

## **Cat scratch disease, *Bartonella henselae***

*Cat scratch disease or fever*

### **Affected Animals:**

Humans. Cats carry the bacteria, but typically do not get sick from it.

### **Overview:**

Individuals with compromised immune systems who are thinking about bringing a kitten into their home may want to first have the animal's blood cultured for *Bartonella henselae*, the bacteria that causes cat scratch disease.

Cats can act as carriers, without being ill themselves, and can pass on the disease when they scratch or bite people. The wound does not have to be very deep to do its damage—still, washing bites or scratches immediately with anti-bacterial soap is an important step in helping prevent the illness from occurring.

Relatively healthy individuals can become sick from *Bartonella henselae*; however, their symptoms are usually mild and disappear within a few weeks or months. As a precautionary measure, it is recommended that people who have poorly functioning immune systems, due to disease, other disorders, or chemotherapy, avoid kittens and young cats—and, if they do get bitten or scratched, they should seek medical attention as soon as possible.

### **Clinical Signs:**

Cats typically do not show signs of sickness when they are infected with *Bartonella henselae*. People who contract the bacteria through a bite wound or scratch develop an erythematous papule at the site of the wound. In three to 10 days, lymphadenopathy may develop. People with the disease may also experience fever, anorexia, malaise, headache, myalgia, arthralgia, nausea, and skin eruptions. Most cases of cat scratch disease are self-limiting, but may take several months to resolve.

### **Symptoms:**

Cats typically do not show signs of sickness when they are infected with *Bartonella henselae*. People who contract the bacteria through a bite or a scratch develop a raised, reddened area at the site of the wound. Three to 10 days later, their lymph nodes may become very tender and swollen. Those afflicted with the illness may develop a mild fever, lose weight, develop red, raised bumps on their skin, and experience flu-like symptoms such as headaches, pain in the muscles and joints, and nausea. Most cases of cat scratch disease will resolve spontaneously; however, this can take several months.

### **Treatment:**

Antibiotic protocols that eliminate the bacteria from infected cats have not been clearly established. A variety of antibiotics have been used to treat the

illness in people and have been quite effective in treating certain forms of infection. In other forms, the antibiotics will control the disease but not clear it completely. A physician should be consulted if the disease is suspected.

**Prevention:**

Thoroughly wash all cat scratches and bites no matter how small they appear. Do not allow individuals with poor immune systems to play with kittens or young cats. Take special care to prevent cats from coming into contact with open wounds. Control fleas in the environment because they transmit the bacteria to cats and are currently under investigation as possible vectors in transmitting the bacteria directly to humans.

**Feline panleukopenia, feline parvovirus, feline distemper**  
*Feline distemper*

**Affected Animals:**

Cats, minks, raccoons.

**Overview:**

Caused by the feline parvovirus, feline distemper, or panleukopenia, is a serious and potentially fatal disease. In its most severe form, feline distemper kills the white blood cells that fight off disease and infection. The disease also can destroy the cat's digestive tract, preventing the intestines from digesting food and absorbing liquids and nutrients. Vomiting and diarrhea can result in severe or fatal dehydration. In addition, affected cats can succumb to secondary bacterial infections because of the reduced number of white blood cells. Because their immune systems are not fully functional, kittens and cats with impaired immune systems are more likely to show severe signs or die from the disease. Healthy, mature cats may show only mild or no symptoms at all.

Newborn kittens that contract panleukopenia while within the mother's uterus have a very different response to the disease. They may develop permanent brain damage and have a hard time walking and maneuvering, but they often survive.

There is no cure for panleukopenia; thus, treatment is in the form of supportive care. Dehydration can be alleviated through the use of fluids administered in the vein or below the skin. Antibiotics can be given to treat secondary bacterial infections. Most importantly, an effective vaccine is available that will prevent the disease's transmission.

**Clinical Signs:**

About a week after being infected with the virus that causes panleukopenia, cats will begin to experience continual vomiting, weight loss, decreased or absent appetite, fever, diarrhea that may contain blood, and dehydration.

Often animals with the disease will be listless or lacking in energy. Some cats can develop a yellow color to the ears and eyes due to jaundice caused by developing liver disease. Cats with the disease often have a decreased number of white blood cells. Bloodwork also will show a marked panleukopenia and some changes in the liver enzymes.

**Prognosis:**

Cats that develop feline parvovirus become very sick; there is a 50 to 90 percent chance that affected kittens will die from the illness because of their immature immune systems. Also, adult cats with weak immune systems do not have a good prospect of surviving. Healthy animals, however, are often able to fight the illness and their symptoms tend to be less severe. If a cat survives the disease, it is immune to reinfection for life.

**Transmission or Cause:**

Feline parvovirus is shed in all secretions of infected cats; it is very hardy, and resistant to many disinfectants. The virus can survive in the environment and remain highly contagious for over a year.

**Treatment:**

There is no cure for panleukopenia or the parvovirus that causes it, so treatment involves supportive care. Preventing dehydration in cats that experience continual vomiting and diarrhea requires the administration of fluids—either into the cat's vein, through intravenous fluid therapy, or under the skin through a procedure called subcutaneous fluid therapy. Antibiotics can help prevent or treat bacterial infections in cats that have a low white blood cell count because of the disease.

**Prevention:**

The best prevention is proper vaccination against the virus starting approximately when the kitten is six to eight weeks old. Repeat vaccinations will be necessary when the animal is nine, 12 and 16 weeks of age. Properly vaccinated cats have long-term immunity.

Feline parvovirus can survive in the environment for over a year and continue to infect other cats that come into contact with it. The virus is very difficult to kill. The only substance that will eliminate it is household bleach diluted with tap water at a concentration of approximately 31 parts water to 1 part bleach. Rinse the surfaces well if animals are to be housed on bleached surfaces. Also, make sure the area is well ventilated to prevent fume inhalation.

## **Feline leukemia virus, FeLV** *Feline leukemia virus, FeLV*

### **Affected Animals:**

Cats.

### **Overview:**

The feline leukemia virus (FeLV) has been compared to the human AIDS virus because of its effect on the immune system. A contagious and often fatal disease, feline leukemia can cause multiple organ disease, cancer, bone marrow suppression resulting in low numbers of platelets and red and white blood cells, and a weakening of the immune system that makes it less likely that an affected cat will overcome infections. There is no cure for feline leukemia, but there are medications that can help enhance the cat's quality of life.

Feline leukemia virus is contagious and affects cats of all ages, sexes, and breeds. It is passed from cat to cat most commonly through a bite wound acquired while fighting. Outdoor, male cats that have not been neutered are most likely to develop the virus because they frequently roam and fight other cats to defend their territory. There is a vaccine available for cats at high risk for the disease; however, because the vaccination, in rare cases, has been associated with a form of cancer, it is not recommended for animals that have a low risk of contracting feline leukemia.

### **Clinical Signs:**

Cats that are infected with feline leukemia virus often will develop anemia, anorexia, weight loss, lethargy, diarrhea, dehydration, respiratory infections, dental disease, and sometimes a fever. Secondary infections and multiple organ disease are complications associated with the virus.

### **Symptoms:**

Frequently owners bring their cats to the veterinarian because the owner feels the cat is doing poorly or is "not himself;" the cat may have stopped eating or have developed a poor appetite. Weight loss, listlessness, and depression are also symptoms. Some cats may have respiratory tract infections, diarrhea, dental disease, and fever. In addition, many cats with the disease may be dehydrated and have a poorly groomed hair coat.

### **Diagnosis:**

A thorough history and physical examination are vital to detect many of the conditions associated with a feline leukemia virus infection. A diagnosis of feline leukemia can be confirmed by several different kinds of tests. However, a quick blood test called an ELISA, performed by the veterinarian, can detect the presence of the virus.

Cats that test positive for feline leukemia should have baseline blood work done to see if the virus is causing diseases of the organ systems. A

chemistry panel will help detect diseases of organs such as the kidney and liver. Also, a complete blood count, or CBC, will determine the number of red blood cells, white blood cells and platelets. The virus can reduce significantly the bone marrow's production of these vital cells.

X-rays of the chest and abdomen often are taken to detect the presence of cancer.

**Prognosis:**

Cats that are infected with the feline leukemia virus can survive many years and have an excellent quality of life. However, once the virus begins to cause secondary diseases, the cat eventually will die due to complications from the disease. The most common causes of death due to feline leukemia include cancer, anemia, and bacterial and viral infections.

**Transmission or Cause:**

The most common way that cats become infected with the feline leukemia virus is through direct contact with the saliva or nasal secretions of an infected feline—which often occurs during a fight when a cat with the virus bites an unvaccinated animal. The virus cannot survive in the environment, so urine and feces are not significant sources of infection to other cats. In addition, routine disinfectants will eliminate the virus from cages and other surfaces. However, cats that groom each other and share food and water sources can transmit the virus because the saliva of an infected cat is contagious. Less commonly, the virus can be passed from a mother cat to unborn kittens in the uterus. Mother cats also can transmit the disease while grooming or nursing the kittens.

**Treatment:**

There are no medications that can eliminate the virus from the cat's body, nor is there a cure for feline leukemia. However, there are methods for improving and prolonging a diseased cat's life. Certain medications, such as alpha interferon, may improve a cat's clinical signs and prolong its survival. Antiviral medications can also be beneficial. These help to suppress viral replication, although they will not eliminate it. Such treatments can be expensive and usually are prescribed for the remainder of the cat's life.

Cats that are sick usually need to remain in the hospital for several days in order to provide the necessary care for stabilization. Bacterial infections that develop as a result of the virus require treatment with antibiotics. If the cat is very anemic, a blood transfusion may be necessary to replace the red blood cells. Intravenous fluid therapy is often necessary in cats that have kidney disease or in cats that are dehydrated because they are not eating, have diarrhea, or are vomiting frequently.

**Prevention:**

The best way to prevent cats from developing feline leukemia is to keep them indoors and away from other cats that could be carrying the virus. If

there is another cat in the house that has feline leukemia, do not allow the animals to share litter boxes, water or food bowls. The vaccine for feline leukemia virus is recommended for cats that do go outdoors or are at high risk for developing the virus for other reasons. Because the vaccine can, in rare instances, cause a type of tumor called a fibrosarcoma, it currently is recommended that only cats at risk be vaccinated. New vaccines currently are being developed that will not cause these types of reactions in the future.

Cats that have feline leukemia must be kept indoors to prevent the spread of the virus to other cats. In addition, cats with the disease should avoid exposure to bacteria, viruses, and other pathogens present in the outside environment since their weakened immune system are less capable of fighting off organisms that cause illness and infection.

### **Feline *Dirofilaria immitis* infection**

#### *Feline heartworm disease*

#### **Affected Animals:**

Dogs and cats. Overall, cats are infected by heartworms much less commonly, even in areas in which heavily infected dogs are present. Male cats tend to be infected more commonly and have a larger worm burden than female cats, mostly because male cats spend more time roaming outside and have less resistance to infection than female cats. Cats that spend significant amounts of time outside, especially in mosquito-populated areas, are at increased risk for developing heartworm infection.

#### **Overview:**

Heartworm disease is a serious infection of the heart by parasitic worms called *Dirofilaria immitis*. It is not uncommon for infected cats to develop fatal respiratory and cardiac-related complications. Other cats, however, will have only minor symptoms such as vomiting, or no clinical signs at all.

Heartworm disease is spread by mosquitoes, which inject the larvae from the heartworm parasite into the skin when they bite. Thus, outdoor cats are at higher risk of infection, as they have an increased exposure to mosquitoes. Certain sections of the world have heavier populations of heartworm disease than others; cases of feline heartworm have been found most frequently in the eastern and mid-western states and in California.

Because of increased availability of tests to detect feline heartworms and a greater awareness of the disease, more veterinarians are able to diagnose the disease. Depending on the severity of the infection, there are a number of methods for treatment, including medications to alleviate the symptoms, drugs to kill the worms, and surgery.

**Clinical Signs:**

The clinical signs of feline heartworm infection can be acute or chronic. Pulmonary or central nervous system signs are seen more often in acute cases. Chronic signs may include episodic pulmonary disorders, gastrointestinal disorders, lethargy, or right-sided congestive heart failure. Nonspecific symptoms may include coughing, dyspnea, vomiting, anorexia, lethargy, and weight loss.

Some cats may exhibit no signs at all other than vomiting. Acute pulmonary thromboembolism resulting in severe dyspnea, weakness, vocalization of distress, and sudden death are not uncommon manifestations of heartworm disease in cats. Physical exam findings that could indicate heartworm disease include respiratory abnormalities, vomiting, heart murmur or gallop heart rhythms, syncope, and bloodwork suggestive of parasitic infection.

**Symptoms:**

Coughing and trouble breathing are the most common signs of chronic heartworm disease. Weakness, vomiting, and acute respiratory distress are also seen.

**Diagnosis:**

Diagnosis can be difficult, because several other diseases can mimic the signs of heartworm disease. Disorders that exhibit similar symptoms include asthma; cardiomyopathy, or abnormality of the heart muscle; lungworm infection; lung fluke infection; and pleural effusion disorders, which cause fluid build-up in the space surrounding the lungs.

Routine bloodwork results may indicate a parasitic infection, but cannot positively identify heartworms. Thoracic radiographs, or chest x-rays, may help support the suspicion of heartworm infection, although abnormalities in the heart can be difficult to detect through this method. Definitive diagnosis of heartworm infection usually depends on the demonstration of adult heartworms by echocardiography, an ultrasound of the heart and vessels. Other techniques for positively identifying heartworms include pulmonary arteriography, a dye injection to visualize the lung arteries through x-rays, or detection of adult heartworm antigens via blood serology tests that detect adult heartworm antigens.

Echocardiograms cannot rule out heartworm disease definitively if there is a low worm count, but these tests are beneficial in ruling out other possible heart diseases. Cats need to be referred to a veterinary cardiologist for an echocardiogram or pulmonary arteriography.

Tests for the presence of heartworm offspring are available, but a negative test in no way rules out heartworm infection. Most feline heartworm cases have a low number of microfilaria, or offspring, that are present for a very limited time.

The most useful blood tests are for adult worm antigens, and moderately sensitive test kits are now available in many veterinary practices. The antigen detected is believed to come from the reproductive tract of female adult worms. If less than three females are present in a cat, the test results may be falsely negative, even though adult worms are present. However, a positive heartworm antigen test gives the most definitive evidence of feline heartworm infection.

Some laboratories also can perform an enzyme-linked immunosorbent assay, or ELISA, test for antibodies in the cat's blood sample. This test is better at picking up infections, but a positive test result does not indicate whether the worms are still living.

### **Prognosis:**

Complications of the heart and respiratory system, such as a blood clot traveling to the lungs, carry a poor prognosis and commonly result in acute death. Other animals will show mild symptoms or no clinical signs at all. It can be very difficult to detect abnormalities in cats with heartworm infections, to accurately diagnose the disease, and to provide any form of treatment.

### **Transmission or Cause:**

Infection with the *Dirofilaria immitis* parasite occurs when a mosquito that previously has bitten an infected animal bites another animal, thereby injecting worm larvae into the new host. Infections in cats are much less common than in unprotected dogs in the same locale. Possible reasons include a mosquito preference to feed from dogs versus cats, a difference in exposure to infected mosquitoes, and a lower number of infective larvae developing into adults within the cat.

### **Treatment:**

Cats diagnosed with heartworm disease that lack any clinical signs should not receive any form of adulticidal heartworm treatment, which kills adult worms, and can have fatal side effects in cats. Rather, the treatment of heartworm disease with adulticide medications should be reserved for those cats with persistent, serious clinical signs in which worm removal either is not an option, or it has failed to improve the signs of disease.

Some veterinary cardiologists have performed the surgical removal of adult worms from the infected cat's heart. This is not a common feline procedure, though, and it requires referral to an experienced surgeon with access to the proper equipment. Also, this surgery is usually attempted only in those animals in which an ultrasound has revealed a large number of worms.

Severely ill cats can be treated symptomatically to alleviate signs. Cage confinement, oxygen supplementation, anti-inflammatory drugs, and fluid therapy are commonly instituted. Once the cat is stable, heartworm treatment options can be considered.

**Prevention:**

Feline heartworm prevention is now commercially available through veterinarians as a once-a-month treatment. This preventive measure is recommended for all cats living in areas with high heartworm counts.

***Leptospira interrogans, Leptospirosis***  
*Canine typhus, infectious jaundice, Leptospira*

**Affected Animals:**

Dogs, cats, humans, and all other animals can become infected with different types, or serovars, of *Leptospira*.

**Overview:**

A contagious bacterial disease of animals that can be passed on to humans, leptospirosis affects the kidneys and the liver, causing damage that can lead to organ failure and death. Typically, rodents and wild animals are carriers of the disease. Infection occurs most commonly when the mucous membrane or abraded skin of an animal or human comes into contact with urine containing the infective leptospire bacteria.

Once infected, the organism begins to replicate in various tissues and causes significant infection in the liver and kidneys, with clinical signs developing within a week of exposure. Cats tend not to be significantly affected by leptospirosis. Dogs, however, can develop serious clinical disease, although not all canines with leptospirosis will show clinical signs of infection. In fact, many animals that have this disease will be asymptomatic or will have chronic or mild symptoms.

Animals can transmit leptospirosis to their owners. People who suspect that they have been exposed to infection should consult a physician.

**Clinical Signs:**

Clinical signs include anorexia, muscle soreness, depression, tachypnea, vomiting, fever, anemia, pale mucous membranes, dehydration, weakness, diarrhea, stiffness, tachycardia, epistaxis, petechiae, melena, coughing, dyspnea, polyuria and polydipsia becoming anuric, weight loss, ascites, and signs of hepatic encephalopathy due to liver damage.

**Symptoms:**

Clinical signs may include loss of appetite, depression, increased respiratory rate, sore muscles, vomiting, fever, anemia, pale mucous membranes, dehydration, difficulty breathing, weakness, diarrhea, dark and tarry stools, increased drinking and urinating, jaundice from liver disease, bleeding from the nose, kidney failure, and death.

**Diagnosis:**

If leptospirosis is present, a complete blood count, or CBC, may show evidence of dehydration, anemia, low platelet numbers, and increased or decreased numbers of white blood cells. A chemistry panel will detect evidence of kidney failure or liver disease. In addition, specific diagnostic tests are available that will detect exposure to *Leptospira*, such as a test that will examine a blood sample for antibodies to the disease. Before antibiotic drugs are given, the organism can be cultured from urine, blood, kidney or liver tissues.

**Prognosis:**

For animals that have acute, severe disease, the prognosis is guarded. Most animals, however, have subclinical or asymptomatic disease, or chronic disease. These animals have a fair to good prognosis.

**Transmission or Cause:**

Leptospire are passed in the urine of infected animals. Infection occurs when the organism in the infected urine penetrates abraded skin or the mucous membranes. In addition, the ingesting of urine in contaminated food, water, or soil can transmit leptospirosis. Transmission also has been known to occur through a bite wound, through the placenta to an unborn animal, and through venereal contact.

**Treatment:**

Life-threatening complications of leptospirosis should be addressed immediately. Because this organism typically affects the kidneys, the use of intravenous fluid therapy is essential. The use of intravenous antibiotics, such as penicillin and dihydrostreptomycin, is needed during the initial treatment phase. Oral antibiotics are prescribed after the animal has begun to recover. Precautions and proper hygiene should be instituted in order to prevent human infection.

**Prevention:**

A vaccine is available that provides protection to the more common types of *Leptospira* bacteria. Dogs in areas of risk should receive three vaccines, given three to four weeks apart; from that time on, they should receive vaccines on a yearly basis. Other prevention steps include keeping rodents away from the animal's environment, since rodents often are carriers of the bacteria. In addition, animals should be kept away from areas in which the bacteria thrive, such as stagnant water, marshes, ponds, and muddy areas. Humans should avoid contact with the urine of animals.

## **Rabies Virus**

### *Rabies*

#### **Affected Animals:**

Dogs, cats, and humans, as well as foxes, raccoons, bats, and all other mammals.

#### **Overview:**

Rabies is almost always fatal in domestic animals. The classic symptoms include apprehension, anxiety, biting or snapping at random, and frothing at the mouth. Any mammal, including a human, can be infected by the rabies virus, which causes severe neurological disease and death. The virus is passed in saliva typically acquired through a bite wound or by eating an infected animal. The most common rabies carriers are wild animals, including foxes, skunks, raccoons, and bats.

There is no cure for rabies and animals showing clinical signs should be euthanized, or humanely put to death. Any human exposed to rabies must be treated immediately, before the onset of neurological disease, to prevent infection. Once neurological symptoms appear, there is no treatment for humans, either. Anyone suspected of being exposed to a rabid animal should contact the county or public health offices immediately.

Rabies vaccinations are very effective in the prevention of disease and are required by law in most areas, but regulations vary from region to region. The best prevention is regular vaccination. Rabies vaccines, by law, must be given by a licensed veterinarian; most states will not recognize a rabies vaccination that has not been given by a licensed veterinarian.

#### **Clinical Signs:**

Clinical signs of rabies can vary, but generally they include behavior changes such as depression; apprehension; nervousness; anxiety; biting or snapping, sometimes at imaginary objects; wandering or roaming; irritability; muscular incoordination; seizures; paralysis; salivation or frothing at the mouth; and a "dropped jaw," or inability to swallow. Any animal that is unvaccinated and shows abnormal behavior or unexplainable neurological disease should be suspected of having rabies.

#### **Symptoms:**

See Clinical Signs.

#### **Description:**

Rabies is a severe, fatal disease affecting all warm-blooded animals and humans. The rabies virus member of the family Rhabdoviridae and is found worldwide, except for a few places such as New Zealand, Hawaii, Japan, Australia, and the British Isles. Highly contagious, the disease is shed in the saliva of infected animals. When an animal becomes infected, it can take between one week to eight months before clinical signs of rabies develop.

Clinical signs occur due to the destruction and severe inflammation of the nerves in the body. The virus also goes to the salivary glands, where the virus can be shed in the saliva. Once signs of neurological disease are visible, the disease progresses very rapidly and the animal usually dies within a week. When a rabies-infected animal bites another animal, or the infected saliva contacts the mucous membranes of an animal, the virus starts to replicate itself in the muscle cells, and then spreads via the nerves to the spinal cord before moving rapidly to the brain.

**Diagnosis:**

Any animal that is unvaccinated and shows abnormal behavior or unexplainable neurological disease should be suspected of having rabies. There is no antemortem test for rabies that provides a conclusive diagnosis in live animals. If rabies is suspected, or the animal has bitten someone and is showing signs of rabies, the only way to confirm the presence of rabies is to immediately submit the brain to an approved laboratory to test directly for the presence of the virus.

**Prognosis:**

Grave

**Transmission or Cause:**

Rabies virus is transmitted through the saliva of an infected animal. Often, animals get the disease by being bitten by or eating an infected with the virus. Wildlife such as skunks, raccoons, bats, and foxes are common rabies carriers.

**Treatment:**

Rabies is almost always fatal once clinical signs appear, and the only humane course of action is euthanasia. Consult a veterinarian about the local laws and regulations concerning exposure or suspected exposure to rabies.

Currently, vaccinated animals that are suspected of being exposed to rabies should be re-vaccinated immediately and then strictly quarantined according to local laws—generally for a period of 45 days. During the quarantine, the animal must be isolated in a secure enclosure from contact with other animals and people. Contact a veterinarian immediately if any contact with rabies is suspected.

Unvaccinated animals that have been exposed to rabies are a severe health hazard. Most states either recommend or mandate euthanasia and testing of unvaccinated exposed animals. If an owner refuses euthanasia, the animal must be held in strict quarantine for six months, with a vaccination administered at the fifth month. Animals that are not current with their rabies vaccination are generally evaluated on a case by case basis according to local laws.

Even an otherwise healthy, properly vaccinated domestic animal that bites a human should be reported to authorities—generally the police or animal control—and quarantined for a period of 10 days.

**Prevention:**

The best prevention is through vaccination. Most states require that rabies vaccinations be administered by a licensed veterinarian. The first vaccine is given at 12 to 16 weeks of age, then again in one year. Remaining boosters are given every one to three years, depending upon the vaccine product recommendations and state laws. In addition, all contact between domestic and wild animals should be avoided.