



# Fact Sheet

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Lyme disease is a potentially serious illness that is spread by the bite of one type of tick found on deer and other animals, commonly called the deer tick, or the black legged tick. The large human population in the Middle Atlantic States is increasingly at risk from Lyme disease because of exposure to deer tick habitat through suburban development on former farmlands and woodlands and through frequent travel to rural areas for recreation. In Maryland, changes in land use have also contributed to an increase in the state's deer herd, with a corresponding increase in the deer tick population.

Complicating the matter further is the fact that ticks are not easily controlled by classic pesticide application. In addition, environmental problems, such as pesticide runoff and groundwater contamination, are becoming as serious as threats from disease.

## The Deer Tick

Ticks are small, flat, bloodsucking pests more closely related to spiders than to insects. They do not jump or fly, but they do cling to vegetation and climb onto passing animals that brush against them. The deer tick, also known as the black legged tick, *Ixodes scapularis* Say, is the common carrier of Lyme disease in the Eastern United States.

## Appearance

Ticks have four life stages: egg, larva, nymph, and adult. The larva is the size of the period at the end of this sentence. The nymph is less than one-sixteenth of an inch long or the size of a pinhead. Nymphs are tan with black legs and a black shield near the head. The deer tick is smaller than the familiar dog tick that commonly bites humans. Unfed adult deer ticks are the size of a sesame seed. The body of the adult female before feeding is brick red with black legs and a black shield at

the head. The unfed, adult male is slightly smaller than the female and entirely dark. All stages are much larger and darker when fully fed with blood (Figure 1).

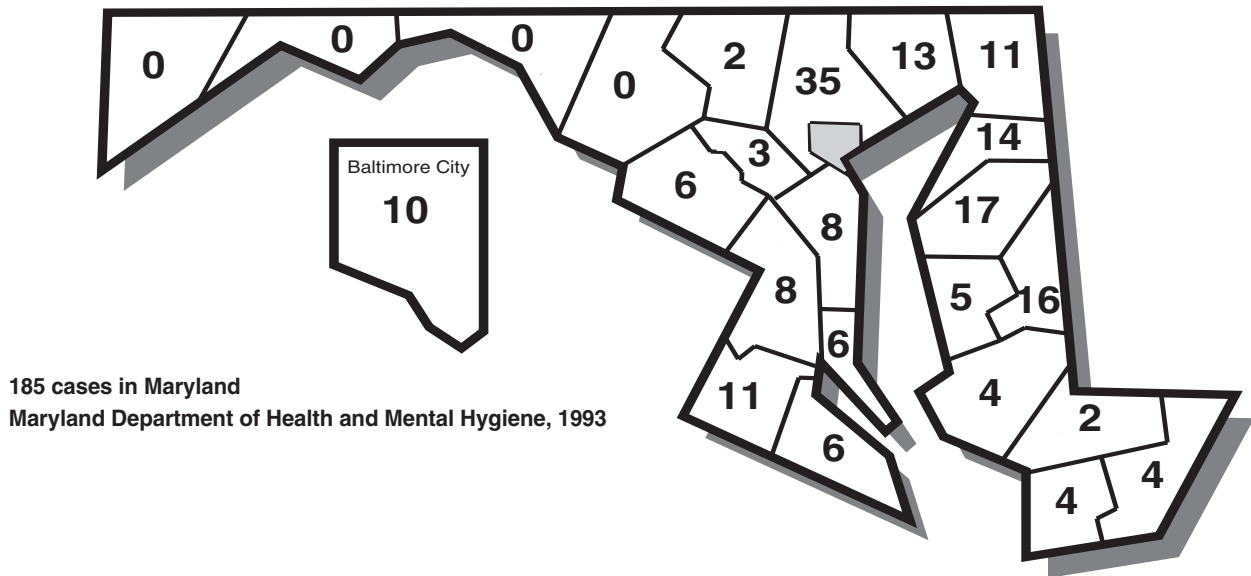
## Seasonal Activity

The deer tick requires 2 years to complete its four life stages. In the spring, each overwintering female lays thousands of eggs. Tiny larvae hatch from these eggs in late summer. The larvae do not disperse far; they crawl in leaf litter or on low vegetation where they wait for their first host (an animal on which they can feed). Larval hosts are usually mice and sometimes other small mammals, birds, or reptiles. If their hosts are infected with Lyme disease, ticks become infected from feeding on the hosts' blood. Ticks, which feed only once in each stage, need several days for a full blood meal. As ticks feed, they swell to several times their unfed size. Afterwards, the larvae detach and fall to the ground where they molt to the nymphal stage.

Because the larvae have been redistributed or spread from the hatching site by their hosts, the newly emerged nymphs are less concentrated than the larvae. These nymphs are found primarily in small mammal and deer habitat where the larvae fed the previous summer and fall. This habitat includes woodlands and regions where grasses and low shrubs border wooded areas. Nymphs search higher in the vegetation for hosts than larvae. While mice and other small mammals are still preferred, larger hosts, such as squirrels, raccoons, opossums, dogs, deer, and humans, may be bitten.



**Figure 1.** Actual size of larva; nymph; fully fed nymph; adult; and fully fed, adult female.



**Figure 2.** Reported cases of Lyme disease in Maryland in 1992 based on victims' residences.

Nymphal ticks are active from April through August when people are often outdoors. Most human Lyme disease cases are probably the result of nymphal tick bites. The majority of these bites occur in May and June when nymphal ticks are most abundant. In late summer, after the nymphal blood meal and further redistribution, the ticks drop to the ground, this time molting into the adult stage.

Adults are active in fall, winter, and early spring whenever temperatures are 50° F or greater. By climbing higher on plants than the nymphs, the adults attach to larger mammal hosts, such as deer, cattle, horses, dogs, and humans. After feeding for several days and mating, the adults drop from their hosts. The females lay their eggs in the spring and then die.

## Lyme Disease

### Lyme Disease in People

Lyme disease is caused by spiral-shaped bacteria transmitted by the bite of an infected deer tick. Most people become ill in the summer when the deer tick nymph is active. An expanding rash at the site of the tick bite is the most common sign of Lyme disease. The rash generally has a reddish edge with more normal-colored skin in the center. Not everyone who contracts Lyme disease develops this rash. Other early symptoms of illness are similar to the flu: headache, mild fever, muscle and joint aches, and fatigue. The rash and/or the flu-like symptoms usually develop within 1 month of the tick bite.

Lyme disease can be treated with antibiotics. Treatment is most effective during the early stage. Untreated, the illness can become more serious. Symptoms related to the nervous system might develop, such as meningitis, facial paralysis, or vision problems. Some people also develop heart trouble, which can cause dizziness, fainting spells, or irregular heartbeats. Arthritis, which often affects the knee, may occur months after the tick bite and is the most common later complication of Lyme disease.

### Lyme Disease in Maryland

In 1992, the Maryland Department of Health and Mental Hygiene recorded 185 cases of Lyme disease (Figure 2). The distribution of deer ticks corresponds with the pattern of reported human cases in Maryland (Figure 3). Although deer ticks have been found in every county, there appear to be greater numbers in the counties surrounding the Chesapeake Bay and the Eastern Shore. Future studies will be necessary to determine if deer tick populations are spreading.

Lyme disease is expected to increase in Maryland. Anyone who spends time in tick habitat is at risk. Those whose job or recreation involves extended periods of outdoor activity in tick habitat are at greater risk.

Because deer ticks that carry the Lyme disease bacteria (and other ticks that transmit different illnesses) can be found nearly everywhere in Maryland, precautions should be taken to reduce the risk of all tick bites. Again, this is especially important for people who spend a lot of time in the woods or surrounding areas.



**Figure 3.** Distribution of deer ticks based on the number of ticks found on examined deer.

## Personal Protection

Personal precautions against tick bites remain the best means of reducing the risk of contracting Lyme disease. Avoid known tick-infested areas whenever possible. If you must be in tick habitat, take precautions.

### Proper Attire

Dress to reduce tick exposure. Wear light-colored clothes so that the tiny, dark-colored ticks are easier to see and remove. Wear long pants tucked into socks or taped to boot tops and a long-sleeved shirt with the shirttails tucked in to prevent ticks from getting under clothing.

### Tick Repellents

Use a tick repellent containing permethrin on clothing and a repellent containing DEET on exposed skin (skin not covered by clothing). Always follow label directions.

Permethrin, marketed as Permanone or Duranone Tick Repellent, kills ticks when applied to clothing but *should not* be applied to skin. Once permethrin has dried on clothing, it remains effective through several machine washings.

Insect repellents containing DEET may be applied to exposed skin and clothing to prevent mosquito and tick bites. Concentrations of less than 100 percent DEET do not repel ticks as long as pure DEET.

For more information, request Pesticide Information Leaflet 10 "Using Insect Repellents Safely" from your county Extension agent.

## Tick Checks

Frequent and thorough "tick checks" are essential. Specific times should be planned for tick inspection, such as noon and bedtime. Check for ticks often and remove them immediately. When they contact a human host, ticks wander until they find a feeding site. They may attach anywhere. Although unattached ticks cannot transmit disease, they should also be removed immediately. Nymphal deer ticks, the stage of most concern to humans, are small but visible on careful examination. The tiny larval ticks have not been shown to transmit Lyme disease.

**Removal of attached ticks.** Animal research has indicated that a tick must be attached and feeding for 36 hours before disease transmission occurs. Therefore, tick removal in the early feeding period is a positive step in disease prevention. If a tick bite occurs, the attached tick should be removed promptly. With sharply pointed tweezers, grasp the tick as close to the victim's skin as possible and pull steadily until the tick is removed. Neither heat, petroleum jelly, nor the application of other irritants is recommended for tick removal. Place the tick in alcohol to preserve it for identification. If the mouthparts are left in the skin, remove them and treat the wound with an antiseptic to prevent other infection. Note the date of tick removal and see a physician if symptoms develop.

Similar precautions should be taken for dogs and other animals because they also can contract Lyme disease. For more information on Lyme disease in animals, ask your county Extension office for Fact Sheet 534 "Lyme Disease in Animals."

# Tick Control

Reducing the number of ticks, and thus the risk of Lyme disease infection, requires an integrated program of habitat modification, host reduction, and, in high risk areas, pesticide application.

## Habitat Modification

Mice serve as the reservoir for Lyme disease and as the primary hosts for the larval and nymphal stages of ticks. Make an effort to reduce rodent habitat where possible. Widen borders of paths and walkways to reduce their attractiveness to small mammals and eliminate human contact with tall grasses and shrubbery. Keep grassy areas mowed.

## Host Reduction

High tick populations are maintained by high deer populations. Deer are the preferred host for the adult ticks; a reduction of their numbers should reduce the number of ticks at all stages, including the nymphal stage. In controlled experiments, the complete removal of white-tailed deer from an area resulted in a gradual drop in tick numbers, but, since hosts other than deer were available, the ticks were not eliminated. Complete eradication of deer is neither practical nor desirable in most situations.

## Pesticide Application

**Damminix.** Permethrin-treated cotton balls in cardboard cylinders, marketed as Damminix, reportedly reduce tick populations where white-footed mice are the principal hosts. White-footed mice use the treated cotton as nesting material. The pesticide does not harm the mice, but it does kill their tick parasites. This device should be used in early spring and late summer to correspond with peak nymphal and larval feeding. The cylinders must be placed close enough together to be available to all female mice in the area where control is desired. Since many animals other than mice serve as tick hosts, Damminix can only be considered part of a tick control program. Damminix is a registered pesticide product and label instructions should be followed carefully.

**Other pesticides.** In a residential lot infested by deer ticks, chemical control, in addition to the habitat and host control mentioned previously, may be necessary. Several pesticides are labeled for tick control, including

carbaryl (Sevin), chlorpyrifos (Dursban), diazinon, ben-diocarb (Turcam), and others. These pesticides are most effective when applied to the brushy margins of paths and yards. When it is evident that ticks are active in these areas, spray low shrubs and leaf litter thoroughly to kill ticks that might wander up on this vegetation and attach to a passing host. Weedy fence lines that provide cover for rodents can be sprayed at the base. Broad application of pesticides to mowed grass is not recommended to reduce tick populations because neither deer ticks nor their hosts infest lawns.

Whenever pesticides are used, read and follow label directions to avoid health hazards and unnecessary harm to the environment. Pesticides must be carefully applied and used only when significant results will be realized. Remember that all pesticides labeled for tick control are poisons that kill other organisms as well.

Efforts at area-wide chemical tick control by aerial spraying have not been effective. Tree leaves intercept most of the spray, and ticks are sheltered by vegetation and leaf litter on the forest floor. In addition, pesticide activity is often short-lived.

## Knowledge as Prevention

The best way to protect your family and pets from Lyme disease is to be aware of high-risk areas and activities and to take preventive measures. Know how to avoid tick bites, how to remove ticks and treat bites if they occur, and how to recognize the symptoms of Lyme disease. Remember that this disease is treatable, particularly when discovered early.

For more information on Lyme disease, call your physician, veterinarian, local or state public health officials, your county Extension office, or the Maryland Cooperative Extension Service's Home and Garden Information Center at 1-800-342-2507.

No endorsement of trade name products is intended by the Maryland Cooperative Extension Service.

## Acknowledgments

The author thanks reviewers John A. Davidson, Ph.D., and Francis E. Wood, Professor Emeritus, University of Maryland at College Park, College Park, MD; Martha A. Greco, D.V.M., M.P.H., Center for Veterinary Public Health, Baltimore, MD; and Karl Neidhardt, M.S., U.S. Army Environmental Hygiene Activity-North, Fort George G. Meade, MD.

Published 1990-91  
Revised 1993-94