

Infectious Diseases Affecting Cats

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The most important infectious diseases affecting cats are feline panleukopenia, feline viral respiratory diseases, feline infectious peritonitis, and the feline leukemia virus disease complex. Other infectious diseases affect cats, but do not occur as frequently.

Feline Panleukopenia

also is variously termed feline infectious enteritis, or cat distemper. It is caused by a parvovirus (DNA virus).

The virus infects cats of any age but is a disease principally of young cats, with worldwide distribution.

Transmission of the virus

usually is by direct contact among susceptible and infected cats. Transmission also can occur by way of contaminated food and water dishes, bedding, litter containers, and the hands and clothing of owners.

Recovered cats may shed the virus in their feces for long periods and act as carriers of the disease. The main route of infection to a susceptible cat is the ingestion of contaminated feces.

Infected cats usually will experience fever first, followed by decreased interest in eating, vomiting, and diarrhea. The diarrheal stools are large quantities of liquid feces that are dark with partially digested blood. Frank blood with a lot of mucus in the feces may be seen occasionally.

Severely affected cats will show marked dehydration and depression with their mucous membranes appearing pale.

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The virus is capable of passing the placental barrier in pregnant cats. Infection of the fetus results in abortion, stillbirth, early fetal death, or permanent structural brain damage.

Diagnosis of feline panleukopenia depends on recognition of the signs of illness and demonstration of the decrease in the white blood cell numbers.

The virus will affect production of white blood cells formed in the bone marrow and a severe decrease in circulating white blood cells will be seen. If the cat recovers, the white blood cells will quickly return to normal numbers and the diarrhea stops.

Cats that die of panleukopenia generally die of bacterial infection which has complicated the viral infection.

Immunization is the preferred method of preventing

feline panleukopenia. Both killed-virus and live-virus vaccines are available and either will induce good protective immunity in cats.

Because colostral antibody interferes with vaccination, cats should be vaccinated repeatedly. In most cases, a minimum of 2 vaccinations are required.

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Vaccinated cats can develop panleukopenia several years after receiving vaccinations as kittens if annual booster injections are not given.

Respiratory Infections

Two viruses, feline herpesvirus and feline calicivirus, have been implicated in respi-

ratory infections in cats. These viruses have been isolated with approximately equal incidence and account for the majority of feline respiratory diseases.

It has been acknowledged for many years that it is not possible to distinguish these viral diseases on grounds other than virus isolations.

Feline herpesvirus is a DNA virus and feline calicivirus is a RNA virus. Shedding of both viruses occurs in all discharges from the nose, eye, and throat, but transmission is largely by direct nose-to-nose contact or by droplets from sneezing cats.

The viruses may persist in cats for a long period after infection, hence infected cats become carriers of the viruses. Infected carriers excrete virus intermittently from the nose and throat.

Infection generally remains in the upper portion of the respiratory tract, although the viruses may cause infection of fetuses and abortion in pregnant cats.

Early in the course of the disease infected cats usually will experience depression, sneezing and coughing. Progression to serous ocular and nasal discharges with elevated body temperature is rapid. Both viruses may cause ulcers

in the mouth but corneal ulceration appears only in feline herpesvirus infections.

When the herpesvirus infection is confined to the upper respiratory tract, it generally is referred to as *feline viral rhinotracheitis*.

Pneumonia is more likely to occur with calicivirus infections.

Diagnosis of feline viral respiratory disease is made on the basis of signs of the illness, especially the pronounced sneezing and the ocular and nasal discharges. Definitive diagnosis of the viral cause of the infection depends solely on virus isolation and identification.

Immunization for both viruses produces significant protection following vaccination. Vaccines against the viruses are included in combination with the panleukopenia virus.

Two vaccinations are required for all ages. Kittens should be vaccinated at 9 weeks and 12 weeks. There should be a 3-week interval between vaccinations for adult cats. Annual revaccination is recommended.

Some vaccinated cats may sneeze, and an occasional one may have watery eyes for one to two days. Severe disease does not occur in properly immunized cats.

Infectious Peritonitis

This disease was first seen in the early 1950's in various parts of the United States and named in 1966. The disease has been reported throughout North America.

Cause of feline infectious peritonitis is a coronavirus. Coronavirus infections are relatively common in domestic cats but the majority of these infections do not produce signs of disease.

Feline infectious peritonitis affects cats of all ages, although the prevalence is highest in animals one to two years old. There appears to be no apparent breed predisposition. Initial exposure to the virus may result in mild respiratory disease as indicated by runny eyes and nose.

The majority of cats with this mild respiratory disease recover, with some of them serving as carriers of the virus. An even smaller number of cats will not recover but experience the primary disease. The viral infection spreads from an infected cat to a susceptible cat by direct contact.

Two Forms. The disease occurs in two forms. In one form the abdomen and chest accumulates fluid as part of the infection. As a result the cat experiences fever, reluct-

ance to eat, depression and weight loss.

As body cavities continue to fill with the fluid, organ systems will become compromised and cause signs of specific organ failure such as jaundice from severe liver involvement or breathing problems from fluid pressing on the lungs. Eventually the disease process becomes so extensive the cats die of organ failure.

The other form of feline infectious peritonitis is more insidious and frequently is associated with involvement of specific organs. Signs of kidney and/or liver failure, pancreatic disease, and nervous system disease may be observed in cats with severe organ impairment.

Lesions affecting the infected cat's eyes are very common and may be the first sign of a problem seen with the disease.

In both forms the disease process becomes so extensive that affected cats die of organ failure.

The mechanisms of disease with feline infectious peritonitis have been studied for many years but the explanation as to how an infected cat recovers or develops one or the other form of disease is not well understood.

The coronavirus may serve as a stimulator of the body immune system which leads to immune complexes being formed. These complexes then collect in blood vessels in the various body organs and cause severe vascular damage to occur.

Organ failures occur as a result of the complexes damaging the blood vessels and interfering with vital organ function. Also, the coronavirus has the capability of altering various parts of the immune system—causing either the fluid accumulation or forms of the disease in which specific organs are attacked.

Diagnosis of feline infectious peritonitis is made by evaluation of history and signs of disease and the results of supportive laboratory tests. Considering the grave prognosis associated with diagnosis of this disease and the lack of curative therapy, it is essential to differentiate the disease from other conditions with similar symptoms.

Laboratory tests used include analysis of chest and abdominal fluids, measurements of total serum protein, clinical chemistry profiles, and serum coronaviral antibody titer and biopsies of affected organs.

Routine immunization against feline infectious peri-

tonitis is not possible currently. Newly acquired cats can be tested for coronaviral antibodies. Tested cats that are negative for coronaviral antibodies 3 to 4 weeks apart are considered free of infection. Only those cats that test coronaviral antibody negative should be used for breeding.

Cats that test positive for coronaviral antibody should be evaluated periodically for development of disease and should not be used for breeding. Breeding these cats may result in fetal resorptions occurring at 4 to 6 weeks of gestation, birth of weak kittens, abortions at mid to late gestation, and stillbirth. Once disease is established in the cat no curative therapy is presently known.

Leukemia Virus

Feline leukemia virus disease complex is caused by infection of cats with feline leukemia virus, an RNA virus present worldwide. The overall infection rate and the proportion of cats that become infected with the virus is related to density of the cat population.

About 25 to 60 percent of free-roaming cats in urban and suburban areas ultimately are infected, but only 2 to 6 percent remain infected for life. The infection rate in

rural cat populations, and in closely confined single cat households, usually does not exceed 5 to 6 percent, with about 0.2 percent of those cats remaining infected for life.

The infection rate is most severe in multiple cat households and catteries.

The virus is excreted primarily in the infected cat's salivary secretions. The virus also is present in respiratory secretions, feces, and urine.

Leukemia virus-infected cats spread the virus through daily intimate contact of social grooming habits, licking, biting, sneezing, and by sharing litter boxes and feeding bowls.

Infection occurs primarily by ingestion of the virus. In addition the virus can be transferred in the womb of a pregnant cat and also excreted into the colostrum. Prolonged close contact among cats is necessary for the most efficient transmission of the virus.

The time period between initial exposure to the feline leukemia virus and the development of either infection or immunity is quite variable and depends on route of virus transmission, age of susceptible cat, and the amount of virus received.

Signs of feline leukemia

virus infection may not be present or may be very subtle in the infection's initial phase.

Kittens may show more disease signs in the initial phase than do older cats. Cats that are ill during this phase will show varying degrees of fever, malaise, loss of appetite, lymph node enlargement, and decrease in the number of white blood cells, red blood cells, and blood platelets.

The cat's defense mechanisms are weakened and kittens die of pneumonia, pyothorax (accumulated pus in the chest), intestinal infections or blood infections.

Cats that survive the infection's initial phase make an apparent recovery but some cats may enter into the second phase of infection in which most will die. About 95 percent of infected cats will recover during the initial phase and about 5 percent will become carriers of the virus or die in the second phase.

Related Illnesses

Feline leukemia virus-related illnesses that occur during the persistent phase of infection account for most of the deaths.

Before becoming ill these persistently infected cats can live for months to years in a totally normal state. When they relapse they are afflicted

with lymphoid and myeloid cancers, bone marrow suppression (lack of production of white blood cells, red blood cells, and blood platelets), reproductive failures in queens (abortion, fetal resorption, stillbirths, weak kittens), eye lesions, and a number of neurologic disorders.

Besides illnesses caused directly by the virus, a large number of disorders result from persistent viral infections. These conditions are caused by the lowered resistance of infected cats to other infections.

The disorders include haemobartonellosis, feline infectious peritonitis, upper respiratory infections, urinary bladder infections, slow healing abscesses, abscesses of teeth, ear infections, intestinal infections, pyothorax, fungal infections, toxoplasmosis, and severe arthritis.

Because of the wide range of disorders associated with feline leukemia virus infections, it is not surprising that about 30 percent of all severe illnesses in cats are due directly or indirectly to this virus.

Diagnosis of feline leukemia virus diseases is made by evaluation of history and signs of disease and laboratory tests.

Currently three basic lab-

oratory tests are available commercially to assist in identifying the feline leukemia virus and virus-immune status of an animal: 1) detection of viral antigens; 2) detection of virus-neutralizing antibodies; and 3) detection of membrane-associated antigen.

Most of the time a cat is tested for detection of viral antigens. A positive test indicates the cat has virus circulating in its bloodstream. It implies that a cat is shedding virus and is a potential health hazard to uninfected susceptible cats and possibly humans.

There has been some concern over the possible public health hazard to people. However, studies to date indicate that feline leukemia virus is not associated with any human illnesses or a cause of leukemia in people.

There is controversy over whether feline leukemia virus-infected cats should be treated medically or put to sleep. Owners must be aware that if they keep a feline leukemia virus-infected cat alive, it should be kept confined and isolated from susceptible cats.

Owners of healthy feline leukemia virus-infected cats ask continuously if there is anything that can be done to prevent overt disease and virus-related illnesses. There is

nothing that can be done except to limit stress, and provide a wholesome diet and plenty of love and attention.

When and if an illness occurs, it must be rapidly diagnosed and the proper treatment instituted. If a problem arises that is untreatable, the owner must ultimately decide whether to give palliative care until death or to have the animal put to sleep at some earlier point.

Vaccines to protect against feline leukemia virus infections are not available currently. A vaccine probably will be available in the very near future.

Two Other Infections

Feline enteric coronavirus is the cause of an inapparent or mild intestinal infection in kittens between 4 and 12 weeks old.

The virus is related to *feline infectious peritonitis* but not the cause of the disease. It is spread from a coronavirus-infected cat to a susceptible kitten by the ingestion of contaminated feces.

Infected kittens demonstrate signs of low-grade fever, intermittent vomiting, and soft or watery stools. Fresh blood occasionally is seen in the feces. Dehydration is seen only in the most se-

vere cases. The virus affects epithelial cells of the small intestine, causing an alteration in the feces.

There is no way presently to prevent the infection in cats.

Feline pneumonitis is caused by an infection with *Chlamydia psittaci*. Transmission of this agent is by direct contact with ocular or nasal discharges from infected cats. The infection produces mild signs of illness.

Affected cats seem to recover rapidly but may show signs of illness shortly after apparent recovery. The infection does not confer good protection against relapses or reinfections.

Runny eyes and nose are the most characteristic signs of the infection. Diagnosis of feline pneumonitis is made based on the history and signs of the illness and laboratory identification of chlamydial organisms in cells of the conjunctiva.

A vaccine is available to protect cats against the chlamydial infection. The age at which to vaccinate is not critical since there appears to be little interference by colostrum antibody. A single injection appears to afford adequate protection. Annual revaccination is recommended.

Immunization of Cats

Disease	Vaccine	Type of Vaccine	Age for Vaccination
Panleukopenia	Feline Panleukopenia	Killed virus or Modified live virus	First vaccination at 9 weeks; second vaccination at 12 weeks; revaccinate annually.
Respiratory Disease Complex	Viral rhinotracheitis	Modified live virus	Vaccination schedule is same as for panleukopenia
	Calicivirus	Modified live virus	Vaccination schedule is same as for panleukopenia
	Chlamydial pneumonitis	Live attenuated	Vaccination at 9 weeks of age; revaccinate annually
Rabies*	Rabies virus	Killed virus or Modified live virus	First vaccination at 3 months of age; revaccinate at 1 year and at least every 3 years thereafter
Feline Leukemia Disease Complex	Feline leukemia virus	None available	
Enteric Disease	Feline coronavirus	None available	
Feline Infectious Peritonitis	Feline coronavirus	None available	

*Rabies of cats is covered in the next chapter