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Reports

Canine Influenza

Causative agent

Canine influenza (CI), or dog flu, is a highly contagious viral infection affecting dogs and also cats. Influenza viruses belong to the family Orthomyxoviridae. Canine influenza is a Type A influenza virus and is further identified based on the composition of two specific proteins in the lipid outer layer of the capsid: hemagglutinin (HA) and neuraminidase (NA). At present, two strains of canine influenza virus have been identified in the United States: H3N8 and H3N2.

See Also:

- [Canine Influenza FAQ](#)
- [Pet Owners' Guide to Canine Influenza](#)

- Client Handout (AVMA members only):**
- [Color Handout](#)
 - [Black & White Handout](#)



Influenza viruses are able to quickly change and give rise to new strains that can infect different species. Both strains of canine influenza identified in the U.S. can be traced to influenza strains known to infect species other than dogs. At some point, these viruses acquired the ability to infect dogs and be transmitted from dog to dog.

Canine H3N8 influenza was first identified in Florida in 2004 in racing greyhounds. It is thought this strain developed from an equine H3N8 influenza strain that jumped from horses to dogs. Since being detected in 2004, canine H3N8 influenza has been identified in dogs in most U.S. states and the District of Columbia.

Canine H3N2 influenza was first identified in the United States in March 2015 following an outbreak of respiratory illness in [dogs in the Chicago area](#). Prior to this, reports of canine H3N2 influenza virus were restricted to South Korea, China and Thailand. It was initially identified in dogs in Asia in 2006-2007 and likely arose through the direct transfer of an avian influenza virus – possibly from among viruses circulating in live bird markets – to dogs.

Following the initial diagnosis in Chicago, additional cases of canine H3N2 influenza were reported in a number of states. In early 2016, a group of [shelter cats in Indiana were diagnosed with H3N2 canine influenza](#). It is believed the virus was transmitted to them from infected dogs.

In May 2017, canine H3N2 influenza was diagnosed in dogs in Florida, Georgia, North Carolina, South Carolina, Texas, Kentucky, Tennessee, Missouri, Louisiana, and Illinois. This was the same strain of H3N2 involved in the 2015 outbreak in Chicago.

There is no evidence that either strain of canine influenza (H3N8 or H3N2) can infect humans.



Transmission

Canine influenza is transmitted through droplets or aerosols containing respiratory secretions from coughing, barking and sneezing. Dogs in close contact with infected dogs in places such as kennels, groomers, day care facilities and shelters are at increased risk of infection. Canine influenza can be spread indirectly through objects (e.g., kennels, food and water bowls, collars and leashes) or people that have been in contact with infected dogs. It is important to clean and disinfect objects that have been in contact with an infected dog to avoid exposing other dogs to the virus. Likewise, people who have been in contact with an infected dog should wash their hands and clean their clothing to avoid spreading the virus.

The virus can remain viable (alive and able to infect) on surfaces for up to 48 hours, on clothing for 24 hours, and on hands for 12 hours. It is important to implement biosecurity protocols and disinfection procedures to reduce the risk of disease transmission.

H3N8 has an incubation period of 1 to 5 days, with clinical signs in most cases appearing 2 to 3 days after exposure. Dogs infected with H3N2 may start showing respiratory signs between 2 and 8 days after infection. Dogs are most contagious during the incubation period and shed the virus even though they are not showing clinical signs of illness. Some dogs may show no signs of illness, but have a subclinical infection and shed the virus.

Pathology and Clinical Signs

Canine influenza virus (CIV) infects and replicates inside cells in the respiratory tract from the nasal lining to the terminal airways. The inflammatory response to the infection results in rhinitis, tracheitis, bronchitis and bronchiolitis. The pathologic process results in death of the epithelial cells lining the respiratory tract, exposing the underlying basement membrane. This predisposes the respiratory tract to secondary bacterial infections that contribute to nasal discharge and coughing.

Virtually all dogs exposed to canine influenza virus become infected, with approximately 80% developing clinical signs of disease. The approximately 20% of infected dogs that do not exhibit clinical signs of disease can still shed the virus and spread the infection.

Like other mammalian influenza viruses, canine influenza virus causes an acute respiratory infection in dogs. There is no "season" for canine influenza, and infections can occur any time of the year. Canine influenza virus infection often resembles canine infectious tracheobronchitis ("kennel cough"), which is caused by one or more bacterial or viral infections, including *Bordetella bronchiseptica* and parainfluenza virus.

The majority of infected dogs exhibit the mild form of canine influenza. The most common clinical sign is a cough that persists for 10 to 21 days despite treatment with antibiotics and cough suppressants. Affected dogs may have a soft, moist cough or a dry cough similar to that induced by kennel cough. Nasal and/or ocular discharge, sneezing, lethargy and anorexia may also be observed. Many dogs develop a purulent nasal discharge and fever (104-105°F). The nasal discharge is usually caused by secondary bacterial infections, including *Pasteurella multocida* and mycoplasma species.

Some dogs are more severely affected and exhibit clinical signs of pneumonia, such as a high-grade fever (104°F to 106°F) and increased respiratory rate and effort. Thoracic radiography (chest x-rays) may reveal consolidation of lung lobes. Although most dogs recover without incident, deaths due to H3N2 have been reported.

Cats infected with H3N2 display signs of upper respiratory disease, including nasal discharge, congestion, malaise, lip smacking and excessive salivation.

Diagnosis

Canine influenza cannot be diagnosed solely by clinical signs (coughing, sneezing and nasal discharge) because these clinical signs also present with other canine respiratory illnesses. **Tests** are available to diagnose and identify strains of canine influenza virus. **Tests include:** virus isolation, immunoassays to detect virus antigen, PCR to detect virus nucleic acid, and serology for antibodies specific to the virus. PCR may be the **most reliable test** for the diagnosis of canine influenza. Contact your diagnostic lab for recommendations regarding tests and sample collection.

Treatment

Veterinary expertise is required to determine treatment options and the best course of treatment. Treatment for canine influenza, as for most viral diseases, is largely supportive. Good husbandry and nutrition may help dogs mount an effective immune response. Most dogs recover from canine influenza within 2-3 weeks. Secondary bacterial infections, pneumonia, dehydration, or other health factors (e.g., pregnancy, pre-existing pulmonary disease, immunosuppression, tracheal collapse, etc.) may necessitate additional diagnostics and treatments including, but not limited to:

- Antimicrobials for known or suspected secondary bacterial infections.
- Nonsteroidal anti-inflammatory medications as needed to reduce fever and inflammation.
- Fluids to help correct dehydration or maintain hydration.

Treatment modifications should be made as needed, based on response to treatment, other health factors, and other factors such as compliance and animal care capabilities of the owner/caretaker.

To prevent transmission of the virus, dogs infected with canine H3N2 influenza as well as other dogs in the household should be **isolated for 4 weeks**.

Antiviral drugs to treat influenza are approved for use in humans only. Little is known about their use, efficacy and safety in dogs. Veterinarians who use approved drugs in a manner not in accord with approved label directions (e.g., use of an antiviral drug only approved for use in humans) must follow the federal extralabel drug use regulations of the **Animal Medicinal Drug Use Clarification Act (AMDUCA)**.

Morbidity and Mortality

Canine influenza virus is not widespread in the dog population and many dogs have never been exposed to the virus. The morbidity rate (the number of exposed animals that develop disease) estimated at 80%. The mortality (death) rate is low; less than 10%. Deaths occur mainly in dogs with the severe form of disease.

To date, no fatalities **in cats** infected with canine influenza have been reported.

Prevention and Control

The canine influenza virus may persist in the environment for approximately 2 days, and be viable on hands and clothing for up to 24 hours. In veterinary, boarding, and shelter facilities, the canine influenza virus appears to be easily killed by disinfectants commonly used in those facilities, such as quaternary ammonium compounds (eg, benzalkonium chloride), aldehydes, potassium peroxymonosulfate, phenols and bleach (1:30 dilution) solutions. Cleaning and disinfection protocols should be established to reduce the risk of virus transmission through indirect contact with people or other fomites (e.g. cages, bowls, exam rooms, etc.).

All employees should wash their hands with soap and water:

- Upon arriving at the facility
- Before and after handling each dog
- After coming into contact with dogs' saliva, urine, feces, or blood
- After cleaning cages
- Before eating meals, taking breaks, or leaving the facility
- Before and after using the restroom

Isolation protocols should be rigorously applied for dogs showing clinical signs of respiratory disease. Dogs exposed to CI or exhibiting respiratory symptoms should not be brought to locations where other dogs are present such as training classes, shows or events, day care, and boarding and shelter facilities until the isolation period is completed.

Sick or exposed dogs should be isolated, preferably in an area with a separate air supply. An isolation period of 4 weeks is recommended. Wear personal protective equipment (gown and gloves at a minimum) when handling ill animals to avoid contaminating clothing. Clean and disinfect all clothing (including shoes), equipment, surfaces and hands after exposure to dogs showing signs of respiratory disease. Owners whose dogs are coughing or exhibiting other signs of respiratory disease should bringing their dogs should not participate in activities with other dogs or bring

their dogs to facilities where other dogs are present to avoid exposing them to the virus.

Veterinary practices should implement biosecurity protocols to prevent transmission of canine influenza between dogs at the practice. Dogs with clinical signs consistent with respiratory disease should not be allowed in the waiting room. Clients may need to wait in the car with their dog until clinic staff is ready to see the dog without risking exposure to other dogs. Dogs suspected of having canine influenza should avoid the main entrance and enter and exit the facility through a different door. Areas where potentially infected dogs are examined and treated, as well as all instruments used, must be thoroughly cleaned and disinfected after the dog is discharged. Staff members should wear personal protective equipment (gloves and a gown at minimum) when examining or caring for dogs suspected of having canine influenza.

Vaccines are available for both H3N8 and H3N2 canine influenza. A bivalent vaccine offering protection against both strains is also available. Currently, there are no canine influenza vaccines approved for use in cats. Vaccination can reduce the risk of a dog contracting canine influenza. Vaccination may not all together prevent an infection, but it may reduce the severity and duration of clinical illness.

The canine influenza vaccine is a "lifestyle" vaccine, and is not recommended for every dog. In general, the vaccine is intended to protect dogs at risk for exposure to the canine influenza virus, which includes those that participate in activities with many other dogs or are housed in communal facilities, particularly where the virus is prevalent. Dogs that may benefit from canine influenza vaccination include those that receive the kennel cough (*Bordetella/parainfluenza*) vaccine, because the risk groups are similar. Dog owners should consult with their veterinarian to determine their dog's risk of exposure to the canine influenza virus and if vaccination is appropriate for their dog.

More Information about Canine Influenza

Canine Influenza Resources (Iowa State University Center for Food Security & Public Health)

Key Facts about Canine Influenza (Centers for Disease Control and Prevention)

Canine Influenza FAQs for Pet Owners and Veterinarians (2017) (University of Florida College of Veterinary Medicine)

Sheltering Organizations: Canine Influenza FAQ (University of Florida College of Veterinary Medicine)

Canine Influenza Fact Sheet (Iowa State University)

H3N2 Canine Influenza Virus Fact Sheet for Veterinarians (University of Florida College of Veterinary Medicine)

Canine Influenza Virus (Cornell University Veterinary Diagnostic Laboratory)

2015 Canine Influenza Outbreak in Chicago Area (Cornell University Veterinary Diagnostic Laboratory)

Doginfluenza.com (Merck Animal Health)

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