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## Vaccine-Induced Canine Distemper in a Lesser Panda

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### SUMMARY

A fatal disease occurred in a lesser panda (*Ailurus fulgens*) 2 weeks after vaccination with modified live distemper vaccine. The disease clinically resembled canine distemper. Pathologically there was giant cell pneumonia, with canine distemper viral inclusion bodies in pulmonary and digestive tract epithelium. Viral isolates were indicative of an attenuated strain rather than virulent types.

AN ADULT MALE lesser panda (*Ailurus fulgens*) arrived at the National Zoological Park and was placed in quarantine. Six days prior to its arrival, the panda had been vaccinated with modified live canine distemper vaccine<sup>a</sup>; 8 days earlier it had been vaccinated with feline panleukopenia vaccine. Both vaccines had been administered at a zoo in southeastern United States.

During quarantine, the panda ate well, but had 2 brief episodes of diarrhea, 6 and 10 days after its arrival. A fecal examination revealed a few strongyle-like eggs.

Approximately 2 weeks after vaccination for canine distemper the panda became depressed and developed a purulent naso-ocular discharge. Rectal temperature was 39.5 C (103 F), and respiration was labored. The panda was treated with 25 mg of gentamicin sulfate<sup>b</sup> intramuscularly. Twenty-four hours after treatment the panda was still lethargic, but quite unmanageable for diagnostic studies. The panda was sedated with 20 mg of tiletamine hydrochloride and zolazepam.<sup>c</sup> The hemogram included evidence of slight anemia and neutrophilia, with a degenerative shift to the left. Thoracic radiography revealed scattered bilateral linear densities that were especially prominent on the left side. The changes were indicative of pulmonary interstitial inflammatory infiltrates.

While under sedation, the panda was treated intramuscularly with antibiotics and fluids. Following this, respiration became more labored and the panda became extremely cyanotic and acidotic, as determined by blood

pH and gas studies. Treatment with oxygen in an incubator proved to be of no avail and the panda died 1½ hours after sedation.

### Pathologic Findings

There was extensive bilateral suppurative conjunctivitis and rhinitis. The trachea and bronchi contained purulent exudate. Portions of both lung lobes were grayish tan, firm, and depressed from the normal parenchyma. On section, these areas were mottled and consolidated, and white purulent material could be expressed from the surfaces. Other pertinent findings included atrophy of most superficial and deep lymph nodes examined. Histologically, there was both interstitial pneumonia (Fig 1) and suppurative broncho-

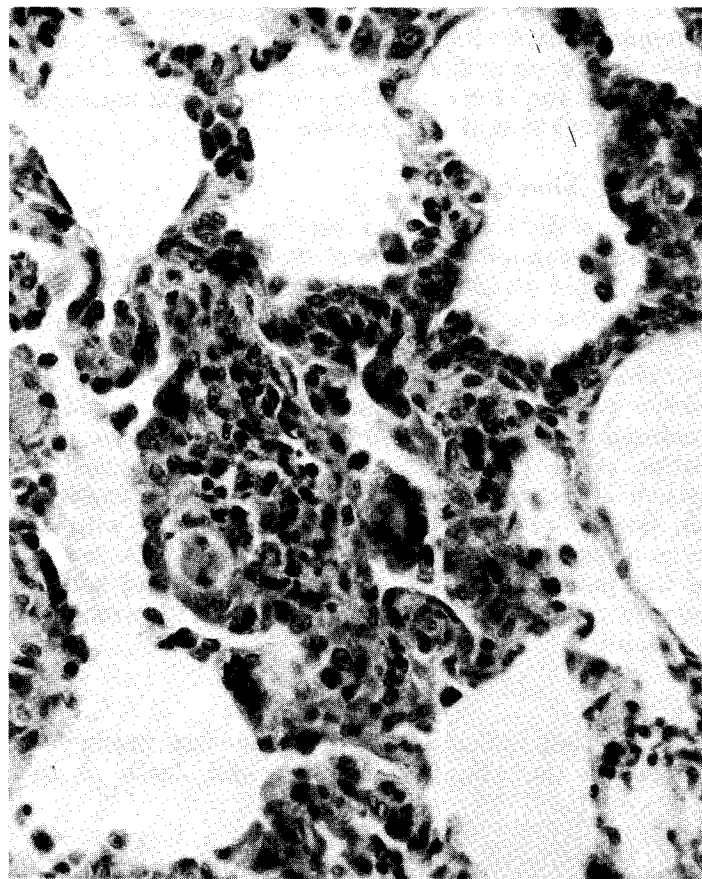


Fig 1—Photomicrograph of lung specimen, showing alveolar walls distended by mononuclear cells and syncytial giant cell formation characteristic of pneumonitis associated with canine distemper. H&E stain; X 340.

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<sup>a</sup> Enduracell, Norden Laboratories, Inc, Lincoln, Ne.

<sup>b</sup> Gentocin, Schering Corporation, Bloomfield, NJ.

<sup>c</sup> CI744, Parke-Davis Company, Detroit, Mi.

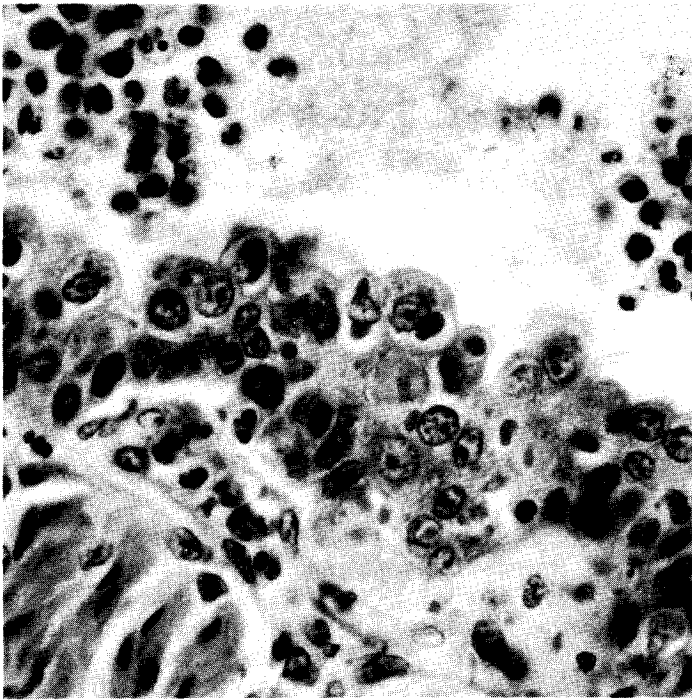


Fig 2—Photomicrograph of segment of a bronchus. Notice purulent exudate in the lumen and intracytoplasmic canine distemper virus inclusion bodies in the mucosal epithelium. H&E stain;  $\times 900$ .

pneumonia. The interstitial component was characterized by numerous syncytial giant cells that contained intracytoplasmic inclusion bodies compatible with canine distemper virus (CDV) inclusions. Similar inclusions were also found in the mucosae of the bronchi (Fig 2), esophagus, and stomach. Many of the lymph nodes had marked depletion of lymphocytes.

### Virologic Studies

Canine distemper virus was recovered from lung specimens frozen at the time of the necropsy. A suspension of this tissue was inoculated into canine lung macrophages and into primary canine kidney cell cultures. The CDV was isolated only from the kidney cell cultures. The isolated virus reacted in the cells like tissue culture-adapted attenuated CDV. It could be passaged, causing typical cytopathic effect. The cytopathic effect and viral growth could be blocked by specific anti-canine distemper serum. Two CDV-susceptible ferrets were inoculated intraperitoneally with the lung suspension and observed for 4 weeks. At the end of this period they were clinically normal and had developed CDV neutralizing antibody titers of  $10^{4.1}$  and  $10^{2.2}$ , respectively.

### Discussion

This study indicates that the attenuated vaccine was responsible for clinical distemper and death in this

lesser panda. This conclusion is based on the clinical and pathologic findings and on the fact that the virus isolated from the lungs could be passaged in canine kidney cells. Virulent CDV replicates only in canine lung macrophages.<sup>2</sup> Inoculation studies on ferrets, which developed protective antibody responses but not clinical disease to the CDV recovered from the lesser panda provides further evidence of its vaccine (non-ferret-virulent) origin. Ferrets are exquisitely sensitive to both virulent CDV and ferret-virulent vaccines and the mortality with these agents approaches 100%.

Families of the order Carnivora, including Ailuridae<sup>1,4</sup> (of which the lesser panda is a member), Procyonidae, Viverridae, and Mustelidae<sup>6</sup> are all potentially susceptible to canine distemper virus and feline panleukopenia virus. The question often arises as to whether modified live vaccine developed for domestic pets should be used in exotic species. The current recommendations for vaccination of exotic species vary considerably. Many practitioners use both modified panleukopenia and canine distemper vaccines for exotic species susceptible to these diseases. In the case of the lesser panda, evidence from this study would indicate that attenuated canine distemper vaccines should not be used.

This recommendation concurs with that in a report from the Amsterdam Zoo,<sup>3</sup> where 3 adult and 2 juvenile lesser pandas died after they were vaccinated with attenuated CDV vaccine.<sup>4</sup> Inclusion bodies were evident in the epithelium of trachea, third eyelid, and urinary bladder.

The vaccination program at the National Zoological Park entails only the use of killed vaccines for all exotic species. In the case of panleukopenia-killed vaccine, efficacy has been documented in large exotic cats by their ability to produce high antibody titers.<sup>5</sup> Similar studies have not been performed for killed canine distemper vaccine; however, there has not been a clinical case of canine distemper or feline distemper at the National Zoological Park since this program was initiated in 1970.

<sup>4</sup> Epivax-T.C.-plus, Burroughs Wellcome & Company, London, England.

### References

1. Anon: Susceptibility of the Lesser Panda to Canine Distemper. *Int Zoo Year Book*, 2, (1960): 107.
2. Appel, M. J. G., and Gillespie, J. H.: *Canine Distemper Virus*. Virology Monograph No. 11, Springer-Verlag, New York, NY, 1972.
3. Erken, A. H. M., and Jacobi, E. F.: Successful Breeding of Lesser Panda and Loss through Inoculation. *Bijdragen tot de Dierkunde*, 42, (1972): 93-95.
4. Fiennes, R. N. T. W.: Report of the Pathologist for the Year 1960. In *Proceedings*. Zoological Society of London, 137, (1961): 179.
5. Gray, C. W.: Immunization of the Exotic Felidae for Panleukopenia. *J Zoo Anim Med*, 3, (1972): 14-16.
6. Keymer, I. F., and Epps, H. B. G.: Canine Distemper in the Family Mustelidae. *Vet Rec*, 84, (1969): 204-205.