



One tick bite can change your life. In the eastern and north-central United States, Lyme disease is the most common tick-borne disease problem, although ticks also transmit a malaria-like protozoan called *Babesia microti* as well as a host of other microbes that can cause mild to fatal infections. In the eastern and north-central United States, one type of tick, the blacklegged or deer tick, is responsible for most cases of disease, and an unlucky person could be infected with two or three disease-causing agents from a single tick bite. The resulting illnesses may start as a summer-time flu, but lasting side effects can be as severe as heart block, chronic arthritic complaints, various neurological abnormalities including tingling, memory loss, paralysis ... and even death. All of these diseases can be treated effectively if diagnosed, and they all are quite preventable. So, although it's true that one tick bite can change your life, sometimes forever, it is equally important to remember ... just don't get bitten!!

In areas where ticks are common, experiencing prolonged fever with muscle ache, severe headache and joint pain during the summer months could indicate a tick-borne disease. In its earliest stages, Lyme disease is often associated with a bulls-eye or solid bright red rash that grows to more than 5 centimeters in diameter over the course of a few days to a few weeks. Diagnostic testing may not be conclusive at the earliest signs of disease, but if taken a week or two later, it is generally very reliable. A negative result from tests taken a month or more after initial signs and symptoms should prompt seeking alternative causes for the symptoms. Not every summer-time flu is Lyme disease or one of the other tick-transmitted infections, but in tick country, these diseases certainly need to be ruled out by a physician and not merely dismissed.

Lyme disease has become a public health threat world-wide, occurring

throughout rural, suburban and even semi-urban portions of the north-temperate region of the globe. In the U.S. about half of all cases are reported from just four states (Connecticut, Rhode Island, Massachusetts and New York). The ticks that transmit the disease-causing spirochetal bacteria are typically found in forested habitats or along woodland borders where humidity is usually highest. These ticks are very prone to drying out; just eight hours at 75 percent relative humidity can be fatal to a blacklegged tick.

The emergence of Lyme disease, or really its re-emergence, began with changes in the landscape starting in the 1920's. In the northeastern United States, demographic shifts to cities and the secession of farmland into second-growth forests began to restore suitable habitat for white-tailed deer, which had been missing for a century and a half. As deer repopulated, it created the necessary (blood) resource for blacklegged tick reproduction. These ticks were re-introduced from coastal New England islands that were never deforested, and they began to spread. Newer demographic changes bringing a surge of suburban development to these second-growth forests have put people into close proximity with wildlife and their parasites. Now, increasingly abundant deer populations are largely responsible for the hyper-abundance of blacklegged ticks and human tick encounters in many regions.

Each engorged female blacklegged tick can lay about 1,500 eggs. There are 60 or more days that these adult ticks are active before it gets too cold in the winter. If about five engorged ticks per day come from a single deer, then one deer can be responsible for generating as many as 450,000 tick eggs that will hatch later in the summer, producing larvae that start the ticks' life cycle. The tick's huge reproductive potential is amplified as deer populations surge, especially when it is happening in



Lyme disease often is first suspected with development of a bulls-eye or solid red rash that grows larger than 5 cm in diameter.

what is now human-inhabited landscapes.

The larvae generally latch onto small rodents, especially mice, which can be heavily infested with these ticks. And animals like mice, chipmunks, and other small rodents are the ones that typically carry the disease-causing infections. Blood feeding on these disease reservoirs is how ticks become infected; they hatch un-infected from eggs, take their first blood meal from an infected rodent, and then are ready to transmit the infection during their next blood meal, when they become nymphs. Just as one deer can produce a lot of engorged female ticks that will make hundreds of thousands of larvae, a yard full of mice can infect thousands of nymphs.

There can be more than 20 resident mice in a half-acre suburban yard. Typically, one in five nymphal deer ticks are infected with the Lyme-causing bacteria, so it should be little wonder that the impact of Lyme disease and other infections transmitted by these ticks seems to be getting worse – it is! In Rhode Island, we estimated that in 1993, about 275,000 residents were likely to encounter at least one of these blacklegged tick nymphs at their home but by 2006 that number had risen to 717,000 residents – nearly three quarters of the state's population. Similar increases have likely occurred in other states in the Northeast and mid-Atlantic regions.

Remembering that all ticks come in small (larvae), medium (nymphs),

and large (adult) sizes, it's important to note that most disease comes from deer tick nymphs that are most active from late May through July. Their small size (about the size of a poppy seed), their typically painless bite, their abundance in suburban residential settings, and their high infection rate all combine to make nymphal deer ticks the prime cause for most disease cases.

But nymphs don't transmit their infections as soon as they latch on and start biting. Experiments have conclusively shown that these ticks must be attached for at least 24 hours before they can transmit the Lyme disease agent. For adult ticks, the time delay for transmission is even longer, over 48 hours. Removing attached ticks within the first 24 hours can prevent infection. Because of their small size and usually painless bite, you may be unaware that a tick is attached. Nearly 75 percent of ticks submitted for testing by tick-bite victims were attached for longer than 24 hours.

### Take action to stay healthy

Various Internet and print sources will suggest all kinds of remedies and prevention tips, and sometimes all that variety of information gets ... well, overwhelming. Our goal is to keep the message on preventing tick-bites simple so that people actually will DO IT! We reduced the key objectives of an effective tick-bite prevention program into three target categories: Protect Yourself – Protect Your Yard – Protect Your Pets. In following this strategy, there are just a few highly effective practices that if used regularly, can definitely keep you safe and disease free. And to help people remember how simple it can be to protect against tick-bites, this year we launched the “Think TICK...Take ACTION” campaign. The letters spelling TICK can be used to remind every family member of the actions they should take every day during tick season to most effectively prevent disease.

**T** Everyone should have at least one pointy tweezer handy for safe tick removal. A pointy tweezer allows you to grasp even the tiniest nymph close to the skin for a clean removal. Remove them as soon as you find them and save them in a zip-lock bag for later identification and testing.

**I** Inspect yourself carefully at least once a day. Do a whole body check, paying close attention to those areas where clothing bunches up and restricts the tick's movements as they climb up. Behind knees, groin, around waistbands, bra straps, and arm bands on tee shirts are all likely spots for ticks to attach. Use a full length mirror and bright lights if you can't find someone to help.

**C** Put repellents on clothing not skin. The best way to repel ticks is with repellents containing permethrin soaked into clothes. Buy the clothes already treated, or treat them yourself and allow to air dry. Shoes, socks, pants and shirts should all be treated. The treatment lasts for a month or longer, and through at least a few cold-water washes. Use similar approved products on pets to repel and kill ticks before they attach to your pet or crawl from the pet onto you.

**K** Use approved pesticides to kill the “kreepy krittlers.” Bifenthrin or other synthetic pyrethroids work well and can generally be used in a targeted spray around the yard perimeter and along paths, trails, stonewalls or other shady, high exposure areas. Arborists are well suited for this work as high pressure sprayers for turning the forest leaf-litter over gives best results.

Granular products applied to leaf-litter also can be effective.

Among others, Bartlett Tree Experts has adapted these simple strategies in developing a highly effective and successful commercial tick control program for customers. Their program combines arboriculture practices like opening up the tree canopy to encourage tick-drying sunlight with high-pressure perimeter sprays and a rodent-targeted treatment (Damminix Tick Tubes). Deer proofing, raking and removing leaf litter and other landscape practices that discourage rodents also can help reduce tick abundance and tick encounter risk.

*More information on the Protect Yourself – Protect Your Yard – Protect Your Pets tick bite prevention program and the “Think TICK...Take ACTION” campaign is available at [www.tickencounter.org](http://www.tickencounter.org).*

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**All four stages of *Ixodes scapularis*, the black-legged or deer tick with dime for size comparison. Clockwise from top: female, male, larval, nymph**

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