

PARVOVIRUS INFECTIONS

ANIMAL GROUP AFFECTED	TRANSMISSION	CLINICAL SIGNS	FATAL DISEASE ?	TREATMENT	PREVENTION & CONTROL
Felidae, Canidae, Procyonidae, Mustelidae, Ursidae, and Viveridae	Faecal-oral route	Diarrhoea, faeces are pasty, blood flecked to haemorrhagic, leukopenia, lymphopenia, feline ataxia, canine myocarditis	Variable depending on the immune status of the animal and virus strain	Interferons, hyperimmu- sera	<i>In houses</i> <i>in zoos</i> Quarantine for at least 30 days, vaccination

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Susceptible animal groups Species from six families (Felidae, Canidae, Procyonidae, Mustelidae, Ursidae, and Viveridae) in the order Carnivora are suspected of being susceptible to parvovirus of the FPV subgroup. Also syndromes resembling parvovirus infection have been described in an insectivore and a rodent.	
Causative organism The feline parvovirus subgroup viruses are unenveloped and contain a single-stranded DNA genome about 5.1 kb. The virus capsids are the primary determinants of host range; differences of only two or three amino acids in three areas on or near the surface determine the ability of CPV and FPV to replicate in dogs or cats or their cultured cells. The amplification of parvovirus DNA sequences intermediate between FPV and CPV from tissues of red foxes (<i>Vulpes vulpes</i>) from Europe suggests that wildlife may have played a role in the interspecies transfer of feline parvovirus subgroup virus to dogs. As currently understood, the FPV subgroup is rooted in FPV, from which mink enteritis virus (MEV) and racoon parvovirus (RPV) isolates are indistinguishable, and blue fox parvovirus (BFPV) is a minor variant. CPV is closely related to and probably derived from FPV and is distinguishable on antigenic and genetic grounds and includes racoon dog parvovirus (RDPV) isolates. Parvoviruses are very hardy, surviving for months under cool, moist conditions protected from sunlight, and they are very stable when frozen. Infectious CPV has persisted in faeces held for 6 months at room temperature and MEV may remain viable in the natural environment for 9-12 months.	
Zoonotic potential None.	
Distribution Animals: Felidae, Canidae, Procyonidae, Mustelidae, Ursidae, Viveridae.	
Transmission Transmission is by the faecal-oral route, probably mainly through ingestion of virus from the environment, rather than by direct contact with infected animals.	
Incubation period 4-10 days.	
Clinical symptoms Typically, about day 4 or 5 after exposure, animals develop lethargy, profound depression, and inappetence. Within a day there is an acute onset of fever, vomiting, and diarrhoea. The faeces may be pasty, porridge-like, or liquid; they are typically foul smelling and may contain mucus or fiber casts and be blood spotted to overtly hemorrhagic. Dehydration, acid-base imbalance, hypoproteinemia, and, especially in cats with FPV,	



leukopenia, occur. Animals that resume eating within 3-4 days of onset of illness are likely to survive, and most animals that are going to die succumb within 4-5 days. Juvenile animals tend to have a higher case fatality rate than do adults.

Prenatal and Neonatal Infections: A condition resembling feline ataxia was reported in lion cubs; reproductive wastage in blue fox vixens with BFPV due to foetal resorption, abortions, and stillbirths; and equivocal reduction in fecundity associated with FPV in bobcats, syndromes due to neonatal or perinatal infection have been reported only in domestic dogs and cats.

Post mortem findings

At necropsy, animals with enteric parvovirus infections are typically dehydrated and, if anaemic, pale. In most cases there are gross lesions in the gastrointestinal tract, but in some, especially in cats and raccoons, they are subtle or not evident, perhaps other than scant liquid faeces in the colon. Segmental subserosal to transmural haemorrhage of the small and large intestine, visible from the external aspect, may occur in any species but is most common in dogs with CPV infection and in mink with MVE. Peyer's patches may be prominent.

Gastric contents are usually scant, fluid, and bilestained or bloodstained. Contents of the small intestine are creamy, mucoid, or fluid, perhaps containing fibrin, in some cases very hemorrhagic. Mesenteric lymph nodes often are enlarged, wet and congested, but they may be reduced in size. The thymus of young animals is consistently atrophic and may be difficult to detect. Bone marrow is pale and gelatinous. The lungs are congested and oedematous.

Microscopically, lesions are found consistently in the small intestine of animals that have died. They reflect the viral insult to the proliferative cells, with ensuing dilation of crypts, atrophy of villi, and erosion and sometimes apparent collapse of the mucosa.

Diagnosis

A presumptive diagnosis is readily made post mortem, based on the characteristic suite of gross and microscopic enteric, lymphoid, and myeloid lesions.

Antibodies: HIT, ELISA. Virus: IFT, PCR, electron microscopy.

Material required for laboratory analysis

Sera, tissue (small intestine, spleen, thymus), faeces. Storage of tissue samples: -80°C, storage of serum samples: -20°C

Relevant diagnostic laboratories

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Treatment

Animals suspected of parvovirus gastroenteritis should be isolated from other susceptible animals, which should be vaccinated if their immunization status is in question. Therapy is entirely supportive, aimed at mitigating the effects of dehydration and electrolyte imbalance during the phase of intestinal infection.

Prolonged treatment is probably not warranted for animals that have not begun to recover within 5-6 days of onset of signs.

Prevention and control in zoos

Animals introduced into a facility should be quarantined for 30 days, or longer if required to complete an immunisation series. This will more than encompass the incubation period for parvovirus, should the animal have been exposed prior to arrival. To minimise risk of exposure, species susceptible to these parvoviruses should not be mixed in holdings, and efforts should be made to prevent intrusions by cats, dogs, and racoons.

Suggested disinfectant for housing facilities

Parvoviruses are resistant to many common disinfectants, such as quaternary ammonium compounds and alcohols, and disinfection requires use of formaldehyde, glutaraldehyde, or chlorine solutions. Routinely, washable surface, equipment, and cage furnishings should be sanitized with effective commercial or generic virucidal agents, among which 0,175% sodium hypochlorite solution is useful if extraneous organic matter does not interfere. Similar disinfectants may be considered for footbaths. Boiling rapidly inactivates parvovirus, but hot-water washes will likely be ineffective because virus may survive for over 7 hours at 80°C and several days at 56°C.

Notification**Guarantees required under EU Legislation****Guarantees required by EAZA Zoos**



Measures required under the Animal Disease Surveillance Plan
Measures required for introducing animals from non-approved sources
Measures to be taken in case of disease outbreak or positive laboratory findings
Conditions for restoring disease-free status after an outbreak
Contacts for further information Prof. U. Truyen, Tiergesundheitsdienst Bayern e.V. Senator-Gerauer-Straße 23, 85586 Poing, Germany Dr. K. Frölich, Institute for Zoo and Wildlife Research, Alfred-Kowalke-Straße 17, 10315 Berlin, Germany
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