

## Canine Influenza (Canine Flu)

### What is canine influenza?

Canine influenza is a highly contagious respiratory infection caused by an Influenza Type A virus, called H3N8. Genetic analysis shows that the canine influenza virus is closely related to equine (horse) influenza virus, suggesting that it evolved from equine influenza virus and jumped species.

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### What is the clinical disease associated with canine influenza virus?

Two clinical syndromes have been seen in dogs infected with the canine influenza virus--a mild form of the disease and a more severe form that is accompanied by pneumonia.

**The mild form.** Dogs generally present with a soft, moist cough that persists for 10 to 30 days. Some dogs have a dry cough similar to the "kennel cough" caused by Bordetella bronchiseptica/parainfluenza virus complex, resulting in mistaken diagnosis of this disease. Dogs with the mild form of influenza may have a secondary bacterial nasal discharge. As with other kennel cough infections the clinical signs are generally mild, the disease resolves without treatment, and treatment does not noticeably alter the course or duration of the disease. The value of antiviral drug therapy including Tamiflu unknown.

**The severe form.** Dogs with the severe form of canine influenza develop high fevers (104°F to 106°F) and have clinical signs of hemorrhagic pneumonia (breathing fast, difficulty breathing and coughing up blood). These symptoms have a rapid onset, and can lead to death within 4-6hrs of presentation. Secondary bacterial pneumonia may be present, and must be treated if the dog is to survive. Mortality rate of 5-8% has been reported with the severe form of disease in selected high-risk populations (shelter animals, dogs who live in kennels, etc), but is generally less than 1%.

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### Which dogs are susceptible?

Virtually all dogs are probably susceptible to canine flu, because immunity has not developed in the canine population at large to any extent yet. Additionally, influenza viruses have the potential for "antigenic drift," or changing their RNA over time allowing them to evade the immune defenses of the dog. Whether this happens with canine influenza is unknown and unconfirmed, but likely, based on what we know about flu viruses. Somewhere between 50-80% of infected dogs show symptoms of disease after infected, mostly the mild form. Approximately 50% of infected dogs develop antibodies to canine flu without showing any signs of disease. Greyhounds are neither more or less susceptible than other dog breeds, though this disease has been

commonly reported in greyhounds, perhaps because they often live in kennels, where contagious disease like flu can spread from dog to dog rapidly if one gets infected.

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### **Is the disease geographically limited?**

The disease was first identified in racing greyhounds in Florida in 2004. However, it has been reported in virtually all states within the United States since then. Cases have been identified in animal shelters, pet stores, veterinary clinics, humane societies and in privately owned pets. The Cornell University Animal Health Diagnostic Center website provides state-by-state statistics.

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### **How is a dog with canine influenza treated?**

The Mild Form requires minimal supportive treatment, as is the case with ANY mild upper-respiratory infection (kennel cough). Cough suppressants can make the dog more comfortable while they deal with the infection. Antibiotic therapy should be restricted to high-risk patients with the Mild Form (dogs who live in kennels).

With the Severe Form, treatment is largely supportive. A rapid onset of disease (4-6hrs) is matched by an equally rapid improvement in clinical signs if treatment is instigated. Intravenous fluid therapy and broad-spectrum antibiotics are generally required. The best results seem to be achieved by using a combination such as doxycycline and clindamycin, or doxycycline and Penicillin/Ampicillin. Enrofloxacin (Baytril) does not seem to be a good choice in these cases, and should be avoided. In severe cases, these antibiotics should be administered intravenously along with fluids to prevent toxic shock. In the few cases that have not responded, the diagnosis is generally bacteria that are resistant to the antibiotics used. So, it seems that death is often due to secondary bacterial infection rather than due to the viral infection by itself.

While there are no reports of the use of antivirals such as Tamiflu, there is a rationale for using these types of drugs, since influenza viruses are often susceptible to Tamiflu. This may hasten recovery, although no studies exist demonstrating benefit.

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### **Is canine influenza virus transmissible from dogs to humans or other animals?**

There is no evidence that the disease is passed from dogs to people, as this usually requires a substantial change in virus RNA. Thus, while the potential exists (as is evidenced by the cross-over of species from equine to canine, or the recent experience with avian influenza), there is no current concern.

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## **How do I keep canine influenza out of my facility, and if it does enter my facility, what should I do?**

Canine influenza is easily killed by most disinfectants (quaternary ammonium compounds, bleach solutions), and does not survive well outside the host. Good clinic practice, involving regular disinfecting of cages, kennels, feeding utensils, etc., and regular hand-washing by personnel is advised.

Clients should be asked about boarding/kenneling history, vaccination status, or any relevant clinical signs. Any dog with clinical signs should be quarantined, avoiding the waiting area/common areas as much as possible.

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## **How do I diagnose canine influenza?**

Serological testing is currently the most reliable method of diagnosis. Blood samples taken at first signs of disease, and then again two weeks later should be tested for antibodies to canine flu if possible. Samples should be submitted to the Cornell University Animal Health Diagnostic Center.

Culturing the virus is difficult. It appears to be successful only from lung tissue of dogs that have died, and only within 2-3 days of onset of clinical signs of severe pneumonia.

PCR-based methods of blood testing to detect viral RNA are difficult, because influenza is a single-stranded RNA virus, and this type of DNA is difficult to deal with in the lab. Currently one company, Allerca, through a subsidiary called Genesentinel GDS, is marketing a diagnostic test offered through TW Medical Veterinary Supply. There is absolutely no information available regarding this test, its validity or accuracy. Additionally, because most cases of Canine influenza are mild, they do not require specific diagnosis. Post-mortem diagnosis in severe disease cases may be necessary in some instances.

Immuno-PCR may become a viable method of detecting viral antigen - this has been shown to be effective in equine influenza diagnosis.

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## **What about the canine influenza vaccine?**

In 2009, Intervet-Schering Plough released a killed H3N8 vaccine. This vaccine has been claimed to limit clinical signs in dogs subsequently infected with canine influenza, but does not prevent infection or shedding of the virus from infected dogs. Clients should realize that the vaccine might reduce the severity and duration of infection and clinical signs, but will not prevent infection. Given the limited spread of H3N8 through the general canine population in the US, and the relatively small percentage of dogs in whom the disease is more than a mild respiratory problem, current recommendations are to limit vaccinations to dogs that have a high

risk of exposure (dogs travelling to areas of known outbreaks, and dogs who frequent high-density closed facilities – boarding kennels, day-care facilities, breeding kennels, dog shows, shelters, etc.). If the dog warrants a Bordetella (kennel cough) vaccination, then also consider giving a canine influenza vaccination. This is consistent with the policy statement of the American Veterinary Medical Association. Additionally, this vaccine currently has a conditional license.

Some boarding facilities might request dogs be vaccinated prior to accepting them. However, given that the company requires 3 doses, 2-4 weeks apart, to be administered to confer optimum immunity, this has to be started at least 4-8 weeks prior to admission into a facility. Thus, vaccinating dogs in a shelter, if they are not anticipated to remain in the shelter for at least 4-8 weeks, is of questionable value.

Little information exists about safety, adverse events or even large-scale “in field” effectiveness, other than that provided by the company. However, few adverse events are anticipated, based on initial company observations of over 1400 field doses, where no adverse events were observed.

While influenza viruses show both antigenic drift and shift, not all influenza viruses do this to the same extent. Equine influenza (another H3N8) has shown relatively little antigenic drift, compared to human influenza isolates which drift a great deal. Canine influenza has not shown antigenic drift over the last 4 years and differs from the equine virus by only 5 amino acids. This suggests that the canine vaccine will likely be effective over several years.

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### **Is there any concern about "swine flu" for dogs?**

In December 2009, the AVMA published an alert regarding the potential for dogs and cats to contract H1N1 influenza virus (commonly known as "swine flu"). While several cats, and potentially some dogs, have contracted this virus from infected humans, currently no evidence exists that animals can in turn infect people with this virus.

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### **References:**

1. VIN – Veterinary Information Network