

## Canine Distemper

Welcome! In this video we'll talk about distemper, a highly contagious viral disease, quite severe, that in addition to the dog it may affect a wide range of terrestrial carnivores, as well as marine mammals and non-hominid primates.

Canine distemper affects the respiratory, gastrointestinal and nervous systems of puppies and adult dogs. The virus responsible for it was isolated by Carré in 1905 and for decades it has been responsible worldwide for a large mortality in animals. Fortunately, this disease does not represent any risk for human beings.

The specific causative agent is the species canine distemper virus which belongs to the genus *Morbillivirus*. It is an enveloped RNA virus. In this envelope are expressed two types of proteins: haemagutinin-neuraminidase (HN) a molecule of the virus that binds the target cell, and the fusion protein (F), related with the penetration of the virus into the host cell. Both of them are important in the development of the immune response against the virus.

It is a virus very labile to the action of chemical agents, which is an advantage. However, it can infect different types of tissues, organs and systems, such as the epithelial, the mesenchymal, the neuroendocrine and the hematopoietic organs.

It is distributed throughout the world. There is a large number of animal species susceptible to the infection. You can see in this table a list of receptive species. Within the large group of carnivores it affects a range from the domestic dog, the fox and the wolf, ferrets, martens, etc., all the way to big cats, such as the lion or panther, or different species of bears. In addition, the disease, produced by a similar Morbillivirus, has been described in marine mammals, such as seals or dolphins, and in non-human primates including macaques.

The transmission of the disease is air-borne, through aerosol droplets which contain viruses. Infected animals may shed viruses by different secretions and body excretions, for example, in the urine, up to 90 days post infection. We have to indicate that the transplacental transmission has also been described.

The mechanism of infection is as follows:

1. Once the virus enters via aerosol, it initially replicates in the tonsils and bronchial lymph nodes.
2. Between the second and fourth days post infection, the viral progeny associated to macrophages migrates causing viremia. In this situation, and in accordance with the beginning of the humoral immune response, various situations may occur:
  - Animals which develop appropriate levels of antibodies eliminate the infection without developing clinical signs.
  - In animals with an inadequate immune response, the virus invades all epithelial tissues and the central nervous system. At the same time, in this group of animals we have two possibilities:
    - Animals with a low level of antibodies but an adequate immune cell response, in which the virus is gradually eliminated from most tissues (though it may possibly remain in skin and CNS), show mild clinical signs.
    - Animals where there is a failure of the immune response, in which the virus persists in all tissues, and develops a multisystemic severe syndrome that leads to death.

The clinical signs and lesions are the following:

Initially, fever, anorexia, depression, mild respiratory syndrome and leukopaenia.

Subsequently,

- Cutaneous signs: such as vesicular or ulcerative dermatitis, as well as hyperkeratosis, which is when the skin thickens by the excessive accumulation of keratin.
- Catarrhal digestive signs: such as the decrease of the consistency and colour of the faeces.
- Nervous signs, which depend on the area of the CNS affected and they vary from simple tremors to a serious syndrome of seizures which may lead to death.

The treatment is symptomatic and may include antibiotics, fluid therapy, Vitamin B complex, anti-inflammatory drugs and anticonvulsants.

We have to highlight the importance of cleaning and disinfecting properly the areas where the animal lives, especially if it interacts or lives with other animals, in order to achieve the elimination of persistent viruses in the environment.

Without a doubt, vaccination is the best system to control and prevent the disease. This fact is critical in puppies which are susceptible to the infection, because natural immunity provided in the milk of their mothers may end before the immune system of the puppy has matured.

We include a table with the recommendations of the vaccination protocol for distemper established by the European Union, where we indicate the type of vaccine and doses for puppies and adults.

Finally we recommend that you expand your knowledge reading a brief literature review included in the additional material.

Thank you for your attention!