

Minocycline as an Alternative to Doxycycline in the Treatment of Canine Heartworm Disease

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In the Literature

Savadelis MD, Day KM, Bradner JL, et al. Efficacy and side effects of doxycycline versus minocycline in the three-dose melarsomine canine adulticidal heartworm treatment protocol. *Parasit Vectors*. 2018;11(1):671.

FROM THE PAGE ...

The shortage and subsequent increase in cost of doxycycline have led to a search for alternative antibiotics and dose protocols. This study sought to determine whether minocycline is an effective alternative to doxycycline and whether a lower dose of doxycycline is as effective as the American Heartworm Society recommended dose in eliminating *Wolbachia* spp from *Dirofilaria immitis* microfilariae. Minocycline has been shown to be more effective in eliminating *Wolbachia* spp from the filarial nematode *Onchocerca gutturosa* as compared with doxycycline,¹ and minocycline at 5 mg/kg every 12 hours has been suggested to be as effective as doxycycline based on pharmacokinetic/pharmacodynamic analysis of a mouse model.²

Thirty-two dogs naturally infected with heartworms received either doxycycline or minocycline at 5 mg/kg or 10 mg/kg every 12 hours for 28 days ($n = 8$ per group). Microfilariae were analyzed for the presence of *Wolbachia* spp DNA using quantitative PCR testing, and

adverse GI effects were documented. All microfilariae from dogs treated with doxycycline at 10 mg/kg every 12 hours were negative for *Wolbachia* spp by day 28. Two dogs in the 5 mg/kg doxycycline group, 2 in the 10 mg/kg minocycline group, and 3 in the 5 mg/kg minocycline group remained positive for *Wolbachia* spp after 28 days. GI signs (eg, vomiting, diarrhea) occurred more commonly in both the 10 mg/kg doxycycline and minocycline groups, although more dogs in the minocycline group experienced these effects.

The American Heartworm Society recommends administering a macrocyclic lactone heartworm preventive and doxycycline at 10 mg/kg every 12 hours for 4 weeks prior to administration of the adulticide melarsomine. The purpose of this pretreatment phase is to eliminate the obligate endosymbiont *Wolbachia* spp. *Wolbachia* spp and its associated surface proteins (WSP) have been implicated in the pathogenesis of filarial disease. It should be noted that this article states that the recommended dose and duration were extrapolated from the treatment of other rickettsial infections; although this was a consideration, data from additional studies contributed to the recommendations. One study reported that a 25-day course of tetracycline administration was more effective than a 15-day course for suppressing microfilaremia in the filarial nematode *Brugia pahangi*.³ Another study reported that doxycycline at 20 mg/kg every 24 hours for 30 days was highly effective in the elimination of *Wolbachia* spp from *D immitis* based on PCR analysis.⁴ Additional data showed reduced antibodies against WSP and IL-8 levels with a doxycycline dose of 10 mg/kg every 24 hours but no apparent

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radiographic improvement in the lungs, suggesting 20 mg/kg every 24 hours may result in a significant decrease in *Wolbachia* spp inflammatory-mediated reactions.⁵ The same author later reported this higher dose reduced lesion scores in a study.⁶ However, the optimum dose and duration of treatment have yet to be determined.

... TO YOUR PATIENTS

Key pearls to put into practice:

- 1** Doxycycline at 10 mg/kg every 12 hours for 28 days appears to be the most effective treatment in eliminating *Wolbachia* spp, which have been shown to contribute to pulmonary arterial and parenchymal lesions.
- 2** Administering doxycycline with food may help reduce GI effects without significantly reducing drug absorption.
- 3** If vomiting or diarrhea is a significant problem, the dose of doxycycline may be reduced to 5 mg/kg every 12 hours.

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