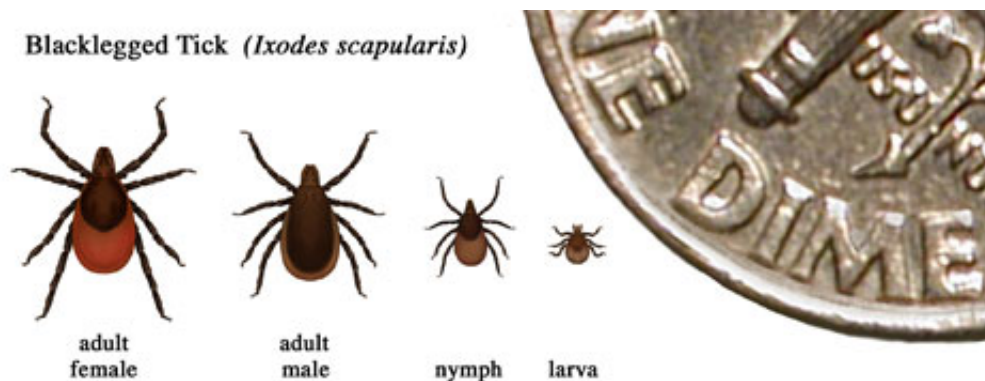


# Test for persistent Lyme infection using live ticks shown safe in clinical study

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Various life stages of the ticks that transmit Lyme bacteria are shown next to a dime. Credit: CDC

In a first-of-its-kind study for Lyme disease, researchers have used live, disease-free ticks to see if Lyme disease bacteria can be detected in people who continue to experience symptoms such as fatigue or arthritis after completing antibiotic therapy. The technique, called xenodiagnosis, attempts to find evidence of a disease-causing microbe indirectly, through use of the natural disease-carrier—in this case, ticks. It was well tolerated by the volunteers, but investigators could not find evidence of Lyme disease bacteria in most of the cases where enough ticks were collected to make testing possible.

Larger studies are needed, the scientists say, to determine the significance of positive xenodiagnosis results in cases where Lyme

disease symptoms persist following antibiotic therapy.

Adriana Marques, M.D., of the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health, and Linden Hu, M.D., of Tufts Medical Center, Boston, led the pilot study. Findings appear online in *Clinical Infectious Diseases*.

The most common tick-borne illness in the United States, Lyme disease is caused by *Borrelia burgdorferi* bacteria that are transmitted to people by [ticks](#) of the *Ixodes* genus.

"Most cases of Lyme disease are cured by antibiotics, but some patients continue to experience symptoms despite the absence of detectable Lyme bacteria," said NIAID Director Anthony S. Fauci, M.D. "This poses a mystery that requires continued research into new or improved ways to diagnose Lyme disease and determine the cause of unresolved symptoms."

"Xenodiagnosis using ticks to detect *B. burgdorferi* has been used previously in animal studies, but this is the first time it has been tried in people," said Dr. Marques. "Our primary goals in this initial trial were to develop procedures for tick xenodiagnosis and to determine its safety in humans."



Four larval ticks attached to a human volunteer. Credit: Tufts Medical Center

Thirty-six adult volunteers enrolled in the study at locations in Maryland, Connecticut and Massachusetts. Participants included 10 people with post-treatment Lyme disease syndrome (PTLDS); 10 who had high levels of an antibody against *B. burgdorferi* after antibiotic treatment; five who had erythema migrans (a bull's-eye rash) and had received antibiotic treatment in the past; one person with erythema migrans who began [antibiotic therapy](#) at the time of tick placement; and 10 healthy volunteers.

Participants consented to have up to 30 laboratory-bred, pathogen-free, larval ticks (each smaller than a poppy seed) placed under a dressing. When possible, the ticks were placed near areas where a rash had been

observed or near affected joints. After four to six days, investigators removed the ticks and processed them to detect whether any Lyme disease bacteria were present.

The investigators found that xenodiagnosis was well tolerated. "The most common adverse event experienced by volunteers was mild itching at the site of tick attachment," said Dr. Marques.

Not all of the placements yielded enough blood-engorged ticks to perform xenodiagnosis. Twenty-three volunteers with Lyme disease had at least one tick tested; of these, 19 people tested negative. Two people had indeterminate results, thought to be due to laboratory contamination. Xenodiagnosis was positive for *B. burgdorferi* DNA in the person with erythema migrans who underwent xenodiagnosis early during therapy and in a volunteer with PTLDS.

The researchers note that a limitation of the study is the relatively small number of people on which xenodiagnosis was attempted. "Future studies are necessary to determine the incidence of positive xenodiagnostic results for *B. burgdorferi* after [antibiotic treatment](#), if these results represent viable organisms or remnants of infection, and whether these results can be related to ongoing symptoms in patients after therapy for Lyme disease," they write.

**More information:** — A Marques et al. Xenodiagnosis to detect *Borrelia burgdorferi* infection: A first-in-human study. *Clinical Infectious Diseases* [DOI: 10.1093/cid/cit939](#) (2014).

— [clinicaltrials.gov/ct2/show/NC ... m=NCT01143558&rank=1](https://clinicaltrials.gov/ct2/show/NC...m=NCT01143558&rank=1)

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