

## **Cats Get Heartworm Too!**

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Feline heartworm (HW) was first described in the 1920s; awareness has increased greatly since the introduction of heartworm preventative medication for cats in 1997 and the associated marketing campaigns. Feline HW remains difficult to diagnose, yet a fully preventable disease.

Heartworms (*Dirofilaria immitis*) are small thread-like worms that live in the blood systems and hearts of cats and dogs as well as other species, such as ferrets, wolves, and foxes. The cat is more resistant to heartworm than other animals, but still susceptible. Heartworm is transmitted by mosquitoes, and is found in almost all areas where mosquitoes are found. For example, heartworm has been found in all areas of the United States except Alaska, and in warmer areas of Canada.

### **How Do Cats Get Heartworm?**

Cats are infected with HW in the same way as dogs, but far fewer larvae mature to adulthood (average 15 adult worms in dogs and 1-3 in cats in endemic areas). This doesn't mean that cats are less affected by heartworm disease however, since the small body size of the cat can be adversely affected by only one or two worms.

It is difficult to estimate prevalence of feline HW for several reasons – there is no perfect test, infections may go unnoticed, and some cats die acutely without a diagnosis. The best available data suggest that feline HW is present at about 5% - 15% of the canine rate in endemic areas. Certainly wherever canine heartworm is found, feline heartworm is present as well.

Some species of mosquitoes will feed on both cats and dogs. Mosquitoes become infected when they bite a dog with immature worms called microfilaria. When the infected mosquito then bites a cat, the microfilaria enter through the bite and develop in tissues under the skin. The immature worms go through several developmental stages, and find their way to a blood vessel. Via the blood vessels, they are carried to the arteries in the lungs, where they cause an intense inflammatory reaction. Many immature worms die at this point, causing even more inflammation.

Worms that survive to adulthood primarily live in the pulmonary artery, although sometimes they may be found in the right side of the heart. It takes about 8 months to produce adult worms from the time the mosquito bites and infects the cat. Adult female worms are about 21 cm in length, and adult males are about 12 cm in length. If both male and female worms are present, they produce live young – microfilaria – that live in the animal's bloodstream, waiting for a mosquito to come along and take a blood meal. Cats rarely produce microfilaria, partly because they harbor few adult worms and partly because their immune system inhibits the development of microfilaria. Therefore, cats rarely transmit HW to other species via mosquitoes.

### **What Problems Are Caused by Heartworm in Cats?**

Many cats will have no clinical signs of HW disease and they will spontaneously eliminate the infection without incident. Other cats may have clinical signs associated with infection at two possible time points:

1) Upon arrival of immature worms in the pulmonary arteries in the 3- to 6-month post-infection period. The high mortality of immature worms stimulates a severe inflammatory response in the lungs and the associated arteries. Lung lesions may be long-lasting. The clinical response in the cat is termed heartworm-associated respiratory disease (HARD) because respiratory signs predominate (difficulty breathing, rapid breathing, and cough). The clinical signs may be transient or intermittent. Clinical signs subside as the worms mature. Many cats with HARD are misdiagnosed as having asthma or bronchitis.

2) Upon death of adult worms, with release of toxins leading to inflammation and clot formation. Clinical signs include rapid onset of respiratory difficulties or sudden death (occurs in 10% or more of HW-infected cats). Even the death of 1 adult worm can be lethal by causing circulatory collapse and respiratory failure. Adult worms are able to suppress the cat's inflammatory response and so actually cause few problems until they die in 1 to 2 years.

Nonspecific clinical signs associated with feline HW include chronic vomiting (present in 25%-33% of cases), lethargy, loss of appetite, and weight loss. Less common signs caused by worm migration to other tissues include fluid in the abdomen or chest, and neurological signs (loss of balance, seizures, collapse, and blindness). Signs of heart disease or heart failure are very uncommon in cats with HW, compared to dogs.

### **How is Heartworm Diagnosed in Cats?**

Diagnosis of feline HW may be difficult. Cats rarely have the infective stage of HW (microfilaria) in their bloodstreams, unlike dogs, so certain tests such as filtration or IFA testing are not recommended. No single diagnostic test can detect feline HW at all life stages of the worm. The most commonly available tests are antibody tests (that detect antibodies produced by the cat in response to HW) or antigen tests (that detect actual adult worms). Combining antigen and antibody testing achieves more reliable results than either test alone.

A positive HW antibody test means the cat has been exposed to the early stages of HW, but may or may not currently be infected. A negative test does not rule out HW infection. The different tests available also vary widely in sensitivity, as each brand may detect a different stage of larval development.

HW antigen testing detects proteins associated with the reproductive tract in mature female worms, so that a positive test confirms the presence of at least one adult female HW. A negative antigen test does not rule out infection with adult worms as antigen levels may be below the detection ability of the test. Antigen tests miss the early stages of HW infection and don't detect the immature worms that cause HARD.

The American Heartworm Society ([www.heartwormsociety.org](http://www.heartwormsociety.org)) has produced guidelines for testing cats:

- Healthy cats in HW areas should be screened with both antigen (for adult worms) and antibody (for immature worms) tests
- For cats with clinical signs compatible with HARD, use both an antigen and antibody test, and chest x-rays to assess severity of lung disease
- Testing may be used to monitor the progress of cats previously diagnosed with HW
- Testing cats before administering preventative medication helps increase awareness about local risk potential and will establish a baseline reference in case the cat must be retested
- Cats with positive HW tests may still be given preventive medication to avoid infection with more worms

Certain changes in lung blood vessels may be seen on x-ray in about 50% of HW-infected cats. Other lung changes are very similar to those seen in feline asthma, and may be impossible to tell the two diseases apart using only x-rays. In cats with positive antigen tests, indicating the presence of at least one adult worm, ultrasound may be used to confirm the diagnosis and locate the worm.

### **How Are HW-Positive Cats Treated?**

Heartworm positive cats with no clinical signs of disease, but with changes visible on chest x-rays, should be monitored every 6 to 12 months with repeat antigen and antibody testing, and x-rays. Recovery is indicated by improvement in x-ray signs and conversion of a positive antigen test to negative. It may be prudent to administer prednisone to cats with x-ray signs of disease whether or not they have clinical signs of illness, although this is controversial. Prednisone helps control the intense inflammatory response to HW in the cat's lungs. Whenever antibody- or antigen-positive cats have clinical signs, prednisone should be administered on a decreasing dose schedule over a period of about one month. The effect of treatment should be assessed by clinical response and x-rays. Cats with recurrent signs can be retreated.

Unlike in dogs, there are no safe drugs that will kill adult heartworms in cats. Surgical removal of adult worms is possible, but prone to serious complications, such as shock and death. In most cases, veterinarians opt to wait and monitor infected cats until the adult HW dies and the cat eliminates the infection.

### **Feline Heartworm Is Preventable!**

Only 4% of cat owners give HW preventives, compared to 59% of dog owners. Even indoor cats in endemic areas should be on HW prevention year-round. In one North Carolina study, 28% of HW-positive cats were considered indoor only. Four drugs are currently licensed for prevention of feline HW by preventing development of immature worms in body tissues. Two products are oral: ivermectin (Heartgard; Merial), milbemycin (Milbemax, Interceptor; Novartis); and two are topical: selamectin (Revolution; Pfizer), moxidectin (Advocate; Bayer).

### **The Five Myths About Feline Heartworm** (from [www.knowheartworms.org](http://www.knowheartworms.org))

- 1: Heartworm is not just a disease of dogs. Heartworm causes different disease in cats than in dogs, but it is equally serious.
- 2: Indoor cats can get heartworm too. It only takes one mosquito bite to infect a cat, and because mosquitoes can and do get indoors, both indoor and outdoor cats may be at risk. In heartworm-endemic areas, both indoor and outdoor cats should take preventative medication.
- 3: Heartworm does not cause heart disease in cats. While heartworm can cause cardiovascular disease in dogs, it causes respiratory disease in cats.
- 4: Despite the fact that cats get few adult heartworms, they may still suffer serious illness because of the inflammation associated with immature worms.
- 5: Diagnosis of heartworm in cats is more difficult than in dogs, but a positive antigen test is a reliable indicator that mature adult worms are present. Since diagnosis may be difficult, prevention is even more important.