

# Heartworm Disease in the Dog

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Heartworm disease in the dog is an ailment of the heart and pulmonary arteries caused by the presence of adult worms of the nematode *Dirofilaria immitis*. These thin, thread-like worms reach a size of 10 to 12 inches long. The disease results in interference with blood circulation and the reaction of the heart and lungs to the presence of the adult worms. The most common signs of heartworms are a cough, shortness of breath, lack of energy, and collapse. After locating in the heart and pulmonary arteries, the adult heartworms produce a large number of microscopic offspring, microfilaria, which circulate through the blood stream.

The disease is transmitted by the mosquito. The mosquito picks up the microfilaria from an infected dog. After a short development period, the microfilaria become infective and are injected into another dog. These infective microfilaria migrate to the heart and arteries of the new host where they become adults in approximately six months. The microfilaria must undergo the change in the mosquito before they become infective to another dog; hence the disease cannot be transmitted directly from dog to dog.

The geographic distribution of nematode *Dirofilaria immitis*, or canine heartworm, is cosmopolitan. The parasite is reported to be widespread in dogs and various wild carnivores throughout the world.

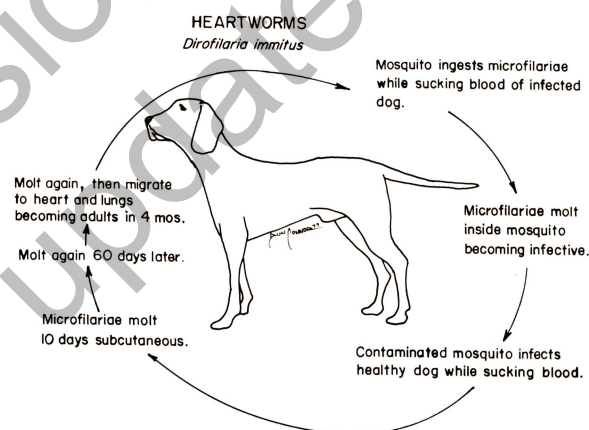
Although heartworms have been reported, man is considered to be an unsuitable host. The parasite apparently cannot complete its life cycle and produce microfilaria in the human.

Heartworms also occur in domestic cats. However, the true incidence in the feline is unknown. Since microfilaria has been reported in only about 18 percent of infected cats, felines are eliminated as a serious reservoir for the parasite.

Although at least 11 different species of filarial parasites have been reported in dogs from various regions of the world, only two are considered important in the United States. In addition to *Dirofilaria immitis*, *Dipetalonema reconditum*, a flea-transmitted filarial worm that lives harmlessly in subcutaneous tissue (right under the skin), is commonly found in the dog in the United States. Although *Dipetalonema* is not considered to cause serious disease, the presence of microfilaria from this worm does tend to confuse the diagnostic picture.

## Diagnosis

Diagnosis is based on the presence of microfilaria in the blood stream of the dog. This is done by obtaining a venous blood sample from the dog and performing a concentration



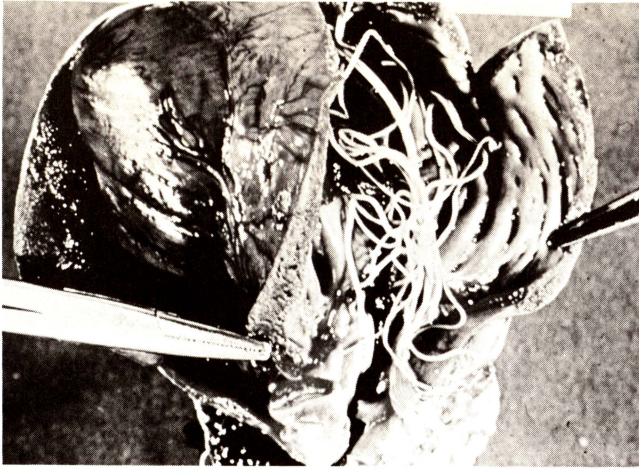
test. There are two equally good concentration methods used by veterinarians for the microscopic demonstration of the immature form in the blood of an infected dog. These methods are highly successful on 85 to 90 percent of the dogs infected with the parasite. It has been estimated that 10 to 24 percent of infected dogs do not have circulating microfilariae. This presents the veterinarian and dog owner with a difficult diagnostic problem.

Other diagnostic procedures must be used to determine the infected status of microfilaria-free dogs suspected of heartworm disease. Radiography and angiography are valuable aids in diagnosing pulmonary and cardiac changes in heartworm disease. Other laboratory tests and methods of cardiac evaluation are also valuable aids for diagnosis.

## Symptoms

Clinical symptoms generally do not occur early in the disease. The animal may harbor the parasite for years before external symptoms develop. The first sign is often a non-productive cough made worse by exercise. The dog will tend to tire quickly on exercise. Difficulty in breathing, fainting, and other signs of cardio-pulmonary disease will become more frequent once the disease has advanced to this point. Secondary liver and kidney disease are relatively common occurrences in advanced heartworm disease in the dog.

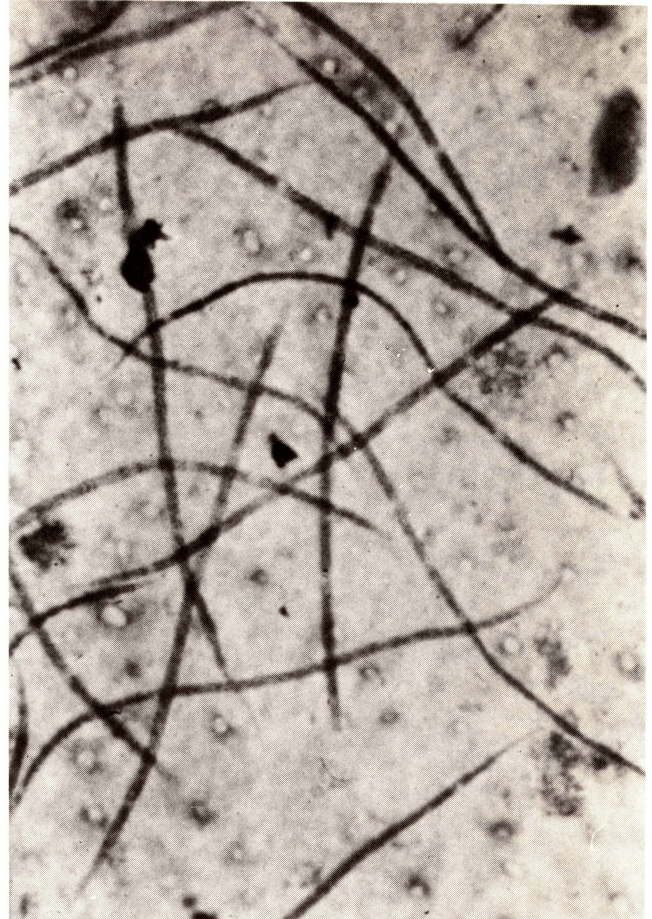




The right chamber of the heart opened to expose adult heartworms.



A fresh smear of blood under the microscope shows microfilaria, the offspring of adult heartworms.



Microscopic examination of concentrated blood sample with numerous microfilaria.

## Treatment and Prevention

Treatment of *Dirofilaria immitis* involves different drugs in elimination of the adult parasite and the microfilaria. Thiacetarsamide sodium given intravenously is still the only recognized adulticidal agent, while dithiazanine iodide given orally is used for eliminating microfilaria. Diethylcarbamazine given orally on a daily basis during the mosquito season and for one to two months after is the only preventive drug currently recognized. Diethylcarbamazine should be given only to heartworm-free dogs. Extreme care should be exercised during and following the administration of thiacetarsamide sodium. The usual procedure is to hospitalize the dog for treatment. Enforced rest for a minimum of six weeks following thiacetarsamide sodium is an essential part of the therapy program.

Treatment failures using thiacetarsamide may occur because of improper dosage or inability of the sick animal to tolerate the drug. The drug is only effective against the adult

worms; hence if many are still in the fourth larval stage and immature adult stages, the percentage of kill will be reduced.

## Summary

It takes approximately five to seven months for the worm to mature and shed microfilaria after being deposited by the mosquito. This must be considered in outlining a treatment or blood examination schedule when the dog is not constantly exposed to heavy mosquito populations.

Because symptoms do not occur early in the disease, periodic checking of the blood for microfilariae presence is advised. A minimum of one sample per year, preferably in April or May, is advised for dogs in Missouri. Treatment is complicated and often hazardous to animals with overt symptoms. Prevention is possible with a daily oral administration of diethylcarbamazine.

