Feline Coronavirus (FCoV) RT-PCR

Feline Coronavirus (FCoV) is a common viral infection in cats. It generally causes asymptomatic infection, but can cause mild diarrhea. As yet poorly understood changes in the virus can give rise to mutants that lead to the development of feline infectious peritonitis (FIP). Most cats infected with a FCoV eliminate virus following infection, but some cats may develop a persistent infection. These cats are generally asymptomatic, can shed large amounts of virus in feces, and serve as a continual source of infection for other cats in the environment. Continual circulation of FCoV within a cat population may increase the chance that a virulent FIP strain might emerge. While the pathogenesis of FIP is poorly understood, it is now believed that detection and removal of persistently infected and shedding cats in a multi-cat household can reduce the risk of FIP emergence within that population.

In response to the increased interest within the cat breeding and cat owning community, the Animal Health Diagnostic Center at Cornell University now offers a fecal RT-PCR test for FCoV. This test can be used to identify asymptomatic FCoV shedding cats so steps can be taken to isolate them from other cats or to prevent their introduction to a resident population. Samples required for the fecal RT-PCR screening test are 2-5 grams fresh feces. When screening an individual cat in a multi-cat household it is important to positively identify the source of the fecal sample. Mixing of fecal samples from multiple cats may result in an inaccurate result. Feces should be stored in a clean plastic bag to prevent dehydration.

In clinical FIP suspect cats, the test can also identify FCoV in ascites fluid, whole blood, plasma, serum or fresh tissues (kidney, liver, or spleen). Samples from FIP-suspects should include 1-2 ml of fluid (ascites, whole blood, serum, or plasma) or 1-2 grams of fresh tissues.

All samples should be shipped in a leak-proof container to the laboratory by overnight courier on ice packs for optimal test outcomes.

Fecal FCoV RT-PCR tests should be interpreted cautiously. Single positive or negative tests are meaningless as cats may shed intermittently or may be recently infected. To be identified as a chronic shedding carrier, a cat should be fecal virus positive on multiple tests over an 8-month period. A cat that tests negative on monthly tests over a 5-month period of time may be considered a non-shedder. (Addie D.D., Jarrett O. 2001 Use of a reverse-transcriptase polymerase chain reaction for monitoring the shedding of feline coronavirus by healthy cats. Veterinary Record. Vol 148. pp. 649-653.)

In a cat with clinical signs consistent with FIP, FCoV RT-PCR positive results on fluids or tissues may indicate active FIP. FCoV RT-PCR positive results in tissues from a clinically normal cat are only indicative of infection with FCoV.

Feline Enteric Coronavirus

By

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Feline enteric coronavirus (FECV) is an enveloped, single-stranded RNA virus that is highly prevalent in domestic cat populations worldwide. Infection is often subclinical or characterized by transient, mild GI illness in kittens. Mutation of FECV to a biotype capable of infection and replication within macrophages is responsible for development of feline infectious peritonitis (FIP), a highly fatal, multisystemic disease (see Feline Infectious Peritonitis).

Etiology and Pathophysiology:

Fecal shedding of FECV begins within 1 wk of initial infection and persists at high levels for 2–10 mo, followed by an extended period (up to 24 mo) of lower level, potentially intermittent, viral shedding. At least 13% of infected cats shed the virus indefinitely.

Cats become infected through ingestion or inhalation of virus-containing feces or through contact with contaminated fomites (eg, litter boxes, mutual grooming, housing, personnel). FECV is relatively fragile but can survive in dry environments for up to 7 wk. Close contact between cats (eg, catteries and multicat households) facilitates transmission. Vertical transmission from infected queens to kittens does occur. Kittens generally do not begin to shed virus before 9–10 wk of age, although viral shedding as early as 4 wk of age has been reported. Soon after infection, virus may replicate in oropharyngeal tissue, resulting in transient (hours to days) salivary shedding. FECV infects and replicates in mature apical epithelial cells of the intestinal villi, causing brush border shortening and destruction.

Clinical Findings:

Most FECV infections are clinically inapparent or characterized by mild, self-limiting gastroenteritis. Occasionally, vomiting and diarrhea can be acute and severe or chronic and unresponsive to treatment. Although diarrhea is the most common clinical sign of infection in kittens, upper respiratory tract signs have also been reported.

Diagnosis:

The viral DNA can be detected in feces by reverse transcriptase PCR (RT-PCR). Because chronic carriers of FECV tend to be asymptomatic, FECV can be assumed to be the cause of the diarrhea only after other causes (eg, infectious, dietary, inflammatory bowel disease, neoplasia, etc) have been excluded. The clinical utility of serologic evaluation for antibodies to FECV is questionable. Positive coronavirus antibody titers are detected in up to 40% of pet cats and in up to 90% of cats in catteries or multicat households. Positive FECV antibody titers are indicative only of exposure to the virus and are not suggestive of the etiology of the current disease, do not correlate with the risk of developing FIP, and are not diagnostic for FIP. Histologic lesions suggestive of FECV enteritis include intestinal villous fusion, atrophy, or sloughing. Because these lesions are nonspecific, definitive diagnosis requires immunohistochemical or immunofluorescent detection of viral antigen in intestinal epithelial cells.

Treatment, Control, and Prevention:

The mild, transient clinical signs are unlikely to require therapy. Treatment, if required, is symptomatic and supportive (ie, fluid therapy, oral electrolyte solutions, antiemetics). There is no specific antiviral therapy. Death due to the FECV-associated gastroenteritis is uncommon.

Control and prevention of FECV are usually a concern only in breeding catteries and rescue shelters. Ingestion of virus-contaminated fecal particles should be prevented as much as possible. Fecal contamination of the environment can be minimized with sufficient litter box numbers, daily litter box cleaning, weekly litter box disinfection, and clipping/cleaning fur from the hind end of long-haired cats. FECV

can survive indoors for up to 7 wk under dry conditions but is readily inactivated by most commercial disinfectants.

Ideally, cats should be housed in small (three or four cats), closed groups. The room, cages, bedding, and litter boxes should be disinfected between groups. Although impractical in a shelter situation, cats should be housed in groups according to their antibody (immunofluorescent antibody test seropositive or seronegative) and virus shedding (based on fecal PCR) status. Seropositive cats can be retested every 3–6 mo and moved into seronegative groups as their antibody titer decreases. In a rescue or shelter situation, cats should be housed singly. Identification of FECV carrier cats requires nine monthly, consecutive positive fecal RT-PCR tests, whereas identification of a cat that has eliminated FECV infection requires five consecutive negative fecal RT-PCR tests.

Seropositive cats should be mated only to other seropositive cats, and seronegative cats to other sero negative cats. Kittens born of seropositive matings or to a seropositive queen are protected from infection by maternally derived immunity until ~6 wk of age. Kittens weaned from seropositive queens by 6 wk of age are unlikely to acquire infection from the queen. Serologic testing of kittens should be delayed until 10–11 wk of age, by which time seroconversion is likely.

New cats should be serologically tested before introduction into a cattery or breeding program. Only seronegative and virus-free (fecal PCR) cats should be introduced into an FECV-free cattery or a cattery attempting to eliminate the virus. Seropositive cats are less likely to develop FIP than seronegative cats when introduced to an FECV-endemic environment. Vaccination with an intranasal, temperature-sensitive FECV mutant is not generally recommended but can be considered in seronegative cats >16 wk old introduced into an FECV-endemic environment. Vaccination will lead to seroconversion and does not completely protect cats previously exposed to FECV from developing FIP.

FELINE CORONAVIRUS

Etiology

Feline coronavirus is a ubiquitous enteric virus in thecat population that invades the epithelium of the villoustip, resulting in villous atrophy and mild enteritis. Amutant variant of feline coronavirus causes feline infec-tious peritonitis (see Chapter 10).Key PointFeline coronavirus is shed in the feces ofmany normal cats, and a high percentage of catsare seropositive, indicating that inapparent infec-tion is extremely prevalent.Clinical Signs•In young kittens, especially those 4 to 12 weeks of age,feline coronavirus causes an acute onset of mildenteritis with diarrhea. Feces are soft to fluid andrarely contain mucus and blood.•Diarrhea is infrequently accompanied by vomiting,low-grade fever, anorexia, and lethargy.•Clinical signs are usually mild and self-limiting within2 to 4 days. Rare fatalities have been seen in kittens.

In a small percentage of infected carrier cats, muta-tion of this coronavirus enables the virus to infectmacrophages, leading to systemic dissemination andfatal feline infectious peritonitis (see Chapter 10 for a detailed discussion of FIP).

Diagnosis Serology

can identify a convalescent rise in coronaviralantibody titer. Subclinical coronavirus infection is wide-spread in cats; thus, seropositivity does not distinguishactive and past infection. EM and PCR can be used toidentify active shedding of coronavirus in fresh feces,but sensitivity is low with both of these diagnostic techniques.TreatmentUncomplicated coronaviral enteritis is usually self-limiting. Routine supportive measures such as fluidtherapy and dietary restriction may be beneficial.PreventionThis virus appears to be practically ubiquitous andspreads very efficiently through catteries; thus, preven-tion may not be practical. An intranasal feline co-ronavirus

vaccine is available, but it does not appear tobe effective and is not recommended.

Feline coronavirus

Leah A. Cohn, Paige Langdon, in Handbook of Small Animal Practice (Fifth Edition), 2008

Definition and Cause

I. Feline coronavirus (FCoV) causes either subclinical infection or mild, transient diarrhea in exposed cats.
II. Spontaneous mutation of enteric FCoV may lead to clinical FIP, which is associated with very high morbidity and mortality.
III. FCoV is an SS-RNA virus of the family Coronaviridae.

Pathophysiology

I. FCoV is highly contagious via fecal–oral transmission, but salivary, urinary, and transplacental sources of exposure are uncommon.
II. Most infected cats shed the virus intermittently and then stop shedding, although some shed persistently.
III. FCoV that has mutated to an FIP-causing form is seldom shed in feces, so epizootics are rare.
IV. Although inactivated by most disinfectants, FCoV may persist in the environment (see Table 112-1).
V. Enteric infection results in villous atrophy and mild, self-limiting diarrhea.
VI. With FIP, a history of recent stress or illness may precede the disease.

A. Mutated FCoV invades intestinal epithelium and enters macrophages, resulting in disseminated spread of mutated viral particles.
B. Immunological response is ineffective and pathologic changes occur.
C. Two forms of FIP are recognized.

1. Effusive (wet) form
   a. Immune complexes circulate and are deposited in endothelia.
   b. A vasculitis ensues with exudation of protein-rich fluid into body cavities.

c. The wet form is usually more rapidly progressive than the dry form.

2. Noneffusive (dry) form

a. An ineffective cell-mediated immune response is mounted against the virus.

b.Pyogranulomatous inflammation in a variety of tissues results in disease.

c.The dry form may become effusive in its terminal stages.

Clinical Signs

I. Enteric FCoV: often subclinical or mild diarrhea

II. FIP

A. Young (<2 years) and elderly cats more commonly affected

B. Sexually intact and purebred cats more commonly affected

C. Effusive FIP

1. Common: fever, pale mucous membranes, dyspnea, abdominal distention

2. Variable: abdominal masses, abdominal organomegaly, icterus

D. Noneffusive FIP

1. Development of clinical signs is often insidious.

2. Signs reflect the body system affected.

a. Hepatomegaly, icterus, abdominal masses, renomegaly

b. Pathologic ocular findings: uveitis, chorioretinitis

c. CNS signs, dyspnea

d. Fever and weight loss common

Diagnosis

I. Enteric FCoV infection

A. Definitive diagnosis is seldom necessary.

B. Antibody titers suggest prior exposure, but do not reflect fecal shedding or active infection.

C. Viral particles identified in fecal specimens by PCR or EM have few, if any, implications for the health of an individual cat.

II. FIP infection

A. General diagnostics tests

1. Hematological findings: nonregenerative anemia, neutrophilia ± left shift

2. Supportive biochemical findings

a. Hyperglobulinemia with a low albumin:globulin ratio

b. Other potential findings: icterus, elevated liver enzymes, azotemia

3. Serum electrophoresis: polyclonal gammopathy

4. Fluid analysis

a. Clear to straw-colored, viscous effusion with low to moderate cellularity, and high protein content

b. Contains lymphocytes, macrophages, and nondegenerate neutrophils

5.Radiography: body cavity effusions ± organo-megaly, pulmonary infiltrates

6. Ultrasonography: nodular lesions within organs, organomegaly, effusions (pleural, peritoneal, pericardial, retroperitoneal)

B. Coronavirus-specific serological tests

1.Detection of serum Ab identifies exposure to FCoV, but is not diagnostic of FIP.

2. Titers cannot distinguish exposure to enteric FCoV from exposure to the mutated virus causing FIP.

3. Titers cannot distinguish exposure to corona viruses of other species from exposure to FCoV.

4. Most healthy cats with Abs to FCoV never develop FIP.

5. Positive FCoV Ab titers do not suggest that the cat is shedding virus.

6. Cats with FIP occasionally have negative titers, especially during terminal stages of disease.

7. In cats with signs suggestive of FIP, high Ab titers support a diagnosis of FIP.

C. PCR tests for coronavirus

1. PCR may identify FCoV in cats with either FIP or enteric FCoV.

2. It cannot distinguish between enteric FCoV and the FIP-causing mutated forms.

3. The test result may be negative in a significant number of cats with confirmed FIP.

4. Positive PCR results from body effusions support a diagnosis of FIP.

5. A fecal PCR test identifies viral shedding; although persistent viral shedding does not increase the risk for development of FIP, it can be a source of exposure for other cats.

D. Histopathologic findings

1. Histopathologic evaluation remains the best method to diagnose FIP.

2. Affected tissues exhibit pyogranulomatous inflammation with vasculitis and perivascular cuffing with mononuclear cells, macrophages, lymphocytes, and neutrophils.

3. FA and immunohistochemical testing of tissue specimens from biopsy (ultrasound-guidance or surgically obtained hepatic or renal tissue) or necropsy may confirm FIP.

Differential Diagnosis

I. Enteric FCoV infection with diarrhea: feline panleukopenia, parasites, dietary indiscretion, protozoal infections, bacterial infections, foreign body, and inflammatory bowel disease

II. Effusive FIP: peritonitis, pyothorax, chylothorax, neo-plasia, heart failure, cholangiohepatitis, and disseminated fungal or bacterial infections

III. Noneffusive FIP: toxoplasmosis, fungal infection, neo-plasia, and cholangiohepatitis

Treatment

I. Enteric FCoV with diarrhea

A. Because the disease is usually subclinical or self-limiting, specific therapy is not often necessary.

B. No known therapy reduces the small chance that FCoV-infected cats will develop FIP.

II. Feline infectious peritonitis

A. Treatment is unsuccessful because the disease is usually fatal.

B. Spontaneous remissions occur rarely.

C. Supportive care with nutritional supplementation, relief of effusions that impair respiration, blood transfusions, parenteral fluid therapy, and antibiotic therapy for secondary infections may help prolong life.

D. Immunosuppressive or immunomodulatory therapy may benefit a small number of cats.

1. Prednisone 2 to 4 mg/kg PO BID
2. Cyclophosphamide 2.2 mg/kg PO 4 days/week or chlorambucil 20 mg/m^2 PO every 2 to 3 weeks
3. Human-recombinant interferon-α 30 U PO SID on alternating weeks
4. Pentoxifylline: suggested therapy but data insufficient

E. Clinical studies of other proposed treatments (e.g., vitamins E, A, C) are not availble.

Monitoring and Prevention

I. Catteries and multicat households

A. Control exposure to feces and disinfect fomites.

B. Ab tests identify exposed cats but do not predict fecal shedding or propensity to develop FIP, so do not euthanize healthy cats based on positive Ab test results.

C. Fecal PCR identifies chronic shedders; segregation may reduce exposures.

D. Strategy to eradicate FCoV is as follows:

1. Obtain negative (zero) titers on new cats.
2. Segregate positive cats in the facility from negative cats.
3. Keep all cats indoors.
4. Remove kittens from seropositive queens at 5 to 6 weeks of age.

II. Vaccination

A. The available intranasal vaccine appears safe when used as directed.

1. Temperature-sensitive vaccine virus replicates only in respiratory epithelium, inducing mucosal immunity.
2. Vaccine efficacy is 50% to 75% for previously unexposed cats (Pederson, 1995).
3. It is not indicated in low-risk cats, such as adults or cats in single-cat households.

4. At-risk kittens possibly benefit from vaccination, with two doses given 3 to 4 weeks apart and followed by yearly booster vaccinations.

5. Currently, the vaccine is not recommended for routine use.

Feline Leukemia Virus (FeLV)

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Feline leukemia virus (FeLV) is one of the most important infectious diseases of cats worldwide. Affected cats can develop anemia (a low red blood cell level), cancers, and/or suppression of the immune system. The disease worsens over time and is usually fatal. The virus can infect domestic and wild cats (such as lions). Widespread testing and vaccination efforts have helped to reduce the prevalence of the disease over the past 30 years, and in 2010 approximately 3% of the cats in the United States were infected. There is increased risk for the disease among outdoor cats, unneutered males, and cats with other diseases (especially respiratory disease, mouth diseases, and abscesses).

Feline leukemia virus is transmitted between cats via infected saliva and urine. Direct contact with these body fluids, mutual grooming, shared litter boxes and food dishes, and fighting (bite wounds) all expose uninfected cats to the virus. To become infected, cats typically require prolonged, repeated exposure to the virus. Mother cats can also transmit the virus to their kittens while they are in the womb and through breast milk. It is likely that the transmission from a mother to her kittens is the greatest source of infection. Young kittens have the highest risk for catching the virus, whereas adults may have some inherent protection. However, cats of all ages can catch the virus and develop the disease.

Cats infected by feline leukemia virus **can develop a number of different disorders**, including:

- anemia
- cancer (especially lymphoma and leukemia)
- suppression of the immune system (increasing the risk of other infections)
- immune-mediated disease (in which the cat's immune system causes damage to its own cells)
- reproductive problems (loss of pregnancy and "fading kitten" syndrome)
- intestinal inflammation, neurologic disorders (including nerve dysfunction and blindness)
- stomatitis (severe inflammation in the mouth)

These disorders can be worsened by the presence of other infectious diseases, such as feline panleukopenia or calicivirus.

Feline leukemia virus is diagnosed with a quick blood test. Your veterinarian may recommend the test when you first adopt your cat, before vaccinating against the disease, after exposure to the virus (for example, after a cat bite wound), or if your cat is ill. The test may need to be repeated in 30 days if the risk of infection is high. If your cat goes outside or lives with another cat that has the virus, your veterinarian may recommend that the test be repeated every year. Additional laboratory tests may be necessary if your cat tests positive for the virus.

Unfortunately, there is no cure for feline leukemia virus. Some positive cats can live without major complications for years with routine veterinary care, proper feeding and care, minimal stress, and avoidance of secondary infections. Infected cats should be kept strictly indoors to reduce the risk of other infections and to prevent spreading the virus to other cats. Your cat should visit the veterinarian at least every 6 months to monitor for disease-related disorders and secondary infections. Your veterinarian will make a recommendation for appropriate vaccinations against other feline viruses (vaccination for FeLV will not help once a cat is infected with the virus). All infected cats should be neutered. See your veterinarian immediately if you notice any sign of infection or illness, because treatments should be started as soon as possible.

Prevention and Control of Feline Leukemia Virus

sting should be done in the following situations:

kittens at their first veterinary visit
cats prior to entering a household with existing uninfected cats
cats in an existing household prior to admission of a new, uninfe

cats prior to their first feline leukemia virus vaccination

ccines are recommended only for uninfected cats at risk.

Feline leukemia virus is usually ultimately fatal. but infected cats may still have a good quality of life. The average survival time after diagnosis is 2.4 years, but some cats will appear "healthy" for multiple years. The disease typically develops faster in kittens than in adults, and some adults ultimately succumb to unrelated conditions.

A vaccine is available to prevent feline leukemia virus infection. Your veterinarian will tell you whether it is appropriate for your cat. The virus does not spread to people.

Feline Leukemia Virus Infection (FeLV) in Cats

Feline leukemia virus (FeLV) is a disease that impairs the cat's immune system and can cause cancer. This viral infection is responsible for too many deaths in household cats, affecting all breeds. The good news is that it is completely preventable. The bad news is that most cats with FeLV live only a few years after their diagnosis.

Symptoms and Types

Cats with FeLV may not show any signs, even for years. Some of the more common symptoms of feline leukemia include:

- Anemia
- Lethargy
- Progressive weight loss
- Susceptibility to infection
- Persistent diarrhea
- Infections of the external ear and skin and poor coat condition
- Fever (seen in about 50 percent of cases)
- Wobbly, uncoordinated or drunken-appearing gait or movement
- Generalized weakness
- Inflammation of the nose, the cornea, or the moist tissues of the eye
- Inflammation of the gums and/or mouth tissues (gingivitis/stomatitis)
- Lymphoma (the most common FeLV-associated cancer)
- Fibrosarcomas (cancer that develops from fibrous tissue)

Causes

Cat leukemia is usually contracted from cat-to-cat transmission (e.g., bites, close contact, grooming and sharing dishes or litter pans). It can also be transmitted to a kitten at birth or through the mother's milk. Kittens are much more susceptible to the virus, as are males and cats that have outdoor access.

Diagnosis

If your cat is ill, your veterinarian will first rule out other infections such as bacterial, parasitic, viral or fungal. In addition, nonviral cancers need to be ruled out.

A simple blood test is available to determine whether your cat has FeLV.

Treatment

Unfortunately, 85% of cats with FeLV die within three years of diagnosis.

There is no treatment or cure for feline leukemia. Treatment is directed at symptoms and often includes steroids, blood transfusion and supportive care when necessary. Some medications have shown promise in treating feline leukemia, including antivirals used in human AIDS treatment.

If your cat has no symptoms when she is diagnosed with FeLV, there is no treatment necessary apart from good at-home care.

If your cat is ill, feline leukemia makes it difficult for the cat's body to respond to treatment. Your veterinarian will prescribe medication to treat the symptoms. Your cat may be hospitalized for severe secondary infections, low red-blood cell count, weight loss with muscle loss, or other symptoms as your veterinarian sees fit. In these cases, he will be kept under hospital care until his condition stabilizes. Emergency treatment, such as blood transfusions, is sometimes required.

Living and Management

You will need to monitor your cat for symptoms of infection and keep in touch with the veterinarian regarding follow-up treatment and testing. Treating minor signs of illness is especially important in a cat with known feline leukemia virus. Due to the virus, her body may be unable to appropriately respond to minor infections and other illnesses.

Cats with feline leukemia virus may have a normal lifespan if other illnesses can be prevented.

Keep FeLV-infected cats indoors and separated from healthy cats to prevent virus exposure and FeLV transmission. Good nutrition is important, as is controlling any secondary bacterial, viral or parasitic infections.

Prevention

Keeping infected cats separated (and quarantining them) is the only way to 100 percent prevent cat leukemia in healthy cats. There is a vaccine against FeLV; however, it is important to test your cat before initial vaccination, as he may already be infected. Even if you intend for your new kitten to be strictly indoors, most veterinarians will recommend including the FeLV vaccine in his kitten booster series. Cats can escape from the house and lifestyles change. It is important for your cat's health that he be protected, and the vaccine poses very minimal risk.

A cat with feline leukemia should be kept strictly indoors and away from uninfected cats.

FeLV (Feline Leukemia Virus)

Feline Leukemia Virus (FeLV) is one of the more common infectious diseases diagnosed in cats. Most people associate the word leukemia with cancer, because in humans it refers to a cancer of the blood and bone marrow. In felines, however, leukemia is a virus that can cause cancer. Since its discovery over 50 years ago, widespread testing and vaccination efforts have helped reduce its frequency.

In This Article

Repeated studies have shown that the prevalence of FeLV infection in the general cat population is about 2–3%. Young kittens are at the highest risk for contracting the virus; however, cats can become

infected at any age. Outdoor cats, unneutered males, and those with other diseases also have a higher risk of infection.

FeLV is the second leading cause of death of cats in the United States; 85% of persistently infected cats (i.e., cats that are unable to eliminate the infection) die within 3 to 5 years of diagnosis. In kittens, the prognosis is even worse, with the infection almost always proving fatal before the kitten's first birthday.

On a more hopeful note, a feline leukemia diagnosis does not always indicate an automatic death sentence: 70% of cats seem capable of resisting or eliminating the virus on their own. In these cases, the cat can go on to live a normal life. Otherwise healthy cats who become infected with FeLV and remain positive can still live several years longer, assuming there are no additional complications or secondary infections. (For these cats especially, proper veterinary care is vital.)

Signs and Symptoms of Feline Leukemia Virus

Feline leukemia can affect any organ in the body, so the symptoms can vary. Because additional conditions can develop as a result, signs may also be indicative of concurrent diseases or secondary infections.

If infected with FeLV, your cat will most likely display one or more of the following:

- Weight loss / loss of appetite
- Lethargy
- Fever
- Diarrhea
- Difficulty breathing
- Anemia
- Enlarged lymph nodes
- Recurring or chronic illness
- Seizures, behavior changes, and other neurological disorders
- Bladder, skin, and other respiratory infections
- Kidney disease
- Changes in eye color or appearance

- Severe dental or periodontal disease, especially at a young age

Feline leukemia attacks the immune system, which in turn weakens the cat's ability to fight off other infections and illnesses. Often, the secondary infections are what become harmful to the cat. In the early stages of infection, signs of the disease are often invisible. Health deteriorates over time, taking weeks, months, or even years. The progression can be quick and consistent, or manifest in repeating cycles of illness followed by relative health.

How Did My Cat Get FeLV?

FeLV is a virus that affects the blood and suppresses a cat's immune system; it can cause various other blood diseases as well. FeLV makes it difficult for the body to protect itself against infection from bacteria and other viruses.

Feline leukemia is transmitted between cats through close contact; it is often referred to as "the social cat's disease." The primary mode of transmission is through saliva, although the virus can also be shed through an infected cat's urine, nasal secretions, feces, and milk.

Possible methods of transmission include the following:

- Sharing food
- Sharing water bowls
- Using the same litter box
- Mutual grooming
- Nursing
- Bite wounds

Infected female cats can also pass the virus along to a fetus during pregnancy, and to nursing kittens through milk. This type of "vertical" transmission (from mother cat to kitten) is a very common cause of FeLV infection.

Currently, researchers believe there are four different classes of FeLV infection:

1. **Abortive infections:** The exposed cat produces an effective and early immune response. This prevents viral replication and eliminates virus-infected cells. During the abortive stage, the cat seems to clear the infection and is likely no longer contagious. Approximately 70% of all cats infected as adults may fall into this category.
2. **Regressive infections:** Viral replication is limited, but a small population of infected cells remain. These cats are antigen-negative, but the virus can be detected in a small percentage of blood tests through a specific type of DNA blood test (polymerase chain reaction, or PCR). It is unclear, however, whether these cats truly eliminate all of the virus from their system, and they may or may not remain contagious.
3. **Latent infections:** A moderate amount of infected cells remain. These cats are antigen-negative but PCR-positive. As long as the infection remains latent, the cats are not contagious. However, the virus may become reactivated at any time, resulting in the typical clinical signs of FeLV infection.
4. **Progressive infections:** Virus replication is not eliminated; both viral antigens and genetic material can be detected in the blood. The cat is actively shedding the virus and is likely to become ill with FeLV-related diseases.

It's important to note here that our understanding of FeLV is changing all the time. For example, some scientists doubt whether FeLV can ever truly be "aborted" or eliminated. Conversely, as cats receive increasingly improved medical care and better home care by their owners, some FeLV-positive cats are apparently living longer and healthier lives than would have been previously expected.

Diagnosing FeLV in Cats

In the vast majority of cases, a blood test will detect the virus. Occasionally, however, bone marrow is examined to confirm infection.

Diagnostic testing may include:

- Blood chemistry test
- Hematology
- Radiography

- Bone marrow aspiration
- Ophthalmoscopy
- Specialized antibody tests

The ELISA (enzyme linked immunosorbent assay) is the most commonly used test to detect FeLV infection. A blood sample is required in order to detect the presence of leukemia viral antigen (proteins or cell markers unique to the leukemia virus).

Testing is recommended when cats are first acquired, before vaccinating, if there has been potential exposure, or if they have been bitten by another cat. Annual testing should be done on cats that live in a household with other FeLV-positive cats or if they have outdoor access. For cats going into a new home or known to be at high risk of exposure, testing should be repeated 60 days after the first test, in case a recent infection has not yet presented itself.

Treating Your Cat for FeLV

There is no medication that can wipe out FeLV, but supportive treatment is available to help with symptoms. Steroids, antiviral drugs, chemotherapy, and blood transfusions may be utilized to manage feline leukemia.

Steroids are used to treat cancerous lymphocytes in the blood, but they can also leave a cat open to developing other diseases, because steroids further weaken the immune system. An antiviral can reduce the amount of virus present in the blood and is easier on the body than chemotherapy. However, antivirals are very expensive, and it is currently unclear how helpful they may be. Antibiotics are given when any bacterial infections arise. Blood transfusions may also be necessary in the case of severe anemia.

Is There a Cure for FeLV?

There is no cure for the virus, and persistent infection is almost always fatal. However, barring any major disease complications and secondary infections, cats infected with FeLV as adults can still have a reasonable quality of life with routine veterinary care, proper feeding,

and good at-home care. Average survival time after diagnosis is around 2.4 years, but some cats will appear "healthy" for many years. Sadly, the disease progresses faster in kittens, with fewer than 5-10% of infected kittens surviving to one year of age.

Is FeLV Contagious for Humans and Other Pets?

FeLV is contagious between cats. But at this time, it cannot be transmitted to humans or other animals.

What Is the Cost for Treating FeLV?

First, there is the cost of the diagnostic exam, which will vary by vet. (As always, the cost for medical care is generally higher in larger cities.) The cost of the FeLV ELISA blood test can run between $50–$75, but may be more depending on where you live; additional testing will add to the bill, as will additional vet visits, supportive care, and medications.

Recovery and Management of FeLV

Cats diagnosed with FeLV as adults can live relatively normal lives for some time with proper management and care. Keep an eye out for things such as:

- Weight
- Appetite
- Activity level
- Litter box habits
- Appearance of the eyes and mouth

Regular vet visits at least every 6 months are important for monitoring the disease and looking out for any secondary infections. Your vet will also make recommendations for appropriate vaccinations to protect against additional feline viruses. The FeLV vaccine does not offer protection once a cat is infected with the virus.

Preventing FeLV

As an owner, there are a number of preventive measures you can take to decrease your cat's risk of contracting or spreading FeLV:

- Adult cats can be tested, then vaccinated if they are negative. If there is a continuing risk of exposure to the virus, booster vaccinations are generally given to adult cats.
- Kittens are the most vulnerable to FeLV and should be vaccinated with a recombinant vaccine. Leukemia is almost completely preventable with just two kitten vaccines and a booster a year later.
- All cats that test negative by the first ELISA blood screening test but are surrounded by possible exposure should be retested in 60 days. All newly adopted kittens should be tested twice: once right after adoption (unless already tested by the shelter or rescue group), and then again in 60 days.
- All infected cats should be neutered after receiving a positive diagnosis to prevent the possibility of passing the virus on to offspring.
- Infected cats should be housed indoors and kept away from other cats, both to limit the risk of infecting other cats as well as to avoid contracting other infections.

Is There a Vaccine for FeLV?

There is a vaccine for FeLV. Kittens are usually vaccinated at around 8–12 weeks of age, then given booster vaccinations three or four weeks later. Yearly boosters are given as long as cats are at risk for exposure. These include cats that live with other cats or are allowed to go outdoors. If a cat is considered to be at low risk for FeLV, your vet may recommend not vaccinating. It's best to talk with your doctor and weigh the options.

Summary

Vaccinations and limiting exposure are the best ways to prevent your cat from contracting FeLV. Once infected, cats cannot be cured of FeLV, but with proper management and care they can enjoy a normal life for a few years after the initial diagnosis.