Canine distemper virus (CDV) may cause a constellation of systemic clinical signs including vomiting, diarrhea, and/or respiratory signs. These may be difficult to distinguish from other infectious and noninfectious diseases in young dogs. Both acute and chronic progressive neurologic signs may also be seen in canine distemper. During early systemic infection, having an accurate diagnosis of distemper infection may better guide appropriate therapy, as well as prepare the owner for the possibility of future neurologic consequences. Likewise, the ability to definitively diagnose distemper virus as the cause of neurologic signs over other diseases with a better prognosis may help owners and clinicians make informed decisions about continuing therapy versus euthanasia. The IDEXX RealPCR™ Canine Distemper Virus (CDV) Test is now available.

IDEXX's new Molecular Diagnostic Laboratory, directed by Christian Leutenegger, DrVetMed, PhD, FVH, now offers real-time PCR (polymerase chain reaction) testing to accurately diagnose canine distemper virus infection providing you with convenient and affordable access to the accuracy of PCR as part of your routine test menu. With IDEXX RealPCR tests, you can count on:

- **The latest in PCR technology.** Real-time PCR is a closed-tube system that delivers short assay run times that virtually eliminate false positive results.
- **Surprising cost savings.** IDEXX RealPCR tests and panels cost about the same as our other laboratory tests and are much more affordable than send-out PCR tests.

**Canine Distemper Virus**

Canine distemper virus (CDV) is a single negative stranded RNA virus in the genus Morbillivirus of the family Paramyxoviridae. CDV is the causative agent in canine distemper, one of the most important infectious diseases in dogs with a worldwide mortality rate second only to rabies. Canine distemper virus causes significant disease in puppies and unvaccinated dogs, other terrestrial carnivores, and marine mammals. CDV may result in systemic infection with susceptible animals is through exposure to aerosolized respiratory secretions from recently infected dogs (diseased or nonclinical) or by exposure to infected wildlife. Shedding of virus begins within seven days of infection and may continue for up to three months. Because of effective vaccination programs, canine distemper is most common in areas with a significant unvaccinated canine population or a wildlife reservoir. The host range has recently widened with interspecies transmission resulting in several recent epizootics with high mortality.$^{1,2}$

Early infection with CDV often goes undetected, but may have fever and lymphopenia. The virus then spreads to epithelial tissues and the central nervous system. Infection may clear, dogs may become silent carriers (if partial immunity), or may progress to the systemic stage. Silent carriers may still be infective for other dogs and may develop hyperkeratosis of the footpads and neurologic signs later in infection. If inadequate immunity is present, acute multisystemic illness usually develops about two weeks after initial exposure. Initial signs include a mild conjunctivitis with clear to mucopurulent nasal and ocular discharge. Lethargy, fever, and decreased appetite are often seen. Upper respiratory signs are followed by a cough, and in severe forms, dyspnea and bronchopneumonia may develop. Gastrointestinal signs follow with vomiting, diarrhea (sometimes bloody), and often severe dehydration. The severity of the multisystemic signs varies with the degree of immunity. Very mild forms may be confused with kennel cough. Severe forms may result in acute death. Treatment during the acute systemic phase is supportive and may also include antibiotics for treatment of secondary bacterial infections.

Some, but not all, dogs who recover from the systemic stage will develop neurologic signs. If they occur, neurologic signs most commonly develop one to two weeks after the systemic illness has resolved, and can also be seen in dogs that were subclinical through the initial stages. Dogs infected in utero or shortly after birth may show peracute neurologic signs without developing other systemic signs. Neurologic signs can also occur simultaneously with the acute multisystemic signs, or can be delayed by months or years (Old Dog Encephalitis). The clinical signs seen vary with the area of the nervous system involved. Myoclonus (involuntary muscle twitching) is a common sign that has become almost pathognomic for distemper, but can also rarely be seen with other inflammatory nervous system diseases. Unusual seizure episodes called “chewing gum fits”, ataxia, para- or tetra-paresis, cerebellar and vestibular signs are all common manifestations of distemper. Optic neuritis, retinal scarring, and uveitis may be
seen. Neurologic signs are generally not reversible. Neurologic signs may be progressive. Seizures may become more frequent and refractory to anticonvulsant therapy. Distemper encephalitis may also progress to coma and death. Post-vaccinal encephalitis may also rarely be seen following modified live vaccination, and has a better prognosis with the potential for resolution of neurologic signs.

**Diagnostic Tests**

The majority of tests currently available for canine distemper virus infection are hampered by either low sensitivity or specificity. Virus isolation for CDV is limited by cost, specialized equipment required, and low turnaround time. Virus isolation is unable to detect post-vaccinal or chronic (Old Dog Encephalitis) distemper encephalitis cases due to defective viral replication. Immunohistochemistry provides a specific, but invasive diagnostic test for distemper. Sensitivity varies with the stage of disease and site sampled. Direct Fluorescent Antibody detection of CDV inclusion bodies in conjunctival smears, whole blood and CSF fluid is a specific diagnostic test for CDV. It is not, however, a sensitive test, and is primarily useful only in early disease. Vaccination with a modified live vaccine may result in a false positive in the first few weeks post-vaccination. Serum antibody titers are difficult to interpret in dogs that have been vaccinated or late in infection, which limits their utility.

With IDEXX RealPCR, CDV RNA is extracted from whole blood, serum, CSF fluid, fecal, conjunctival or respiratory samples. If the sample contains CDV RNA, the RNA is converted to complementary DNA (cDNA). The cDNA is then amplified with the PCR process. In real-time PCR, the reaction mix includes fluorescently labeled probes that bind only to the unique cDNA of the target organism, releasing fluorescence as the cDNA accumulates. If the pathogen is present, the resulting fluorescence is detected by the PCR instrument. This provides both a very specific and sensitive diagnostic test for canine distemper.

**Using the IDEXX RealPCR CDV Test in Your Practice**

**When to use:** Distemper testing via real-time PCR should be performed in all dogs with signs which may be attributable to distemper, but particularly in young dogs or dogs that are not fully vaccinated or for which the vaccine status is unknown.

- Dogs with combinations of conjunctivitis, respiratory and gastrointestinal signs.
- Dogs with only respiratory signs in which standard treatment for kennel cough has been unrewarding. Note that for these patients, the IDEXX RealPCR Canine Respiratory Disease Panel (Test Code CRS), which includes real-time PCR for canine distemper virus in addition to six other infectious canine respiratory agents, may be a more appropriate choice.
- Dogs with neurologic signs
- Vaccinated dogs suspected of having distemper (for which other diagnostic tests for distemper would be inaccurate due to either low sensitivity or vaccine interference).

**Limitations:** Vaccination with a modified-live canine distemper vaccine may result in positive PCR results (but not in CSF fluid that is uncontaminated with peripheral blood) for a few weeks immediately post-vaccination. Killed and vectored-recombinant vaccines do not interfere with PCR testing.

**Sample Guidelines:**

- **For neurological manifestations:** CSF (at least 0.5 ml) and whole blood (2 ml lavender top, EDTA).
- **For respiratory manifestations:** Deep pharyngeal swab* (with visible organic material on swab; please rub firmly) and a conjunctival swab* (wipe eye clean, swab inside of eyelid), in the same tube. Please submit swab dry, without transport media, in a serum tube or an empty, sterile tube.
- **For GI manifestations:** Whole blood (2 ml lavender top, EDTA); and fecal sample (fecal cup).
- **With no distinct clinical manifestations:** Whole blood (2 ml lavender top, EDTA) and conjunctival swab* (wipe eye clean, swab inside of eyelid). Please submit swab dry, without transport media, in a serum tube or an empty, sterile tube.

*plastic-stemmed swabs are preferred

**Contacting IDEXX**

For more information about IDEXX RealPCR, call our Internal Medicine Team at IDEXX Reference Laboratories, 1300 44 33 99. If you are not currently an IDEXX Reference Laboratories customer and would like to try IDEXX RealPCR, ask to speak with your sales representative.

**References**


The information contained herein is intended to provide general guidance only. As with any diagnosis or treatment, you should use clinical discretion with each patient based on a complete evaluation of the patient, including history, physical presentation and complete laboratory data. With respect to any drug therapy or monitoring program, you should refer to product inserts for a complete description of dosages, indications, interactions and cautions.

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