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Canine distemper: what’s new in treatment and prevention

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Distemper is caused by a paramyxovirus that causes a severe multisystemic fatal disease including respiratory, enteric and CNS signs. It is closely related to measles virus and a number of other multisystemic severe diseases of animals such as herbivores, pinnipeds, and cetaceans. In recent years, outbreaks of distemper have occurred where these marine mammals have contacted dogs living in isolation or having a lapse in their vaccination boosters.

As a multisystemic disease, CDV must spread to many tissues as the course of infection. Serum antibody is protective against viral spread and the level at the time of infection is critical in determining the course of illness. Systemic spread can infect epithelial tissues causing severe multisystemic illness and this occurs with the lowest level of immunity. During the systemic spread, virus can enter the CNS when there is no protection or partial protection by serum antibody. CNS infection occurs after this systemic illness; however the course of infection within the CNS can either be directly caused by the virus or be a result of the body’s immune response to the presence of virus. In the latter case, dogs have an intermediate level of immunity, and the subsequent involvement of the CNS can develop months to years later. Dogs with the lowest level of immunity develop no illness or mild signs compatible with tracheobronchitis.

The clinical signs of systemic CDV infection usually precede the development of neurologic signs. Respiratory signs can involve both the lower and upper respiratory tract. However, neurologic signs can occur in the absence of other systemic manifestations. Old dog encephalitis is a chronic persistent form of latent CDV in the CNS.

For diagnosis, clinical suspicion is the usual means of detecting infected dogs. Although the multisystemic disease is easy to recognize, the neurologic form can be more difficult. Clinical pathologic changes include erythrocite inclusions and a mononuclear CSF cytology. Radiography of the thorax will show viral pneumonia with secondary bacterial infection. Immunocytological methods can be used to detect virus within various tissues. Immunocytology should be done, only in the acute phases of illness. The direct method can be used to examine scrapings of conjunctiva, tissues, blood, CSF, or urine. This test is not as sensitive as ELISA or PCR and a negative does not eliminate the disease. However, a positive test result usually reflects large amounts of virus which can be more likely correlated with infection. Unfortunately false-positive results may be obtained because of nonspecific fluorescence. It is important to understand the timing of direct immunofluorescence for antigen in confirming infection. Acute infections are within 1 week and have epithelial signs. Chronic persistent infections are considered to last longer than week however the persistence is hidden only in nervous and ocular tissues (rarely lung and foot pad). This particular hidden infection is not eliminated by systemic antibody response.

Serologic detection of antibody titers can be helpful for determining the possibility of infection. Rising IgG titers or IgM single titers are considered for systemic disease (timing for antibody determinations is later than antigen in immunocytology). Therefore for acute disease, a single IgM or paired IgG titer can be used to detect recent or active infection. The antibody titers are also protective and can be used to measure seroprotection when the appropriate type of test is used. For CNS infections a comparison is made between serum versus CSF IgG. Using this and another titer or measure an antibody index or ratio can be calculated. It is ideal to compare this ration with another tested antigen.

PCR has been used to detect viral genome in tissues and body fluids. The results would seem promising for diagnosis of CNS distemper when the virus can be found in body tissues or fluids. Unfortunately, further controlled studies are needed with quantitative PCR to determine if this method can be accurate. Low levels of virus in contact dogs, those recovering from mild infections, or those vaccinated might lead to false-positive results.

There are some important and unique features of distemper vaccination which may alter the vaccination protocol. Elevated rectal temperature has an effect on the immune response as 103.6°F rectal temperatures suppress the antibody titer. Distemper vaccines can also be given in the face of an outbreak to dogs that either have a lapse in their immunity or have been exposed and were not adequately immunized. Parenteral administration of vaccine can thwart canine distemper that is incubating within 4 days of exposure. It is important to remember that we are concerned with exposure and not clinical illness!

Vaccinations for distemper in puppies are usually started at 6 to 8 weeks of age. At this age a minimum of at least 3 vaccinations, 3 to 4 weeks apart should be given, followed by a yearly booster. If an animal presents at an older age they still need at least 2 distemper vaccines for solid primary immunity if no other vaccines have been given. Duration of immunity has been lengthened in recent years. This is due to the concern of over vaccination causing potential side effects and from studies showing protective immune responses to distemper for at least 3 years.
Vaccination with MLV CDV vaccine provides the greatest chance for postvaccinal disease of any canine biologic. Concurrent diseases or immunosuppression and canine distemper vaccination pose the potential problem of postvaccinal canine distemper encephalitis. Post vaccinal systemic disease such as HOD has also been observed in some breeds. These vaccine reactions may be strain dependent.

Attempts to use inactivated distemper vaccines in the past have failed. Onset and duration of immunity has been limited with inactivated products. A recombinant distemper vaccine (Recombitek, Merial) is now available consisting of a canary pox vector. It has been developed because of potential vaccine-induced illnesses that can occur with MLV products.

Current MLV strains of CDV vaccine are Rockborn, Snyder Hill, Onderstepoort. The Rockborn is the most immunogenic but has a risk of postvaccinal disease. Most companies in the USA have discontinued their use because of the greater risk of vaccine-induced complications. Onderstepoort strains are intermediate potency. Challenge infections have shown that immunity to distemper can last for at least 3 years. The recombinant vaccine is safe from vaccine-induced disease. It seems to provide protection equal to that of the Onderstepoort strains.

Immunity to canine distemper can be effectively determined with measurement of serum antibody titers. Canine distemper virus vaccines generally provide adequate protection against disease; however, the possibility for vaccine failure exists as a result of the level of maternal antibody, concurrent immunosuppression. Outbreaks of canine distemper have occurred where lapses in periodic vaccination have occurred. Furthermore, wildlife reservoirs have been important in spreading the virus to susceptible dogs.

References