



## MEDICAL DIAGNOSTIC LABORATORIES, L.L.C.

2439 Kuser Road, Hamilton, NJ 08690-3303

www.mdlab.com ♦ Toll Free 877-269-0090

### Vector-Borne Disease Testing Update



As part of a continual effort to enhance our infectious disease testing menu, MDL is delighted to offer the following new diagnostic tests:

Test #	New Test
424	<i>Borrelia afzelii</i> by Real-Time PCR
425	<i>Borrelia garinii</i> by Real-Time PCR
430	<i>Borrelia lonestari</i> by Real-Time PCR
431	Babesia WA1 By Real-Time PCR

#### Specimen Requirements & Collection Procedures

- Specimen requirements – Whole blood submitted in a Yellow top tube (ACD solution A) and ticks stable at room temperature. Synovial fluid, biopsy specimens, cerebrospinal fluid (CSF) must be transported in a non-additive tube with a cold pack.
- The proper specimen collection technique is very important in identifying pathogens from DNA. Therefore, please refer to MDL's collection procedures ([www.mdlab.com](http://www.mdlab.com)) to assist you in obtaining the best results.

As a premier infectious disease laboratory, MDL continually strives to improve our services by providing the most current, accurate, and informative diagnostic tools available.

If you should have any questions, please contact your sales representative or call MDL toll free at (877) 269-0090.

## ***Borrelia lonestari***

In the southeastern and south central United States, the prevalence of Lyme disease caused by *B. burgdorferi* sensu stricto is much lower than that found in the northeastern United States. However, another Lyme disease-like illness that develops following the bite of the Lone Star tick, *Amblyomma americanum*, has been described. Individuals affected with this illness, termed "southern tick-associated rash illness", or STARI, commonly develop a localized expanding circular skin rash (erythema migrans [EM]) at the site of the tick bite similar to that seen with classic Lyme disease. A mild illness characterized by generalized fatigue, headache, stiff neck, and occasionally fever and other constitutional signs also develop. STARI appears to respond to antibiotic treatment and has been attributed to infection with an as-of-yet-uncultivated spirochete tentatively referred to as *Borellia lonestari*. Cases consistent with this clinical presentation have been reported from several southeastern and south central states, including Missouri, Maryland, Georgia, South Carolina, and North Carolina. The majority of patients with STARI do not have laboratory evidence of infection with *B. burgdorferi* sensu stricto. Moreover, a new spirochete, *B. lonestari*, was described from *A. americanum* on the basis of polymerase chain reaction (PCR) amplification of the flagellin and 16s rRNA genes. Virtually identical sequences have been found in ticks from geographic regions as disparate as New Jersey and Texas, suggesting this organism is widely distributed. Likewise, *Borrelia* spirochetes have been detected in *A. americanum* and *I. scapularis* in Alabama. Despite relatively widespread documentation of this organism in ticks, a vertebrate reservoir host that could be responsible for maintaining infection in the tick population has not yet been identified.

## ***Borrelia afzelii* & *Borrelia garinii***

*Borrelia afzelii* and *Borrelia garinii* are part of the "*B. burgdorferi* sensu lato", group and are distinguished from the species "*B. burgdorferi* sensu stricto" (strict sense of *B. burgdorferi*). Human infection due to *B. burgdorferi* sensu lato may involve multiple organs or tissues, resulting in skin, cardiac, neurological and musculoskeletal disorders. *B. burgdorferi* sensu stricto is widely distributed in the Northeast, Midwest and Western regions of the United States. *B. burgdorferi* sensu stricto, *B. garinii*, and *B. afzelii* have been documented in Europe. The principal vectors of *B. burgdorferi* sensu lato are ticks of the *I. ricinus* complex, including *I. scapularis* and *I. pacificus* in the United States, *I. ricinus* in Europe, and *I. persulcatus* in Asian Russia, China and Japan. These *Borrelia* vectors are not species-specific. For example, the European sheep tick, *I. ricinus*, has been recognized as a vector of all three human pathogenic *Borrelia* species, *B. burgdorferi* sensu stricto, *B. garinii*, and *B. afzelii*.

Different species of *B. burgdorferi* sensu lato are associated with distinct clinical manifestations of Lyme borreliosis (LB): Lyme arthritis is associated with *B. burgdorferi* sensu stricto infection, neuroborreliosis is associated with *B. garinii* infection, and Acrodermatitis chronica atrophicans (ACA) is associated with *B. afzelii* infection.

Lyme carditis is a well known clinical manifestation in both North American and European patients with LB. Lyme arthritis is the most common musculoskeletal symptom resulting from *B. burgdorferi* sensu stricto infection in North America. About 60% of untreated patients with EM experience brief arthritic attacks in the US. In contrast, only 3 to 15% of patients suffered from arthritis in Europe, where *B. garinii* and *B. afzelii* are more frequently recovered than *B. burgdorferi* sensu stricto. Neuroborreliosis is the most frequent manifestation of disseminated infection in Europe and is a common symptom in North American LB patients as well. All three species, *B. burgdorferi* sensu stricto, *B. garinii*, and *B. afzelii*, are known to cause Lyme neuroborreliosis. In European patients, *B. garinii* constituted 72% of the *Borrelia* isolates or DNAs detected in human CSF samples, whereas 8% and 20% of the specimens were identified as *B. burgdorferi* sensu stricto and *B. afzelii*, respectively. ACA is a late cutaneous manifestation of LB characterized by chronic and long-lasting progressive red and bluish-red lesions, usually on the extensor of the extremities. Molecular studies of ACA isolates from patients in several European countries have provided evidence that *B. afzelii* is the predominant etiologic agent of ACA.

## ***Babesia WA1***

Babesiosis is a zoonotic disease which requires transmission from an animal reservoir to humans via a tick vector. In the northeastern United States, the black-legged deer tick *Ixodes scapularis*, the same vector that transmits Lyme disease, is the principal vector for the transmission of the etiologic agent of Babesiosis, *Babesia microti*. *Babesia* species from rodents, primarily the white-footed deer mouse but also the field mouse, vole, rat, and chipmunk, are transmitted to humans during tick bites in endemic areas. Diagnoses of Babesiosis are understandably more prevalent during periods of tick activity such as spring and summer. *Babesia* shares a close affinity with malaria parasites in its intraerythrocytic niche in the host, which can and has led to its incorrect identification as *Plasmodium* spp., the malaria agent.

Human infections occurring on the West Coast of the United States have been caused by *Babesia*-like organisms designated WA-1 type *Babesia* (where the prefix "WA" stands for Washington State in which the first human case was described). Based upon sequencing data, WA-1 type *Babesia* shows more affinity to small babesial isolates from dogs and wildlife in California than to *B. microti*.

Although WA1 is morphologically similar to *B. microti*, several differences were noted, including antigenic cross-reactivity, virulence in hamsters (100% fatality within 10 days), and Southern restriction fragment length polymorphisms of DNA digests. All of these data indicated that WA1 is a new human pathogen that is distinct from *B. microti*. Subsequent studies examining the ribosomal subunit sequences along with comparison against other piroplasm-derived sequences showed that WA1 was most closely related to *B. gibsoni*, a pathogen of dogs that produces a chronic condition with poor susceptibility to antimicrobial treatment. Phylogenetically, WA1 falls within a cluster that includes *T. equi* (*B. equi*) and the known lymphoproliferative *Theileria* piroplasms.