

Feline Leukemia Virus (FeLV)

**What is feline leukemia virus (FeLV)?**

Feline leukemia virus infection was, until recently, the most common fatal disease of cats. Because we can now vaccinate against this disease, we are seeing far fewer cases, though it still remains a major cause of death.

"Leukemia" means cancer of the white blood cells. We often use the term "leukemia" to include all the diseases associated with FeLV, even though most are not cancers of the blood. This virus can cause many other fatal diseases in addition to leukemia.

**Which diseases are caused by FeLV?**

There are three major disease categories associated with FeLV:

* Leukemias are cancers of the white blood cells.
* Lymphosarcoma is a cancer that begins in lymphoid tissue, such as a lymph node. Almost any tissue may be affected, but organs commonly involved include the lymph nodes, intestinal tract, kidneys, liver, spinal cord, brain, bone marrow and blood.
* Non-cancerous diseases include a variety of somewhat unrelated diseases, such as anemia, abortion, arthritis and immune suppression. When the immune system is suppressed, the cat becomes susceptible to many diseases he/she would ordinarily resist. In this case, even mild diseases may become fatal.

**How is the virus transmitted?**

The virus is mainly transmitted via cat fights. Because large quantities of FeLV are shed in cat saliva, puncture wounds associated with fighting result in injection of the virus into other cats. Other less frequent routes of viral spread include sharing food and water bowls, cats grooming each other and transmission from a mother to her kittens before birth.

**What is a leukemia test?**

A leukemia test is used to determine if a cat harbors FeLV. Any of three different tests may be used to detect one particular virus protein in the cat. Some tests detect the early stages of infection, whereas others are used to identify irreversible stages of infection.

* There are two types of ELISA tests. The first is performed on a blood sample and detects FeLV at any stage of infection. This test turns positive within a few days of infection and, in some cases, may later turn negative if the cat’s immune system eliminates the infection.
* The second ELISA test is performed on a sample of tears or saliva. The test turns positive only in a late stage of infection, meaning it may yield a false negative result in cats who are in the early stage of FeLV infection. It also has been associated with some false positive results due to inherent errors in the way the test is performed. Because of these problems, the tears and saliva tests are not routinely performed.
* The IFA test is performed on a blood smear and turns positive only after the FeLV infection has progressed to a late stage. Once positive, the IFA test usually means that the cat has a permanent infection. A cat that tests IFA positive is only rarely able to successfully eliminate the virus.

**What can happen if a cat is infected with FeLV?**

When humans are exposed to a virus, like the flu, there are two possible outcomes. Either our immune system responds to the challenge and protects us or it is unable to respond successfully and we develop the virus.

A number of factors determine which outcome occurs:

* The amount of the virus we were exposed to
* The strain of the virus (some are more potent than others)
* The status of our immune system
* Age (the very young and very old are more likely to become infected)
* The presence of other infections that may cause debilitation

The behavior of feline leukemia virus in the cat’s body is not so black or white. Instead of two possible outcomes, there are four possible outcomes for cats with FeLV.

Understanding these outcomes will allow you to more fully comprehend some of the unusual situations that may arise in cats.

* **Immunity**: In this case, the cat mounts an immune response and eliminates the infection. This is the most desired outcome because it means that the cat will not become permanently infected with the virus. During this challenge period, the cat may actually develop a mild form of illness. Fever, poor appetite, lethargy and swollen glands (lymph nodes) in the neck may develop and last for three to 10 days. This outcome occurs about 40 percent of the time after a cat is challenged by FeLV. Immunity to the virus is more likely to develop in the adult cat than in the kitten.
* **Infection**: In this case, the cat's immune system is overwhelmed by the virus. This is the least desired outcome because the cat becomes permanently infected with the virus. Although the cat may be sick for a few days initially (as described above), he/she usually recovers and appears normal for weeks, months or years. Ultimately, most of these cats die of FeLV-related disease, but as many as 50 percent stay healthy after two to three years and 15 percent remain healthy after four years. Vaccination of these cats will not cause any problems, but the vaccine will not help the cat, either. This outcome occurs an estimated 30 percent of the time after a cat is challenged by FeLV.
* **Latency**: In this case, the cat harbors the virus, but it is not easily detected. Unlike other viruses, FeLV does not directly kill the cat's cells or make them cancerous. Instead, the virus inserts a copy of its own genetic material (DNA) into the cat's cells. These cells may later be transformed into cancer cells or cells that will no longer function normally. With this outcome, the genetic change in the cat's cells will remain undetected for an average of two and a half years, during which time the cat will appear completely normal. In the early stages of infection, the blood ELISA and IFA tests will remain consistently negative. The PCR test, a recently available diagnostic tool, will detect the latent infection. However, this test is somewhat expensive and not widely available, so it is not used for routine testing.
* **Immune Carrier**: In this case, the cat becomes an immune carrier, meaning FeLV becomes hidden in some of the cat's epithelial cells. Although the virus is multiplying, it is not able to get out of these cells because the cat is producing antibodies against the virus. The cat will not show any signs of illness; instead, he/she will appear completely normal. This situation is uncommon and probably occurs only 1 to 2 percent of the time.

**How are cats with leukemia treated?**

Some forms of leukemia are unresponsive to all available forms of cancer treatment. Other types may respond to chemotherapy, though most of these have an average survival time of less than one year. Because the virus is not affected by treatment, the cat will always remain infected with FeLV. Relapse of leukemia is also possible (and expected). These factors cause us to recommend treatment of leukemia in very few situations.

**What should I do to disinfect my house?**

The virus lives, at most, only a few hours outside the cat if the environment is dry. Therefore, extensive environmental disinfection is not necessary. If you wait even two days to bring a new cat into the house, you can be assured that none of the virus from a previous cat will remain.

**I have a healthy cat that is infected with the virus. What does this mean?**

Healthy infected cats may can appear unaffected by the virus for several years. However, such cats should be considered infectious and potentially dangerous to other cats. These cats should be isolated from non-infected cats to prevent the spread of infection. Many owners find this undesirable or impossible and elect euthanasia to protect the non-infected cats.

**Is there any danger to my family?**

Extensive tests have been conducted for over 15 years to determine if FeLV can be transmitted to humans. Thus far, no conclusive evidence has shown any FeLV-related disease in humans or other animal species, including dogs. However, those with compromised immune systems are of concern to many researchers. Newborn babies, transplant recipients on anti-rejection drugs, AIDS patients and those undergoing chemotherapy should not be unneccessarily exposed to this or any other virus.

**Can I protect my other cats?**

A vaccine is available to protect cats from FeLV. Though no vaccine is 100 percent effective, the FeLV vaccine is strongly recommended for cats that are exposed to open populations of cats (i.e., outdoor cats). The veterinary community has seen a decline in the incidence of feline leukemia virus infection and related diseases as a result of widespread vaccine use and we strongly recommend it for our patients. If your cat stays indoors at all times and is not in contact with another cat that goes outdoors, the need for vaccination is minimal. Cats that are already infected with FeLV will not be helped by the vaccine, but will not be hurt by it, either.

We recommend FeLV pre-vaccination testing for:

* Cats with a history of fighting or fight wounds (i.e., abscesses)
* Cats exposed to FeLV-infected cats
* Cats from unknown backgrounds (particularly animal shelters, humane societies or pet shops)
* Routine health care, especially in multi-cat households

**Will vaccinating my cat cause the leukemia test to be positive?**

No. The vaccine will not cause a cat to test positive for FeLV. While the history of vaccination is important for us to know, it does not alter our ability to interpret the feline leukemia virus test.

**Are there any adverse effects associated with the FeLV vaccine?**

Possibly. In the last 10 years, several million doses of the leukemia vaccine have been given without any adverse side effects. However, a form of cancer that arises at the injection site has been found in a small subset of cats (estimated at between one in 10,000 and one in 100,000) that have received the leukemia vaccine. This tumor is called a fibrosarcoma or tumor of the connective tissue. Often, it is not possible to remove the tumor with surgery. For most cats, the risk of contracting a fatal FeLV-related disease is considered far greater than development of vaccine-related tumors.