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Abstract: Sixty eight animals from various parks and zoos in southern Africa were tested for the presence of antibodies to canine distemper virus (CDV). The areas surveyed include: the Johannesburg and Pretoria zoos, the De Wildt Cheetah Breeding and Research Centre, Botswana (Ghanzi region), Namibia (Gobabis region), the Kruger National Park, Midkwe Game Reserve, and Umfolozi Game Reserve. The species tested include cheetahs (*Acinonyx jubatus*) (n=23), lions (*Panthera leo*) (n=41) and leopards (*Panthera pardus*) (n=4). None of the 68 animals surveyed tested positive for CDV antibodies indicating a lack of exposure to this potentially fatal disease.

Absence of canine distemper antibodies in selected southern African non-domestic felids

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Sixty eight animals from various parks and zoos in southern Africa were tested for the presence of antibodies to canine distemper virus (CDV). The areas surveyed include: the Johannesburg and Pretoria zoos, the De Wildt Cheetah Breeding and Research Centre, Botswana (Ghanzi region), Namibia (Gobabis region), the Kruger National Park, Madikwe Game Reserve, and Umfolozi Game Reserve. The species tested include cheetahs (*Acinonyx jubatus*) (n=23), lions (*Panthera leo*) (n=41) and leopards (*Panthera pardus*) (n=4). None of the 68 animals surveyed tested positive for CDV antibodies indicating a lack of exposure to this potentially fatal disease.

Keywords: canine distemper virus, cheetahs, leopards, lions, southern Africa

Canine distemper (CD) in dogs and other carnivores has been known worldwide for many years and has been the infectious disease of dogs with the highest fatality rate besides rabies (Appel & Summers 1995). The disease is caused by canine distemper virus (CDV) which belongs to the morbillivirus genus together with measles, rinderpest, peste des petits ruminants, phocine distemper, and more recently, dolphin and porpoise morbillivirus. Many different species of the order Carnivora are susceptible to CD and the mortality rate varies greatly between species (Appel & Summers 1995).

Several dramatic and unexpected outbreaks of CD have recently occurred in non-domestic animals. Seventeen animals succumbed in a wildlife park in California in 1992 (Appel & Summers 1995). In 1978, CDV is thought to have caused several fatal epidemics within the Serengeti-Mara ecosystems of east Africa, affecting black-backed jackals (*Canis mesomelas*) and bat-eared foxes (*Otocyon megalotis*). African hunting dogs (*Lycan pictus*) were thought, at the time, to have died from CDV in 1991. During this period the lion population was not affected. However, in early 1994 an outbreak occurred among lions of the Serengeti-Mara ecosystems of east Africa (Roelke-Parker, Munson, Packer, Kock, Cleaveland, Carpenter, OBrien, Pospischill, Hofmann-Lehmann, Lutz, Mwamengele, Mgasa, Machange, Summers & Appel 1996). By August 1994, 85% of the Serengeti (Tanzania) lion population had anti-CDV antibodies, and the epidemic spread north to lions in the Maasai-Mara National Reserve (Kenya). Many spotted hyenas (*Crocuta crocuta*), bat-eared foxes and leopards (*Panthera pardus*) were also affected. This epidemic resulted in the deaths of 30% of the Serengeti-Mara lion population. The source of this epidemic appears to be domestic dogs surrounding the parks (Roelke-Parker et al. 1996).

The only deaths to occur from CD in southern African have been in African hunting dogs and appear to have been vaccine related (Van Heerden, Bainbridge, Burroughs & Kriek 1989.)

National parks in South Africa tend to be fenced off, preventing the entry of feral dogs, and thus the spread of canine viruses to non-domestic species. It was therefore decided to survey serum samples from southern African non-domestic felids for the

presence of antibodies to CDV in order to ascertain whether or not there was an indication that these felids had been exposed to this potentially lethal disease.

The animals surveyed included: 14 captive lions (Johannesburg zoo n=9, Pretoria zoo n=5), 27 free-ranging lions (Kruger National Park n=18, Madikwe Game Reserve n=5, Gobabis in Namibia n=1, Umfolozi Game Reserve n=3), 16 captive cheetahs (De Wildt Cheetah Breeding and Research Centre), six free-ranging cheetahs from Namibia, one free-ranging cheetah from Ghanzi in Botswana, two leopards from the Kruger National Park and two free-ranging leopards from Ghanzi, Botswana.

The serum samples were assayed by an indirect immunofluorescent assay (Spencer & Burroughs 1992) using commercially available Crandell feline kidney cells infected with CDV as substrate (VMRD, Inc., Pullman, WA, USA). The secondary antibody used to detect antibodies in the serum samples was a commercially available fluorescently conjugated sheep anti-cat IgG (VMRD). Reagents to domestic cat immunoglobulins may be used to detect antibodies in the sera of non-domestic felids as there is complete homology as shown by double Ouchterlony tests (Spencer 1996). The sera were screened at a 1:10 dilution in phosphate buffered saline (PBS) and none of the 68 animals surveyed demonstrated antibodies to CDV.

Canine distemper virus is a known pathogen of many species and the host range appears to be increasing. Large felid species have lived in the wild and in zoological parks for centuries where they would have come into contact with canids, mustelids and procyonids. These families have experienced frequent outbreaks of distemper before vaccines became available. However, canine distemper in felids is a recent phenomenon (Appel, Yates, Foley, Bernstein, Santinelli, Spelman, Miller, Arp, Anderson, Barr, Pearce-Kelling & Summers 1994) and has been shown to be due to wild-type strains of virus (Harder, Kenter, Appel, Roelke-Parker, Barrett & Osterhaus 1995).

Although there does not appear to have been any CDV infection in the non-domestic felids surveyed in this study, the devastating outbreak that occurred in the Serengeti and Mara populations support the notion of ongoing surveillance in southern African populations. The precise route of transmission of

CDV from domestic dog to lion in the Serengeti outbreak is not clear but it would appear to have occurred via spotted hyenas as these hyenas do range among human dwellings surrounding the park where they come into contact with unvaccinated domestic dogs. This would also further support the need for maintaining strict boundaries surrounding the National Parks and Game Reserves and for the monitoring of the general status of domestic dogs living in areas surrounding parks.

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References

APPEL, M.J.G. & SUMMERS, B.A. 1995. Pathogenicity of morbilliviruses for terrestrial carnivores. *Vet. Micro.* 44: 187-191.
APPEL, M.J.G., YATES, REBECCA A., FOLEY, G.L., BERNSTEIN, J.J., SANTINELLI, S., SPELMAN, LUCY H., MILLER, L.D., ARP, L.H., ANDERSON, M., BARR, MARGARET, PEARCE-KELLING, SUSAN & SUMMERS,

B.A. 1994. Canine distemper epizootic in lions, tigers, and leopards in North America. *J. Vet. Diagn. Invest.* 6:277-288.
HARDER, T.C., KENTER, M., APPEL, M.J.G., ROELKE-PARKER, MELODY E., BARRETT, T. & OSTERHAUS, A.D.M.E. 1995. Phylogenetic evidence of canine distemper virus in Serengeti lions. *Vaccine* 13:521-523.
ROELKE-PARKER, MELODY E., MUNSON, LINDA, PACKER, C., KOCK, R., CLEAVELAND, SARAH, CARPENTER, MARGARET, O'BRIEN, S.J., POSPISCHIL, A., HOFMANN-LEHMANN, REGINA, LUTZ, H., MWAMENGELE, G.L.M., MGASA, M.N., MACHANGE, G.A., SUMMERS, B.A. & APPEL, M.J.G. 1996. A canine distemper virus epidemic in Serengeti lions (*Panthera leo*). *Nature* 379:441-445.
SPENCER, JENNIFER A. 1996. Immunological and virological studies in the cheetah (*Acinonyx jubatus*) and the lion (*Panthera leo*). Ph.D Thesis, Medical University of Southern Africa.
SPENCER, JENNIFER A. & BURROUGHS, R. 1992. Antibody response to canine distemper vaccine in African wild dogs. *J. Wildlife. Dis.* 28:443-444.
VAN HEERDEN, J., BAINBRIDGE, N., BURROUGHS, R.E.J. & KRIEK, N.P.J. 1989. Distemper-like disease and encephalitozoonosis in wild dogs (*Lycan pictus*). *J. Wildlife. Dis.* 25:70-75.