Canine Distemper Virus

Canine distemper virus (CDV) is a *Morbillivirus* species that is clinically significant in dogs, other canids, and many other carnivore species including ferrets, bears and some large wild cats (e.g. lions, cheetahs). It is non-enveloped – which means that it survives poorly in the environment. It is also a single stranded RNA virus – which means that it has a high rate of mutation. Other *Morbillivirus* species include those that cause Measles in humans, Rinderpest in cattle and Peste-de-petit-ruminants in sheep.

Puppies and unvaccinated dogs are most at risk of distemper, due to lack of protective immunity. In naturally occurring infections, the most common route of transmission is respiratory.

FAQs

What are the clinical signs of CDV infection?

Severity and pattern of clinical signs vary with the effectiveness of the host immune response, age of the host and virulence of the virus. Dogs with a good immune response (>50% of those infected) may remain subclinical, while those mildly affected may show transient pyrexia, oculonasal discharge, and other upper respiratory tract signs such as sneezing. Those with a poor immune response can develop severe respiratory signs (including productive cough and dyspnoea), vomiting and diarrhoea, depression, and hyperkeratosis/parakeratosis and/or vesicle/pustule formation of the footpad (a.k.a. *hardpad*) and nasal planum.

Neurological signs most often manifest 1-6 weeks *after* general signs have waned, but may occur either concurrently, or weeks to months later. It is not possible to predict which individuals will progress to neurological complications, but dogs with systemic signs are at increased risk. Neurological signs are commonly progressive and include seizures, cerebellar or vestibular signs (*loss of balance, nystagmus, head tilt, loss of menace response*), paraparesis or tetraparesis (*weakness in two or four limbs*), and myoclonus (*irregular muscular spasms / contraction*). Neurological abnormalities may also be seen in puppies infected in utero, along with immunodeficiency, weakness, abortion and stillbirth. Neurological signs are associated with a poor prognosis (especially where there is chronic demyelinating encephalitis); although, some dogs can do well.

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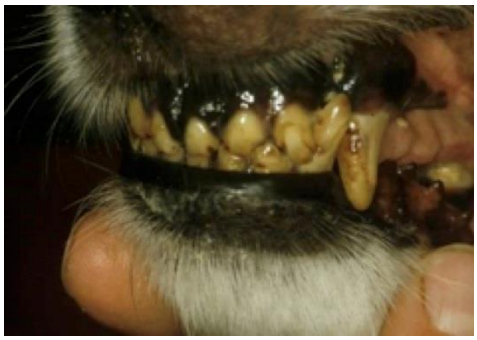
Bone and joint abnormalities (e.g. metaphyseal osteosclerosis in growing puppies and rheumatoid arthritis at any age) are rare. Ocular signs (e.g. uveitis, chorioretinitis, keratitis, keratoconjunctivitis sicca (KCS), and optic neuritis) can occur with persistent CDV infection, which can lead to blindness.

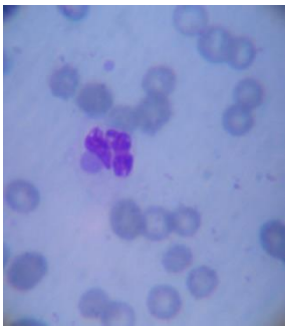


In puppies that are infected with CDV before their permanent dentition has erupted, enamel hypoplasia, tooth root damage, dentine/enamel irregularity and other dental abnormalities may occur - only becoming apparent once these teeth have erupted.

How do I diagnose CDV infection?

Clinicians are more likely to suspect distemper in dogs showing multiple clinical abnormalities, especially if neurological signs are present; however, in the early stages of CDV infection suspicion may be low (particularly in countries where vaccination is common).

Some non-specific changes may occur on haematology. Lymphopenia is associated with virus associated depletion of lymphoid tissues. Viral inclusion bodies may be seen in circulating lymphocytes, less frequently in other leucocytes (see the neutrophil in the photo), and in red blood cells, particularly in early infection. Viral inclusion bodies can also be seen on cytological examination of other tissues (such as conjunctival swabs and cerebrospinal fluid (CSF)), but this is a very insensitive method of diagnosing Distemper.



CSF analysis of dogs with distemper can be unremarkable (especially in dogs with chronic demyelinating encephalitis), but some dogs have a mononuclear, often lymphocytic, mild pleocytosis and increased protein content. CDV PCR is more sensitive than cytology for the diagnosis of distemper on CSF.

Samples that are suitable for CDV PCR include conjunctival swabs, nasal swabs, blood, CSF, transtracheal wash/bronchoalveolar lavage, urine, and tissue. Testing samples from multiple sites increases the likelihood of making a diagnosis. NB: if a dog has recently been vaccinated with a live-attenuated CDV vaccine, PCR may detect the vaccine virus up to 1-week post-vaccination.

Rising CDV antibody titres can be used for diagnosis of CDV in non-vaccinated animals, but in these cases the delay in detecting an antibody increase often makes a diagnosis retrospective; however, occasionally this test may be useful (e.g. in an unvaccinated dog with a negative PCR).

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Other diagnostic tests for CDV include virus isolation or detection (ELISA, IFA, in situ hybridization) in fluid or tissue samples; however, some of these techniques might not be widely available.

What treatment options are there?

There is no specific antiviral treatment for distemper, so treatment is mainly supportive. Some dogs with only mild respiratory and/or gastrointestinal signs recover spontaneously without treatment. If more severe signs and secondary infections (e.g. *Bordetella bronchiseptica* in respiratory cases) are present then hospitalization and treatment is required (e.g. fluid therapy and antibiotics where appropriate). Isolation and barrier nursing of suspected animals is essential to avoid transmission of the virus. Anecdotally some people have supplemented with vitamin A or vitamin C, based on limited data from humans and ferrets, but this is unproven.

Neurological signs are managed supportively, e.g. anti-epileptic drugs if seizures.

How can we prevent distemper?

Vaccination is essential to prevent this disease. Puppies with declining maternal derived antibodies should remain away from potential carriers/infected animals until vaccination is complete.

Updated September 2021 by Dr Emi Barker