### Diagnostic Testing for Canine Lyme Disease: How Testing Can Influence Diagnosis and Treatment

#### **Overview**

Infection with *Borrelia burgdorferi*, the causative agent of canine Lyme disease, is being more widely detected throughout the country, resulting in increased interest in managing this often subclinical disease.

IDEXX's diagnostic tests for detecting Lyme disease use the  $C_6$  antigen, a unique, synthetic peptide derived from an outer-surface portion of *Borrelia burgdorferi*. These tests include the SNAP<sup>®</sup> 3Dx<sup>®</sup> Test for patient-side identification of Lyme-positive dogs, and the Lyme Quant  $C_6^{\text{T}}$  Test, a reference laboratory test that provides an antibody level (similar to a titer) to evaluate the infection so you can determine whether treatment is warranted and monitor response to treatment.

Research shows that the  $C_6$  antibody is detectable earlier in infection, is specific, will not cross-react with vaccination or other tick-borne infections, and, most interestingly, declines rapidly and significantly after successful treatment.<sup>\*</sup> The combination of these  $C_6$  assays allows you to identify infection and use valuable, measurable information to decide on a therapeutic plan and to monitor your treatment choice.

#### Lyme Testing Can Influence Your Therapeutic Plan

# What are the benefits of screening clinically healthy dogs for Lyme disease?

- Potentially dangerous diseases, such as Lyme-associated nephropathy, may be prevented if a dog who is Lyme-positive is treated before the development of proteinuria.
- Lyme-associated nephropathy may be detected before clinical illness develops by screening and monitoring seropositive dogs for proteinuria.
- Clinical signs of canine Lyme disease can be vague and sometimes there is a response to treatment in dogs that were originally perceived as being without clinical signs.
- · Clients can be educated on tick prevention programs.
- Knowing if the dog is seropositive can aid in vaccination decisions.

## What does it mean when the SNAP 3Dx Test remains positive for Lyme after treatment, and what should I do?

This just means that the C<sub>6</sub> antibody level is still above the detection limit of the SNAP test. The animal still may have been effectively treated. To determine this, a Lyme Quant C<sub>6</sub> Test should be performed.

# How do I use the follow-up Lyme Quant C<sub>6</sub> Test after treatment to determine if a dog was successfully treated?

- A >50% drop in C<sub>6</sub> level indicates successful treatment even if the level remains about 30 U/mL. This follow-up C<sub>6</sub> level is the dog's new baseline for evaluating a future C<sub>6</sub> screening test.
- A <50% drop in C<sub>6</sub> level may indicate noncompliance with treatment, ineffective treatment or re-infection. Consider retreating the dog and rechecking the C<sub>6</sub> level in six months.

## How do I use the new baseline $C_6$ level to help me interpret future $C_6$ screening tests?

- If the dog's six-month post-C<sub>6</sub> level is <50% from the original pretreatment level, but still above 30 U/mL, the dog will likely remain positive for some time on future SNAP 3Dx screening tests.
- If the C<sub>6</sub> level remains the same on future Lyme Quant C<sub>6</sub> Tests, then, even if the results are above 30 U/mL, the animal has not been reinfected and does not require retreatment.

\*Liang FT, Steere AC, Marques AR, et al. Sensitive and specific serodiagnosis of Lyme disease by enzyme-linked immunosorbent assay with peptide based on an immunodominant conserved region of *Borrelia burgdorferi* VIsE. *J Clin Microbiol*. 1999;37(12):3990–3996.

O'Connor TP, Esty KJ, Hanscom JL, Shields P, Philipp MT. Dogs vaccinated with common Lyme disease vaccines do not respond to IR<sub>e</sub>, the conserved immunodominant region of the VIsE surface protein of *Borrelia burgdorferi*. *Clinical and Diagnostic Laboratory Immunology*. May 2004. Philipp MT, Bowers LC, Fawcett PT, et al. Antibody response to IR<sub>e</sub>, a conserved immunodominant region of the VIsE lipoprotein, wanes rapidly after antibiotic treatment of *Borrelia burgdorferi* infection in experimental animals and humans. *J Infectious Dis*. 2001;184(7):870–878.

If the C<sub>6</sub> level has increased from the post-treatment baseline value on future Lyme Quant C<sub>6</sub> Tests, re-infection is likely and retreating the dog should be considered with a follow-up C<sub>6</sub> level six months post-treatment.

# Why is it beneficial to run the Lyme Quant $C_6$ Test rather than treat all dogs that are Lyme-positive on the SNAP 3Dx Test?

- Having a C<sub>6</sub> level can help determine whether treatment is warranted in the first place.
- Following the drop in C<sub>6</sub> level post-treatment helps you determine whether treatment was successful.
- Since many dogs' C<sub>6</sub> levels do not become negative after treatment, the SNAP 3Dx Test may remain positive and stay positive for years. In that case, you would not be able to tell the owner if the dog had been successfully treated, resulting in unnecessary retreatment of the pet and unnecessary owner concern.
- For the reasons stated above, not having a baseline and a post-treatment C<sub>6</sub> level can create confusion for monitoring treatment success and interpreting future C<sub>6</sub> screening tests.

Using the IDEXX recommended protocol for screening and monitoring response to therapy allows you to determine whether a dog has been infected with *Borrelia burgdorferi*, and whether treatment is recommended. It also allows you to determine whether treatment was effective and guides you in interpreting subsequent  $C_6$  screening or follow-up tests.

### Lyme Testing Can Benefit Your Clients and Patients

Having a well-defined and trusted protocol for Lyme screening, treatment and follow-up will instill confidence in your pet owners. This will help them to better understand the benefits of:

- Routine screening
- · Complying with treatment recommendations
- Post-treatment follow-up
- Tick prevention programs
- · Vaccination, if this is part of your Lyme prevention program

This peace of mind and confidence should lead to better owner compliance and understanding of this disease. Your clients can be reassured they are doing their best to prevent this potentially devastating disease.

