



Canine Distemper

Extended Version

Classic case: 5-month-old mixed breed dog with lethargy, ocular and nasal discharge, cough, vomiting, and diarrhea

Presentation:

- Signalment and History
 - **Dogs**
 - Usually urban or suburban
 - Usually YOUNG - between 3 and 6 months of age
 - More common, with higher mortality in dolichocephalic (long nose) breeds versus brachycephalic breeds
 - **Ferrets** – unvaccinated at any age
 - Also infects coyote, dingo, wolf, fox, mink, skunk, raccoon, panda, lion, cheetah, jaguar, margay, ocelot
- **Generalized distemper** in dogs– lethargy, poor haircoat, dehydration
 - Respiratory and ocular signs first
 - Ocular and nasal discharge (serous or mucopurulent)
 - Cough, loud breath sounds
 - Keratitis, conjunctivitis, uveitis
 - Gastrointestinal signs second
 - Inappetence, vomiting, diarrhea
 - CNS signs third (usually 1-3 weeks later, but can be months)
 - Seizures – “chewing-gum” seizures to generalized
 - Ataxia
 - Vestibular symptoms
 - Cerebellar symptoms
 - Paresis
 - **Myoclonus** – rhythmic twitching of the head, neck, or one or more limbs
- Canine survivors may develop
 - Hyperkeratosis of footpads (hardpad) and nasal planum
 - Enamel hypoplasia (if disease occurred during enamel development)
 - **Old-dog encephalitis** Ataxia, compulsive walking, head-pressing, hypermetria
- **Distemper encephalomyelitis** may occur in older dogs with no history of systemic disease and adequate vaccination history. This is different from old-dog encephalitis. Usually cerebellar and vestibular symptoms.
- **Inclusion-body polioencephalitis** can occur after vaccination – similar to sx of old-dog encephalitis
- Transplacental infections in dogs– abortion or stillbirths; puppies that survive develop neurologic signs by 6 weeks and may have lifelong immunodeficiency



Mucopurulent oculonasal discharge in a dog with canine distemper.

Image courtesy, Dr Brian WJ Mahy and CDC.

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Presentation: (continued)

- **Ferrets**
 - **Papular chin dermatitis**, cheilitis with swelling and crusting, perineal dermatitis (may be orange-tinged) – **dermatitis is pathognomonic when other symptoms are present**
 - Anorexia, depression, dyspnea, pyrexia, photophobia,
 - Pruritis, mucopurulent oculonasal discharge
 - Hyperkeratosis of planum nasale and footpads
 - Vomiting and diarrhea are uncommon
 - Advanced stages – incoordination, torticollis, nystagmus

DDX: Canine infectious tracheobronchitis, parvoviral enteritis, leptospirosis, infectious canine hepatitis, Rocky Mountain spotted fever, organophosphate or lead toxicosis, other CNS diseases of young dogs, influenza in ferrets

Test(s) of choice:

- **Presumptive diagnosis in a young, unvaccinated dog with**
 - **Oculanasal discharge**,
 - Vomiting, diarrhea, ± neurologic signs
- CBC – absolute lymphopenia
- Thoracic radiographs – interstitial pattern
- Serum IgM titers in unvaccinated dogs confirm recent exposure or current infection
- CSF
 - Elevated protein
 - Lymphocytic pleocytosis
 - Positive distemper antibody titers (only if no blood contamination)
 - If blood contamination:
 - Paired samples of CSF and serum are tested for canine distemper virus (CDV) and parvovirus (CPV) antibody titers
 - Ratio of CDV/CVP higher in CSF than in blood is suggestive of infection
- Fluorescent antibody – cytologic smears (**conjunctival**, tonsils, CSF, bone marrow, urine sediment)
- PCR for CDV – whole blood, serum, CSF
- RT-PCR of buffy coat, conjunctival, preputial or vaginal swabs
- Post-mortem – fluorescent antibody testing as above, including brain

Rx of choice:

- Supportive care, antibiotics for secondary infections, anticonvulsants
- Corticosteroids for optic neuritis, encephalitis **without** systemic dz

Prognosis:

- **Guarded to poor** – worse prognosis with CNS signs;
- **Ferrets usually have a grave prognosis**



Nasal discharge in a dog suffering from canine distemper. Image courtesy, [WikiMedia Commons](#).

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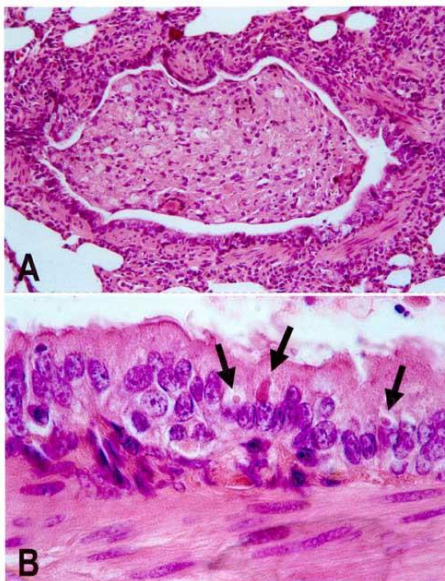
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Prevention:

- **Dogs: Modified-live canine distemper vaccine every 3-4 weeks**
 - From 6 weeks of age through 16 weeks, then annually
 - Immunocompromised dogs may still develop disease
 - Dogs exposed to a large amount of a highly virulent strain may **STILL** develop disease
 - Vaccine-induced infections are very rare and will only cause neurologic symptoms
 - **Complications (mostly Weimaraners are affected)** are rare (hypertrophic osteodystrophy and juvenile cellulitis) within 10 days of vaccine
 - Weimaraners may also develop a corticosteroid-responsive neutrophilic meningitis/arteritis
 - Recombinant CDV vaccine recommended for young Weimaraners (usually no problems after a year of age)
- Prevent spread from infected dog
 - Isolate from other patients; wear gowns and gloves
 - **Thoroughly disinfect** all potential fomites (e.g. nebulization equipment)
 - **CDV is fragile**
 - Sensitive to most disinfectants
 - Isolate infected dogs from healthy dogs for at least 2 weeks after disappearance of clinical sx)
- **Ferrets:**
 - PureVax Ferret Distemper Vaccine (recombinant canary-pox vector vaccine)
 - Do **not** use multivalent canine vaccines in ferrets!

Pearls:

- Caused by **morbillivirus of the family Paramyxoviridae** (closely related to measles and rinderpest)
- **Highly contagious** via **aerosol**, transplacental routes, or by direct contact w/ secretions, esp. fomites
- Viral shedding begins by 7th day and may persist **up to 90 days**
- **Old-dog encephalitis** likely due to persistent viral inf. of CNS gray matter
- “Chewing-gum” seizures are **NOT** pathognomonic for distemper-can be due to any cause of seizures



Lung lesions in an African wild dog with canine distemper. Bronchiole occluded by inflammatory cells (A). Detail of A, showing eosinophilic intracytoplasmic viral inclusions (B).

Image courtesy, CDC and WikiMedia Commons.



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Pearls: (continued)

• Pathophysiology of Distemper

- Viral replication in upper-respiratory epithelium tissue macrophages
- Virus multiplies in tonsils and retropharyngeal and bronchial lymph nodes via lymphatics
- Systemic dissemination via mononuclear cells – 3-6 days after exposure
 - Fever
 - Leukopenia
- Viremia, hematogenous spread (day 9) to epithelial & CNS tissue
 - Adequate humoral and cell-mediated immunity: Dog may clear virus by day 14
 - Intermediate immunity – infection of epithelial tissues by day 14
 - Clinical signs develop and resolve
 - Virus is cleared from most tissues (may persist in footpads and CNS)
- Poor immunity: viral spread to skin, endocrine glands, exocrine glands, epithelial cells of intestinal tract, respiratory system, and genitourinary tract by day 14

Refs: Côté, Clinical Veterinary Advisor, 2nd ed, pp 317-319; Quesenberry and Carpenter, Ferrets, Rabbits, and Rodents, 3rd ed, pp 78-80, 138; Merck Manual, 10th ed (online): [Canine Distemper](#), [Ferret distemper](#), [Rinderpest](#), A Practical Guide to Canine and Feline Neurology, Dewey, 2nd ed. pp 275, 306-307; Small Animal Neurology, Jaggy. p 400-401; van de Bildt MWG, et al., [Distemper Outbreak and Its Effect on African Wild Dog Conservation](#). Emerg Infect Dis. [serial on the Internet]. 2002 Feb

My Notes: