

Bartonella DNA Detection by PCR

FOR MOLECULAR DIAGNOSIS OF *Bartonella henselae* AND *Bartonella quintana* INFECTIONS

Test Highlights

- Real-time polymerase chain reaction (PCR) detection for *Bartonella species*, especially *B. henselae* and *B. quintana*
- Targets the heat shock protein gene *htrA*, common to *Bartonella spp.*
- More sensitive and specific than traditional methods
- Utilizes a DNA internal control to monitor nucleic acid extraction and PCR

Clinical Background

- *Bartonella spp.*, including *B. henselae* and *B. quintana*, are tiny, fastidious, Gram-negative bacilli that can adhere to and invade mammalian cells, including endothelial cells and erythrocytes. These agents cause a wide spectrum of clinical illnesses, such as trench fever, cat scratch disease, bacillary angiomatosis, peliosis hepatis, and endocarditis.
- *Bartonella spp.* that rarely cause infections in humans include *B. clarridgeiae*, *B. elizabethae*, *B. grahamii*, *B. vinsonii* subsp. *arupensis* (first isolated and characterized at ARUP Laboratories), *B. vinsonii* subsp. *berkhoffii*, and *B. washoensis*.
- The pathologic manifestations of *Bartonella* disease vary with the immune status of the host.
 1. *B. henselae* infections cause cat scratch disease in children, endocarditis in immunocompetent individuals, and bacillary angiomatosis/peliosis in HIV-infected individuals. Risk factors for infection include cat scratch or bite.
 2. *B. quintana* infections cause trench fever and endocarditis in homeless individuals and bacillary angiomatosis/peliosis in HIV-infected individuals. Risk factors for infection include homelessness, body lice, and alcoholism.
- *Bartonella* are extremely slow growing and fastidious, requiring special media for growth. Cultures are not recommended to diagnose most cases of *Bartonella* infection, and in fact, the sensitivity is at best only 20 percent compared to PCR assays.
- Numerous PCR assays have been developed for direct detection of *Bartonella spp.* in pus, skin lesions, or tissue. A gene fragment specific for either citrate synthase or a heat shock protein (*htrA*) is demonstrable by PCR in the majority of patients with *Bartonella* infections.
- The immunofluorescence assay (IFA) has been used most commonly to demonstrate *Bartonella* antibodies in persons with cat scratch disease, endocarditis, and in some cases of HIV-associated aseptic meningitis, encephalopathy or neuropsychiatric disease.

Indications for Use

This test should be utilized to confirm the presence of *Bartonella spp.* DNA in EDTA whole blood, plasma, serum, tissue, and CSF samples from patients presenting with clinical symptoms associated with having a *Bartonella* infection.

Interpretation

A positive result is supportive of the diagnosis of *Bartonella spp.* infection.

Limitations

- This assay is for the detection of *Bartonella spp.* DNA and has been validated and optimized especially for *B. henselae* and *B. quintana* DNA detection. Theoretically, the PCR assay may also detect the other rare species of *Bartonella*, but has not been validated for these other species.
- *Bartonella* speciation, which involves DNA sequencing of PCR product, can differentiate *Bartonella henselae* from *Bartonella quintana* and possibly identify other *Bartonella spp.* Speciation may be performed only if special arrangements are made with Christine M. Litwin, M.D., Medical Director, Microbial Immunology.
- A negative result does not rule out the presence of *Bartonella spp.* DNA in quantities below the sensitivity of this assay or the possibility of PCR inhibitors in samples.
- Unidentified sequence variations within the *htrA* gene of *Bartonella* targeted by this assay may lead to a false-negative result.

Methodology

- DNA is extracted from samples suspected of containing *Bartonella*, followed by real-time PCR. An Eclipse™ hybridization probe specific to and optimized for *B. henselae* and *B. quintana* is utilized for detection in a single reaction.
- A DNA internal control is multiplexed into each assay, monitoring the nucleic acid extraction and the PCR processes for inhibition.

References

1. Zeaiter Z, Fournier PE, Greub G, Raoult D. Diagnosis of *Bartonella* endocarditis by a real-time nested PCR assay using serum. J Clin Microbiol 2003;41:919-25.
2. Welch, DF, Carroll KC, Hofmeister EK, et al. Isolation of a new subspecies, *Bartonella vinsonii* subsp. *arupensis*, from a cattle rancher: Identity with isolates found in conjunction with *Borrelia burgdorferi* and *Babesia microti* among naturally infected mice. J Clin Microbiol 1999;37:2598-2601.
3. Mouritsen CL, Litwin CM, Maiese RL, et al. Rapid polymerase chain reaction-based detection of the causative agent of cat scratch disease (*Bartonella henselae*) in formalin-fixed, paraffin-embedded samples. Hum Pathol 1997;28:820-826.
4. Litwin CM, Martins TB, Hill HR. Immunologic response to *Bartonella henselae* as determined by enzyme immunoassay and Western blot analysis. Am J Clin Pathol 1997;108:202-209.

Test Information

0093057 *Bartonella* DNA Detection by PCR
0060762 *Bartonella* DNA Detection by PCR, Whole Blood

For specific collection, transport, and testing information, refer to the ARUP Web site at www.aruplab.com.