

Deer tick bacteria DNA in joint fluid not reliable marker of active lyme arthritis

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New research shows that polymerase chain reaction (PCR) testing for *Borrelia burgdorferi* DNA—the spirochetal bacteria transmitted by deer ticks—in joint fluid may confirm the diagnosis of Lyme arthritis, but is not a reliable indicator for active joint infection in patients whose arthritis persists after antibiotic therapy. Findings of this study are published in *Arthritis & Rheumatism*, a journal of the American College of Rheumatology (ACR).

Lyme disease is caused by the *B. burgdorferi* bacteria, which is transmitted to humans by the bite of an infected blacklegged tick, commonly known as the deer tick. The characteristic erythema migrans skin rash—resembling a bull's-eye mark—is often the first sign of infection, along with symptoms such as headache, fever, and fatigue. Surveillance data from the Centers for Disease Control and Prevention (CDC) report more than 30,000 new cases of Lyme disease each summer in the U.S., with 93% of cases occurring in Connecticut, Delaware, Massachusetts, Maryland, Minnesota, New Jersey, New York, Pennsylvania, Rhode Island, and Wisconsin. If left untreated, roughly 60% of patients will develop Lyme arthritis, which commonly affects the knee.

"Currently, the primary use for PCR testing in Lyme disease is to establish if active infection remains in patients with persistent arthritis following antibiotic therapy," said Allen Steere, M.D., Director of Clinical Research, Rheumatology Unit, at Massachusetts General Hospital and Harvard Medical School in Boston. "Our study goal was to determine the *B. burgdorferi* burden and viability in skin and joints of patients with Lyme disease." Researchers used PCR techniques to detect the deer tick bacteria DNA in skin samples of 90 patients with confirmed Lyme disease and in joint fluid or synovial tissue samples from 63 patients with Lyme arthritis, 23 who were responsive to antibiotics and 40 with antibiotic-refractory arthritis. In addition, both bacterial DNA and RNA were searched for in a subgroup of these

patients.

In most patients, erythema migrans skin lesions, an early disease manifestation, yielded positive culture and PCR results for the Lyme disease agent. Similarly, the majority of pre-treatment synovial fluid samples in patients with Lyme arthritis, a late disease manifestation, had positive PCR results for *B. burgdorferi* DNA. Patients with Lyme arthritis were treated with oral antibiotics for one or two months, and in those for whom the arthritis did not resolve, IV antibiotics were administered for an additional month. If they had persistent arthritis despite three months of antibiotics, patients were treated with non-steroidal anti-inflammatory drugs (NSAIDs) and disease-modifying antirheumatic drugs (DMARDs).

About 30% of patients with persistent arthritis, despite the three month antibiotic regimen, still had positive PCR results for 4-9 months after the start of antibiotics. However, positive PCR results in the post-antibiotic period did not correlate with relapse or duration of arthritis. Moreover, synovial tissue samples obtained in the patients who underwent synovectomies for persistent arthritis more than one year after they first received antibiotics, in all cases, had uniformly negative culture and PCR results.

Researchers also detected *B. burgdorferi* mRNA, a marker of the bacterium viability, in 8 of 10 erythema migrans skin samples, but in none of 11 synovial fluid samples, including those taken prior to antibiotic treatment. Thus, the authors showed that the bacteria in erythema migrans samples were active and viable, while those in synovial fluid were near-dead or dead at any time point during the testing. "Our results confirm that detection of the bacteria which causes Lyme disease in synovial fluid is not a reliable test of active joint infection," Dr. Steere concluded. "We recommend treatment of patients with Lyme arthritis with appropriate oral and if necessary, IV antibiotics for two to three

months. However, in those with persistent arthritis despite oral and IV antibiotics of this duration, we then give DMARD treatment."

More information: "Burden and Viability of *Borrelia burgdorferi* in Skin or Joints of Patients with Erythema Migrans or Lyme Arthritis" Xin Li, Gail McHugh, Nitin Damle, Vijay K. Sikand, Lisa Glickstein, and Allen C. Steere. *Arthritis & Rheumatism*; Published Online: May 17, 2011.
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