

Distemper

A N I M A L I N S I D E R

SPECIAL POINTS OF INTEREST:

- About
- Infection
- Disease progression
- Diagnosis
- Treatment
- Prevention
- Relation to Paget's disease

INSIDE THIS ISSUE:

About	1
Prevention	1
Infection	2
Diagnosis	2
Disease progression	2-3
Treatment	3
Relation to Paget's disease	4

About Canine Distemper

Canine distemper is a viral disease that affects animals in the families Canidae (dogs, wolves, foxes, etc.), Mustelidae (ferrets, weasels, otters, etc.), Mephitidae (skunks), Hyenidae (Hyenas), Ailuridae (the red panda), Procyonidae (raccoons, ringtails, etc.), Pinnipedia (seals, walrus, sea lion, etc.), some Viverridae (raccoon-like animals in South Asia) and Felidae (cats) (though not domestic cats; feline distemper or panleukopenia is a different virus exclusive to cats). The disease is highly contagious (via inhalation) and fatal 50% of the time, thus making it the leading cause of infectious disease death in dogs. The virus infects the gastrointestinal

A number of vaccines against canine distemper exist for dogs (ATCvet code: QI07A D05 and combinations) and domestic ferrets (QI20DD01), which in many jurisdictions are mandatory for pets. The type of vaccine should be approved for the type of animal being inoculated, or else the animal could actually contract the

tract, respiratory tract, the brain, and spinal cord. **Common symptoms can include:**

- 1) High fever
- 2) Watery discharge from the



NOTE THE PURULENT NASAL DISCHARGE AND HYPERKERATOTIC NOSE.

eyes and nose

- 3) Vomiting and diarrhea
- 4) Hardening of the footpads and nose
- 5) Seizures (of any part of the body, but seizures that look

Prevention

disease from the vaccine. Infected animals should be quarantined from other dogs for several months due to the length of time the animal may shed the virus. The virus is destroyed in the environment by routine cleaning with disinfectants, detergents, or drying. It does not survive in the environ-

ment for more than a few hours at room temperature (20–25 °C), but can survive for a few weeks in shady environments at temperatures slightly above freezing. It, along with other labile viruses, can also persist longer in serum and tissue debris.

as if the dog is chewing gum are unique to distemper)

6) Paralysis. It is most commonly associated with domestic animals such as dogs and ferrets, although it can infect wild animals as well such as racoons. It is a single-stranded RNA virus of the family paramyxovirus, and thus a close relative of measles and rinderpest. Despite extensive vaccination in many regions, it remains a major disease of dogs.

I n f e c t i o n

The virus, a single-stranded negative RNA, can cause systemic infection in the host carnivore. Puppies from three to six months old are particularly susceptible. CDV spreads through aerosol droplets and through contact with infected bodily fluids, including nasal and ocular secretions, feces, and urine, six to 22 days after exposure. It can also be spread by food and water contaminated with these

fluids. The time between infection and disease is 14 to 18 days, although a fever can appear from three to six days after infection.

Canine distemper virus tends to orient its infection towards the lymphoid, epithelial, and nervous tissues. The virus initially replicates in the lymphatic tissue of the respiratory tract. The virus then enters the blood stream and infects

therespiratory, gastrointestinal, urogenital epithelial, and central nervous systems, and optic nerves. Therefore, the typical pathologic features of canine distemper include lymphoid depletion (causing immunosuppression and leading to secondary infections), interstitial pneumonia, encephalitis with demyelination, and hyperkeratosis of the nose and foot pads.

The mortality rate of the virus largely depends on the immune status of the infected dogs. Puppies experience the highest mortality rate, where complications such as pneumonia and encephalitis are more common. In older dogs that develop distemper encephalomyelitis, vestibular disease may present. Around 15% of canine inflammatory central nervous system diseases are a result of CDV.

D i a g n o s i s

The below signs, especially fever, respiratory signs, neurological signs, and thickened footpads occurring in unvaccinated dogs strongly indicate canine distemper. However, several febrile diseases match many of the signs of the disease and only recently has distinguishing between canine hepatitis, herpesvirus, parainfluenza and leptospirosi

s been possible. Thus, finding the virus by various methods in the dog's conjunctival cells gives a definitive diagnosis. In older dogs that develop distemper encephalomyelitis, diagnosis may be more difficult, since many of these dogs have an adequate vaccination history.

An additional test to confirm distemper is a brush border slide of the bladder tran-

sitional epithelium of the inside lining from the bladder, stained with Dif-Quick. These infected cells have inclusions which stain a carmine red color, found in the paranuclear cytoplasm readability. About 90% of the bladder cells will be positive for inclusions in the early stages of distemper.

D i s e a s e p r o g r e s s i o n

The virus first appears in bronchial lymph nodes and tonsils two days after exposure. The virus then enters the blood stream on the second or third day. A first round of acute fever tends to begin around three to eight days after infection, which is often accompanied by a low white blood cell

count, especially of lymphocytes, as well as low platelet count. These signs may or may not be accompanied by anorexia, a runny nose, and discharge from the eye. This first round of fever typically recedes rapidly within 96 hours, and then a second round of fever begins around the 11th or 12th day

and lasts at least a week. Gastrointestinal and respiratory problems tend to follow, which may become complicated with secondary bacterial infections. Inflammation of the brain and spinal cord, otherwise known as encephalomyelitis, is either associated with this, subsequently follows, or comes completely independent of these problems. A thickening of the footpads sometimes develops, and vesicular pustular lesions on the abdomen usually develop. Neurological signs typically are found in the animals with thickened footpads from the virus. About half of sufferers experience meningoencephalitis.

Neurological signs

The signs within the central nervous system include a localized involuntary twitching of muscles or groups of muscles, seizures often distinguished by salivation, and jaw movements commonly described as "chewing gum fits", or more appropriately as "distemper myoclonus". As the condition progresses, the seizures worsen and advance to grand mal convulsions, followed by death of the animal. The animal may also show signs of sensitivity to light, incoordination, circling, increased sensi-

tivity to sensory stimuli such as pain or touch, and deterioration of motor capabilities. Less commonly, it may lead to blindness and paralysis. The length of the systemic disease may be as short as 10 days, or the start of neurological signs may not come until several weeks or months later. Those few that survive usually have a small tic or twitch of varying levels of severity. With time, this tic will usually diminish somewhat in its severity.

Gastrointestinal and respiratory signs

Commonly observed signs are a runny nose, vomiting and diarrhea, dehydration, excessive salivation, coughing and/or labored breathing, loss of appetite, and weight loss. When and if the neurological signs develop, incontinence may ensue.

Lasting signs

A dog that survives distemper will continue to have both nonlife-threatening and life-threatening signs throughout its lifespan. The most prevalent nonlife-threatening symptom is hard pad disease. This is when a dog experiences the thickening of the skin on the pads of its paws, as well as the end of its nose. Another lasting symptom commonly is enamel hypoplasia. Pup-

pies, especially, will have damage to the enamel of teeth that are not completely formed or those that have not yet grown through the gums. This is a result of the virus killing the cells responsible for manufacturing the tooth enamel. These affected teeth tend to erode quickly.

Life-threatening signs usually include those due to the de-

generation of the nervous system. Dogs that have been infected with distemper tend to suffer a progressive deterioration of mental abilities and motor skills. With time, the dog can acquire more severe seizures, paralysis, reduction in sight and incoordination. These dogs are usually humanely euthanized, due to the immense pain and suffering they face.

Treatment

There is no specific treatment for the canine distemper. Like for measles the treatment is symptomatic and supportive.

Vitamin A supplements have been shown to reduce measles associated mortality in humans. Similar findings were made for ferrets infected with CDV.

The distemper virus was observed to be susceptible to ribavirin in vitro, and 0.02 to 0.05 micromols are needed to

induce its mechanism of error catastrophe and the inhibitory effect on virus replication by 50%. The main concern in the use of ribavirin was the result of its interaction with the blood-brain barrier. As the brain is an immunologically privileged area, the concern was the capacity of ribavirin to overcome this barrier. In a study using mice with encephalitis due to measles, once the virus has become estab-

lished in the nervous phase, the blood-brain barrier prevents ribavirin from acting in the brain. The verification of all these results in vivo resulted in an effectiveness of 80%, versus 50% of the control group, in animals that had already reached the nervous phase of viral infection. Survival rates were recorded at the end of the 15 day treatment protocol. No post treatment survival data was recorded. The application of ribavirin demands a close monitoring of the animal due the risk of leukopenia; also, the ingestion of long-chain tryglicerides (fats) are needed to better absorb the drug, and for preservation of gastric tissues, which are quite susceptible to it.

The medical and veterinary communities widely accept, while possible treatments are still being explored into their efficacy, prevention using vaccination is the most reliable way of preventing disease spread among the population.



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R e l a t i o n t o P a g e t ' s d i s e a s e

Paramyxoviruses, such as CDV, measles, respiratory syncytial virus, simian virus 5, and parainfluenza virus type 3, have long been suspected as the causative agents of Paget's disease, a focal destructive disease of bone. Most studies, however, have pointed more directly at CDV and measles. A virus detection technique, in situ RT-PCR, has found CDV in 100% of Paget's disease samples, whereas other virus detection techniques have been less accurate.