

Feline Leukemia Virus (FeLV)

Veterinarian-developed and -monitored.

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Overview, Risk Factors, Transmission

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Overview

Feline leukemia virus (FeLV) infection is **responsible for more deaths among cats** than any other infectious disease. The virus affects domestic cats and occurs in some wild felines as well.

Types of FeLV

There are three main types of feline leukemia virus: FeLV-A, FeLV-B, and FeLV-C. FeLV-positive cats can be infected with one, two, or all three types:

- FeLV-A occurs in all FeLV-infected cats and causes severe **immunosuppression** (weakened immune system).
- FeLV-B occurs in about 50% of all FeLV-infected cats and causes more **neoplastic disease** (i.e., tumors and other abnormal tissue growths) than cats infected only with FeLV-A.
- FeLV-C occurs in about 1% of FeLV-infected cats and causes **severe anemia**.

After the initial infection, the virus replicates in the tonsils and pharyngeal lymph nodes (the pharynx is the muscular tube in the neck). Then it spreads via the bloodstream to other parts of the body, especially the **lymph nodes, bone marrow, and intestinal tissue**, where it continues to replicate. **Viremia**, the presence of virus in the blood, usually shows up 2 to 4 weeks after the initial infection.

Incidence

FeLV is one of the most **devastating feline diseases worldwide**. In the United States, FeLV infects about 2% to 3% of all cats.

Risk Factors

Sick cats are four times more likely than healthy cats to be infected with FeLV. Researchers estimate that about 50% of cats with severe bacterial infections, and 75% of cats with toxoplasmosis, a protozoan disease, also have FeLV infections.

Males are 1.7 times more likely to be infected than females, and **younger cats** are more susceptible to infection than older cats. FeLV is found mostly in cats from 1 to 6 years old; the average age is 3 years.

Outdoor cats are more likely to be infected with FeLV. Less than 1% of healthy indoor cats in the United States are infected with FeLV, compared to 1% to 2% of healthy outdoor cats, and more than 13% of sick stray cats. FeLV is more common in **multicat households** than in single-cat households, especially when cats go outdoors.

Transmission

FeLV usually spreads through **infected saliva**. It can also spread through infected urine, tears, and feces, and through an infected mother to her kittens during gestation and nursing. Twenty percent of FeLV-positive mothers pass the virus to their kittens. Methods of transmission include the following:

- **Bite wounds** from infected cats (more common among outdoor and indoor-outdoor cats)

- **Blood transfusions**
- **Mouth and nose contact** with infected saliva or urine
- **Mutual grooming**
- **Nose-to-nose contact**
- **Shared food dishes and water bowls**
- **Shared litter trays**
- **Sneezing**

Immune cats that are temporarily viremic may or may not shed the virus (i.e., spread it through their saliva, tears, urine, feces) during the few weeks that it's in their blood. All persistently viremic cats spread the virus through their saliva, tears, urine, and feces for the rest of their lives. In normal conditions, FeLV survives less than a few hours outside of a cat's body.

Veterinarian researchers generally agree that **FeLV cannot be transmitted to humans**. Some studies have shown a correlation between certain human leukemia and exposure to FeLV-infected cats, but this has not been proven.

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Symptoms

During the first few weeks after the initial infection, cats may have the following symptoms:

- **Blood cytopenias** (deficiency of any of the various cellular elements normally present in the blood)
- General **malaise**
- **Lymphadenopathy** (swollen lymph nodes)
- Mild **fever**

Symptoms depend on the type of virus and the stage of disease. Common general symptoms include:

- **Anemia**
- **Blood in the stool**
- Chronic, recurring **infections** (FeLV-infected cats are susceptible to bacterial, fungal, protozoan, and other viral infections.)
- **Decreased appetite**
- **Decreased stamina**
- **Depression**
- **Diarrhea or constipation**
- **Excessive drinking and urination**
- **Infertility**
- **Jaundice** (a yellowing of the skin, whites of the eyes, mucous membranes, and body fluids)
- Low-grade **fever**
- **Lymphadenopathy** (swollen lymph nodes)
- **Neuropathies**, which can cause anisocoria and hind limb paralysis

- **Weight loss**

Symptoms in FeLV-infected **pregnant** cats include:

- **Fading kittens** that often develop symptoms that can lead to death within the first few weeks of life:
 - o Increased susceptibility to secondary bacterial and viral **infections**
 - o **Lack of appetite**
 - o **Lethargy**
 - o **Stunted growth**
 - o **Thymic atrophy** (wasting of the thymus gland)
 - o **Wasting** (loss of body mass)
- **Fetal resorption** (biochemical disintegration of fetuses)
- **Spontaneous abortion**

About 30% of FeLV-infected cats develop **lymphoid or myeloid tumors** (e.g., lymphoma, lymphoid leukemia, erythremic myelosis); lymphoma is the most common. Symptoms of FeLV-infected cats that have **cancer** include the following:

- **Constipation**
- **Cloudy eyes**
- **Intestinal inflammation and diarrhea**
- **Liver or kidney disease**
- **Neurological abnormalities**
- **Respiratory distress**
- **Vomiting**

Diagnosis

Diagnostic tests can detect all three types of feline leukemia virus but can't distinguish between them. There are two FeLV blood tests that detect antigens to FeLV including:

- **enzyme-linked immunosorbent assay** (ELISA)
- **immunofluorescence assay** (IFA) also called the Hardy, or slide test

The main difference between these tests is that ELISA detects antigens in the blood serum, and IFA detects them in the white blood cells. ELISA can detect FeLV antigens early in the course of the infection, while the virus is in the blood and before it invades the bone marrow and white blood cells. Once FeLV reaches the bone marrow, both ELISA and IFA can detect it.

ELISA results in more **false positive** results. ELISA can also be used to test for antigens in a cat's saliva and tears, but the results are not reliable. Saliva and tear tests are used to screen a large number of cats, and to test cats from whom it is difficult to obtain sufficient blood samples.

Kittens that test positive by ELISA should be retested when they're older than 16 weeks. Uninfected kittens can test positive, if they are carrying their mother's antigens to FeLV. By 16 weeks of age, the mother's antigens should be out of a kitten's system.

A cat may test positive by ELISA, but several weeks later, test negative. This means that the cat has developed immunity, and will likely never show any sign of infection.

Cats that test positive by IFA are generally positive for life. Negative results do not necessarily mean that the cat is uninfected. Negative test results can occur in infected cats that have been exposed only recently to the virus and aren't producing antibodies yet.

The cat's blood may reveal certain abnormalities indicative of FeLV infection, including:

- anemia (abnormally low level of circulating red blood cells),
- lymphopenia (abnormally low level of lymphocytes in the blood), and
- neutropenia (abnormal decrease in the number of circulating neutrophils, a type of white blood cell).

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Treatment

There is **no cure** for FeLV. All treatments, including the following, are aimed at relieving pain and discomfort:

- **Antibiotics** to treat secondary bacterial infections
- **Blood transfusions**
- **Chemotherapy** to treat tumors
- Dietary **supplements**
- **Immunomodulatory drugs** (e.g., drugs that target the immune system), such as interferon, immunoregulin, and acemannan

The United States Department of Agriculture (U.S.D.A.) has granted a conditional product license for lymphocyte T-cell immune modulator (LTCI) to treat associated symptoms in cats with feline leukemia virus and/or feline immunodeficiency virus (FIV).

This drug is administered as an injection in three initial doses. The second dose usually is given 7 days after the first dose, and the third dose is given 14 days after the first dose. Monthly injections may be administered as needed. During treatment, blood tests are performed regularly to monitor lymphocyte and red blood cell levels. Long-term effects of this treatment have not yet been determined.

Prognosis

The prognosis **varies considerably**. About 70% of cats that are infected with FeLV develop immunity and are able to fight the virus before developing symptoms. These cats usually live a normal life.

Some cats that develop initial immunity suffer a viremic breakout months or years later, usually after being stressed or medicated with drugs that suppress the immune system.

Thirty percent of FeLV-infected cats that don't develop immunity to the virus are **persistently viremic**. These cats may live months or years, depending on how far the disease has progressed when the cat is diagnosed. More than 50% of these cats die within a couple of years.

Prevention

Several vaccines can protect cats from contracting FeLV. The **vaccines** are generally safe, although the cat may appear sick or sluggish for a few hours, to a couple of days afterward. Some cats may have an allergic reaction (e.g., fever, diarrhea, malaise).

FeLV vaccines are not 100% effective. Vaccinated cats may develop a short-lived infection after exposure to FeLV, but rarely do they develop clinical disease.

Kittens should be vaccinated at 9 to 10 weeks of age, again 3 to 4 weeks later, and then annually.

Keep a FeLV-infected cat indoors and away from other cats. If the cat dies from FeLV, the Cornell Feline Health Center recommends **a waiting period of at least 30 days** before getting another cat. The house and cat supplies should be **thoroughly cleaned and disinfected** before bringing a new cat home.

An FeLV-positive cat that is not sick is probably still shedding the virus. FeLV-positive cats should not be housed with other cats. Deciding what to do with an FeLV-positive cat in a multicat household can be very difficult. There are several options, including:

- **Euthanasia**
- Finding a home for the FeLV-positive cat where it will be the **sole cat**
- **Isolating** the FeLV-positive cat within the home, by keeping it in a separate room and providing a separate litter tray and feeding bowl

Because FeLV can be spread through litter trays, water and food bowls, and bedding, these should be disinfected with a solution containing 4 ounces of household bleach per 1 gallon of water, or they should be replaced after isolating the FeLV-positive cat. Floors should be cleaned and disinfected with a bleach solution, and rugs should be thoroughly vacuumed.