

Canine distemper virus

Distemper, Hardpad disease

Affected Animals:

Distemper affects dogs, ferrets, skunks, raccoons, and foxes.

Overview:

Impossible to cure and sometimes fatal, canine distemper is a serious viral illness that attacks a dog's body on all fronts. The disease may harden the paws and nose, damage the teeth, make breathing difficult and diminish the appetite. Even more disturbingly, canine distemper affects a dog's nervous system, often resulting in seizures and paralysis. Dogs who do not die from this disease usually suffer later in life from recurring neurological problems, such as nervous twitches and seizures.

The virus is highly contagious. It is passed typically by aerosolization, in which droplets containing the virus are expelled into the air through the infected animal's breath and nasal secretions. Fortunately, there is a vaccine. Until the virus is completely eradicated, however, supportive care is the only relief available to the animals that contract it.

Clinical Signs:

Anorexia; depression; listlessness; fever; upper respiratory tract infections; a thick, yellow discharge from the nose and eyes; coughing; dyspnea; vomiting; and diarrhea. Hyperkeratosis of the nose and pads of the paws can occur. In young dogs, enamel hypoplasia of the teeth is seen in neonatal infections. Neurological disease can occur and often includes seizures, paraparesis or tetraparesis, hyperesthesia, myoclonus, and death.

Symptoms:

Decreased appetite and weight loss; depression; listlessness; fever; upper respiratory tract infections; a thick, yellow discharge coming from the nose and eyes; coughing; difficulty breathing; vomiting; and diarrhea. Hardening of the nose and pads of the paws can occur, and with younger dogs, damage to the teeth may result. Neurological disease signifies the most serious stage of the illness: seizures, paralysis of two or four legs, and involuntary twitching of the muscles are common nervous system disorders resulting from distemper. The disease can be deadly.

Prognosis:

The prospect of survival depends on the dog's immune system and its individual ability to kill the virus. Generally, 50 percent of dogs that contract the virus will develop the clinical signs and symptoms associated with

distemper, but the illness can range from mild clinical signs to death. Death may occur from one or two weeks to three months following infection.

Transmission or Cause:

Transmission commonly occurs in unvaccinated dogs that come into contact with infected animals. Canine distemper virus is spread most frequently by contact with respiratory tract secretions from an infected animal. Other potential sources of infection include contact with infected body tissues and secretions such as urine. Pregnant dogs that contract the virus can infect their unborn puppies.

Treatment:

There is no cure for canine distemper virus. Therapy consists of supportive care only: intravenous fluid therapy can alleviate dehydration, and antibiotics can be beneficial in preventing bacterial infection, which is secondary to the virus. Once an animal develops neurological symptoms of the disease, such as seizures or paralysis, its chances of surviving are slim and its quality of life is bound to become progressively worse. Thus, these animals are usually “put to sleep,” or euthanized, in order to ensure a humane death.

Prevention:

The key to prevention is to vaccinate puppies properly when they are between six and 16 weeks old. Keep puppies that have not had all their vaccinations away from unvaccinated and wild animals. The use of appropriate disinfectants such as quaternary ammonium disinfectants is effective in killing the canine distemper virus in kennels, hospitals, or other potentially infected areas; sanitation is very important in preventing the spread of any infectious disease. The owner should consult with a veterinarian about the best vaccination schedule for an individual dog.

Dirofilaria immitis

Heartworm disease

Affected Animals:

Dogs and cats. Dogs that live outside have an increased risk for developing a heartworm infection. Felines get this infection less commonly than canines.

Overview:

A parasite that can infect the heart and lungs, heartworms pose a very serious threat to both indoor and outdoor dogs. Adult heartworms cause disease because they live in the right side of the heart and pulmonary arteries where they obstruct the flow of blood through the heart and to the

rest of the body. Because heartworms can cause serious, fatal diseases, prevention and treatment of infected dogs are critical.

Transmitted to dogs by mosquitoes that have fed off an animal that has heartworm disease, the *Dirofilaria immitis* larvae migrate through the body tissues until they enter the vascular system. Within the bloodstream, they circulate and travel to the right side of the heart and pulmonary arteries. Here, they mature into the adult stage. The complete maturation of the heartworms, from larvae to adulthood, takes five to seven months. *Dirofilaria immitis* parasites can live for up to five years. Adult heartworms can grow to be as long as 14 inches and up to 100 or more can be living at one time.

Treatment is usually through medication and often is effective, but dogs with serious complications of the heart and lungs due to heartworm have a much more guarded prognosis for recovery.

Clinical Signs:

Coughing from the lung damage, jaundice from liver damage, and weakness from damage to other organs may develop. Clinical signs include coughing, exercise intolerance, weakness, difficulty breathing, and fainting following exercise, if the dog is able to exercise at all. Eventually, congestive heart failure can develop, resulting in the backup of fluid within the abdomen and under the skin of the rear legs. In severe cases, sudden death can occur following exercise.

Diagnosis:

Diagnosis of heartworms is done by examining under the microscope a sample of the dog's blood for heartworm offspring, called microfilaria. Another blood test looks for the adults by detecting antigens made by the female adult heartworm. However, this antigen test can be falsely negative if there are too few heartworms and thus not enough antigen is made to be detected, or if there are only male heartworms present.

Another useful diagnostic test, a chest x-ray, determines the severity of the illness and will show changes that reflect heartworm disease such as heart enlargement, pulmonary artery enlargement, as well as any lung changes. A urinalysis may reveal any damage that has been done to the kidneys. Blood work can indicate if the dog is anemic from the disease, and it will help determine the overall health of the animal.

Prognosis:

The prognosis for animals that have mild or no clinical signs of disease is good. The prognosis in animals with severe infection and severe clinical signs is guarded because the risk of complications is great.

Transmission or Cause:

Dogs get heartworms from a mosquito that transmits the infective larvae from another animal with the disease; the mosquito obtains this microfilaria through biting. While in the mosquito, the heartworm larvae mature into the infective stage of their lifecycle. Next, the mosquito bites another dog, and in the process, passes on the infective heartworm larvae to that dog. In the newly infected dog, the heartworm larvae will continue to develop over the course of five to seven months. The larvae will gain access to the vascular system, develop into adult heartworms, and migrate to the heart and pulmonary arteries to live. It is here that the female heartworms produce many microfilaria, which circulate in the dog's bloodstream and can be picked up by another mosquito.

Treatment:

Treatment of heartworms is still somewhat risky, but it is much safer today than it was years ago, when treatment involved the use of a medication containing arsenic which had many severe side effects, including liver failure and death. Now there is a much safer medicine, melarsomine dihydrochloride, which kills adult and immature heartworms and does not have as many side effects as the previous medicine. However, there is still some risk involved: lethargy, lack of appetite, saliva, increased heart rate, and retching can occur with this new drug.

Before determining the treatment plan, the veterinarian first will perform a variety of tests to determine the severity of the disease, including x-rays, bloodwork, and a urinalysis. Sometimes, an electrocardiogram and an echocardiogram are recommended to assess more accurately the condition of the heart.

Generally, the melarsomine dihydrochloride will be administered as two deep muscle injections, given 24 hours apart. The dog is kept hospitalized and monitored closely for any reactions. If the disease is staged as severe, however, the veterinarian will alter the treatment plan to minimize the potential side effects. Three to four weeks after the injections are given, a medication will be administered to kill the circulating microfilaria. The dog must rest during this entire period to prevent adverse effects from occurring. No running, jumping, or excessive stair climbing should be allowed. Owners should walk their dogs slowly on a leash.

Prevention:

Prescription heartworm preventive medications that are properly administered are nearly 100 percent effective in preventing heartworm disease. Many preventives also will fight against gastrointestinal parasite infections.

Canine infectious tracheobronchitis

Kennel cough

Affected Animals:

Dogs.

Overview:

Many owners are familiar with the harsh, dry, “goose honking” sound associated with kennel cough. Infectious tracheobronchitis, or kennel cough, is a term that is used to describe a common, very contagious respiratory disease of dogs in which there is inflammation of the upper respiratory passages, and occasionally the lower airways such as the lungs. Viruses, bacteria, or a combination of the two can cause kennel cough.

Despite the loud, frequent coughing, kennel cough will often go away on its own if the dog’s immune system is healthy and strong. However, in severely affected puppies and debilitated older animals, kennel cough can be life threatening if it goes untreated. Pneumonia can be a complication of the disease. Fortunately, vaccines are available that will help protect the animal from this disease.

Clinical Signs:

Clinical signs include a persistent, harsh, dry cough, with some gagging and retching that is made worse by exercise, excitement, or pressure on the neck by a collar. More severe infection can lead to a fever, anorexia, nasal discharge, depression, lethargy, dyspnea, and a moist, productive cough. Some dogs develop pneumonia and consolidation of the lung lobes.

Symptoms:

Dogs with kennel cough are generally healthy, but they will have a persistent cough that is made worse by exercise, excitement, or pressure on the neck by a collar. Common symptoms include a harsh, dry cough with some gagging and retching. More severe infection can lead to a fever, loss of appetite, a runny nose, depression, listlessness, difficulty breathing, and a phlegm-producing cough. Some dogs with severe cases will develop pneumonia. These animals are very sick and need medical attention or they can die very quickly.

Diagnosis:

Diagnosis is based on clinical signs, the dog’s vaccination status, and an assessment of whether the dog has had contact with other potentially infected animals through areas where groups of dogs are housed, such as boarding facilities, obedience training classes, and dog shows. Pressing or gently palpating the windpipe of a dog with kennel cough will usually produce a harsh, dry, “goose honking” cough. Dogs who have a more

severe infection may need to have their blood drawn for a complete blood count, or CBC, so that the veterinarian can look for any changes in the red blood cells, white blood cells, or platelets. Many times, the white blood cell numbers will be higher than normal if there is an infection. If pneumonia is suspected chest x-rays will be able to show any signs of lung disease.

Prognosis:

The prognosis for mild kennel cough is excellent; symptoms will usually disappear within two weeks. If the dog develops severe kennel cough and pneumonia results, the prospect of a full recovery is less certain; in these cases, symptoms can continue for up to seven weeks and severe illness or possibly even death may result.

Transmission or Cause:

Kennel cough, a highly contagious disease, is passed on when a dog with the illness coughs, sneezes, or expels any saliva or other respiratory secretions into the air. Dogs that are housed together in kennels or groups typically perpetuate the spread of the disease. Affected animals that are coughing should be kept in isolation.

Treatment:

The examining veterinarian will determine the best treatment for the dog, since many medications are available. Most often, however, kennel cough can be treated by antibiotics, which destroy any bacteria that are causing infections in the respiratory system. An antibiotic will not kill a virus, but it will kill the bacterial infections that may occur alone or secondary to the virus. Although not recommended for dogs that have a productive cough, cough suppressants are often very beneficial to dogs that have a persistent, dry, hacking cough and are not trying to cough up mucus and fluid. In addition, vaporizers can promote healing by keeping the dog's respiratory tissues moist. Dogs with kennel cough should drink plenty of water to help prevent dehydration. Restriction of exercise will help decrease the irritation of the airways.

Prevention:

A vaccine is available that helps the dog's body develop immunity to the different viruses and bacteria that commonly cause kennel cough. There is an intranasal vaccine that provides excellent local protection against the disease in the nose, mouth, and throat. This vaccine needs to be given at least three days before a dog is housed in an animal group facility, and should be repeated in dogs at risk every six to 10 months. In addition, another vaccine, given as an injection under the dog's skin, can be used as a yearly booster. Proper nutrition and routine de-worming also will help keep the animal healthy so its immune system is strong enough to fight off disease. To decrease the spread of the disease, kennel personnel should ensure that dogs with a persistent cough are kept in isolation.

***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.

Canine parvovirus type 2, canine parvoviral enteritis

Parvo

Affected Animals:

Dogs. Doberman pinschers, rottweilers, pit bulls, English springer spaniels, and Labrador retrievers are especially susceptible.

Overview:

A highly contagious viral illness that usually affects young puppies, parvovirus is transmitted from one dog to another via the infected animal's feces. Parvovirus works by temporarily destroying the lining of the intestinal tract so that very little or no food or liquid can be absorbed. As a result, dogs that become infected with parvovirus may experience bloody diarrhea, severe vomiting, weight loss, and fever. In addition, because parvovirus also affects the immune system, limiting it from producing the white blood cells that protect against infection, dogs with the virus may develop other diseases.

It is rare for an adult dog more than two years of age to get sick from parvovirus. Rather, puppies are the most severely infected by the disease, and without appropriate medical attention, they may not survive the illness. However, there is a vaccine against parvovirus that should be given to puppies as a series early in their lives, and repeated every year thereafter. With appropriate medical attention, most of these dogs will survive, but the cost of treatment is much more expensive than the cost of proper vaccination. In addition, keeping the environment free of feces can deter the spread of parvovirus, as feces can remain infective within grounds for several months.

Clinical Signs:

Clinical signs include diarrhea that may contain blood, vomiting, depression, anorexia, dehydration, weight loss, abdominal discomfort, and sometimes fever with sepsis, or bacteria within the bloodstream. The diarrhea sometimes will be absent for the first 24 to 48 hours of illness. Bloodwork results may reveal a neutropenia, or low numbers of white blood cells, and hypoalbuminemia, which is a decreased amount of a protein called albumin within the blood.

Diagnosis:

Often, diagnosis is suspected based on the history and physical exam findings. A complete blood count, which measures the number of white blood cells, red blood cells, and platelets, often will show an insufficient number of white blood cells. A parvovirus test, performed using a fecal sample, shows the presence of the shedding virus in the feces. Occasionally, a false negative result can occur if the virus has not yet begun to shed in the feces; thus, dogs that test negative often are re-tested if the veterinarian suspects parvovirus.

Prognosis:

For puppies that receive medical attention and survive the first two or three days of treatment, the prognosis is good to excellent. Puppies between the ages of six to 18 weeks that do not receive treatment have a poor prognosis

for survival. Older animals have a better prognosis than puppies and tend to require a briefer period of hospitalization. Ultimately, however, the prognosis is dependent on the individual animal's immune system and the degree of illness.

Transmission or Cause:

Parvovirus is transmitted from an infected dog to another dog most commonly through the fecal-oral route. The virus is shed in the feces typically for two weeks following infection. However, once the virus is within the environment, it can remain infective for months. Highly contagious, parvovirus can infect any dog that enters a contaminated area and has not had proper vaccinations. Some dogs do not develop symptoms of parvovirus; instead, they are carriers of the disease, shedding infective feces for a year or more.

Treatment:

The treatment of parvovirus is supportive care because there is no cure. Fluid therapy, usually given intravenously at a veterinary hospital, is critical in preventing dehydration and replacing fluids lost through vomiting and diarrhea. Animals typically are hospitalized and kept on fluid therapy for several days, until they are able to hold down water and food. Food and drink should not be given for 24 to 72 hours to allow the intestines time to recover. Fluids given under the skin can be beneficial as well, but there is a risk of tissue damage and cell death, or necrosis and infection through repeated skin injections.

A veterinarian usually will give the dog antibiotics to prevent infection due to bacteria. Antiemetic medications, beneficial in preventing nausea and vomiting, may be given as well. Antacids can be given to prevent damage to the esophagus from vomiting acidic fluids. With quick, aggressive medical therapy, the majority of animals survive.

Prevention:

The best prevention is proper sanitation of the environment and vaccination of young puppies. Vaccines should be given at six, nine, 12 and 16 weeks of age. Because they are more susceptible to parvovirus, certain breeds such as Doberman pinschers, rottweilers, pit bulls, English springer spaniels, and Labrador retrievers will need an additional vaccine again when they are 20 weeks of age.

Even when vaccines are administered properly and according to schedule, animals may become infected by parvovirus if they live within a contaminated environment. Because antibodies from the mother can inactivate the vaccine until the puppy is 16 to 18 weeks of age, preventing contact with infected animals or contaminated environments is critical. The use of dilute bleach (1:32) will kill the virus and is an effective cleaning

agent. Always use cleaning products in well-ventilated areas. Keep all infected animals in strict isolation and prevent transmission of fecal material from one area to another.

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.