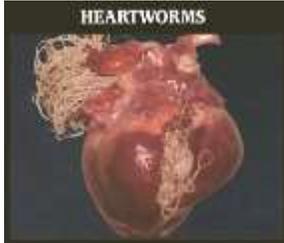
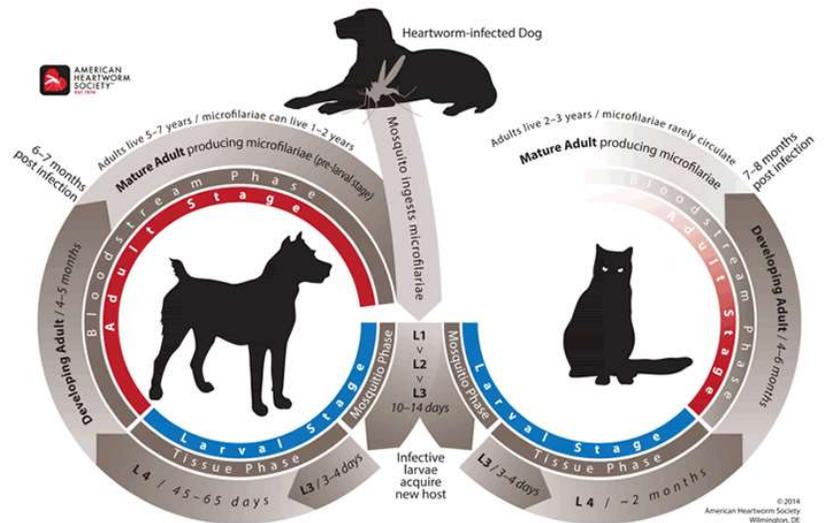


Heartworms

Heartworm Disease, caused by the parasite *Dirofilaria immitis*, is a serious and even life threatening disease that is seen in all 50 states. Dogs are the preferred host of heartworms however cats are susceptible to heartworms as well. Heartworms are transmitted from one dog to another through mosquito bites. Mosquitoes pick up heartworm larva while feeding on an infected dog and deposit them in another dog or cat when they take another blood meal. There are several conditions that have to be met for this to occur. First, the correct species of mosquitoes must be present in the area (not all species of mosquito can transmit heartworms). Second, in order for the heartworm larva to develop in the mosquito the ambient temperature must be above 57°F. Third, there must be infected dogs in the area. And fourth there must be susceptible dogs or cats present. Heartworms are a fairly large parasite, in dogs they can range from 7 to 14 inches long and in cats they can range from 8 to 10 inches long. Heartworms can live for 5 to 7 years in a dog and 2 to 4 years in a cat.



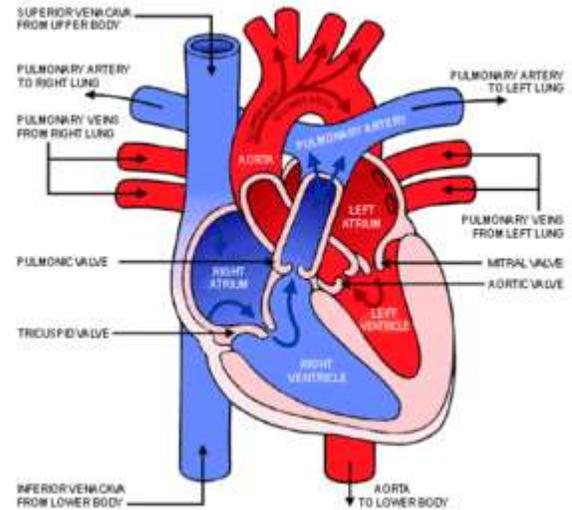
Once in a mosquito the microfilariae go through two different developmental stages and then become capable of infecting a new dog or cat. This developmental period can take a few weeks and depends on environmental conditions. The temperature cannot drop below 57°F during this time frame or either the mosquito will die or the development of the heartworm will stop. Once the microfilariae have gone through the development stages and become the larva capable of infecting a new animal they are deposited on the skin during future feedings by the mosquito. Once on the skin of the dog the larva migrate through the bite wound and into the host animal and go through another developmental stage that lasts one to three days.



After that stage the heartworm larva travels through the tissue for several weeks and goes through yet another developmental stage approximately two months after infection. The heartworms are now known as juveniles and enter the vascular system of the animal and are carried to the pulmonary arteries where they mature into adults and the cycle starts again. It

takes about 6 to 7 months after infection for this cycle to be completed and for microfilariae to be present in the blood stream.

The adult heartworm prefers to live in the pulmonary arteries of the dog. The pulmonary arteries send blood away from the heart to the lungs where it picks up oxygen and then returns to the heart. While the heartworms are present in the arteries they are nourished and fed by the blood passing through the vessels. When both male and female heartworms are present they mate. Heartworms do not lay eggs like other parasites; instead they give birth to live young called microfilariae. These microfilariae are then released into the circulatory system in hopes of having a mosquito ingest them during a blood meal. Microfilariae can live for up to two years in the dog that they were born in and if they have not been picked up by a mosquito they will die off. Microfilariae can be transmitted from mothers to unborn puppies through the placenta, however the puppies will not develop adult heartworms because the heartworms must pass through a mosquito to fully develop.



If there are enough heartworms present the heart has to work extra hard to move blood through the arteries that are clogged with worms. When there are more than 25 worms in a 40 pound dog the worms begin to back up into the right ventricle of the heart. The worms take up a large amount of space in the heart that would normally be used for blood. This means that the heart has to work harder to pump blood to the lungs. When there are 50 worms present the ventricle is completely full and the chamber that receives the blood from the rest of the body, the atrium, begins to fill with worms. When there are over 100 worms present in the heart the entire right side of the heart is filled with worms and there is very little room for blood to be pumped through the heart. Signs of Heartworms can mimic several other diseases. In animals the most common signs are cough, difficulty breathing, weight loss, exercise intolerance, a pale appearance, weak pulse, and/or collapse. Cats tend to present with a cough, difficulty breathing, and/or wheezing.

There are several different types of blood tests available to check for heartworm antigens in dogs and they are highly accurate. There is a blood test available for cats that test for antibody response and is also highly reliable. X-rays and ultrasound can also be used as diagnostic tools to confirm the presence of heartworms or as methods of monitoring heartworm positive animals. It is important to note that testing animals that are under 6 months of age is not beneficial because microfilariae are not yet present in the blood. The presence of microfilariae results in a positive test result when looking at a complete blood count slide. It is highly recommended to test for heartworms every year even if the animal is on a preventative product year round.



Usually all, but the most advanced cases, of heartworm disease can be successfully treated in dogs. After a positive diagnosis, strict cage rest is implemented while phase 1 of treatment begins. Phase 1 consists of twice daily antibiotics to kill symbiotic bacteria that support the heartworm infection for 1 month. During phase 2 a drug called an adulticide that is injected into the muscle through a series of treatments is used to kill the adult worms in dogs. Treatment may be administered on an outpatient basis, but hospitalization is usually recommended. When the dog is sent home, exercise is still limited to leash walking eliminations and cage rest, which can last for an additional two months. This decreases the risk of partial or complete blockage of blood flow through the lungs by dead worms. To prevent re-infection and eliminate microfilaria giving a heartworm preventive product such as Heartgard® is required. Currently, there are no products approved for treatment of heartworms in cats. Cats tend to be more resistant to heartworm than dogs, and often appear to be able to rid themselves of the worms. In cats, veterinarians often are only able to treat the respiratory disease associated with naturally dying worms. Advanced therapy involves ultra-sound guided removal of the actual worm from the heart and lungs in cats.



Heartworms and heartworm disease can easily be prevented with the monthly use of a Heartworm preventative product such as Heartgard®, Revolution®, Sentinel® or Interceptor Plus®. And in this case an ounce of prevention is worth a pound of cure. It is recommended to use a monthly preventative product year round because today's society has become more mobile as have our pets. Even though we live in Wisconsin we may travel to warm southern climates with our pets and can expose them to heartworms even in January. Humans can come into contact with heartworms as well, however we would need to be bitten by an infected mosquito so using mosquito repellents when appropriate is the best way to prevent being exposed to heartworms.

For more information please feel free to contact Cedar Grove Veterinary Services at (920) 668-6212 or info@cgvet.com.

You can also go to the American Heartworm Society website (<http://www.heartwormsociety.org/>), the CAPC website (<http://www.capcvet.org/capc-recommendations/canine-heartworm>) or Veterinary Partners website (<http://www.veterinarypartner.com/>) for more information on heartworms and Heartworm disease.

