



## Commentary

This study used a variety of methods to detect infection with *Borrelia burgdorferi* and therefore provides convincing evidence that fipronil can help prevent transmission to dogs in an experimental setting. Importantly, the practitioner should bear in mind that *B. burgdorferi* and other tick-borne disease-causing agents can be transmitted in less than 24 hours (i.e., prior to the 48-hour time frame used to evaluate acaricide activity in this study). Although it is likely that acaricides can play a vital role in helping to prevent tick-borne diseases in dogs, it is also likely that they cannot be relied upon exclusively. Further laboratory and field studies are needed to determine the degree to which using acaricides according to manufacturer's instructions can prevent transmission of *B. burgdorferi* and other tick-borne disease-causing agents. However, given the available data, these products should be part of an individualized program designed by the practitioner to limit as much as possible tick exposure, attachment, and feeding, thereby minimizing risk of disease transmission to dogs and their human companions.

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## PROTOCOL

Reduce potential Lyme disease in dogs by preventing transmission of *B. burgdorferi*.

- Begin applying acaricides prior to tick season and continue monthly treatments to ensure most effective levels of protection during season.
- Use an acaricide with 100% kill within 48 hours after exposure during the entire treatment period (products without a high level of efficacy may place dogs at increased risk) until next recommended application.
- Consider vaccination specifically targeted for *B. burgdorferi* within an attached tick<sup>1</sup> in Lyme endemic areas. Experts agree that vaccination in addition to effective acaricide use further reduces the potential for dogs contracting Lyme disease.



Experts agree that in addition to effective acaricide use, vaccination specifically targeted for *B. burgdorferi* within an attached tick<sup>1</sup> should be considered in Lyme endemic areas.

## REFERENCES

1. Efficacy of a nonadjuvanted, outer surface protein A, recombinant vaccine in dogs after challenge by ticks naturally infected with *Borrelia burgdorferi*. Conlon JA, et al. *Vet Ther* 1:96-107, 2000.
2. The use of FRONTLINE Spray Treatment to prevent transmission of *Borrelia burgdorferi*, the causative agent of Lyme disease, from infected black-legged ticks, *Ixodes scapularis*, to dogs. Hunter JS, et al. *Proceedings 47<sup>th</sup> Annu Meet Am Assoc of Vet Parasit*: 42, 2002.
3. Data on file



*This summary includes research findings as reported in the cited references, primarily reference 2, as well as data on file at Merial.*

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Cover photo, *Ixodes scapularis*, *Borrelia burgdorferi* spirochetes in Dieterle silver stain; photo on page 2, *Borrelia burgdorferi*; photos on pages 3 and 4, *Ixodes scapularis*. Photos courtesy Centers for Disease Control and Prevention.

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NEW FIPRONIL RESEARCH

REDUCING THE RISK OF  
*BORRELIA BURGDORFERI* TRANSMISSION



NAVC

**clinician's brief™**

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## NEW FIPRONIL RESEARCH

### REDUCING THE RISK OF **BORRELIA BURGDORFERI** TRANSMISSION

**T**ick-borne diseases, such as Lyme disease, continue to plague both dogs and people. Lyme disease is caused by the spirochete, *Borrelia burgdorferi*, an organism that is transmitted to both dogs and people by the deer tick (*Ixodes scapularis*) and the Western black-legged tick (*Ixodes pacificus*). The most common manifestation of *Borrelia* infection in the dog is arthritis, but renal, cardiac, and neurologic disease may also occur, making Lyme disease difficult to identify. Time can be lost while Lyme disease remains undiagnosed and untreated, making it potentially life-threatening.

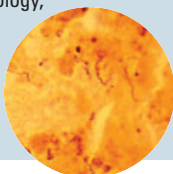
Lyme disease is often difficult to diagnose and may be difficult to treat; therefore preventive measures are an important means of protection for your canine patients.

#### Combining Strategies

Prevention of Lyme disease in the dog can be achieved through a combination of strategies, including tick avoidance, vaccination specifically targeted for *B. burgdorferi* within an attached tick<sup>1</sup> in Lyme endemic areas, and the application of acaricides prior to the beginning of tick season and monthly thereafter. Use of an appropriate acaricide takes advantage of the time delay between tick attachment and subsequent activation and multiplication of the spirochete within the infected tick, reducing the potential for transmission of *B. burgdorferi*.

#### LYME DISEASE IN DOGS

- **Causal agent.** Lyme disease spirochete, *Borrelia burgdorferi*
- **Lyme disease vector (intermediate host).** Deer tick (*Ixodes scapularis*) and Western black-legged tick (*Ixodes pacificus*)
- **Transmission times.** Between 48 and 72 hours of attachment (may occur earlier)
- **Common manifestations.** Arthritis, and/or renal, cardiac, or neurologic disease
- **Diagnostics.** Serology, culture, and PCR tests



#### Fipronil for Reducing Lyme Disease Potential

A study was conducted to evaluate the ability of fipronil,\* an acaricide, to prevent the transmission of *B. burgdorferi* infection to dogs exposed to infected *Ixodes scapularis* ticks. Based upon the results of this study, fipronil may effectively reduce transmission potential of Lyme disease throughout the entire treatment interval. More specifically, products that provide consistently high levels of control throughout the treatment period provide the greatest reduction of potential infection with *B. burgdorferi*. Numerous products in addition to fipronil possess acaricidal activity, but none has demonstrated the potential for reducing the risk of transmission following exposure to Lyme-infected ticks 28 days after a single dose.

\*The active ingredient in FRONTLINE® Plus, FRONTLINE® Spray, and FRONTLINE® TopSpot®

## FIPRONIL STUDY HIGHLIGHTS

Two parallel, independent efficacy studies were conducted using 24 purpose-bred beagle dogs (12 females, 12 males) each. Dogs were each exposed to 75 field-collected *Ixodes scapularis* ticks (42% *B. burgdorferi* infection). Live ticks were counted 48 hours postinfestation.

**STUDY I** – Fipronil 0.25% wgt/vol (FRONTLINE® Spray).<sup>2</sup>

**STUDY II** – Fipronil 10% wgt/vol combined with 9% wgt/vol (*S*)-methoprene (FRONTLINE® Plus).<sup>3</sup>

Study I dogs (24) and Study II dogs (24) were divided into 3 groups each.

- Untreated control dogs (8)
- Fipronil treated dogs (8) – 7 days before tick exposure
- Fipronil treated dogs (8) – 28 days before tick exposure

### DIAGNOSIS

Evidence of *B. burgdorferi* transmission was determined 3 different ways in all 48 dogs.

- Serology – Kinetic ELISA and Western blot tests
- Skin biopsy and culture
- PCR – Examination of skin for *B. burgdorferi* DNA

### CHALLENGE

Fipronil was challenged under the most strenuous conditions (single dose; no additive effects of repeat dosing).

- 75 ticks with a 42% infection rate
- Second challenge occurred when the next recommended monthly dose application would have normally been given
- 3 separate measurement parameters



### RESULTS

- Results support the finding that most infected ticks feed beyond 48 hours prior to transmitting *B. burgdorferi* infection.
- Fipronil was highly effective in killing ticks within 48 hours after dogs were challenged with 75 *Ixodes scapularis* at both 7 days and 28 days after application.
- Fipronil was highly effective in preventing transmission of *B. burgdorferi* to dogs by infected ticks at both 7 days and 28 days after a single application.
- Fipronil provided early protection from tick infestation and *B. burgdorferi* transmission after initial product application, as well as at 1 month after application (when the next dose would be due).

## FIPRONIL RESULTS SUMMARY

### 48-Hour Efficacy Against *Ixodes scapularis*

Challenge	Day 7	Day 28
Efficacy counts performed on Day 9 & Day 30		
FRONTLINE Spray	100%	99.6%
FRONTLINE Plus	100%	97.6%

### Transmission of *B. burgdorferi* Blocked

FRONTLINE Spray Treatment Group	Serology	Biopsy Culture	PCR
Control dogs	All positive	All positive	All positive
7-day postapplication challenge	All negative	All negative	All negative
28-day postapplication challenge	All negative	All negative	All negative
FRONTLINE Plus Treatment Group	Serology	Biopsy Culture	PCR
Control dogs	All positive	All positive	All positive
7-day postapplication challenge	All negative	All negative	All negative
28-day postapplication challenge	6/8 negative	6/8 negative	6/8 negative