

(REVIEW ARTICLE)



One current viral threat to wildlife or in captivity

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Open Access Research Journal of Biology and Pharmacy, 2022, 04(02), 001–003

Publication history: Received on 01 February 2022; revised on 08 March 2022; accepted on 10 March 2022

Article DOI: <https://doi.org/10.53022/oarjbp.2022.4.2.0033>

Abstract

In general, it is assumed that there are many differences between human beings and other animal species. That may be true, but in terms of diseases caused by viruses and microorganisms that difference is much narrower. As André Lwoff, Nobel Prize winner in 1965, said, “viruses are viruses” and therefore the fact that they affect animal species makes no difference. Over the centuries, the human species has been threatened by various bacterial and viral pathogens. In this respect, animal species are not immune. Currently, a ribovirus (SARS-CoV-2) affects the human species presenting several variants, the last known being omicron. Likewise, in animals and initially in dogs, the Canine Distemper virus was described, of which several genotypes are also known that make any vaccination plan tremble, including other families besides the Canidae. Due to the above, it is not unreasonable to propose CDV as a latent threat in animal species, wild or in captivity. A dizzying read...!!

Keywords: Viruses; Threat; Wildlife; Captivity; Genotypes; Diagnosis

1. Introduction

Today it is a reality that there are several threats to wildlife and one of them is represented by the *Canine Distemper Virus* (CDV), the cause of a multisystemic disease denominated Canine Distemper (CD), associated originally only with dogs and distantly with other members of the *Canidae* family, such as wolves and coyotes.

However, since 1994 it has been described that CDV affects not only dogs, but also evolutionarily distant species such as tigers and lions, as well as other mammals including ferrets, raccoons, civets, and even seals. On the other hand, there is a permanent situation over time and it is related to the death of dogs that, even though they are vaccinated against CDV, still die in a contact with the virus.

What is happening then? The answer must be sought in the scientific literature and if that were the case, the name of a Japanese scientist undoubtedly appears: Masami Mochizuki, who in 1999 shows us the existence of at least two types of CDV strains: the “news” and the “olds” strains [1].

Subsequently, and with the use of other methodologies, it has been described that there are at least 14 different CDV genotypes around the world. With this, the question: why do dogs vaccinated against CDV get sick and die?, could have a very logical answer.

2. A little of Virology, Epidemiology and Diagnosis

CDV is related to the virus of the measles, the rinderpest virus, the plague virus of small ruminants, the *seal distemper virus* and the *dolphin distemper virus*. All are classified within the *Mononegavirales* order, *Paramyxoviridae* family, *Paramyxovirinae* subfamily, *Morbillivirus* genus [2].

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The virus is enveloped and have a size between 150 to 300 nm. Their genome is a single chain of RNA of negative polarity [2]. Because, the lipoprotein of the envelope is easily destroyed by lipid solvents the virus is fragile and loses its infective capacity. It also has the membrane protein (M), two glycoproteins: hemagglutinin (H) and the fusion protein (F) that induce the production of antibodies neutralizing agents, two proteins associated with transcriptases (P and L) and the core protein capsid (N) that covers the viral RNA [2, 4, 5].

Although there are some antigenic differences between CDV strains shown by serological tests, it is generally accepted that there is only one serotype. But nevertheless, there are considerable differences in the pathogenicity of the different strains isolated [6-8].

CD is enzootic in the world and has a wide range of hosts. Most terrestrial carnivores are susceptible to infection by CDV [5], including the big cats, which are also susceptible to infection and disease by CDV (lions, leopards and tigers in California in 1992 and lions in Tanzania in 1994) [9,10]. In Chile, the presence of CD was suggested empirically until 1994 when it was reported the first isolation of the virus in cell cultures inoculated with secretions from a Canine puppy that showed nervous signs with unilateral myoclonus, movements involuntary and ascending paresia of the posterior train. The clinical diagnosis was corroborated by histopathological studies, electron microscopy and direct immunofluorescence [11, 12].

There are several techniques for the diagnosis of CD, among them are: histological diagnosis (inclusion bodies in cells of the oral and conjunctive membranes); cerebrospinal fluid analysis or the ELISA test for specific IgM. However, appearance of false positives, is a problem. The definitive diagnoses are viral isolation, but not constitute a routine technique within the diagnostic laboratories. Thus, the RT-PCR technique emerges as an alternative to detect the presence of the virus with greater sensitivity [6,13].

Currently, the diagnosis of CD in Chile continues mainly in the hands of clinical signs, even though cases have been reported in which the vaccine has not been effective. There are RT-PCR that detect CDV but do not indicate which variant or genotype it detects, which does not allow establishing differences at the genomic level between national isolates of CDV that could explain something worrisome: the presentation of the clinical picture in dogs with their daily vaccination program.

In this aspect we have carried out part of an investigation that considered samples of maned wolves and foxes using the RT-PCR technique, with promising results [14, 15].

To carry out these studies, we have implemented the use of the H, N, M and L genes as a detection target in different works leading to obtaining the title of Veterinary Medicine and knowing that the H gene is used to genotype CDV, we have incorporated the differential detection of genotypes using PCR variants [16, 17, 18, 19, 20].

If we have been able to do it, something can be done for the benefit of wildlife or in captivity.

3. Conclusion

Kary Mullis' colossal idea divided biology into a before and an after. Its use undoubtedly allowed the establishment of diagnostic methods in animal species in danger of extinction due to viral, bacterial or parasitic pathogens as well as others that affect humans such as SARS-CoV-2, the causal agent of COVID 19.

Compliance with ethical standards

Acknowledgments

We thank the FAVET students for achieving part of their dreams with us.

Disclosure of conflict of interest

No conflicts of interest in authors.

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