

# Heartworm Disease in Dogs

## Basics

### OVERVIEW

- Disease caused by infestation with heartworms
- *Dirofilaria immitis* is the scientific name for the heartworm
- Heartworms are spread through the bite of mosquitoes carrying infective heartworm larvae; the heartworm larvae migrate in the dog's body and reach the heart and blood vessels of the lungs in approximately 6 months; adult heartworms grow to about 12 inches long; adult heartworms reproduce and may release immature heartworms (known as "microfilaria") into the blood of the dog; when a mosquito bites an infected dog, it takes in the microfilaria with its blood meal; the microfilaria undergo development in the mosquito and become infective heartworm larvae, and the life cycle continues

### SIGNALMENT/DESCRIPTION OF PET

#### Species

- Dogs

#### Breed Predispositions

- Medium- to large-breed dogs and those living outdoors
- All unprotected dogs are at risk for getting heartworms in areas where heartworm infestation is common (known as "endemic regions")

#### Mean Age and Range

- Infestation with heartworms can occur at any age; most affected pets are 3–8 years of age

#### Predominant Sex

- Males are affected more often than females

### SIGNS/OBSERVED CHANGES IN THE PET

- Pets often have no signs or exhibit minimal signs, such as occasional coughing (designated as having "Class I heartworm disease")
- Coughing and exercise intolerance associated with moderate lung damage (designated as having "Class II heartworm disease")
- Extreme weight loss, with muscle wasting (known as "cachexia"); low red blood cell count (known as "anemia"); exercise intolerance; fainting (known as "syncope"); and fluid buildup in the abdomen (known as "ascites") may be seen in dogs with right-sided congestive heart failure (right-sided CHF) in severely affected dogs (designated as having "Class III heartworm disease"); the "right side" of the heart is the side of the heart that blood enters from the body (blood that has low oxygen levels) and then is pumped into the lungs to get oxygen; congestive heart failure is a condition in which the heart cannot pump an adequate volume of blood to meet the body's



needs

- Labored breathing or short, rough snapping sounds (known as “crackles”) when listening to the lungs with a stethoscope (known as “auscultation”)—in dogs with severe elevated blood pressure in the lungs (condition known as “pulmonary hypertension”) in Class III heartworm disease or with blood clots in the lungs (known as “pulmonary thromboembolic complications”)
- Rapid heart rate (known as “tachycardia”); fluid buildup in the abdomen (ascites); enlargement of the jugular vein, with possible detection of pulses in the jugular vein; and liver enlargement (known as “hepatomegaly”) indicate right-sided CHF; may be seen in Class III heartworm disease
- Spitting up of blood derived from the lungs due to pulmonary or bronchial hemorrhage (known as “hemoptysis”)—occasionally occurs; indicates severe blood clots in the lungs (pulmonary thromboembolic complications)
- Pale gums and moist tissues of the body (mucous membranes); difficulty breathing (known as “dyspnea”); weak pulses; presence of hemoglobin (the compound in the red blood cells that carries oxygen to the tissues of the body) in the blood (known as “hemoglobinemia”); and presence of hemoglobin in the urine (known as “hemoglobinuria”) are indications of a serious complication of heartworm disease, known as the “caval syndrome”

## CAUSES

- Infestation with heartworms (*Dirofilaria immitis*)

## RISK FACTORS

- Living in areas where heartworm infestation is common (known endemic regions)
- Most common geographic location is in tropical and subtropical zones
- Heartworm disease is common along the Atlantic/Gulf coasts and Ohio/Mississippi River basins; however, heartworm disease has been diagnosed in dogs in all 50 states
- “Outside” dog increases the risk; but “inside” dogs can be exposed to mosquitoes carrying the infective heartworm larvae
- Lack of heartworm preventive medication or lack of routine use of heartworm preventive medication, as directed by your dog’s veterinarian
- Outside air temperature greater than 64°F all day, every day for at least 1 month (related to mosquito life cycle)
- Outside air temperature greater than 80°F every day for 10–14 days (related to mosquito life cycle)

## Treatment

### HEALTH CARE

- Most affected pets are hospitalized during administration of medication to kill the adult heartworms (known as “adulticide treatment”)
- Eliminate immature heartworms (microfilaria) with monthly heartworm preventive medication, as directed by your dog’s veterinarian; Interceptor® may cause rapid decrease in microfilaria numbers (when microfilaria are present) and should be used with caution
- Hospitalization recommended for dogs experiencing blood-clotting problems (thromboembolic complications)

### ACTIVITY

- Severe restriction of activity required for 4–6 weeks after administration of medication to kill the adult heartworms (adulticide treatment)

### DIET

- Moderately restricted sodium diet recommended for dogs with signs of right-sided congestive heart failure

### SURGERY

- Treatment of choice for dogs with signs of the serious complication of heartworm disease known as the “caval syndrome”
- Worm removal from the right side of the heart and main artery to the lungs (known as the “pulmonary artery”) via the jugular vein is highly effective for treating high worm burden (that is, a high number of adult worms), when employed by an experienced veterinarian with the appropriate instruments

# Medications

Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive

- Stabilize pets with right-sided congestive heart failure with medications to remove excess fluids from the body (known as “diuretics”); angiotensin converting enzyme (ACE) inhibitors; cage rest; and moderate sodium restriction before administration of medication to kill the adult heartworms (adulticide treatment); congestive heart failure is a condition in which the heart cannot pump an adequate volume of blood to meet the body’s needs
- Stabilize lung/breathing failure with oxygen supplementation; medications to prevent the development of blood clots (known as “antithrombotic agents,” such as aspirin or heparin); or anti-inflammatory dosages of steroids, depending on the clinical and x-ray (radiographic) findings
- Melarsomine (Immiticide®)—a medication to kill the adult heartworms (adulticide); administered by injection usually one, then a month later, two injections 24 hours apart; a follow-up positive heartworm-antigen blood test result 6 months after the last injection may indicate need for repeat treatment
- Steroids (such as prednisone or prednisolone) may be used to treat inflammation of the lungs due to an allergic reaction (known as “allergic pneumonitis”) for several days prior to administering medication to kill the adult heartworms (adulticide), Immiticide
- Eliminate the immature form of the heartworm (microfilaria) with monthly heartworm preventive medication
- Doxycycline or minocycline has been used by some clinicians prior to administering medications to kill the adult heartworms (adulticide treatment) to eliminate *Wolbachia*, a gram-negative bacteria found in the heartworm that is associated with inflammation of the lungs and kidneys following adulticide treatment

# Follow-Up Care

## PATIENT MONITORING

- Perform a heartworm-antigen blood test—6 months after administering medications to kill the adult heartworms (adulticide treatment)
- Some dogs with persistent, low-grade heartworm-antigen levels may not require retreatment—determined by age, severity of infection, degree of improvement since the first treatment, strength of the positive heartworm-antigen blood test result, and coexistent disease; monthly heartworm preventative medication eventually will kill remaining heartworms in pets with weak-positive heartworm-antigen blood test results (the weak-positive test indicates that most adult worms have been killed by the adulticide treatment)

## PREVENTIONS AND AVOIDANCE

- Heartworm preventive medication should be provided for all dogs at risk of getting heartworms; year-round heartworm prevention is recommended; if seasonal heartworm prevention is used, treat from the beginning of the mosquito season and continue for one month following the first frost; follow the directions of your pet’s veterinarian
- Heartworm-antigen blood test should be performed prior to starting preventive treatment
- Heartworm-antigen blood test performed 7 months after end of previous mosquito season
- Ivermectin (a few different products available)—highly effective, monthly heartworm preventive ; can be given safely to dogs that have immature heartworms (microfilaria) in their blood
- Milbemycin (a few different products available)—highly effective, monthly heartworm preventive; sudden (acute) reactions may occur when milbemycin is given to dogs that have immature heartworms (microfilaria) in their blood
- Moxidectin—monthly topical (applied to the skin) administration as a heartworm preventive
- Selamectin—highly effective, monthly topical (applied to the skin) preparation for heartworm prevention
- All of the heartworm preventive medications can be administered safely to collies at the appropriate dosages, as directed by your dog’s veterinarian
- All products should eliminate microfilaria in the bloodstream in 1-3 months

## POSSIBLE COMPLICATIONS

- Blood clots to the lungs following administration of medications to kill the adult heartworms (known as “post-adulticide pulmonary thromboembolic complications”)—may occur up to 4–6 weeks after treatment; usually more severe in dogs with severe heartworm disease (Class III) and those not properly confined
- Low platelet counts (known as “thrombocytopenia”) and a blood-clotting disorder (known as “intravascular coagulation”) may occur
- Melarsomine adverse effects—blood clots to the lungs (known as “pulmonary thromboembolism”), usually occur 7–30 days after administration of medication to kill the adult heartworms; lack of appetite (known as “anorexia”); injection site reaction with inflammation of the muscle (known as “myositis”); sluggishness (lethargy) or depression; elevation of liver enzymes on blood tests; partial or complete paralysis or change in mental status (rare); lack of effectiveness

## EXPECTED COURSE AND PROGNOSIS

- Usually uneventful with excellent prognosis in dogs without clinical signs of heartworm disease (asymptomatic dogs) and mildly symptomatic pets (Class I heartworm disease)
- Guarded prognosis with higher risk of complications in dogs with severe (Class III) heartworm disease

## Key Points

- Routine heartworm preventive medication (as directed by your dog’s veterinarian) is key to preventing your dog from becoming infested with heartworms; heartworm disease is a preventable disease
  - Good prognosis for pets with mild-to-moderate heartworm disease
  - Complications involving the lungs following administration of medication to kill the adult heartworms (post-adulticide pulmonary complications) likely in pets with moderate-to-severe heartworm disease
- Reinfestation can occur, unless appropriate heartworm preventive medication is administered