



# BRINGING THE 16<sup>TH</sup> TRIENNIAL HEARTWORM SYMPOSIUM TO YOU

## Foreword

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AMERICAN  
HEARTWORM  
SOCIETY™  
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## OUR EXPERTS

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**S**ince the American Heartworm Society (AHS) was formed in 1974, hundreds of heartworm researchers, veterinarians, students and others have convened every three years for a scientific conference that features the world's leading experts on heartworm disease. Hosting this important symposium is one of the most important investments the AHS makes in fulfilling our mission of leading the veterinary profession and the pet-owning public in the understanding of heartworm disease.

The 2019 symposium, which was held September 8-11, 2019, in New Orleans, featured 62 speakers and poster presenters and was attended by representatives from 35 states and 12 countries.

While it's not possible to share all of the information from the 2019 Triennial Symposium in just a few short pages, we wanted to bring you some of the key findings. In this *Clinician's Brief* supplement, we've posed a series of questions to a group of speakers and moderators who took the stage at the symposium. We hope the answers will prove interesting and of value to you in your daily practice. Meanwhile, I recommend you mark your calendars now for the next Triennial Heartworm Symposium, which will be held September 8-11, 2022, in New Orleans.



## HEARTWORM PREVENTION: MOSQUITOES, MICROCLIMATES, MACROLIDES AND MORE

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**Q.** While the American Heartworm Society has long recommended year-round heartworm prevention for pets, “seasonal” heartworm prevention is common. You and Dr. Tanya McKay from Arkansas State University presented on some of the challenges with trying to target a specific time frame when heartworm prevention is needed. Can you explain?



**DR. STEPHEN JONES:** When people talk about heartworm “season,” it implies that there is a time of year when heartworm prevention is necessary and a

time of year when it isn’t. I think a better way to view this is that there are different times of the year when the presence of mosquitoes creates greater or less threat, versus a safe “season.”

We all know that in the summertime, when conditions are warm and humid in many parts of the country, mosquito burdens increase along with the threat of heartworm transmission. In the winter, the threat can be considerably less. Rather than stopping heartworm prevention when the threat decreases, a better approach may be to actually do more—such as administering mosquito repellents along with preventives—when the threat increases.

“Because a single bite from an infected mosquito can result in a heartworm infection, heartworm prevention is important even when mosquito activity is seemingly low.”

– Dr. Stephen Jones



**Q.** What additional support for year-round heartworm prevention was discussed at the symposium?

**DR. JONES:** One of the most important factors is that microclimates foster mosquito persistence. Microclimates are little pockets in the environment that provide moisture and warmth, allowing mosquitoes to survive during period of environmental extremes. Examples are door entryways, roof soffits and sheds in colder climates, as well as bird baths, ponds or irrigated areas in dry climates.

We also stressed that because a single bite from an infected mosquito can result in heartworm infection, heartworm prevention is important even when mosquito activity is seemingly low. Finally, Dr. Doug Carithers explained that macrolides don’t directly kill worms. Instead, heartworm preventive compounds essentially work by generating immunity to worms in the animal, so that the immune system can eliminate them. Consistent, year-round dosing, vs. stopping and starting preventives, helps maximize this response.

**Q.** Prevention of feline heartworm disease was the topic of a panel discussion. Why is heartworm prevention in cats often overlooked?



**DR. MARK COUSINS:** I think one reason is that testing in cats is challenging and we don't have the means to truly determine the prevalence of infection. As veterinarians, we like "blue dot" tests that clearly tell us if the result is positive or negative, and with feline heartworm disease, it isn't always that simple. Because diagnosing heartworm disease in the cat is challenging, the tendency is to not think about it as much as we should—even in highly endemic areas.

**Q. In your feline practice, how do you convince cat owners that heartworm prevention is important?**

**DR. COUSINS:** Heartworm education starts with the culture of the hospital. It has to be something that's ingrained in the training and performance of all staff members, because the client needs to hear the message multiple times. In my practice, I ask my staff to emphasize the need for prevention when clients are in the exam room. When I come into the room I can continue the educational process. I tell my clients that heartworm prevention is as important a component of their cats' preventive medicine package as the vaccines we give, and that lifelong prevention is necessary for every cat. At this point, clients understand that feline heartworm prevention is important for their cats' health and are likely to comply.

*"As veterinarians, we like "blue dot" tests that clearly tell us if the result is positive or negative, and with feline heartworm disease, it isn't always that simple."*

– Dr. Mark Cousins

## HEARTWORM TESTING: DIAGNOSTIC DILEMMAS

**Q. When a dog tests positive for heartworm, veterinarians must choose whether or not to administer any of a number of additional tests—often in the face of financial constraints. How do practitioners find their way through this challenge?**



**DR. CLARKE ATKINS:** The diagnostic workup for infected dogs can be dramatically variable, depending upon the age of the patient, the presence of clinical illness and the ability of the owner to pay for additional testing. Our goal is always to initiate treatment as soon as possible to stop the progression of disease and prevent transmission of infection. The primary purpose of ancillary diagnostic tests is to determine the patient's fitness for adulticidal treatment.



Following are three scenarios, along with testing considerations:

A **young dog** with no clinical signs that tests positive on an antigen test can be assumed to have a relatively low worm burden. Such patients typically require only a minimal workup, including a microfilaria test (modified Knott's, Millipore filter testing, direct smear or capillary tube concentration) and a physical



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– Dr. Clarke Atkins

exam. If the physical exam is normal, it is likely the dog can safely undergo adulticidal therapy, especially if exercise is restricted. While it can be useful to pursue additional testing, if finances are a concern—as is often the case with heartworm-positive dogs—a more extensive work-up is usually not needed.

The **middle-aged, asymptomatic patient** that tests antigen-positive may or may not have been infected for years. The worm burden is dependent on the dog’s prevention history, geographic location and housing, and years of exposure. While conducting a complete work-up of a patient such as this is not an absolute necessity, I recommend that, in addition to the microfilaria test, thoracic radiographs and lab work (urinalysis at a minimum, and preferably a CBC and a chemistry panel) be conducted.

The **dog that is middle-aged to aged with clinical signs** presents the greatest diagnostic dilemma. While the dog is in critical need of having the worms removed, it is also at greatest risk of an adverse event from arsenical administration, as treatment may

throw patients with severe pulmonary vascular disease and adult worms into embolic crisis and/or heart failure. The more pre-treatment knowledge we can obtain, the better we understand what underlying organ damage may be present. In addition to the microfilaria test, diagnostic tests for such patients ideally should include thoracic radiographs, CBC, chemistry panel, and urinalysis. If the patient’s exam findings include arrhythmia, murmur, or syncope, additional testing should include an ECG and, when possible, an echocardiogram.

**Q. Several presentations at the symposium focused on heat treating of serum or plasma samples, which has been shown to be effective in unmasking antigen/antibody immune complexes that can confound heartworm test results. To review, why do these complexes form?**



**DR. LINDSAY STARKEY:**

Immune complexes, otherwise known as antigen-antibody complexes, can form within any host, whether a dog, cat or

human; formation of antibodies is the normal immune response to infection. For reasons we cannot necessarily predict, antibodies can bind the antigen we are trying to detect with a heartworm test. The end result can be a “no antigen detected” test result.

**Q. When should a heartworm-associated immune complex be suspected in a dog or cat?**

**DR. STARKEY:** While that can be a struggle, a veterinarian’s clinical intuition is always going to be important, because it enables the veterinarian to recognize when something is off with the test result. It could be an unexpected “no antigen detected” result in a shelter dog, a pet with an unreliable prevention history, a dog or cat with clinical



signs consistent with heartworm infection, or a dog that tests positive on a microfilaria test in the absence of detectable antigen with the antigen-based test. When a “no antigen detected” test result seems suspect, additional diagnostics are needed.

**Q. Heat treating has been found to be effective method for immune-complex dissociation (ICD), but can present some challenges for veterinarians. You presented data on a recent study that looked at acid as an alternative to heat. What did you learn?**

**DR. STARKEY:** Heat treating can be impractical for practices to conduct for several reasons. First, the test requires 5 milliliters of blood—an amount that can be difficult to obtain, especially in small dogs, cats and fractious animals. In addition, the sample needs to be heated to 104 degrees Celsius, which can also be impractical in some practices. In a study at Auburn University, we investigated using an acid that’s easily obtained as an alternative to subjecting the blood sample to heat. A key advantage was that the acid test only required 50 microliters of blood.

The study used plasma samples from 24 dogs that were known to be infected but had tested “no antigen” on routine antigen tests, as well as samples from 75 non-infected dogs. When we applied both heat and acid treatment to the



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– Dr. Lindsay Starkey

samples from infected dogs, we were able to achieve the same results with both techniques in every instance except one. In the non-infected dogs, neither ICD method induced false-positive results. Our hope is that in the future we will have a more practical alternative veterinarians can turn to when they suspect a patient’s heartworm test result is inaccurate.

## **HEARTWORM TREATMENT: MINIMIZING MELARSOMINE COMPLICATIONS**

**Q. During the symposium, your presentation focused on the pre-treatment protocol used in canine heartworm treatment. Why is administration of a tetracycline antibiotic prior to adulticide therapy important?**



**DR. MOLLY SAVADELIS:**

Doxycycline is currently recommended by the American Heartworm Society as part of the canine heartworm

treatment protocol to reduce *Wolbachia*—an endosymbiotic bacterium found in all life stages of the worm. Upon worm death, *Wolbachia* is released into the host in large amounts, causing a significant inflammatory reaction and lung pathology. In studies, we’ve demonstrated that when we eliminate *Wolbachia* prior to worm death with doxycycline treatment, we see a great reduction in the overall lung pathology associated with adulticidal treatment.

“While our findings determined that a doxycycline dosage of 10 mg/kg twice daily is the best choice when treating dogs with heartworm infection, in cases where owner compliance is jeopardized by the presence of severe side effects, veterinarians may need to consider lowering the dose to 5 mg/kg twice daily.”

—Dr. Molly Savadelis

**Q. While you were at the University of Georgia, you participated in a study comparing doxycycline and minocycline in a heartworm pre-treatment protocol. Why was this study conducted and what were the findings?**

**DR. SAVADELIS:** While doxycycline has demonstrated efficacy in eliminating *Wolbachia*, we’ve historically seen decreasing availability and increasing prices. As a result, veterinarians have sought potential alternatives.

In a clinical trial conducted at the University of Georgia, we evaluated the effects of doxycycline and minocycline at both 5 and 10 mg/kg twice daily in 32 microfilaremic dogs for 28 days. By the end of the study, we determined that 10 mg/kg twice daily of doxycycline was the only drug and dosage that eliminated *Wolbachia* DNA by 28 days; in each of the other three groups, two or more dogs continued to have some *Wolbachia* DNA present. Additionally, owners

of the dogs in the trial reported an increased number and severity of gastrointestinal side effects at the higher dosage of both drugs. While our findings determined that a doxycycline dosage of 10 mg/kg twice daily is the best choice when treating dogs with heartworm infection, in cases where owner compliance is jeopardized by the presence of severe side effects, veterinarians may need to consider lowering the dose to 5 mg/kg twice daily.

**Q. Other presentations detailed studies on variations in the standard heartworm treatment protocol, while you offered guidelines on treating the more severe kinds of heartworm-related disease in your presentation. What were some of the highlights?**



**DR. MARISA AMES:** Heartworm treatment continues to be a topic of high interest to veterinarians. Attendees at the symposium heard a number of

presentations on treatment protocol variations, including non-adulticide protocols and shorter adulticide protocols. We also learned about new compounds that might change the treatment landscape in the future.

My presentation focused on treatment of severe heartworm disease. While the majority of dogs with heartworm infections have no—or only mild—clinical signs, a small percentage of dogs can have severe clinical signs arising from pneumonitis, pulmonary hypertension, right-sided heart failure and—in the worst-case scenario—caval syndrome. The likelihood of complications associated with HWD increases with the chronicity of infection. Prognosis is dependent on stabilization, the ability to administer subsequent adulticide therapy and the ability of the family to commit to treatment of chronic conditions.





Veterinarians seeking information on specific treatment plans for these complications can visit [heartwormsociety.org/treating-severe-HWdisease](http://heartwormsociety.org/treating-severe-HWdisease).

**Q. Heartworm treatment success can be jeopardized when dogs undergoing treatment are not exercise-restricted. How can the language used to educate clients about exercise restriction facilitate better compliance?**



**DR. DEBRA HORWITZ:** When a veterinarian or staff member tells an owner that he or she has to confine their dog for six weeks or more, the owner's immediate

reaction may be to push back. Clients don't necessarily understand why they need to do that, nor can they envision how they're going to do it, especially if they have active dogs that love to run, play and take walks.

As an alternative, I recommending telling owners their dog needs "rest time for recovery," and that the simple but important factor of keeping the dog calm and quiet as adulticide therapy facilitates worm death can help avert treatment complications. Meanwhile, owners should be reassured their dogs can be kept content and mentally stimulated despite the need to avoid physical activity—and that the all-important bond with the dog can be maintained.

*"Owners should be reassured their dogs can be kept content and mentally stimulated despite the need to avoid physical activity—and that the all-important bond with the dog can be maintained."*

– Dr. Debra Horwitz



**Q. How can owners find ways to bond with their dogs while keeping them calm and quiet?**

**DR. HORWITZ:** One of the most important things to recommend for the owner is to keep their dog close to them while they're at home. The owner should find several places where the dog can rest while still being in the same room with family members. That might mean keeping a crate in the family room, as well as additional crates in the kitchen and a first-floor bedroom. It's important to involve the whole family, including young children. While kids can't roughhouse with the dog, they can be encouraged to talk to the pet and even do things like read a book out loud to the dog. The dog will enjoy the attention and it's good for the bond.

Meanwhile, environmental enrichment doesn't have to be complicated. Owners can use the dog's daily food ration as a means of creating mental stimulation and enhancing their time together, whether they put the food in a puzzle toy or use kibble as a reward for learning quiet interactive tasks. A piece of kibble can also be a good enticement to get the dog back in his or her crate after taking a quiet bathroom break. Emphasizing leash use anytime the dog is moved is also essential.

Finally, in cases where dogs are especially high-energy or anxious, veterinarians can consider such ancillary solutions as compression shirts, pheromone products, nutraceuticals and medications designed to decrease anxiety. ■

# THE AMERICAN HEARTWORM SOCIETY AND YOU

**The American Heartworm Society (AHS) is focused on serving the needs of the veterinary profession. Here's how you can take advantage of AHS resources:**

**HEARTWORM SYMPOSIA.** The AHS brings the latest in scientific information to veterinary professionals through scientific symposia. Opportunities include:

- **The Triennial Heartworm Symposium.** This comprehensive conference takes place every three years, and includes presentations by leading heartworm experts with attendees from all over the United States and the world. The next symposium will be held September 8-11, 2022.
- **Heartworm University.** This traveling symposium is a half-day or day-long continuing education session offered free of charge to veterinarians and veterinary technicians, and is designed to bring in-depth information on heartworm disease to veterinarians in different locales. Many Heartworm University sessions are held in conjunction with state and regional veterinary medical association meetings.

**HEARTWORMSOCIETY.ORG.** The American Heartworm Society website is one of the most important resources offered by the AHS. Here, veterinary professionals can access the American Heartworm Society guidelines, heartworm incidence maps, and client education materials, including brochures, videos, infographics, and other materials on heartworm and pet care. The website also includes a "Heartworm Basics" section, which includes content and FAQs written specifically for pet owners.

**AHS COMMUNITIES.** Heartworm disease is one of the most important disease in companion animals and it's vital that practitioners stay informed of the latest developments. The best way to do so is to join one—or all—of the AHS communities.

- **Become an AHS member.** Members receive a number of benefits, from discounts on client education materials and the triennial symposium registration, to exclusive materials, such as the AHS symposium proceedings and the quarterly AHS Bulletin. Information on joining is available on [heartwormsociety.org/membership/benefits](http://heartwormsociety.org/membership/benefits).
- **Subscribe to AHS updates.** The AHS provides email updates to veterinarians and veterinary staff on heartworm news and the latest educational tools and resources. To subscribe, visit [heartwormsociety.org/subscribe](http://heartwormsociety.org/subscribe).
- **Join our social communities.** Our Facebook page ([facebook.com/heartwormsociety](https://facebook.com/heartwormsociety)) connects you to the latest information on heartworm, as well as posts that can be shared with your practice's social communities. You can also follow us on Twitter at ([twitter.com/AHS\\_Think12](https://twitter.com/AHS_Think12)) and Instagram ([Instagram/americanheartwormsociety.com](https://Instagram/americanheartwormsociety.com)) to link to a wide range of resources and debates. Finally, tune in to the AHS on YouTube ([youtube.com/americanheartworm](https://youtube.com/americanheartworm)) where you can check out video interviews with speakers from the 2019 Triennial Heartworm Symposium—as well as past symposia—and download client education videos for use in your practice.

**Have questions? Email us at [info@heartwormsociety.org](mailto:info@heartwormsociety.org)**



[www.heartwormsociety.org](http://www.heartwormsociety.org)

