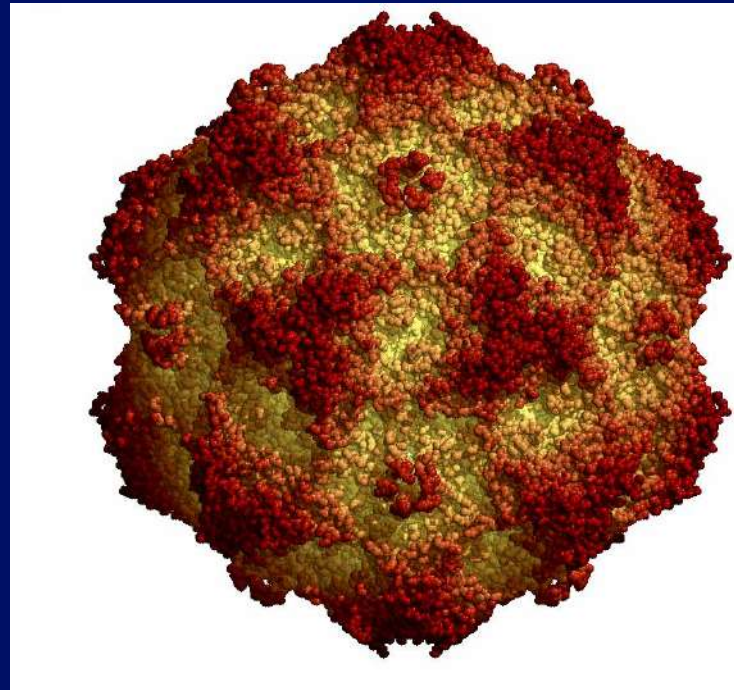




PARVOVIRIDAE



Faculty

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MORPHOLOGY OF PARVOVIRUSES

- The members of this family are small sized as the name itself means (parvo= small).
- Icosahedral symmetry (spherical).
- **Size - 20-25 nm (smallest DNA virus).**
- Non enveloped virus
- Hardy in nature & resistant to environmental stress.

Continue..

- **DNA of virus is linear**
- Size of the genome is 5.3 kb
- Two types of proteins present in virus i.e
structural proteins :VP1,VP2,VP3
nonstructural proteins:NSP1,NSP2

Out of these proteins **VP2** is most immunogenic

Physiochemical Properties

- Virus is stable at pH 3-9
- Virus is heat stable, resistant at temp of 70° C for 60 min.

Main host

Bovine, canine, porcine, feline

Division of *parvoviridae*

- *Parvoviridae* family is further divided into 2 sub family namely:
 - 1.*Parvovirinae*: infects birds & mammals.
 - 2.*Densovirinae*: infects insects only.

Continue..

Parvovirinae contains three genera:

1) Parvovirus : it includes members of which infects vertebrates & replicate autonomously.

2) Erythrovirus:

Includes human parvovirus B19 and a related virus of monkeys which also replicate autonomously.

3) Dependovirus:

includes members of which are called adeno-associated viruses because they are defective and unable to replicate except in the presence of a helper virus, usually an adenovirus.

Genus: Parvovirus

- Viral replication takes place in the nucleus so intranuclear inclusion bodies are produced in the nucleus.
- In infections of the fetus (pig or cat) or newborn (dog or cat) where there is considerable cell division in many organs, the infection may be widespread; in older animals a narrower range of tissues is affected.
- At all ages, the continuous division of cells in lymphoid tissues and the intestinal epithelium leads to **common occurrence of leukopenia and enteritis.**

Manifestations of Parvovirus Diseases in Animals

- **Feline panleukopenia virus** : Generalized disease in kittens, with panleukopenia, enteritis; cerebellar hypoplasia.
- **Canine parvovirus 2 (subtypes 2a, 2b, 2c)**: Generalized disease in puppies; enteritis, myocarditis (rarely), lymphopenia.
- **Porcine parvovirus**: Stillbirth, abortion, fetal death, mummification, infertility

Continue..

- **Mink enteritis virus:** Leukopenia, enteritis
- **Goose parvovirus:** Hepatitis, myocarditis, myositis
- **Duck parvovirus:** Hepatitis, myocarditis, myositis

CANINE PARVOVIRUS

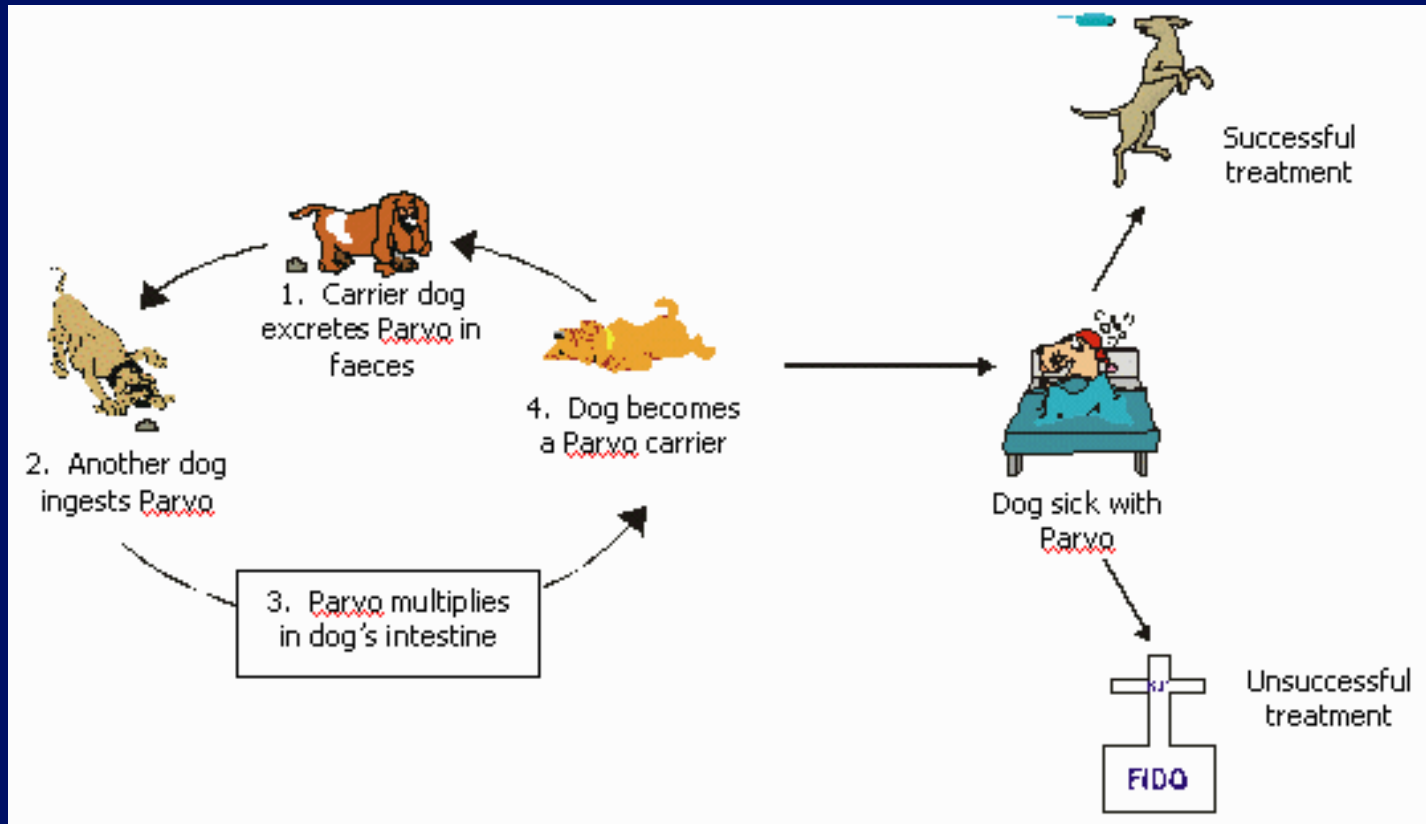
- Earlier this virus was known as canine parvo virus 1 (CPV1)/ minute virus of canines.
- Later virus structure was evolved & then it was named as canine parvo virus (CPV)2 which is further divided into CPV2a, CPV2b & CPV2c.

Epidemiology

- Canine parvovirus 1 was recognized in 1978 as a cause of hemorrhagic gastroenteritis simultaneously from USA, Australia, UK & others parts of the world
- In India virus was first reported in 1981 near Chennai.
- **Mostly affects young pups of 4-8 weeks of age.** The relative availability of mitotically active cells in specific tissues during differentiation in early life confers an age-dependent susceptibility to several parvovirus-induced diseases.

TRANSMISSION

- By direct contact
- Indirectly through excretions of the animal & the infected animal excretes the virus in high concentration in faeces



PATHOGENESIS

Virus enters through oro-feacal route



Viraemia after 2-7 days



Multiplication of virus in lymphoid tissue



Virus replicates in epithelial cells of intestinal villi



Effects osmoregulatory function of intestine

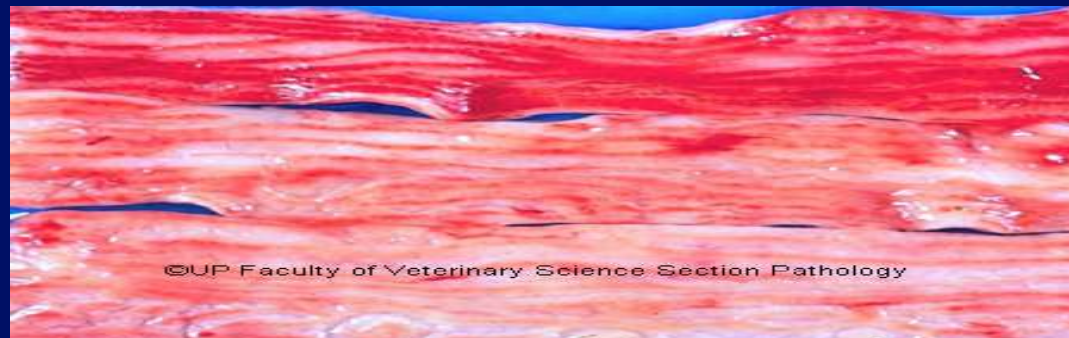


Leads to diarrhoea



Clinical symptoms

- Enteritic form: Rise in temp, Anorexia, vomition , haemorrhagic diarrhoea (due to destruction of epithelial cells of intestinal villi) Vomition & diarrhoea leads to dehydration & death.
- Myocarditic form: Affects pups of 3-8wks of age. There is cardiac arythemia, dysponea, laboured breathing leading to acute heart failure.



DIAGNOSIS

- Clinical symptoms & history of infection.
- Detection of antibody by ELISA.
- **Detection of antigen by hemagglutination, hemagglutination inhibition.**
- Detection of virus by PCR .
- Cultivation of virus in different cell lines:
 - MDCK-Maden Darby Canine Kidney cell line**
 - CRFK-Crandle Feline Kidney cell line**

PREVENTION & CONTROL

- Vaccination of pups at 6-8 weeks of age followed by booster at 11th weeks of age.
- Both inactivated and live-attenuated virus vaccines available
- Control can done be by strict hygiene, disinfection of contaminated premises & segregation of infected animals.



FELINE PANLEUKOPENIA

- Also known as **FELINE INFECTIOUS ENTERITIS** or **FELINE DISTEMPER**
- Highly contagious generalized disease of domestic and wild cats caused by FELINE PANLEUKOPENIA VIRUS. Only **one serotype** of this virus has been identified.

Host

- Domestic and wild cats, although cats of all ages are susceptible to infection
- Disease occurs predominantly in young **recently-weaned kittens**, as maternally-derived antibody levels wane.

Transmission

- Transplacental infection occurs in fully susceptible queens.
- High rates of virus excretion occur during the acute stage of the disease, mainly in **faeces** but also in **saliva, urine, vomitus and blood**.
- Faecal shedding usually continues for some weeks following clinical recovery.
- Fleas and **humans** may act as mechanical vectors. Prognosis is grave if the white blood cell count falls **below 1000 cells** per cubic millimeter of blood.

PATHOGENESIS AND PATHOLOGY

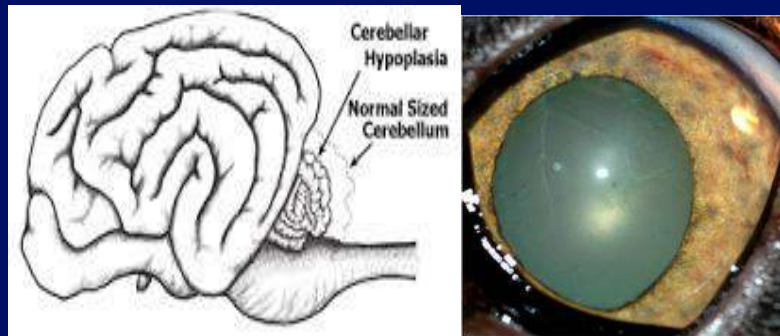
- Following ingestion or inhalation, replication occurs in the mitotically active **lymphoid tissues of the oropharynx** and associated lymph nodes.
- Viraemia develops within 24 hours, producing infection of the cells of the **intestinal crypts and the lymphopoietic cells of the bone marrow, thymus, lymph nodes and spleen.**
- Destruction of these target tissues results in panleukopenia and villous atrophy.
- The crypts of Lieberkiihn are dilated and contain necrotic epithelial cells. Intestinal villi become blunted and may fuse.
- The effects of transplacental infection range from **cerebellar hypoplasia** and **retinal dysplasia** to foetal death.

CLINICAL SIGNS

- The incubation period ranges from two to ten days but is typically **four to five days**.
- Subacute disease presents as **depression, fever and diarrhoea** lasting one to three days, followed by rapid recovery.
- The disease is most severe in young unvaccinated kittens between 6 and 24 weeks of age.
- **Vomiting**, sometimes accompanied by diarrhoea or dysentery, follows within two days and can result in severe dehydration and electrolyte imbalance.

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- Intrauterine infection of the developing foetus often occurs.
- Foetal infections early in gestation may result in resorption or abortion.
- Stillbirths, early neonatal death and teratological changes such as **cerebellar hypoplasia** and retinal dysplasia may occur in the litters of queens infected during late pregnancy.
- Kittens with cerebellar hypoplasia exhibit **cerebellar ataxia** manifested as **hypermetria**, incoordination and frequently, intention tremors.



DIAGNOSIS

- Specimens for virus isolation in **primary feline cell lines** include **oropharyngeal swabs, faeces, spleen, mesenteric lymph nodes and ileum.**
- A white cell count of less than $7 \times 10^9/L$ is often encountered in acutely affected animals. Neutropenia is more common than lymphopenia.
- **Intranuclear inclusion bodies** may be detected in crypt cells.
- Viral antigen can be detected in faeces using **ELISA** or haemagglutination employing pig or Rhesus monkey red cells.
- A rising antibody titre may be detected in serum samples by Haemagglutination- inhibition (**HAI**) or Virus neutralization (**VN**) tests.
- PCR

CONTROL

- **Inactivated vaccines** are less effective than modified live vaccines and require booster inoculations. They are safe for pregnant queens and might be considered for vaccination of Siamese and Burmese kittens.
- **Modified live vaccines** can be used to immunize kittens at 8 to 10 weeks of age, with a booster dose at 12 to 14 weeks of age. These vaccines should not be used in pregnant queens because replicating virus may cause cerebellar hypoplasia in developing fetuses.
- Premises should be thoroughly disinfected with **1% sodium hypochlorite or 2% formalin.**