

Heartworms (*Dirofilaria immitis*)

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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 dogs, cats, 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 dogs become infected with heartworms?

Adult heartworms lay very tiny larvae called microfilariae. The microfilariae can live up to three years in the dog's bloodstream. 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. Severely infected dogs can have up to several hundred heartworms in their hearts and vessels. Adult worms in dogs usually live up to 5 years. Thirty to eighty percent of infected dogs have microfilariae, and the microfilariae can live up to 2 years.

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.

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

Dogs with heartworm infections may show decreased appetite, loss of weight, and listlessness. Often, the first sign of the disease is a cough. Animals with heartworm disease will start to show lack of endurance during exercise. Some will accumulate fluid in their abdomen (ascites) that makes them look pot-bellied. In rare situations in which animals have many adult worms, the animals may die of sudden heart failure. Antigen testing is performed to identify dogs infected with *D. immitis*. Because blood tests are not always accurate as described above, we need to interpret test results in relation to the history and the symptoms the animal is showing. Radiographs (x-rays) are often taken to look for typical changes in the heart and lungs caused by *D. immitis*. Changes include enlargement of the pulmonary artery and the right ventricle. Certain types of cells (eosinophils) may increase in the blood or secretions from the lungs in heartworm infections. These additional findings can all help support the diagnosis.

What kinds of medications are available to prevent heartworm infection?

Medications used to prevent heartworm infections are called preventatives. The first thing to remember is that preventatives are NOT used to kill the adult worms. Special drugs called adulticides must be used to kill the adults. These drugs will be discussed in the treatment sections. Some preventatives can cause severe problems if given to animals with adult heartworms. Follow the recommendations of your veterinarian and the manufacturer of your preventative in regard to testing prior to giving the preventative. A number of heartworm preventatives for dogs are on the market. Some are given daily, others, monthly. Recently, an injectable preventative is available that is given once every 6 months. Some heartworm preventatives, or drugs that are combined with them, will control other parasites.

Testing dogs on a monthly preventative, given seasonally: Remember that the time interval between when the dog is infected with microfilaria and the development of the microfilaria into adult worms is about 6 months. If we perform an antigen test less than 6 months after the last possible bite from an infected mosquito, immature heartworms may be present but the antigen test will not detect them since it only detects adult worms. Therefore, it is advised that for dogs on seasonal preventative, any testing should be performed no earlier than 6.5 months after the last possible date of transmission (the last date preventative medication was given). Many veterinarians believe that in areas with very short mosquito seasons, and for clients who carefully administer the monthly preventatives and do not miss any doses, testing at 2-3 year intervals is sufficient. It is recommended, however, that a test be performed after the first year the dog has been on the preventative.

A daily or monthly preventative should be given to all dogs. Remember that mosquitoes can get indoors, so even though your dog may not go outside, the dog is still susceptible.