

# CCU DISEASE HUNTERS

## HEART WORM

The following information was taken from the [CDC website](#):

### Overview



*Dirofilaria* are long, thin parasitic roundworms that infect a variety of mammals. Infection is transmitted by mosquito bites. There are many species of *Dirofilaria*, but human infection is caused most commonly by three species, *D. immitis*, *D. repens*, and *D. tenuis*. The main natural hosts for these three species are dogs and wild canids, such as foxes and wolves (*D. immitis* and *D. repens*) and raccoons (*D. tenuis*). *D. immitis* is also known as "heartworm." *D. repens* is not found in the United States, and *D. tenuis* appears to be restricted to raccoons in North America.

Dirofilariasis is the disease caused by *Dirofilaria* worm infections. In dogs, one form is called "heartworm disease" and is caused by *D. immitis*. *D. immitis* adult worms can cause pulmonary artery blockage in dogs, leading to an illness that can include cough, exhaustion upon exercise, fainting, coughing up blood, and severe weight loss.

### Symptoms

Human infections with *D. immitis* can result in areas of inflammation induced by dying adult worms in pulmonary arteries that appear as coin lesions on chest x-rays. Coin lesions can also be caused by cancer and other serious diseases, and a coin lesion discovered accidentally on chest x-ray usually leads to an invasive procedure to learn the cause. Most human cases of pulmonary dirofilariasis are diagnosed from samples taken during these procedures. Most reported cases of *D. immitis* infection in humans have been in persons with no symptoms. People with symptoms can have cough (including coughing up blood), chest pain, fever, and pleural effusion (excess fluid between the tissues that line the lungs and the chest cavity). Rarely, *D. immitis* worms have been found in humans at outside the lungs, including the brain, eye, and testicle. When *D. repens* and *D. tenuis* infection is reported in humans, it is generally as the cause of nodules under the skin, but on occasion, worms are found in the conjunctiva.

### Who is at risk

Dirofilariasis is found throughout the world where *Dirofilaria* species are common. In the United States, canine dirofilariasis has been reported from all states, and *D. tenuis* in raccoons is common in many areas where raccoons are found. Canine and human



dirofilariasis are most prevalent in eastern and southeastern states, although rates are increasing rapidly in a number of western states. *D. immitis* is the *Dirofilaria* species most commonly reported to cause dirofilariasis in humans in the United States. *D. repens* is the *Dirofilaria* species most commonly reported to cause dirofilariasis among humans in Europe. One or both of these species have been found to cause human dirofilariasis in other parts of the world.

### How it spreads

The definitive mammalian hosts for *Dirofilaria* are primarily domestic dogs, wild canids (such as wolves and foxes), and raccoons. In these hosts, sexually mature worms produce microfilariae that circulate in the blood and are ingested by mosquitoes during a blood meal. In mosquitoes, the microfilariae develop into larvae that migrate to the proboscis (the long, tubular part of the mouth of the mosquito that punctures the skin during a blood meal), where they are ready to infect another host during a blood meal. Several types of mosquitoes are capable of transmitting *Dirofilaria* infection, including *Aedes*, *Anopheles*, and *Mansonia*.

Humans and a wide range of other mammals are accidental hosts that play no role in the transmission of *Dirofilaria*. In these hosts, *Dirofilaria* larvae can develop into adult worms but the worms remain sexually immature and no microfilariae are produced.

### Resource

[DPDx - \*Dirofilaria\* life cycle](#)

### Prevention

Dirofilariasis can be prevented by avoiding mosquito bites in areas where mosquitoes may be infected with *Dirofilaria* larvae. The risk of such mosquito bites can be reduced by leaving as little skin exposed as possible, by the use of insect repellent when exposed to mosquitoes, and by sleeping under an insecticide-treated bednet in areas where *Dirofilaria*-infected mosquitoes bite at night and have access to sleeping areas.

### Diagnosis

In humans, dirofilariasis is diagnosed most frequently by the examination of tissue from areas of inflammation in the lung obtained as part of the diagnostic investigation of coin lesions (small, round abnormalities) on chest x-rays or from the examination of tissue in nodules under the skin. Blood tests are not yet helpful in the diagnosis of dirofilariasis in humans.



## Treatment

The definitive treatment of *Dirofilaria* infection in humans is surgical removal of lung granulomas and nodules under the skin; this treatment is also curative. In many cases, no treatment with medicines is necessary.

*This information is not meant to be used for self-diagnosis or as a substitute for consultation with a health care provider. If you have any questions about the parasites described above or think that you may have a parasitic infection, consult a health care provider.*

## CCU Disease Hunter Screen information

Undergraduate students at Coastal Carolina University working with Dr Paul E. Richardson have developed a genomic based test to detect the parasite Heart Worm using primer specific for two genes in Heart Worm; Cox1 and mitochondrial RNA. Primers were identified from literature that were specific for Heart Worm. In the lab the students refined the method using polymerase chain reaction to amplify small genetic sequences to identify the parasite based on specific size DNA fragments. Mosquitoes (10 per sample) were collected, and DNA was isolated from the samples and screened for Heart Worm. If a band of the expected size was present, that was called a positive result.

**Please Note:** This test only detects the presence of the disease in mosquitoes. Currently, we are studying the factors that are responsible for its presence and what level of parasite is needed to cause disease. This is a research project and not a clinical test. **This test CANNOT determine if there is a threat to the community**, it only determines the presence of the disease in a community. More work must be done before we can make those statements.

If you have any questions, please contact:

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