

Southern Tick-Associated Rash Illness (STARI)

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In the northeastern United States, *Borrelia burgdorferi*, the causative agent of Lyme disease, is maintained in nature through a cycle involving the white-footed mouse and other rodents as primary reservoir hosts and the black-legged tick, *Ixodes scapularis*, as vector. Although white-tailed deer mount an antibody response following infection, they appear unable to infect ticks with *B. burgdorferi*, thus, they do not serve as a reservoir host. The primary role of deer is serving as a major host for vector tick populations.

Lyme disease occurs much less commonly in the southeastern and south-central United States than it does in the northeastern United States. However, a Lyme disease-like illness that develops in humans following bites by lone star ticks, *Amblyomma americanum*, has been described. Individuals affected with this illness, termed “southern tick-associated rash illness” (STARI), commonly develop a localized expanding circular skin rash 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 accompanies the rash. The disease appears to respond to antibiotic treatment.

STARI, which also is referred to as “Masters’ disease” in recognition of the physician who first described its clinical presentation, has been attributed to infection with a yet-uncultivated spirochete, tentatively referred to as *Borellia lonestari*. Cases consistent with STARI have been reported from several southeastern and south-central states, including Georgia, Maryland, Missouri, North Carolina, and South Carolina. The majority of patients with STARI do not have laboratory evidence of infection with *B. burgdorferi*.

Because the etiologic agent has not yet been isolated in culture, PCR amplification of DNA has been used to identify the presence of *B. lonestari* in humans and ticks. DNA evidence of *B. lonestari* has been found in wild-caught *A. americanum* ticks from Alabama, New Jersey, Tennessee, and Texas, as well as in a tick removed from an affected person who had traveled to Maryland and North Carolina. Despite widespread documentation in ticks, a vertebrate reservoir host of this organism has not been identified. White-tailed deer are preferred hosts for larvae, nymphs, and adults of *A. americanum*. Because of their intimate association with lone star ticks and because of their important role in the natural history of *Ehrlichia chaffeensis*, which also is vectored by lone star ticks, the status of white-tailed deer as potential hosts for *B. lonestari* was assessed by SCWDS and other researchers at the University of Georgia.

Frozen serum samples from 80 white-tailed deer from 17 populations in 8 southeastern states where deer were known to be parasitized by lone star ticks were selected from the SCWDS serum bank and tested. DNA evidence of *B. lonestari* infection was found in 7 of the 80 deer (8.7%) tested from a total of 5 of the 17 sites (29.4%). Positive animals were detected from Arkansas, Georgia, North Carolina, and South Carolina. Analysis of the nucleotide sequences of the DNA products from each of the seven positive deer samples revealed 100% identity with *B. lonestari* sequences.

The DNA sequences amplified from deer blood were identical to those amplified from lone star ticks described as harboring *B. lonestari* and also are identical to the single sequence reported from a human patient exhibiting evidence of STARI. Although other animals may be infected with this organism, this is the first report of evidence of *B. lonestari* in a vertebrate other than a human.

The results of this study suggest white-tailed deer also are naturally infected with *B. lonestari*, but the actual role of deer as a reservoir host is uncertain. Additional studies are needed to verify infection in deer and transmission of *B. lonestari* by ticks. Details of this work are available in Moore et al., 2002, *Journal of Clinical Microbiology* 41: 424-427. (Prepared by Susan Little and Gus Moore).