

## Heartworm treatment at Hill High Animal Hospital:

Why we follow the guidelines of the **American Heartworm Society** to safely and effectively eliminate heartworms from dogs rather than the so-called "slow-kill" "treatment" that some animal shelters and foster groups suggest.



The guiding principle in medical treatment is *Primum Non Nocere* which translates from Latin as "first, to do no harm" (to the patient.) The modern take on this notion is to help when you can, and when you cannot, at least do not make the patient worse off as we know that there are few medical treatments that have no possible negative side effects. Medical science has proven that the "slow-kill" treatment patients *are* significantly worse off.

Modern FDA approved treatment of adult heartworms *Dirofilaria immitis* consists of pre treating the infected dogs with HeartGard Plus for at least 2 months to prevent any new heartworm infections along with the antibiotic doxycycline to weaken the adult heartworms and making female worms relatively sterile to decrease risks of other dogs' in the neighborhood from getting infected. This also greatly reduces the population of endosymbiotic bacteria *Wolbachia sp.* that live inside the heartworms, so when the heartworms die the heartworms do not release these live bacteria in the blood. These bacteria can cause worse side effects such a lung and kidney inflammation if allowed to be released alive into the blood stream. The 2 month pre treatment period also allows younger heartworms to age enough so that the heartworm killing treatment will be more effective, as very young heartworms are resistant to the proper medication.

The dog is then administered an injection of Immiticide to start killing the heartworms. One injection kills the male heartworms, so that over the next month half of the heartworms are killed. The enforced strict rest allows these dead heartworms to gradually be partially cleared from the blood vessels in the lungs and heart chambers. The dead worms tend to clump together and get pushed deeper into the lung arteries where they can clog up blood flow (acute and chronic pulmonary thromboembolism) and cause inflammation. The more clogging and inflammation that occurs the higher the probability of negative side effects such as severe pulmonary hypertension and right sided heart failure can be seen, particularly if the dog is not strictly rested. Medication such as prednisone is administered to reduce the inflammation in the lungs over the following weeks of restriction.

After the initial month of rest, 2 more injections of Immiticide medication are administered 24 hours apart which will result in killing the remaining (female) heartworms over the following weeks. Another rest period of a month along with prednisone therapy is prescribed then the pet is released from restrictions. The entire time the pet stays on HeartGard Plus to prevent reinfection. 6 months later the dog is tested for heartworm antigen and if none is detected the pet is considered "cured." Pathology studies of dogs that had the above treatment has shown over 98% effectiveness at eliminating the live heartworms based on necropsy searches for heartworms.

The so-called "slow-kill" method starts with the use of HeartGard Plus (no other monthly heartworm preventatives have been studied to have anti heartworm effect) and the use of doxycycline. No heartworm killing medication is administered. After 2 or more years many of the dogs that have been administered this medication combination have been shown to eventually test "negative" for heartworm antigen. Sounds too good to be true, yes? The "benefits" of this treatment are the costs are lower and some dogs will eventually test "negative" for heartworms. Additionally, these dogs eventually become much less infective to dogs in their neighborhoods as the worms will often become sterile and would not become infected with new heartworms. So, what are the negative consequences of this "treatment"?

### **Top Reasons it is unethical to use the "slow-kill" method**

1. Dogs treated with the so-called "slow-kill" are not put on prednisone to reduce the known inflammation of dying heartworms. If they were kept on anti inflammatory doses of prednisone for required multiple years the side effects of just the prednisone would be grave for the pets.
2. The dogs are not severely restricted for the year/years it takes to kill all the worms so the inflammation and clogging and clotting in the lung arteries are allowed to occur, exercise while worms are causing inflammation is the largest factor in fatal reactions that are seen in heartworm infected dogs. The American Heartworm Society states it is ESSENTIAL that all exercise be restricted while the worms are dying.
3. The swelling and roughening of the lining of the lung arteries *endarteritis* is known to rapidly continue with the ongoing presence of live heartworms during the "slow-kill" process along with large blood clots *thromboembolism* forming resulting in ongoing irreversible heart disease.
4. Most importantly, several recent medical studies unknown when the original "slow-kill" effect was noted have shown that over 50-80% of the purported "negative" heartworm tests of the "slow-kill" method are falsely negative due to chronic antibody production that "covers" the heartworm antigen proteins that the standard hospital heartworm tests use detect an infection. Researchers have found that if you have a veterinary reference laboratory "heat treat" the blood samples (which removes the antibodies from the heartworm antigens in the blood) a strong majority of the formerly "negative" heartworms tests will show truly positive. We have yet to meet an advocate of the "slow-kill" method that has reviewed this newer evidence, yet ignorance is not a basis for recommendation. In short, it is not effective.
5. We do not know the safety of long term or pulse administration of doxycycline on the pet's normal bacterial biome, repeated use is necessary as the symbiotic bacteria is reduced but not 100% eliminated from the heartworms. Drug resistance is a real concern.
6. The American Heartworm Society reports that the so called "slow-kill" method is one of the factors of creation of drug resistant heartworms; these experts take the rare stance of stating it use is NOT RECOMMENDED using all capital letters in all their published literature!

In a nutshell, "slow-kill" truly works only 20-50% of the time over several years, the entire time the pet's heart and lung disease is worsening, no anti inflammatory drugs are given to control the intense inflammation that occurs as each worm dies at any given unknown time, and either the pet is inhumanely strictly confined for years or is allowed non restricted activity resulting in higher risks of worsening heart disease and/or death. It is NOT RECOMMENDED by veterinary heartworm experts period! In fact, the only time that the experts would justify the use is with dogs that have such severe heart failure due to severe disease (Google Caval Syndrome) or if the Immiticide drug is not available which has occurred once a few years ago.

Hill High Animal Hospital strongly believes that reasons that the medical experts give for using the 3 dose Immiticide protocol along with the HeartGard Plus and doxycycline treatments is the most humane way to treat our canine patients. We believe that the medical reasons against the so-called "slow-kill" method far outweigh the few positive reasons for its' use. We must base our practice ethics based on the ongoing progress of information of medical science as discovered by experts and therefore cannot ethically perform the alternate "treatment" regardless of lay advice you may have come across.

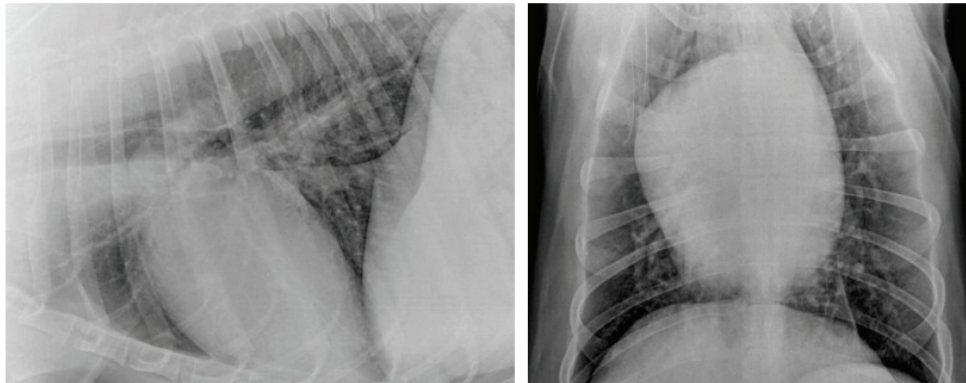
The costs of heartworm treatments, hospitalization, and medications usually range from \$350-\$750 depending on if your pet is a toy breed versus giant breed. Some hospitals will mark up the treatment fees to a different degree. Additional testing such as blood screening for anemia, low blood platelets, high protein in dilute urine, along with radiographs to discern the degree of heart and lung disease to detect dogs that are at high risk for complications are always recommended; specific estimates for your pet may vary.

## Mosquito in act of transmitting Heartworm Disease

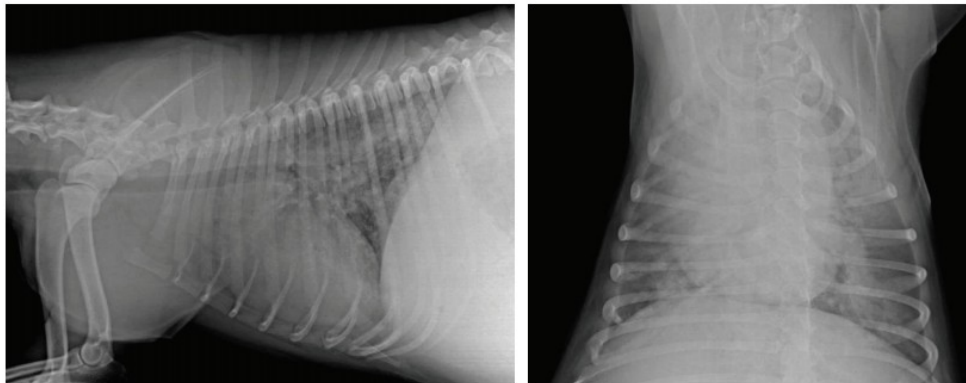


**Figure 3.** Left, Image of a feeding mosquito indicating how deeply the stylet (S) penetrates the skin and the dramatic folding (*black arrow*) of the labium (L). Right, Magnified image of a feeding mosquito indicating the release of a hemolymph pool (*white arrows*) containing infective heartworm larvae (L3). Photographic images courtesy of Stephen Jones, DVM.

## Radiographs of Heartworm Disease



**Figure 5.** Moderate heartworm disease. Radiographic images courtesy of C. Thomas Nelson, DVM.

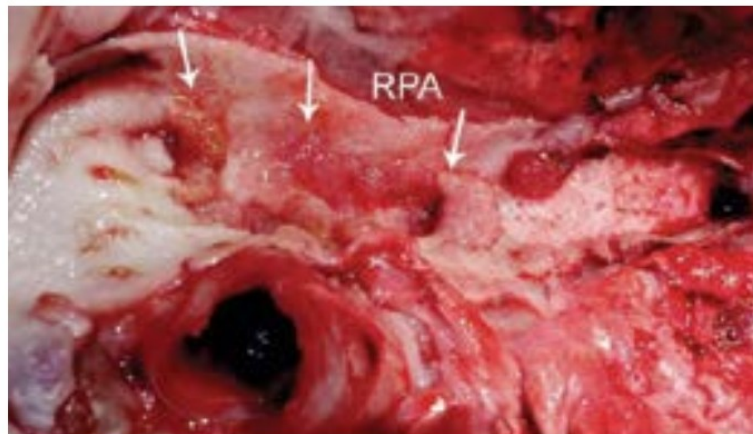


**Figure 6.** Severe heartworm disease. Radiographic images courtesy of C. Thomas Nelson, DVM.

## Heartworms in heart and lung blood vessels

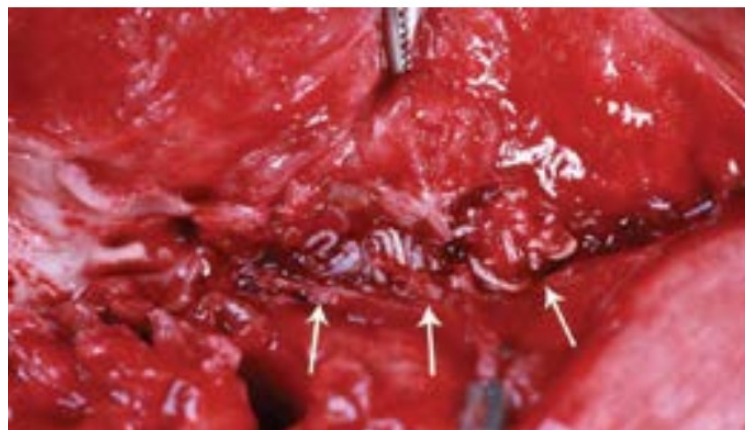


## Living heartworms causing disease



**Figure 9.** Image of the main trunk of the right pulmonary artery (RPA) exhibiting significant endothelial proliferation (*white arrows*). Photograph courtesy of Stephen Jones, DVM.

## Dead heartworms still cause disease



**Figure 10.** Image of a dead adult heartworm (*white arrows*) lodged in a distal pulmonary artery. Photograph courtesy of Stephen Jones, DVM.