

Heartworm Disease: A Q&A

FACTS ON THIS VERY DANGEROUS DISEASE

By Freddie Ann Hoffman (??)

What is "heartworm disease?"

Heartworm disease (dirofilariasis) is a parasitic infection caused by the worm *Dirofilaria immitis*. It is a serious and often fatal disease in ferrets. The infection also occurs in other animals, including dogs, cats, coyotes, foxes, wolves, sea lions, and even humans.

Why are these parasites called "heartworms?"

Adult heartworms live in the heart and pulmonary arteries of animals. They have been found in other areas of the body, but this is unusual. In an animal, the worms can survive up to five years.

The female worm can grow up to 14 inches (2.3 to 5.5 cm) long and 1/8 inch (5 mm) wide; the male is about half the size of the female. Infestations in ferrets can range from 1 to 30 adult worms. Female heartworms can produce millions of young, called microfilaria, which circulate in the bloodstream

How is heartworm disease spread?

Heartworms are transmitted through mosquito bites. As many as 30 species of mosquitoes can transmit heartworms. When a mosquito bites an infected animal, it ingests microfilaria. For the next 10 to 50 days, the microfilaria develop into an advanced larval stage, at which point they become infective. When the mosquito bites an uninfected animal, it transfers the microfilaria to the subcutaneous tissues. For two to three months, the microfilaria move through the tissues of the new host, maturing as they travel. Once the microfilaria reach sexual maturity, the worms enter the animal's bloodstream and

are carried to the heart, pulmonary arteries, and other organs, where they reproduce, thereby completing the full life cycle.

The number of infected animals and the length of the mosquito season correlate directly with the incidence of heartworm disease in any given geographic area.

Can an infected ferret transmit heartworms?

Not directly. The disease is not spread from animal to animal. It requires the mosquito, which is called an "intermediary host," for transmission of this parasite.

Where is heartworm disease found?

Heartworm disease occurs all over the world. In North American, the disease—once limited to the Southern regions—is now found in most regions of the U.S. and Canada, particularly where mosquitoes are prevalent.

What are the signs of heartworm infection?

Although signs of infection may not occur immediately in the ferret and are often overlooked, the disease progresses more rapidly in the ferret than in the dog. This

may be due to the relative size of the animal with regard to the size of the worms. Infected ferrets can present with coughing, shortness of breath, rapid breathing, lack of appetite, weight loss, weakness, listlessness, and loss of stamina. Heartworm disease can be confused with bacterial pneumonia, congestive heart failure, or lymphoma in the lungs.

On examination, the ferret may have pulmonary rales (harsh lung sounds), holosystolic heart murmur, ascites (fluid in the abdomen), and fluid in the thoracic cavity.

Cases of sudden death may also be due to heartworm disease. Therefore, any ferret not taking heartworm preventive that presents with difficulty breathing (dyspnea) or fluid in the lungs (pulmonary edema or pulmonary effusion) should be tested for heartworm infection.

How do the worms affect the body?

Adult worms damage organs by clogging the heart and major blood vessels. This disrupts organ function and the body's oxygen supply. In addition, the body's



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immune system responds to both adult worms and microfilaria, resulting in the formation of antigen-antibody complexes. Complexes are filtered by the tiny blood vessels (capillaries) in the lungs, liver, and kidneys, where they lodge, stimulating an inflammatory response leads to organ failure.

How is heartworm disease diagnosed?

In most cases, diagnosis can be made by a blood test that can be performed in the veterinary clinic. Additional diagnostic procedures may be needed to assess the extent of the infection prior to intervention (see below).

Serological test for antigens to adult heartworms: This test, which detects antigens (proteins) produced by adult female heartworms, is the most widely used test. It is performed on a blood sample. Serologic testing can be positive *even if the animal does not have any microfilaria in the blood*, which occurs about 20 percent of the time. There are, however, two occasions when a serological test may not be positive when the animal is actually infected:

1. There are too few worms to produce sufficient antigen to be detected by the test.
2. All of the worms are male—male worms do not test positive on these tests.

Newer tests, such as the IDEXX Snap heartworm antigen test (IDEXX Laboratories, Inc., www.idexx.com), are much more sensitive than older types of serological tests. These tests are able to detect burdens of one or two worms. The IDEXX test is an "in-clinic, single pet-side test" that uses the ELISA technology to

detect low worm burdens.

Blood test for microfilariae: Microfilaria can be seen under a light microscope. For this test, a drop of blood is smeared into a thin layer on a glass slide and viewed under a microscope. Seeing microfilaria on the slide is a positive result. The higher the number seen, the more advanced the infection. It should be noted, however, that greater numbers of microfilaria are seen generally in the summer months and in the evening.

Blood chemistries: Complete blood counts (CBC) and blood tests for kidney (BUN, Creatinine) and liver (ALT, bilirubin) function may give an indirect indication of the presence of heartworm disease, if the tests are abnormal. These tests are also performed on animals after diagnosis of heartworms to determine the body's function prior to starting treatment.

Radiographs (X-rays): Increased heart shadow on a chest film and swelling of the large artery leading to the lungs from the heart is generally considered presumptive evidence of heartworm disease. Radiographs may also reveal the condition of the heart, lungs, and vessels. This information can help predict complications that can occur during therapy.

Electrocardiogram: An electrocardiogram (ECG or EKG) is a tracing of the electrical currents generated by the heart. An EKG is most useful to determine the presence of abnormal heart rhythms, which can occur in heartworm disease.

Echocardiography/ultrasound of the heart: An echocardiogram can show the heart chambers and, in some cases, heartworms themselves. However, ultrasounds



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are less accurate in ferrets, producing both false negative and false positive results. In two ferret cases, although heartworms were thought to be seen on ultrasound by experienced operators, worms were not confirmed by either antigen tests or necropsies. Conversely, two cases of heartworms diagnosed by antigen test and confirmed on necropsy were not seen on ultrasound.

Pathology (usually at postmortem): Ferrets that show signs of heartworm disease will often have severe inflammation of the pulmonary blood vessels (pulmonary arteritis) as well as inflammation in the lung (an eosinophilic or granulomatous pneumonitis) on microscopic evaluation. There may also be evidence of liver cirrhosis and glomerulonephritis in the kidney.

Should heartworms be treated in ferrets?

Unlike the dog, which can be successfully treated for heartworms 95 percent of the time, direct treatment of heartworm in ferrets has been shown to end in a high rate of death. Drugs used to kill adult heartworms cause the worms to die in the animal's body. As the worms break up, their remains

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