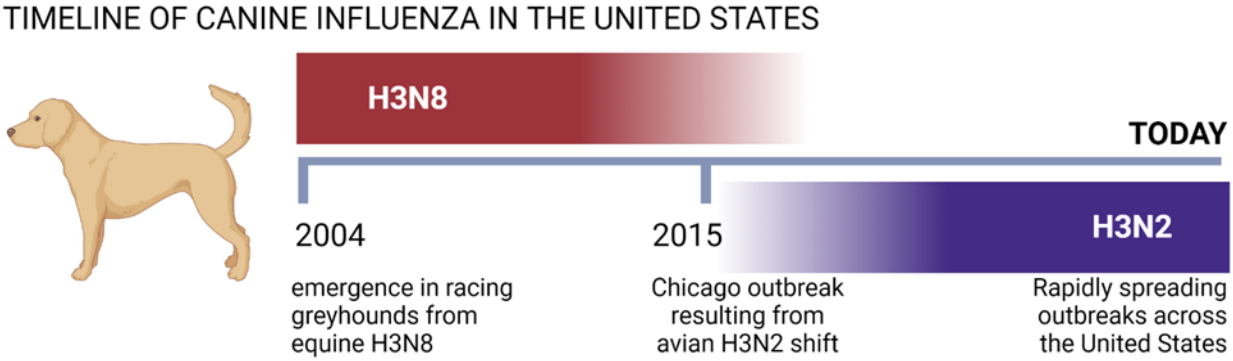
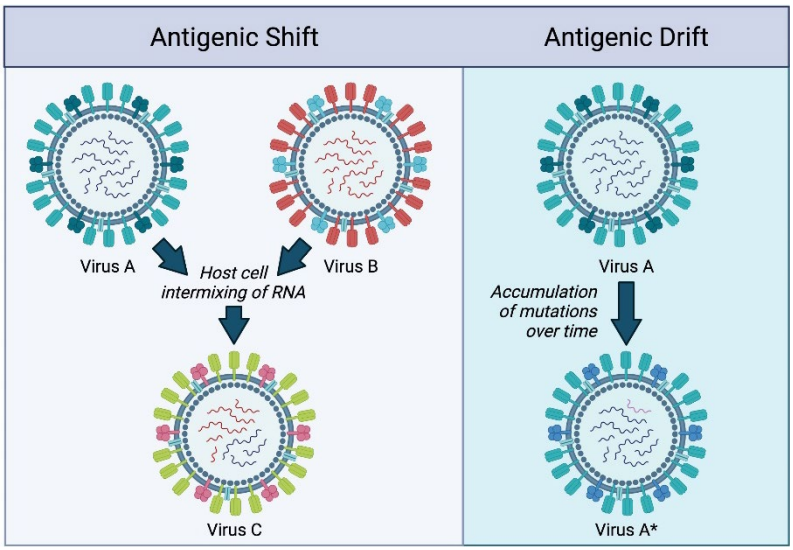
Canine Influenza Update **(April 18, 2023)**

What do we know about the origins of canine influenza?

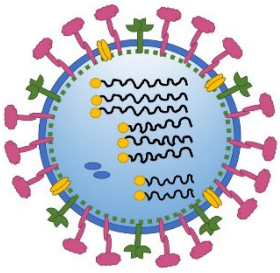


H3N2 has largely outcompeted H3N8 at this time and is driving the outbreaks we see today. Current outbreaks are occurring throughout the United States, including right here in Oklahoma. As with many respiratory disease outbreaks, we know that the confirmed positive cases are merely the tip of the iceberg in the true number of cases that are circulating in our communities.

Why does influenza A keep causing outbreaks?



Influenza A is an RNA, enveloped virus with a segmented genome. The most important surface antigens are hemagglutinin and neuraminidase (H&N). Canine influenza A H3N2 describes the classification of these surface antigens.



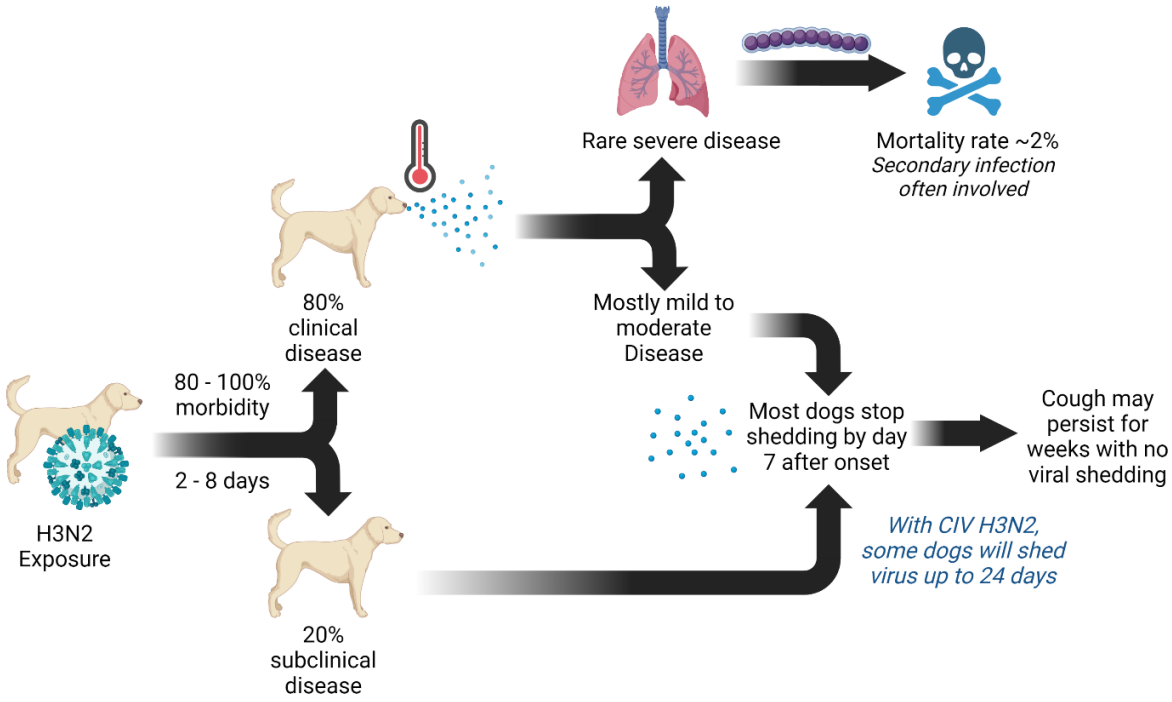
Why does all this matter?

- Mutations rates are high in RNA viruses since they cannot use host cell repair mechanisms (also known as antigenic drift)
- Enveloped viruses are easier to inactivate through disinfection, drying, and heat
- Segmented genomes all for antigenic shift and reassortment that can drive the emergence of novel outbreaks and epidemics
- The H and N antigens determine our vaccine effectiveness and immune protection

What is the clinical presentation and timeline for H3N2 canine influenza?

Most dogs have no prior immunity at this time, so any age or breed is susceptible and considered vulnerable. Due to negligible herd immunity and rapid transmission of CIV, outbreaks appear at an alarming speed. Risk factors include anything that brings dogs into close contact – **shelters, boarding facilities, doggie daycares, grooming facilities, classes** and more.

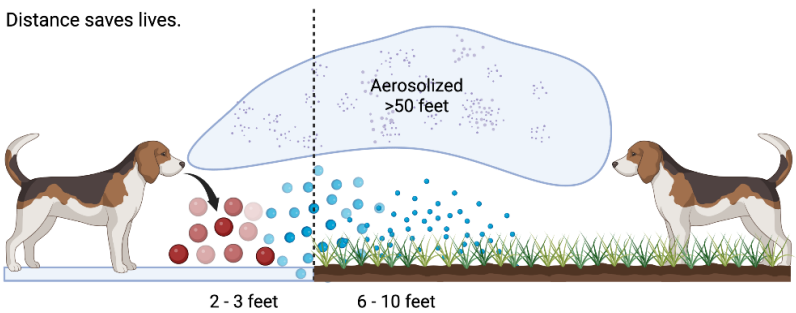
The **most common clinical sign is a cough** that can be soft and moist or dry and indistinguishable from other causes of acute respiratory disease in dogs ("Kennel Cough"). Other signs include sneezing, nasal and/or ocular discharge, fever, lethargy and anorexia. If discharge is purulent paired with a high fever and lethargy, consider secondary bacterial infections in that animal.



Transmission is primarily through respiratory secretions. Fomites (including people) also contribute. Canine influenza viruses compromise the normal defense mechanisms of the canine respiratory tract so that secondary bacterial infection are common sequelae. These include pathogens such as:

- ***Strep. equi zooepidemicus***
- ***Mycoplasma* spp.**
- *Bordetella bronchiseptica*
- *Pasteurella multocida*

Secondary bacterial infections increase severity and mortality in CIV outbreaks.



How and when should I be submitting samples for canine influenza diagnostics?

Peak viral shedding typically occurs 3 to 4 days after infection, which means that you should try to collect samples 24 to 48 hours after the onset of clinical signs. By day 7 of clinical signs, false negatives are fairly common, although some dogs will shed transmissible virus 24 days post onset of signs. Acute and convalescent titers may be used after day 7 if needed.

Sampling: Deep nasal swabs from both nostrils

- May collect oropharyngeal swab as well and add it to nasal swabs
- May submit respiratory tissues if necropsy
- Ideal Timing: within 36 hours of onset of signs
- Place swabs in sterile red-top or conical tube with several drops of sterile saline
- Do NOT use bacterial transport media for viral PCR
- Refrigerate immediately and send overnight on freezer packs
- Submit to OADDL or IDEXX: RT-PCR for influenza A detection (not subtyping)

Other pathogens you might be testing for (part of the canine infectious respiratory disease complex):

Viral pathogens	Bacterial Pathogens
Canine adenovirus-2	*Streptococcus equi zooepidemicus*
Canine distemper virus	*Mycoplasma species*
Canine herpesvirus-1	*Bordetella bronchiseptica*
Canine parainfluenza virus	*Pasteurella multocida*
Canine pneumovirus	
Canine respiratory coronavirus	
H3N2 Canine influenza	
H3N8 Canine influenza	
Influenza A (general) – detect others	

What are the current treatment recommendations?

Goal: reduce clinical disease course; prevent/treat secondary infections

Two Categories of Treatment:

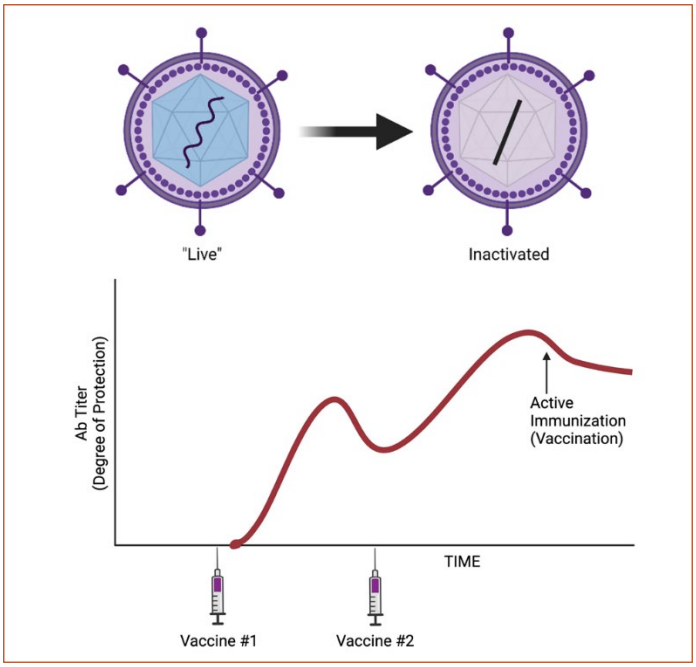
1. **Mild-moderate disease:** the majority of clinical cases will be mild and **self-limiting**, *resolving on their own in 2-3 weeks*. These cases should be **isolated at home for 4 weeks**. Ensure adequate rest, hydration, optimal nutrition, and keep them clean, dry and warm. In isolated cases, these animals generally do not need intensive management or therapeutics beyond supportive nursing care.
2. **More severe disease or disease in high risk animals (case-by-case):** These are going to be dogs at high risk of secondary bacterial infections or with evidence of pneumonia (high fever, depressed)
    a. **Antimicrobials:** no effect on CIV, but necessary in high risk situations or pneumonias; select a broad spectrum or base on culture and sensitivity and be sure that empirical use covers streptococci (gram + cocci) and mycoplasmas (lack a cell wall)
    b. Fluid therapy for dehydration
    c. Supplemental oxygen therapy, nebulization, coupage
    d. NSAIDs for high pyrexia (104°F or higher)

Oseltamivir is not approved or recommended in dogs with CIV. Cough suppressants should be avoided.

What are the current vaccine recommendations?

Per AAHA Guidelines, the CIV vaccine in considered non-core. However, based on risk assessment and the current outbreaks, we should be recommending the CIV vaccine in any dog that we are recommending the *Bordetella* vaccine.

All marketed vaccines have very low rates of adverse effects and are effective at preventing disease and reducing viral shedding. Available vaccines include monovalent H3N2, monovalent H3N8, and bivalent (both). **You must select a vaccine with H3N2 coverage** to protect dogs during this current outbreak.



The canine influenza vaccines are inactivated. While they have no risk for residual virulence or shedding, you must remember that inactivated vaccines require two doses, 2-4 weeks apart.

If the second dose is not administered within 6 weeks of the first, you need to restart the series. **Dogs are not protected until at least two weeks past the second dose of the initial series.**

Boosters are recommended annually.

Vaccine technology advancements will improve options in the near future.

I am dealing with an outbreak – what now?

In order to slow the spread, you should be:

- ✓ Isolating infected dogs for 4 weeks
- ✓ Pursuing a diagnosis in suspected cases
- ✓ Vaccinating all dogs that come in contact with other dogs
- ✓ Consider curbside appointments for dogs with signs of respiratory disease
- ✓ Wear appropriate personal protective equipment
- ✓ Place dogs hospitalized with CIV in isolated areas on separate ventilation when possible
- ✓ Know which disinfectants work and how to use them
- ✓ Have plans in place for your hospital / clinic / shelter

Influenza remains on surfaces for 48 hours, bedding for 24 hours and skin for 12 hours. Cage surfaces, food bowls, leashes, and our own hands are all potential fomites. Establish good disinfection protocols. A chart of disinfectants, their usage, and limitations is available at the end of this packet.

Is canine influenza zoonotic?

No. However, CIV H3N2 has a broader host range than H3N8. **Cats, guinea pigs, and ferrets** are all susceptible to infection and mild disease. No mortality is reported in cats at this time. The biggest spillover risk is to cats in shelter outbreaks. Remember, every influenza has the potential to shift and move to a new host in the future.

What should I be communicating to my clients and staff about the current situation?

Client Communication

- Let your clients know that the outbreak is occurring and that their dog may be vulnerable
- Educate clients to call ahead before bringing their dog in with signs of respiratory disease
- Encourage strict home isolation for 4 weeks if infected
- Educate clients about signs that may indicate more severe disease or secondary infections
- Recommend vaccination
- Ensure clients know their dogs are not protected until 2 weeks post second vaccination
- Stress that the second vaccine is essential to immunity – if this vaccine cannot be administered within 6 weeks of the first vaccine, then you will need to restart the initial series

Staff Communication

- Canine parainfluenza is not the same as influenza
- Risk profile for CIV overlaps significantly with "kennel cough"; the recommendations you provide to prevent "kennel cough" apply in CIV as well.
- Dogs are not protected by vaccination until at least 2 weeks after the second dose of the vaccine
- Ensure your staff know how to properly handle and submit a sample for diagnosis
- Ensure you are all on the same page for isolation, including telephone triage, sites for examination of dogs with respiratory disease, PPE protocols
- Ensure you are all on the same page for disinfection: what to use, how to use it, when to use it, and where to use it

All images were created by Dr. Rudd in Biorender

Jennifer Rudd, DVM, PhD, DACVM
Assistant Professor of Veterinary Microbiology
Department of Veterinary Pathobiology
Oklahoma State College of Veterinary Medicine
Jennifer.rudd@okstate.edu | 405.744.5268

ASPCApro

Shelter Disinfectant Quick Reference

Disinfectant	Accelerated Hydrogen Peroxide	Potassium Peroxymono-sulfate	Quaternary Ammonium Compounds *(Quats)*	Calcium Hypochlorite	Regular Household Bleach* *(Sodium Hypochlorite)*
Effective against non-enveloped viruses?	Yes, dilute 1:32	Yes at 1%	Not according to independent published research	Yes	Yes, dilute 1:32 (1/2 cup per gallon)
Effective against ringworm following effective pre-cleaning?	Yes, dilute 1:16 **	Yes at 2%	Yes, if labeled fungicidal against Trichophyton spp.	Not according to independent published research	Yes, dilute 1:32 (1/2 cup per gallon)
Inactivated by organic material?	Minimal	Slightly; less inactivation than bleach or quats	Mildly inactivated	Yes	Yes
Requires cleaning as separate step?	Some detergent activity, but cleaning beforehand recommended for heavily soiled surfaces	Some detergent activity, but cleaning beforehand recommended for heavily soiled surfaces	Variable detergent activity, requires some cleaning beforehand	No detergent activity, always requires extensive cleaning beforehand	No detergent activity, always requires extensive cleaning beforehand
Stability when diluted	90 days	7 days	Varies	24 hours	24 hours
Recommended contact time	10 minutes for 1:32 dilution 5 minutes for 1:16 dilution	10 minutes	10 minutes	10 minutes	10 minutes
Rinse required?* **	No	No	Yes	Yes	Yes

* Regular household bleach is most commonly 5.25%, however always check the concentration of the bleach product you are using and prepare dilutions accordingly.
** Independent studies have demonstrated efficacy against ringworm with 1:32 dilution and 10 minutes contact time.
*** To remove any residual disinfectant, rinsing housing areas and food/water dishes is always recommended regardless of which product is used.