

A new *Borrelia* species discovered in BC ticks

Borrelia burgdorferi sensu lato is a diverse bacterial group with a worldwide distribution of 20 named and 1 unnamed genospecies. *B. burgdorferi* sensu stricto seen in North America, *B. afzelii* and *B. garinii* in Europe, are the main genospecies (group 1) that cause Lyme disease. A second group of eight genospecies (*B. bavariensis*, *B. bissettii*, *B. kurtenbachii*, *B. mayonii*, *B. miyamotoi*, *B. lusitanae*, *B. spielmanii*, *B. valisiana*) have been shown to have a limited disease potential. The third group of nine genospecies (*B. americana*, *B. andersonii*, *B. californiensis*, *B. carolinensis*, *B. japonica*, *B. tanuki*, *B. turdi*, *B. sinica*, *B. Yangtze*) have not been reported in, or isolated from humans.¹ It is expected that additional genospecies will be discovered.

B. mayonii is the newest identified Lyme disease-causing spirochete first identified in the midwestern United States by scientists at Mayo Clinic. Six *B. mayonii* human infections were identified from about 9000 samples obtained from Minnesota, Wisconsin, and North Dakota residents tested for Lyme disease between 2012 and 2014. The spirochete was also cultured by the US CDC in two patients. Additional testing at the US CDC and at the Mayo Clinic confirmed this as a new genospecies, *B. mayonii*.² *B. mayonii* was also identified in *Ixodes scapularis*, blacklegged (deer) ticks collected in several counties in northwestern Wisconsin and Minnesota. This tick species is common in northeastern US and Canada. Like *B. burgdorferi*, *B. mayonii* causes fever, headache, rash, and neck pain in the early stages of infection (days after

exposure) and arthritis in later stages of infection (weeks after exposure). Although data are limited, *B. mayonii* infection was also associated with nausea and vomiting and diffuse rashes (rather than a single bull's-eye rash more common with *B. burgdorferi*),

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and a higher concentration of bacteria was detected in the blood. To date, infected patients have responded to standard Lyme disease treatments.

Ticks infected with *B. mayonii*-like spirochetes have now also been discovered in BC—first detected in an *Ixodes angustus* female nymph that was removed from a dog in June 2016 in the Lower Mainland. The *B. mayonii*-like species was confirmed by the National Microbiology Laboratory (NML) in Winnipeg. Sequencing of 368bp *FlaB* gene suggested that the species is very closely related to the newly discovered *B. mayonii*.² The BCCDC Public Health Laboratory identified 18 samples with inconclusive PCR results among 2779 ticks tested for Lyme disease from 2013 to 2016. The NML found that two of the 18 samples displayed the same sequence pattern and were determined to be *B. mayonii*-like. The second infected tick was removed from a child in the central Interior of

BC in July 2016. The third infected tick was recovered from a dog in the Lower Mainland that was tested in September 2016. No clinical signs or symptoms were observed in the two dogs or the child. Serological testing of the child has been negative for Lyme disease. The BCCDC Public Health Laboratory will continue passive tick surveillance to help understand the epidemiology of this *B. mayonii*-like spirochete. Based on the data to date, the *B. mayonii*-like agent can be detected using existing PCR tests and the effectiveness of serology is under investigation.

As always, physicians need to be aware of the broad spectrum of Lyme disease presentations and consider testing and treatment where clinically appropriate.

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