Nobivac
Essential protection for essential bonds

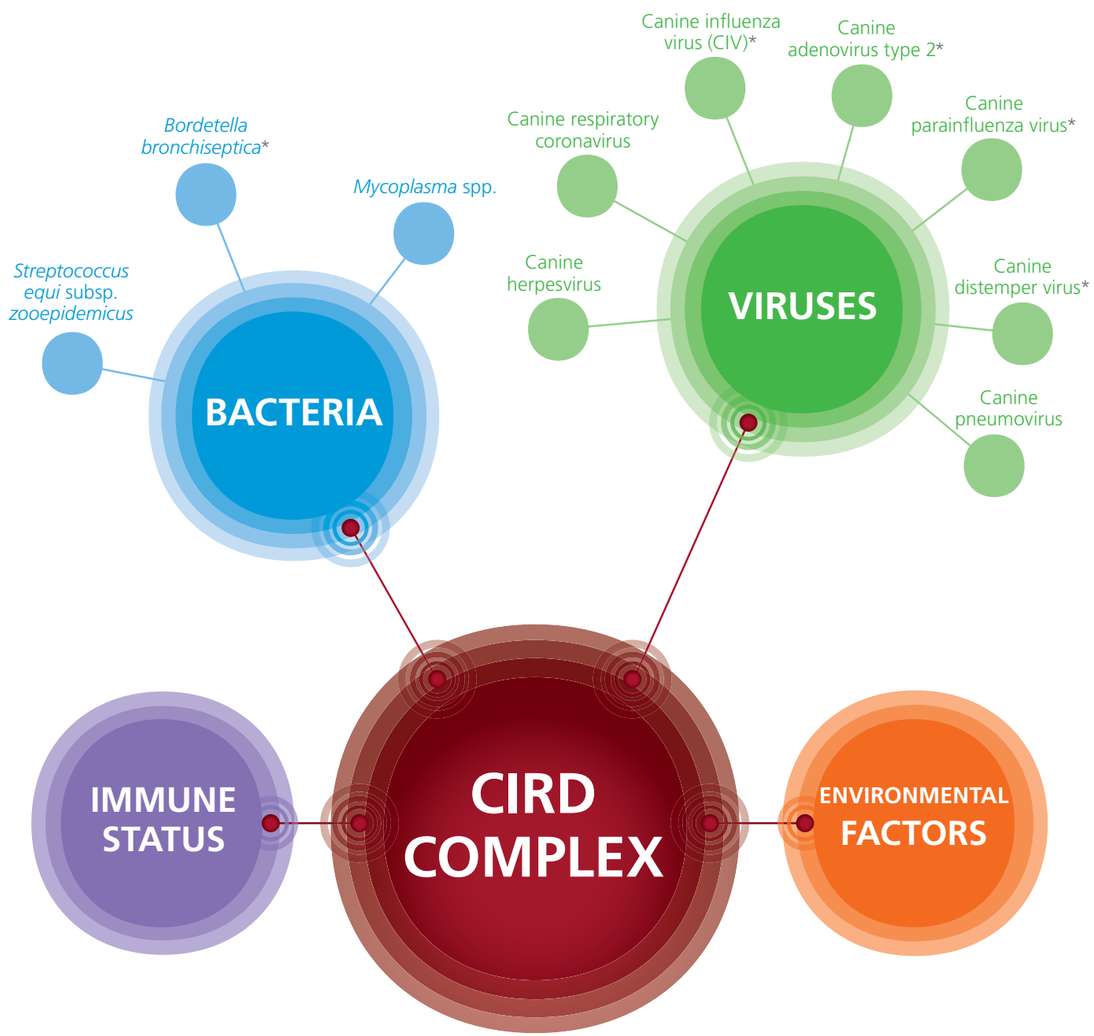
A simple cough may be more complicated than you realize

To help protect against the many causes of canine infectious respiratory disease complex (CIRD complex), rely on the **comprehensive portfolio of vaccines from Merck Animal Health**.

MERCK
Animal Health

CIRD complex may involve more than one pathogen[1]

- In the upper respiratory tract, *Bordetella*, parainfluenza virus, and adenovirus type 2 are primary CIRD complex pathogens
- In the lower respiratory tract, CIV is an emerging cause of CIRD complex that can significantly damage the lungs



*Vaccine available.

CIRD complex is an easily acquired disease

CLINICAL SIGNS

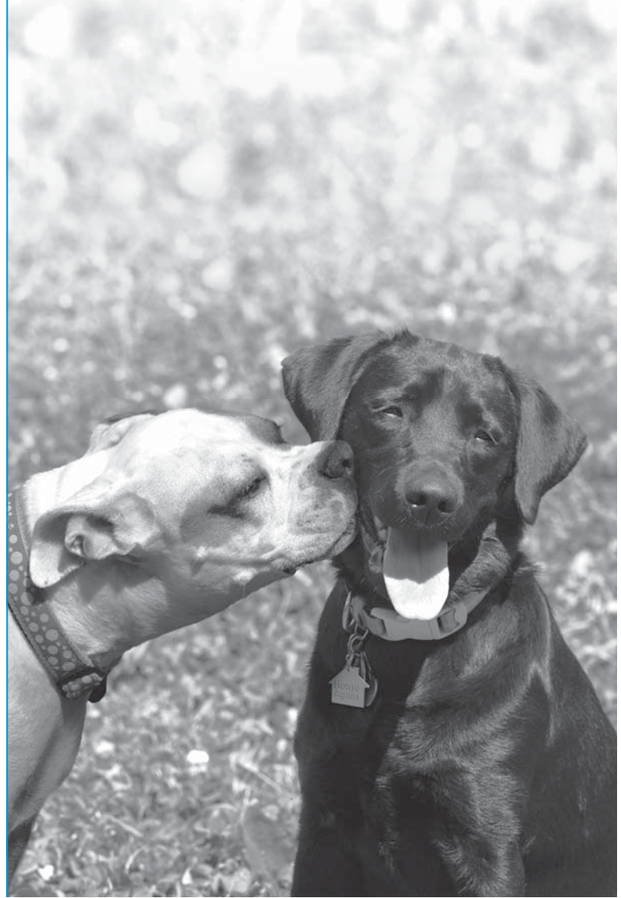
All pathogens involved in CIRD complex can cause a similar clinical presentation

- **COUGHING**
- **SNEEZING**
- **FEVER**
- **NASAL DISCHARGE**
- **OCULAR DISCHARGE**

DOGS ARE AT RISK

Multiple dog environments may contribute to the development of CIRD complex

- **SOCIAL DOGS**
- **BOARDING FACILITIES**
- **DOGGIE DAY CARE**
- **DOG SHOWS**
- **DOG PARKS**
- **GROOMERS**
- **KENNELS**
- **SHELTERS**

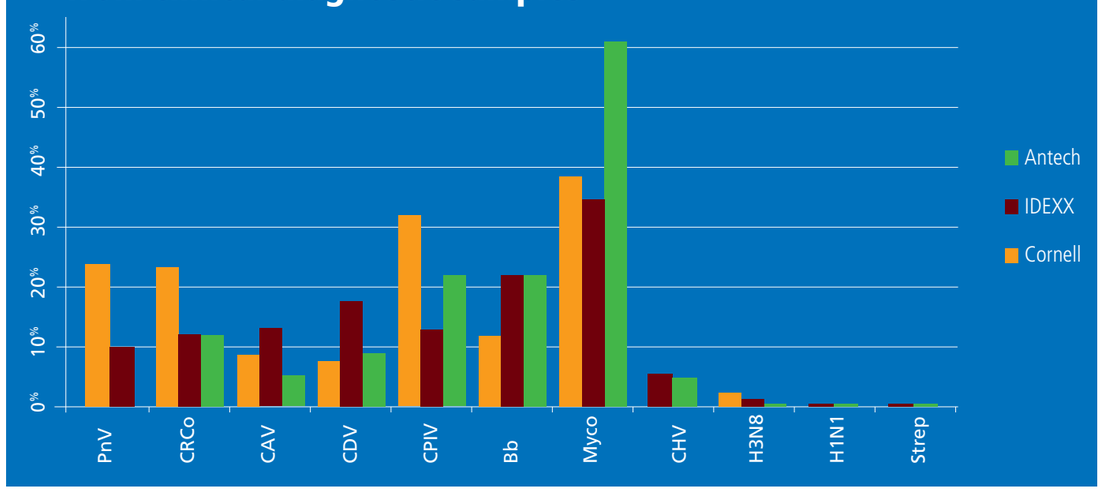


Vaccination is key to controlling CIRD complex

Comprehensive vaccination protects in two ways

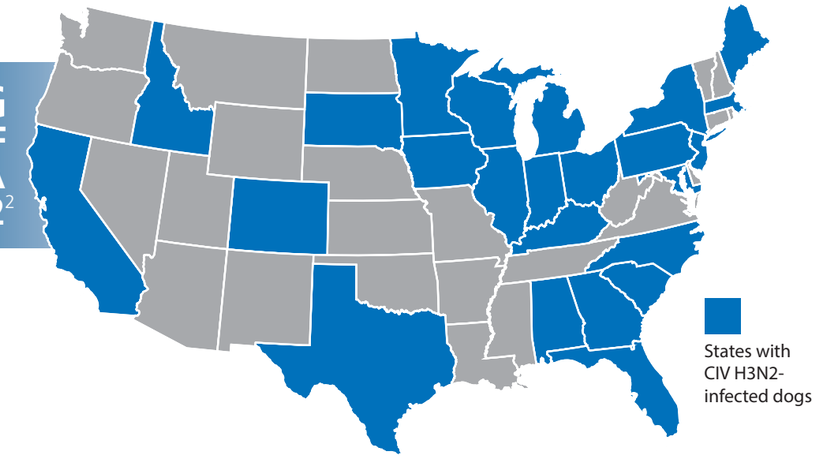
- Reduces disease signs and severity in the **dog that was immunized**[1]
- Reduces shedding and spread of disease among **surrounding dogs**[1]

Prevalence for potential canine respiratory pathogens from clinical diagnostic samples[1]



Prevalence is defined as positive percentage of all samples tested. Data include samples submitted to Cornell Diagnostic Laboratory from October 1, 2011 to October 1, 2012 (orange), IDEXX Laboratories Inc., IDEXX Canine Respiratory Disease (CRD) RealPCR™ Panel during 2012 (red), and Antech Diagnostics from January 2011 through March 2013 (green). The number of samples tested for each pathogen is as follows, where NST means not specifically tested: canine pneumovirus (PnV; Cornell n=499, IDEXX n=200, Antech n=NST); canine respiratory coronavirus (CRCo; Cornell n=503, IDEXX n=4062, Antech n=2229); canine adenovirus (CAV; Cornell n=497, IDEXX n=4062, Antech n=4820); canine distemper virus (CDV; Cornell n=500, IDEXX n=4062, Antech n=4816); canine parainfluenza virus (CPIV; Cornell n=359, IDEXX n=4062, Antech n=4821); *Bordetella bronchiseptica* (Bb; Cornell n=205 via PCR and n=401 cultures, IDEXX n=4062, Antech n=4780); *Mycoplasma* (Myco; Cornell n=299, IDEXX n=4062, Antech n=4760); canine herpesvirus (CHV; Cornell n=NST, IDEXX n=4062, Antech n=4795); canine influenza virus H3N8 (H3N8; Cornell n=471, IDEXX n=4062, Antech n=2506); H1N1 influenza virus (H1N1; Cornell n=NST, IDEXX n=4062, Antech n=4715); *Streptococcus equi* subsp. *zooepidemicus* (Strep; Cornell n=NST, IDEXX n=4062, Antech n=4828). Although the large majority of results are based on PCR assays, Cornell Diagnostic Laboratory routinely performed viral isolation, and both Cornell and Antech commonly performed bacterial culture on submitted materials.

THE GROWING PREVALENCE OF CANINE INFLUENZA VIRUS (CIV) H3N2[2]



INFORMATION ABOUT RECENT CIV OUTBREAKS

Only complete vaccination coverage ensures a healthy dog

Vaccination for *Bordetella* is not enough.

Two different ways of vaccinating are necessary for parainfluenza[5]

Parainfluenza

Injectable: helps stimulate an IgG response for protection in the lower respiratory tract

Intranasal: requires IgA stimulation from a vaccine in order to get strong mucosal protection

Protect with both – get lower respiratory and mucosal protection

Two different ways of vaccinating are necessary for adenovirus[6]

Adenovirus

Injectable: strong IgG protection from an adenovirus type 2 vaccine provides cross-protection against hepatitis

Intranasal: strong IgA protection in the mucosal pathways from an adenovirus type 2 (respiratory) vaccine

Protect with both – get IgG protection for adenovirus type 1 and IgA protection for type 2

Vaccinate for CIV[7]

CIV

Injectable: stimulates IgG response for protection in the lower respiratory tract

Protect the lungs and aid in the control of disease associated with canine influenza virus

Merck Animal Health offers a comprehensive portfolio of vaccines to protect against CIRD complex

Intranasal vaccines for the upper respiratory tract

Local administration promotes a stronger IgA response[8]

- IgA is a key protector of the nose and throat and appears to be more important than systemic responses when it comes to protecting against upper respiratory pathogens

Dogs injected against parainfluenza virus:

- Have been shown to develop respiratory disease caused by parainfluenza infection[9]
- Have been shown to spread the virus to other dogs with no direct contact[9]
- May be vulnerable to other pathogens, which can cause more severe respiratory disease and occasionally death[10,11]

Intranasal Nobivac® Intra-Trac®$_3$ allows you to provide a broader range of protection against *Bordetella*, parainfluenza virus, and adenovirus type 2

In a *Bordetella* study, Nobivac® Intra-Trac®$_3$ significantly reduced cough severity, days of coughing, and nasal shedding[12]

- Nobivac® Intra-Trac®$_3$ reduces both infection and disease
- Nobivac® Intra-Trac®$_3$ ADT eliminates the possibility of accidental injection through unique advanced delivery technology
- Nobivac® Intra-Trac® KC is safe intranasal protection against *Bordetella* and parainfluenza virus and can be used safely in pregnant bitches

THE AMERICAN ANIMAL HOSPITAL ASSOCIATION **RECOMMENDS INTRANASAL** OVER INJECTABLE VACCINATION[13]

BORDETELLA:
"In high-risk environments (eg, shelters), intranasal Bordetella *vaccine, in combination with parainfluenza virus vaccine, is recommended over injectable vaccine."*

PARAINFLUENZA VIRUS:
"When feasible, intranasal parainfluenza virus vaccination is recommended over parenteral vaccination."

ADENOVIRUS TYPE 2:
"Administration of intranasal adenovirus type 2 vaccine is recommended for use in dogs considered at risk for respiratory infection."

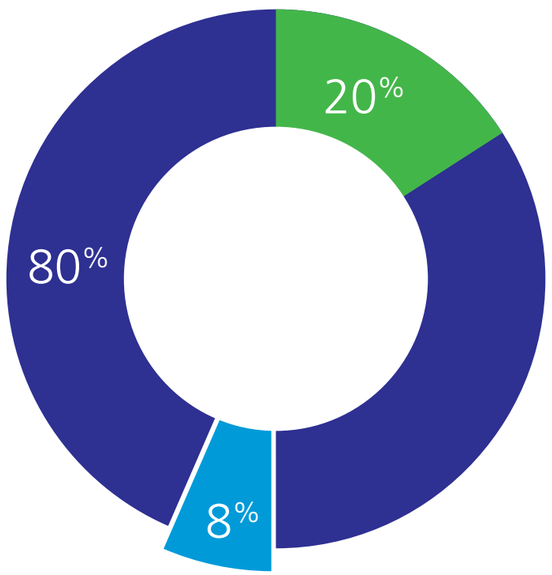
Intranasal Nobivac® Intra-Trac®$_3$ provides more coverage than the leading competitors

	Nobivac® Intra-Trac®$_3$ ADT[14]	Bronchi-Shield® ORAL[15]	Bronchi-Shield® III (IN)[16]	Bronchicine® CAe Injectable[17]	Vanguard® B (IN)[18]
Bordetella protection	✔	✔	✔	✔	✔
Canine Parainfluenza virus protection	✔	✗	✔	✗	✗
Canine Adenovirus type 2 protection	✔	✗	✔	✗	✗
Initial immunization requirements	0.5 mL - 1 nostril	1 mL - applied to buccal cavity of mouth	0.5 mL in each nostril	Two 1 mL subcutaneous doses	0.5 mL in each nostril
Onset of protection	As quickly as 48 hours[19]	Unknown	Unknown	Up to 49 days after initial dose	Unknown
Statistically significant nasal IgA	✔[12]	Unknown	Unknown	✗	Unknown
1 year DOI, published challenge data	✔[20]	✗	✗	✗	✗
Earliest use	3 weeks	8 weeks	8 weeks	8 weeks	3 weeks

DOI=duration of immunity.

CIV is the primary cause of CIRD complex in the lower respiratory tract[21]

- Close to 100% of dogs are naïve to this virus and have no natural immunity to it
- Virtually all exposed dogs will be infected
- Clinical signs may be severe, and the disease is potentially fatal



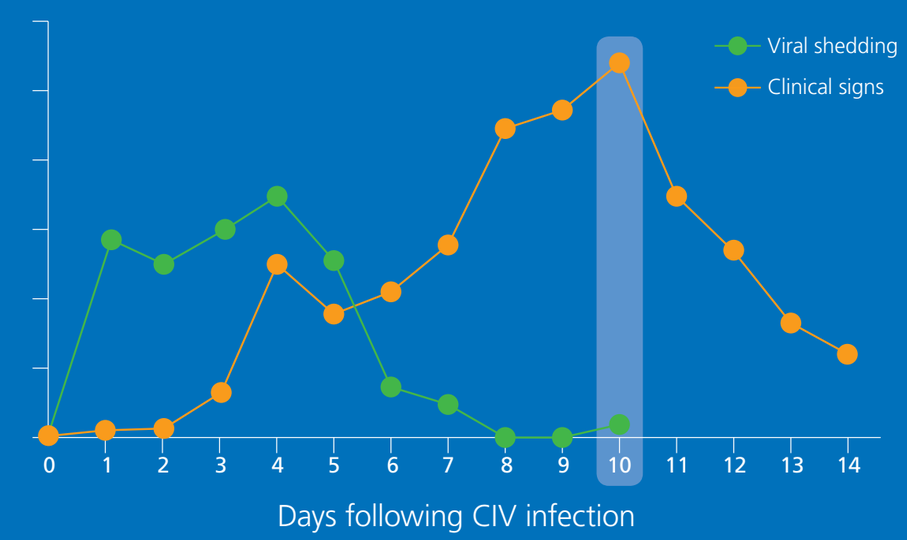
- About 20% will show no signs but still shed and spread CIV
- About 80% will develop clinical disease
- Up to 8% of critically ill dogs may die from complications

CIV is hard to diagnose

Common laboratory tests like PCR, when performed after peak viral shedding, can fail to detect the virus[22]

- PCR testing on nasal swabs should be done early, during the first 4 days of illness, to detect active infection
- Serology to detect antibodies to the virus is the best diagnostic method for confirming infection once clinical signs are evident (at least 7 days following onset of signs)

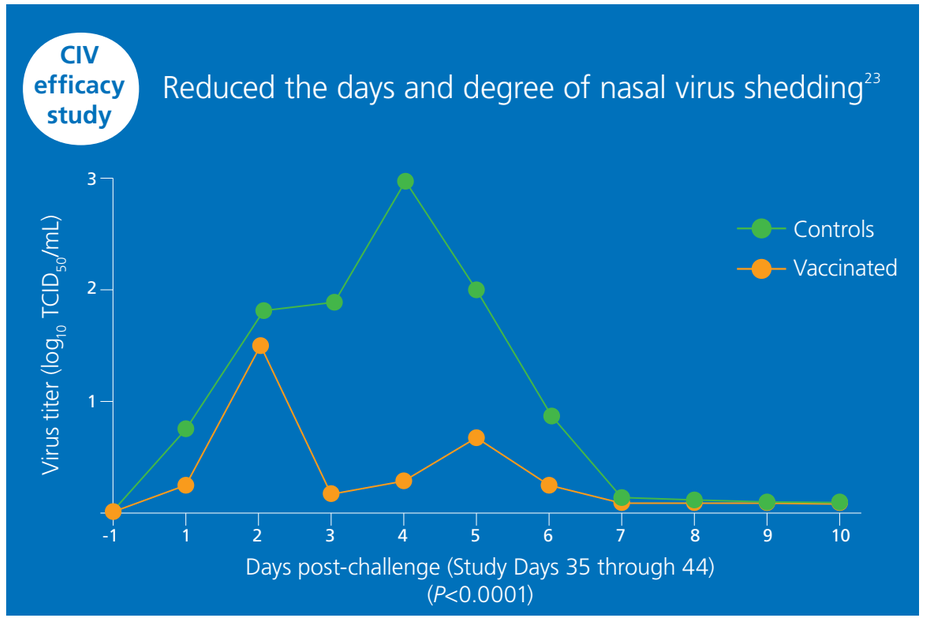
Viral shedding for **CIV H3N8** begins before clinical signs appear[7]



- Geometric mean virus titers (expressed as $\log_{10}$ $TCID_{50}$/mL)
- Average clinical score (daily average score for all clinical signs, such as ocular discharge, nasal discharge, coughing, sneezing, and depression)

Nobivac® Canine Flu H3N8: Injectable vaccine protection for the lower respiratory tract

Nobivac® Canine Flu H3N8 is highly effective in protecting the lungs and decreasing viral shedding, which lessens the opportunity for CIV to infect other dogs[23]

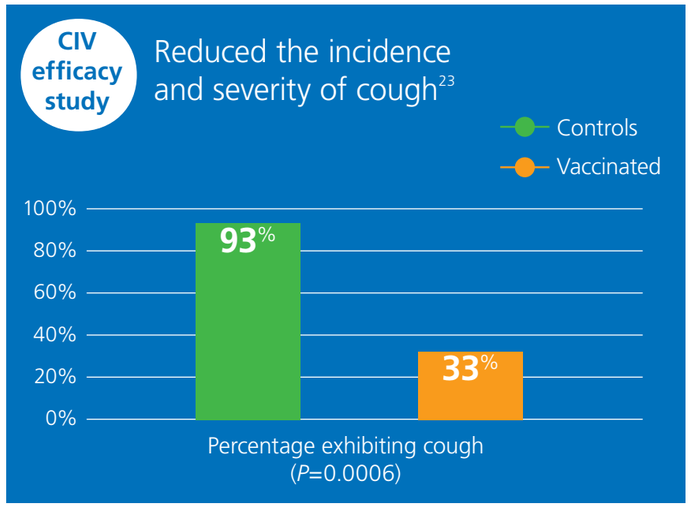


Nasal virus shedding was monitored in all dogs by collecting and processing swabs on the day before challenge, and then daily from Day 1 through Day 10 post-challenge.

- On Day 4, controls shed 500 times more viral particles than vaccinates
- Mean viral shedding lasted only 2 days in vaccinates vs 5 days in controls*
- Vaccinates also shed less virus overall than controls*

*Both results were shown to be statistically significant (*P*<0.0001).

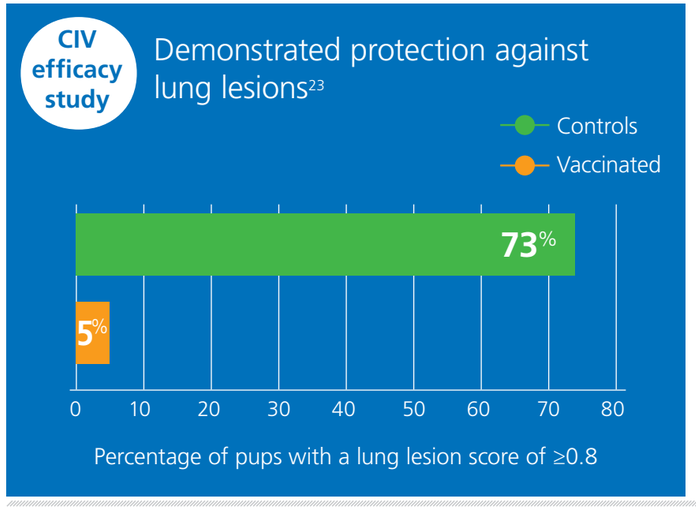
Nobivac® Canine Flu H3N8 alleviates cough and protects the lungs



- 14 of 15 controls exhibited cough[23]
- Only 7 of 21 vaccinates exhibited cough[23]
- Cough was mild in vaccinates; severity of cough varied in controls[23]

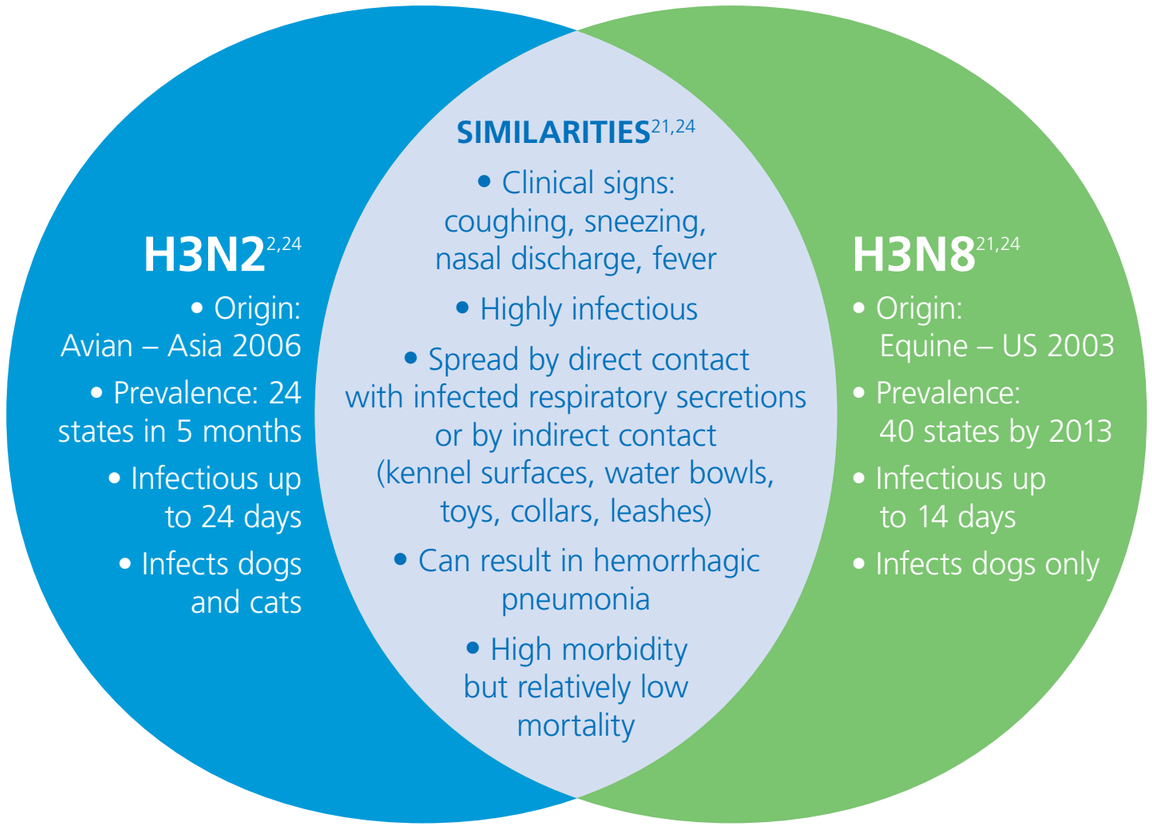
Systemic administration stimulates a strong IgG response[23]

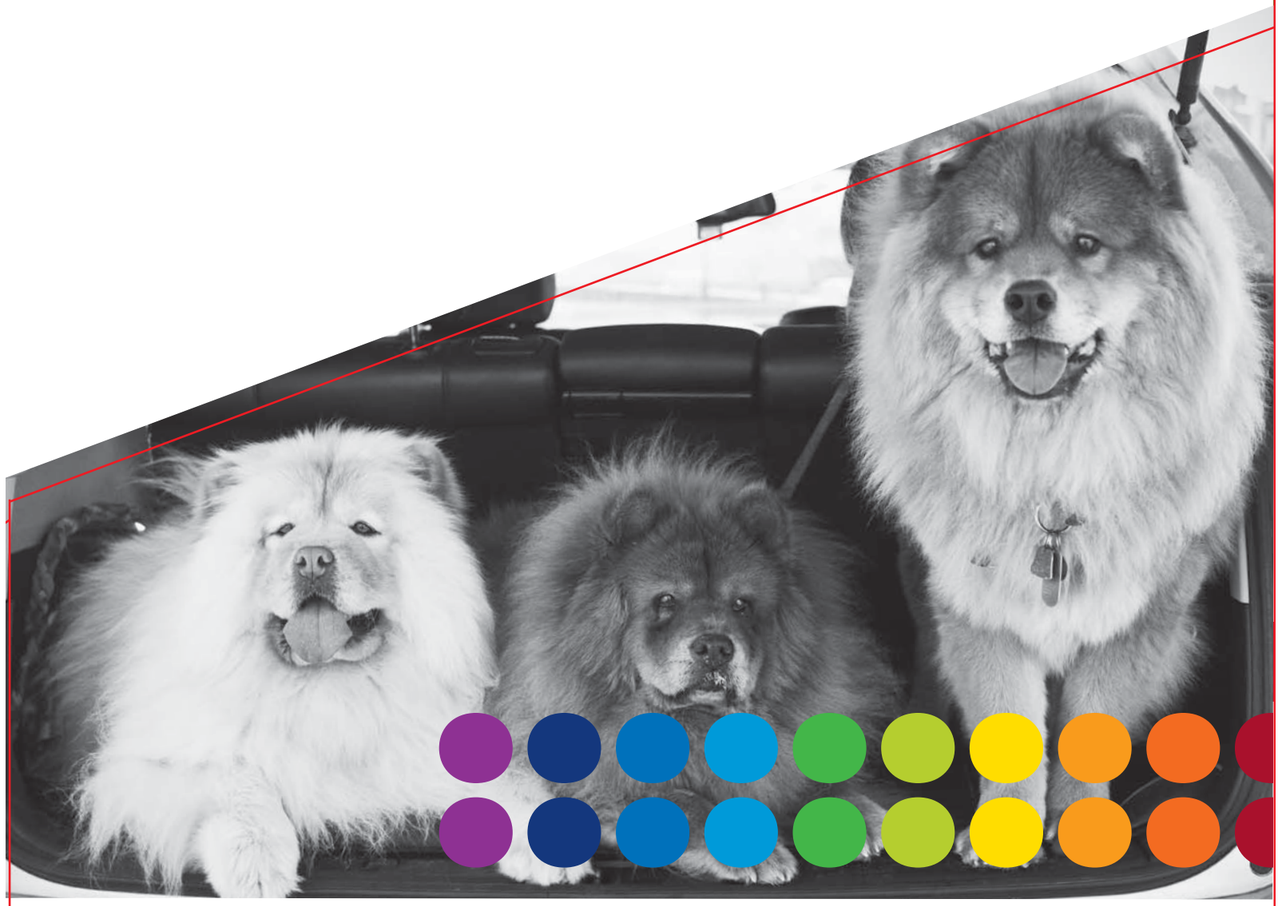
- IgG is a key protector of the lungs



- Gross lung lesions were scored as a percent consolidation of each lung lobe, and weighted scores were calculated based on an accepted scoring system
- Scores ≥0.8 indicated dogs had sustained lung damage
- Lung scores ranged significantly higher in controls (0-27.9) versus vaccinates (0-2.9)

What to know about CIV H3N2 versus CIV H3N8





References: 1. Cohn LA. 2013. Canine Infectious Respiratory Disease Complex. Editorial Review. Merck Animal Health Publication. **2.** Canine Influenza H3N2 Updates. Cornell University College of Veterinary Medicine website. https://ahdc.vet.cornell.edu/news/civchicago.cfm. Updated August 8, 2015. Accessed September 28, 2015. **3.** Richardson JA, Glaser A, Reine-Salz N, Dubovi EJ. Prevalence of canine infectious respiratory disease in dogs in Chicago outbreak (March-April 2015). ACVIM Forum Proceedings, June 2015. **4.** Data on file. Canine Infectious Respiratory Disease in Georgia and North Carolina, June 1- August 7, 2015 Report. Merck Animal Health. **5.** Kontor EJ, Wegrzyn RJ, Goodnow RA. Canine infectious tracheobronchitis: effects of intranasal live canine parainfluenza-*Bordetella bronchiseptica* vaccine on viral shedding and clinical tracheobronchitis (kennel cough). *Am J Vet Res.* 1981;42(10):1694-1698. **6.** Day MJ, Horzinek MC, Schultz RD. WSAVA guidelines for the vaccination of dogs and cats. *J Small Animal Practice.* 2010;51(6):1-32. **7.** Deshpande MS, Abdelmagid O, Tubbs A, Jayappa H, Wasmoen T. Experimental reproduction of canine influenza virus H3N8 infection in young puppies. *Vet Ther.* 2009;10(1-2):29-39. **8.** Tizard IR, ed. *Veterinary Immunology: An Introduction.* 8th Ed. Philadelphia, PA: Saunders Elsevier. 2009:253-254. **9.** Weese JS, Stull J. Respiratory disease outbreak in a veterinary hospital associated with canine parainfluenza virus infection. *Can Vet J.* 2013;54(1)79-82. **10.** Buonavoglia C, Martella V. Canine respiratory viruses. *Vet Res.* 2007;38:355-373. **11.** Ellis JA, Krakowka GS. A review of canine parainfluenza virus infection in dogs. *J Am Vet Med Assoc.* 2012;240(3):273-284. **12.** Davis R, Jayappa H, Abdelmagid OY, Armstrong R, Sweeney D, Lehr C. Comparison of the mucosal immune response in dogs vaccinated with either an intranasal avirulent live culture or a subcutaneous antigen extract vaccine of *Bordetella bronchiseptica. Vet Ther.* 2007;8(1):32–40. **13.** Welborn LV, DeVries JG, Ford R, et al.; for American Animal Hospital Association (AAHA) Canine Vaccination Task Force. 2011 AAHA canine vaccination guidelines. *J Am Anim Hosp Assoc.* 2011;47(5):1-42. **14.** Nobivac® Intra-Trac®$_3$ [product label] Merck Animal Health, Madison, NJ. **15.** Bronchi-Shield® Oral [product label]. St. Joseph, MO: Boehringer Ingelheim Vetmedica, Inc. **16.** Bronchi-Shield® III [product label]. St. Joseph, MO: Boehringer Ingelheim Vetmedica, Inc. **17.** Bronchicine® CAe [product label]. New York, NY: Zoetis. **18.** VANGUARD® B (IN) [product label]. New York, NY: Zoetis. **19.** Bey RF, Shade FJ, Goodnow RA, Johnson RC. Intranasal vaccination of dogs with live avirulent *Bordetella bronchiseptica*: Correlation of serum agglutination titer and the formation of secretory IgA with protection against experimentally induced infectious tracheobronchitis. *Am J Vet Res.* 1981;42:1130-1132. **20.** Lehr C, Jayappa H, Erskine J, Brown A, Sweeney D, Wasmoen T. Demonstration of 1-year duration of immunity for attenuated *Bordetella bronchiseptica* vaccines in dogs. *Vet Ther.* 2008;9(4):257-62. **21.** Crawford C, Spindel M. Canine influenza. In: Miller L, Hurley K, eds. *Infectious Disease Management in Animal Shelters.* Ames, IA: Wiley-Blackwell. 2009:173–180. **22.** Canine influenza. AVMA website. https://www.avma.org/KB/Resources/Reference/Pages/Canine-Influenza-Backgrounder.aspx. Published April 22, 2015. Accessed Sept 28, 2015. **23.** Deshpande MS, Jirjis FF, Tubbs AL, et al. Evaluation of the efficacy of a canine influenza virus (H3N8) vaccine in dogs following experimental challenge. *Vet Ther.* 2009;10(3):103-12. **24.** Updates in Canine Influenza Virus: Management, treatment and prevention of disease. VETgirl Webinar, July 27, 2015. Archived at www.vetgirlontherun.com.

When it comes to CIRD complex, don't wait—vaccinate

Reasons to vaccinate:

- ✔ To keep dogs under your care happy and healthy
- ✔ To keep pet parents happy by sparing them canine cough attacks
- ✔ To protect other dogs in the community
- ✔ To prevent outbreaks in your practice, your boarding facility, and in your community
- ✔ If you board dogs:
  - To prevent costs for decontamination
  - To prevent loss of income because of facility closure
  - To preserve your good reputation

Dogs are at risk

- ✔ Social dogs
- ✔ Boarding facilities
- ✔ Doggie day care
- ✔ Dog shows
- ✔ Dog parks
- ✔ Groomers
- ✔ Kennels
- ✔ Shelters

MERCK ANIMAL HEALTH has a comprehensive portfolio of CIRD complex vaccines.

CONTACT US

To learn more, contact your Merck Animal Health sales representative, your distributor representative, visit **www.merck-animal-health-usa.com**, or give us a call.

Customer Service	Technical Service	Vaccine Protocol Help Line
1-800-521-5767	**1-800-224-5318**	**1-866-437-7955**
(Monday-Friday, 9:00AM-6:00PM EST)	(Monday-Friday, 8:30AM-5:00PM EST)	(Monday-Friday, 8:00AM-5:00PM EST)

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