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Transmission of the Lyme Disease Spirochete

Lyme disease is the most prevalent tick-associated disease in the United States. Thousands of human cases are reported annually, mainly in northeastern and upper midwestern regions of the country. The blacklegged tick (*Ixodes scapularis*), formerly known as *Ixodes dammini* and sometimes referred to as the deer tick, is the most important species that transmits the bacterial (spirochete) disease agent.

The rise in deer populations over several decades in and near forests is correlated with substantial increases in blacklegged ticks and corresponding amplification of the disease organism in nature. Although deer are important hosts for adult blacklegged ticks, they do not serve to infect ticks. White-footed mice are considered the chief reservoirs for the Lyme disease agent. Larval and nymphal blacklegged ticks acquire the pathogen when they feed on these rodents and possibly other hosts, such as chipmunks and some birds. The disease organism can then be passed from larvae to nymphs to adults during the developmental process. There is occasional passage of the disease agent from infected females to larvae (via the eggs), but this form of pathogen transmission is not considered to be epidemiologically significant.¹

The length of time that a nymphal or adult female tick is attached to a host is an important factor in pathogen transmission. The nymphal tick, which is about the size of a poppy seed, is the most important stage for transmitting the disease organism. Most human infections are acquired during the months of May, June, and July when nymphs are most abundant. **Not all ticks are infected.** Depending on the site and other factors, infection rates are highly variable and usually range between 10% and 35%. After several hours of attachment, the tick begins to ingest blood. It is in this phase that the disease agent is transmitted to the host.

Several laboratory studies, using mice as experimental hosts, have shown that infected ticks need to be attached for more than 24 hours to effectively transmit the pathogen. The probability of transmission increases with the duration of attachment; maximal transmission usually occurs between 48 and 72 hours post attachment. In summary, an infected, flat (unengorged) tick does not transmit the disease agent until host blood is ingested.

Early detection and prompt removal of attached ticks is of paramount importance in reducing risk of infection. A pair of tweezers or forceps can be used to grasp the tick's mouthparts at the skin surface. Gentle pulling or twisting of the tick with steady pressure will dislodge it. The area of attachment can be cleaned with an antiseptic or rubbing alcohol.

Information on Submitting Ticks

- Effective January 1, 2006, we will accept all ticks for identification but test only those *Ixodes scapularis* ticks that have ingested human blood. We will examine all ticks for degree of engorgement. Laboratory personnel will test engorged black-legged ("deer") ticks (*Ixodes scapularis*) and, upon special request, certain other species of ticks for the presence of spirochetes that cause Lyme disease. We will not test the American dog tick (*Dermacentor variabilis*), larval ticks of all species, or unengorged ticks.
- Ticks should be submitted by residents to their municipal health departments. The health departments will then submit them to us with a request for identification and/or testing for the Lyme disease agent.
- Ticks will be accepted only from residents of Connecticut.
- The following information should accompany the tick: Name, address, and telephone number of person submitting the tick; name, age, and sex of person bitten; date tick was removed; part of body where tick was found; town in which tick was acquired.
- Please indicate if more than one tick is in a container.
- The best way to send a tick is in a small plastic zipper-locking bag. Dry ticks are easier for us to process than ticks preserved in alcohol.
- For our safety and ease in handling, please avoid the following: plastic film canisters, especially those which are black; glass containers; ticks mounted on glass slides; and ticks preserved in formalin. Ticks under cellophane tape are also difficult to handle.
- Reporting time depends largely on volume of ticks received. Priority will be given to processing and reporting findings on engorged *Ixodes scapularis* ticks.

* Information taken from an Article
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