reported to be infected with highly pathogenic avian influenza (HPAI), caused by the H5N1 virus in Germany is indicative for the high degree of alertness and effectiveness of the European surveillance system in place. Since mid-February, more than 100 wild birds have died on the island, and tests have confirmed H5N1 infection in several. During the recent H5N1 outbreaks, mainly in Asia several cases of cats and other felidae have been found to be infected with H5N1. Experimental studies have shown that the domestic cat can become infected with the virus and cat-to-cat transmission has been experimentally demonstrated.

An increase demand for cats to be put down or being abandoned is an indication of questions from the public and pet owners specifically. Veterinary authorities and practitioners will need to address these concerns. This document provides information about the potential risk of cats contracting H5N1 virus and the eventual role of cats in the spread of avian influenza H5N1 to domestic and wild birds or mammals (including humans). Further, this document provides information for veterinary professionals is the aim to:

a) create awareness among veterinarians about avian influenza
b) provide information about recognizing the disease and care in handling suspect cases
c) assist in addressing questions from (pet) owners
d) address issues of occupational health and safety for veterinarians and their staff

Background

During the Hong Kong outbreak in 1997 the first human cases from H5N1 were reported with several fatalities. From January 2004 trough February 2006, 173 people have been confirmed infected with the H5N1 virus of which 93 have died of the disease. Until now, human-to-human transmission has not been confirmed. Although most cases of H5N1 have been in birds, humans and other mammals are at risk of HPAI infection. Highly pathogenic avian influenza is of concern due to the current outbreaks in Asia, Africa and Europe and the potential for a pandemic spread. The virus is highly contagious in birds and already over 200 millions of domestic poultry have either been culled or died of the disease. Presently a large number of wild birds have been found dead. Is the recent confirmation of a cat with the H5N1 virus in Germany reason for concern? Table 1 shows the timeline of H5N1 avian influenza in cats and other felidae.

Table 1. Timeline of (H5N1) avian influenza in cats and other felidae (and civets)

1970s and 1980s	Experimental infection of domestic cats with influenza A viruses of subtypes H3N2 from humans, H7N3 from a turkey, and H7N7 from a harbor seal (*Phoc vitulina*) resulted in transient virus excretion and a temporary increase in body temperature but did not induce clinical signs of disease.
December 2003	Two leopards and two tigers died at a zoo in Thailand. All were fed on fresh chicken carcasses. Investigation confirmed H5N1 in tissue samples. This was the first report of influenza causing disease and death in big cats.
20 February 2004	Anecdotal evidence suggests H5N1 infection in a single household of domestic cats in Thailand.
02 September 2004	Research shows that domestic cats experimentally infected with H5N1 develop severe disease and can spread infection to other cats.
11 October 2004	An H5N1 outbreak began in zoo tigers in Thailand said to have been fed with chicken carcasses. Altogether, 147 tigers out of the population of 441 died or were euthanized for animal welfare reasons.

15 July 2005	Tests on three civets that died late June 2005 in Viet Nam detected H5N1, marking the first infection of this species with the virus. The endangered Owston's palm civets were raised in captivity; source of infection is still unknown.
October 2005 – February 2006	Cats reported dead by FAO field veterinarians in several countries in the vicinity of poultry farms from premises to be infected with H5N1.
28 February 2006	H5N1 was found in a cat on the Baltic Sea island of Ruegen (Germany). In the prior weeks many infected wild birds had been found dead on the island. Possibly the cat was infected by eating infected wild birds.

Public Information

Role of cats in the spread of the disease

It is unlikely that cats play a major role in the transmission cycle of H5N1 viruses. However, research has shown that domestic cats are at risk of disease and can die from H5N1 virus. Horizontal transmission has been experimentally proven. Most probably cat infections only occur in association with H5N1 outbreaks in domestic or wild birds, e.g. when mostly stray cats feed on infected birds. So far, experimental infected cats have shed the virus via the respiratory and the intestinal tract, and carried the virus to other cats.

Within an area where HPAI infected wild birds are reported most wild birds found infected were waterfowl and not the species cats normally interact with. The risk that cats get infected by wild aquatic birds therefore seems small. This risk is even smaller for domestic cats compared to stray cats.

Within an area where domestic poultry is infected with H5N1 there is a risk that cats get infected with H5N1 when there is contact with infected poultry or their faeces. Anecdotal reports from endemic areas indicate that contact with infected poultry (faeces and eating infected carcasses) would be a likely source of infection for cats. Cats will probably have a limited contribution in the spread of the disease. The large number of infected poultry compared to the limited number infected cats is indicative for the minor role cats appear to play in the epidemiology of the disease. Furthermore, research has shown that poultry shed significant larger amounts of virus than cats. This also reduces the risk of human infections trough cats.

The role of stray cats

Due to their mobility, stray cats in infected areas could spread the disease to uninfected zones. If infected, stray cats could theoretically pose a risk for humans and other animals to become infected.

The role of other mammals

Reports show infection and disease of tigers, leopards and civets. It is also known that dogs and pigs could become infected with the virus. Due to the broad spectrum of hosts of the H5N1virus, the possibility that other wild or domesticated mammals like, seals, Mustelidae or furbearing animals, could become infected by contacting infected animals can not be ruled out. Carnivores could also become infected by eating infected poultry or infected wild birds.

Recommendations

For areas where avian influenza has been found or is suspected the public is advised to:

- Be especially vigilant for dead or sick cats
- Avoid contact between cats and poultry (or their faeces)
- Keep cats inside
- To contact a veterinarian, if cats have (potentially) been in contact with infected birds and show breathing problems or nasal discharge
- Not to touch or handle any sick-looking or dead cat (or other animal) and report to the authorities
- Not to feed sick or dead poultry. They should be disposed properly
- To clean litter box and animal's eating dish regularly
- To wash hands with water and soap regularly and especially after handling animals and cleaning their litter boxes or coming in contact with faeces or saliva
- Not to let dogs run freely, to keep on a lead when outside the premises

- Not to feed any water birds
- Not to let animals hunt or eat any other animal
- To disinfect (e.g. with bleach 2-3 %) cages or other means with which sick animals have been transported or come in contact with.

Information for veterinarians

Avian influenza in other animal species

Hosts: Natural hosts for H5N1 appear to be water birds such as ducks. Lately swans have been found dead in a number of western and central European countries (e.g. Germany, France and Romania). Tests have shown that some of these animals had been infected with the HPAI virus. Poultry that have come into contact with the virus have died massively.

Dogs: To date no clinical cases of dogs have been reported. In an unpublished study carried out in 2005 by the National Institute of Animal Health in Bangkok, researchers tested 629 village dogs and 111 cats in the Suphan Buri district of central Thailand. Out of these, 160 dogs and 8 cats had antibodies to H5N1, indicating that they were infected with the virus or had been infected in the past.

Pigs have generally been considered as playing a role as „mixing vessels" for influenza virus and therefore presenting a risk for the avian influenza virus combining with a human influenza virus into a strain, more apt to infect humans. Regarding the present H5N1 strain, studies conducted in pigs in Vietnam yielded 8 animals to have been in contact with this strain out of the 3000 investigated pigs. None of the animals had any clinical signs and it was not possible to isolate the virus from them. In experimental infection, pigs appear not to be very susceptible; the virus does not replicate readily in infected swine and thus they are not able to easily spread the disease.

Herbivores appear to be at lower risk and so far no cattle have been identified as carrying influenza viruses. They are considered to be resistant. Horses however are susceptible to Influenza viruses but so far mainly subtypes as H3N8 have been identified. Experimentally also mice have been infected but their role in natural transmission has not been established.

Clinical picture

From experimental infection of cats the following signs have been described:

- Significant rise in body temperature
- Decreased activity
- Protrusion of the third eye-lid
- Labored breathing.

Other symptoms observed are

- Nasal discharge
- Coughing or sneezing
- Increased serum levels of alanine amino transferase and aspartate aminotransferase (indicative of liver damage).

Differential diagnosis

In case of animals found dead, a number of diseases causing sudden death would need to be considered such as:

- acute poisonings
- trauma (e.g. animals being hit by car).
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With regard to infectious diseases cats:

- Common viral causes: Herpesvirus 1 (rhinotracheitis) and calicivirus (Signs: sneezing and nasal discharge)
- Bacterial causes: *Bordetella bronchiseptica, Mycoplasma* spp. and *Chlamydophyla (*Signs: muco-purulent discharge)
- Fungal causes*: Cryptococcus neoformans* causes upper respiratory disease in cats. Facial deformity and ulcerative lesions are common
- Neoplasias generally induce a more chronic process.

Postmortem lesions and histological lesions
The following has been observed:

- Multiple foci of pulmonary consolidation (diffuse alveolar damage on histology)
- Necrosis and inflammation of the liver
- Multifocal hemorrhages found in lung, heart, thymus, stomach, intestine, liver, and lymph nodes (found in tigers and leopards).

Public health implications
Humans and other mammals need to come in contact with large amounts of virus to become infected. In case of an infection with H5N1, mammals and humans apparently only shed small amounts of virus, contributing to reduced risk of spread among themselves. Recent data from experimentally infected cats' evidenced extra-respiratory replication of the H5N1 and excretion of virus in faeces of cats need to be taken into consideration. Hygienic practices need to be re-enforced, frequent washing of hands with water and soap especially after handling animals, cleaning cat litter boxes as well as before and after the preparation of food.

Occupational health and safety
Veterinarians and their staff are specifically at risk of coming into contact with infected cats, in case the disease becomes more widespread among this species. Normally, veterinarians and their staff engage in frequent hand washing and disinfect examination tables and instruments to reduce the general risk of disease transmission among their patients and to protect the persons present in the consultation room from eventual exposure.

Advice for veterinarians
The following is advised for veterinarians:

- Be ware of possibility to receive (sick) cats infected with H5N1
- Take hygienic measures when handling sick cats (gloves and surgical masks)
- Take deep oro-pharyngeal swabs of suspected animals (e.g. animals with respiratory problems) and sent them to the laboratory clearly indicating the type of examination requested
- Support cases to be reported to veterinary authorities
- Inform owners of suspected animals and provide them with clear and practical information, avoiding creating any panic among cat owners or the general public.

Veterinarians are advised to contact the Veterinary Authorities in their respective countries for specific instructions.