

Heartworms (*Dirofilaria immitis*)

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The actual number of infected cats and dogs in the United States is unknown. The infection rate in cats is probably much lower than that of dogs, since cats are not an ideal host for *Dirofilaria immitis*, the heartworm.

What are heartworms?

Heartworms belong to the same class of worms as roundworms. In fact, they look a bit like roundworms, but that is where the similarity ends. Heartworms spend their adult life in the right side of the heart and the large blood vessels connecting the heart to the lungs.

Heartworms are found in cats, dogs, and ferrets. They also occur in wild animals such as California sea lions and black bears. They have rarely been found in people.

How do cats become infected with heartworms?

Adult heartworms lay very tiny larvae called microfilariae. The microfilariae live a month in a cat's bloodstream versus three years in dogs. These microfilariae enter a mosquito when it sucks blood from an infected animal. In 2-3 weeks, the microfilariae develop into larger larvae in the mosquito and migrate to the mosquito's mouth.

When the mosquito bites another animal, the larvae enter the animal's skin where they live for 3 months and grow to a size of 3 inches. The larvae then migrate to the heart where they grow into adults, sometimes reaching a length of 14 inches. The time from when an animal was bitten until adult heartworms develop and lay microfilariae is about 6 months.

Unlike dogs, who can have up to several hundred heartworms in their hearts and vessels, infected cats usually have only 1-4 worms. The worms in cats tend to live only one or two years compared to 5 years in dogs.

Many times, infected cats will not have microfilariae in their bloodstreams, and if they do, the microfilariae usually live only one month.

What damage do heartworms cause?

The adult worms can obstruct the different chambers of the heart and the various large blood vessels leading to and from the heart and lungs. First, the right pumping chamber (ventricle) of the heart and the large pulmonary artery leading from it to the lungs becomes enlarged as the worms take up space. If worms die, they may follow the flow of blood into smaller vessels in the lung and obstruct those vessels.

In severe infections, the worms can also block the large vein (vena cava) bringing blood to the right side of the heart. As the blood backs up, the liver becomes enlarged and damaged.

Serologic tests have now been developed to detect antibodies (proteins to fight off the 'invaders') the animal makes against heartworms. This is the test most commonly used in cats. This test will be positive even if only one male worm is present. But this test has a downfall, too. Although it is very good at giving positive results when an infection is present, false positive tests are more common with this test than the antigen test. A false positive result means the test result is positive when no infection is present. One in every 200 antibody heartworm tests in cats may be falsely positive.

What kinds of medications are available to prevent heartworm infection?

There is only one heartworm preventative approved for use in cats. It contains ivermectin and is marketed as Heartgard for Cats. It is given monthly and prevents heartworm disease and controls hookworms in cats. It can be given to kittens 6 weeks of age and older. Cats should be tested before they are started on a preventative, but experts do not agree on how often a cat that is on a preventative should be tested. But the rate of false positive test results is high (one in every 200 tests).

A positive antibody test in a cat could mean the cat has adult worms. It can also mean the cat had adult worms. It is felt that many cats that acquire the heartworm larvae through a mosquito bite are able to kill the larvae before, or soon after they develop into adult worms. A cat that has managed to clear itself of a heartworm infection will still have antibodies in its blood. Cats with a positive antibody test should be tested with an antigen test. If that test is positive, the existence of an active heartworm infection is quite certain. If it is negative, we still are not sure of the cat's status. The cat could be infected with only one male worm, for instance.

The question often arises, 'My cat is a totally inside cat. Should I still consider a prevention program?' The answer varies depending on whom you ask; it is a controversial topic. The risk of infection to a totally indoor cat is small, but not zero. Mosquitoes can come indoors, so indoor cats could still be bitten prey. The possibility of exposure is still there, especially in geographic areas with a lot of heartworm disease in dogs. Discussing your options with your veterinarian is the best approach.

What are the signs of heartworm infection and how is it diagnosed?

Signs of heartworm disease in cats are similar to those in dogs: rapid breathing, coughing, decreased appetite, loss of weight, and listlessness. We may also see vomiting, blindness, and seizures. In some cases, death can occur. On the other hand, some infected cats show no signs at all.

Before any treatment for heartworm infection in a cat is started, it must be verified that the cat actually has an active infection. Because of the difficulty in interpreting test results in cats, as described above, radiographs (x-rays) and special diagnostic tests of the heart are performed to help confirm the diagnosis. Unlike dogs, enlarged pulmonary arteries are usually NOT seen in cats with heartworm disease.

How is heartworm infection treated?

If a cat has a confirmed heartworm infection, but is not showing marked signs of the disease, it is generally recommended that no treatment be given. Such cases can be monitored every 6 months through radiographs. The respiratory signs in these cats often respond to low doses of prednisone. This drug has no direct effect on the heartworms, it just helps reduce the signs of disease.

Generally, treatment is only attempted in cats that have clinical signs that do not respond to prednisone or other supportive measures. The only approved treatment for heartworm disease in cats is the arsenic-containing drug, thiacetarsamide sodium (Caparsolate®). It has to be given in the vein through a catheter. If any drug gets outside of the vein, severe tissue damage could occur. Some cats become quite ill from this drug, and therapy sometimes has to be stopped. Most cats have to be hospitalized for the several days of treatment.

Treatment in cats is riskier than in dogs. The possibility of a pulmonary embolism (obstruction of the vessels to the lung by dead worms) is much greater in cats. This complication can be expected in 1/3 of the cats treated.

Again, the signs of an embolism include fever, cough, coughing up blood, and even heart failure. Cats treated with Caparsolate® must be kept very quiet during the treatment and for 2-4 weeks thereafter. Follow-up testing after treatment should be performed.

Surgical removal of heartworms from some cats may be necessary.

