

Ticks in North Carolina: Increasing Disease and Confusion

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Any state that has a town named Tick Bite (Lenoir County) and a creek named Tick Creek (Chatham County) you know must have a big problem. Last year almost 1,000 people in NC had reportable tick diseases (see table on page 6). Since only a minority of reportable cases get reported and there are a number of non-reportable infections such as Southern Tick Associated Rash Illness (STARI), this means that many thousands of NC's citizens get sick each year from tick bites and a few die. This year tick issues seem worse than ever as judged by the emails and phone calls Tick-borne Infections Council of North Carolina, Inc (TIC-NC) receives. We get questions about everything from how to remove a tick to whether an area is safe to visit or move to. We are also hearing about a lot of illness. Some people report being very sick. One of the most common concerns we hear about is people's difficulty in finding medical care due to the different levels of knowledge and approaches among NC medical providers.

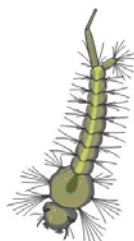
Tick

Disease

Lone Star Tick <i>Amblyomma americanum</i>	Ehrlichiosis, STARI, tularemia, tick paralysis, a Rickettsia that may be a human pathogen, and possibly Lyme disease and babesiosis in NC.
American Dog Tick <i>Dermacentor variabilis</i>	Transmits Rocky Mountain Spotted Fever, tick paralysis, tularemia, and possibly ehrlichiosis.
Brown Dog Tick <i>Rhipicephalus sanguineus</i>	Transmits ehrlichiosis and babesiosis, and possibly Rocky Mountain Spotted Fever.
Deer Tick or Black-legged Tick <i>Ixodes scapularis</i>	Lyme disease, babesiosis, ehrlichiosis, and possibly bartonella, Powassan encephalitis, and tick-borne encephalitis (viral).

Many health professionals as well as much of the public lack knowledge about the kinds of NC ticks that bite humans, the pathogens they carry, and the tick life cycle. Four types here bite humans and all may transmit one or more diseases. New "emerging infections" are being identified as well.

One of the confusions is caused by what people call the ticks. One often hears the name "seed" tick and "deer" tick. In NC, the most common tick now is the Lone Star (*Amblyomma americanum*) tick. It was not abundant 25 or 30 years ago. Back in the 1970s and 1980s people started seeing tiny ticks and assumed they were the "deer" ticks that carry Lyme disease. Most of the time these tiny ticks seen in the Piedmont are actually the nymph stage of the Lone Star tick. Sometimes people call these nymph ticks "seed" ticks. They are just as dangerous as black-legged (deer) ticks (*Ixodes scapularis*). Adult Lone Star and black-legged ticks also transmit disease agents. Fortunately, not all ticks are infected with disease-causing organisms but we do not know the proportion infected in various parts of the state because systematic studies have not been done. (Continued on page 5).



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Ticks in North Carolina

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Ticks have three stages and may spend a year between each one. When they first hatch all types are very small, the size of the period at the end of this sentence. Usually, the only larval ticks that bite humans are the Lone Star. (The Lone Star is an aggressive feeder and likes humans just as well as other animals in all its stages.) By the next stage, after molting, the tick is a nymph and is still very small. If it is the nymph of the black-legged (deer) tick it is the size of a poppy seed. The nymph of the Lone Star is only a little bigger than a poppy seed. Nymphs of the black-legged tick also bite people. Nymphs are often the stage that is associated with disease since they are so small they are often not noticed. Nymphs of the dog ticks do not bite people.



Female adult Lone Star tick



The only kind of tick that is easily identified by the public is the adult female Lone Star since it has a white spot on its back. All others usually require an expert for identification. Anecdotally, there seem to be fewer ticks in the mountains. The Piedmont has all four human-biting ticks with the Lone Star now being the most common. The coast also has all four and probably has more of the black-legged tick than the rest of the state due to their liking moist conditions. The state does not have any reliable up-to-date maps of the distribution and frequency of human-biting ticks and tick-borne infections (TBIs).

An attached tick



Most tick infections may cause similar symptoms at first-- often flu-like with fever, aches, and pains. Rocky Mountain Spotted Fever (RMSF) is very dangerous, killing 20%-30% of its victims if they are not promptly treated. It usually causes fever, chills, and severe headache and makes people quite sick. In the last 25 years, NC has had an average of 3.5 deaths per year from RMSF. Usually, deaths are due to delayed recognition and treatment. The two types of ehrlichiosis can also cause fatalities.

Brown Dog tick

Many of the infections have different kinds of rashes associated with them. The important thing to remember is that many people get one or more infections from tick bites and never have a rash. Tests are usually negative in the early stages of infections. The so-called "bull's-eye" rash associated with Lyme disease and STARI is a misnomer and should not be used because many of these rashes, which develop at the site of a bite, may be solid red. The official name of this rash is *erythema migrans* (EM). It starts at the site of the tick bite, is usually oval, and expands to greater than 2 inches. (It is normal to have small red, local reactions to tick bites, especially the Lone Star. These local reactions are usually itchy and are *not* EM rashes.) People presenting with an EM rash should be treated for Lyme/STARI borreliosis immediately. Only 50% to 80% of people infected with the Lyme or STARI bacteria ever get a rash so recognition of an infection may be difficult.



Black-legged (deer) tick
against a centimeter rule



Because of overlapping symptoms any flu-like illness or fever during tick season (March to November) in persons with exposure to ticks (which can mean just a walk in a park) should be considered for a tick-borne infection. The more quickly they are treated the better the outcome. Unfortunately, blood tests for the various infections are not entirely reliable and are not helpful in the acute stage. Ticks can also be active during warm spells in the winter, so TBIs need to be considered all year if symptoms are suggestive.

American Dog tick

Reported* Tick-borne Diseases, North Carolina 2006 (2005)

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Disease	Number of cases
	Year 2006 (2005)
Ehrlichiosis, Granulocytic	1 (4)
Ehrlichiosis, Monocytic	53 (29)
Ehrlichiosis, Other	3 (4)
Lyme disease	30 (49)
Q Fever	4 (6)
Rocky Mtn Spotted Fever	842 (625)

Source: NC Department of
Health and Human Services, Division of Public Health

*Public health officials agree that most cases are not reported. Reported cases must meet strict surveillance criteria. Therefore, these numbers represent only a small portion of the actual cases. Reporting criteria are not meant to be used for diagnosis.

Borrelioses: Lyme disease and STARI (Southern Tick Associated Rash Disease)

There is also a lot of confusion about Lyme disease and STARI. Lyme disease is very controversial in general, and more so in southern states. There is currently a great deal of medical disagreement about diagnostic tests for Lyme, whether or not fetal and sexual transmission of Lyme disease occurs (some studies suggest this), how long to treat, whether late Lyme disease exists, and, if so, how to treat that. There is also political controversy about the epidemiology of Lyme disease and its treatment. The reasons are complex and include disagreement among medical professionals, insurance companies' fear of long-term payments, tourist industry concerns, economic ties, and many other issues.

Lyme disease. In spite of what some medical professionals believe, it is important to know that Lyme disease is present in NC though probably at a lower frequency than in the northeast and upper midwest. Studies in NC have identified cases, found the vector tick, and the bacteria that causes Lyme disease. This bacteria, a spirochete related to syphilis, is called *Borrelia burgdorferi*.

Southern Tick Associated Rash Illness. STARI is also sometimes called "southern Lyme disease" or "Master's Disease" (after Dr. Ed Masters who has researched it). It is not known exactly what organism causes this disease but it is likely a *Borrelia*, possibly *Borrelia lonestari*, a cousin of the Lyme disease spirochete. There are no tests for STARI and the state does not keep records of cases. Anecdotally, based on exposure and history many people in the NC Piedmont appear to have had this infection and some are chronically and seriously ill.

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People in NC with Lyme disease-like symptoms may have Lyme disease or may have the Lyme-like disease that the Lone Star tick carries. It is not known whether people could have both infections at the same time. STARI (or whatever the infection associated with the Lone Star tick is) appears to be getting very common and needs much more research. The Centers for Disease Control (CDC) has suggested that STARI is a mild disease. However, the only case reports in the scientific literature are on people with a Lone Star tick bite and an EM rash who were promptly treated since it would be unethical not to treat. The CDC is currently asking for cases of STARI to study but, unfortunately, the public health system has not notified NC medical care providers about this. In our experience STARI as well as Lyme disease can be very serious and debilitating if not treated promptly and adequately. It might be better to refer to both diseases as Borreliosis. Diagnosis and treatment can be complicated by co-infections, such as simultaneous Borreliosis and babesiosis.

Prevention and removal

Methods exist for outdoor control of ticks but they are not highly practical or affordable. Personal protection is also not ideal since it involves wearing hot clothes in hot weather and using potentially toxic repellents that don't always work. Nor is it possible to always stay indoors, of course. Even then, people with indoor pets often get ticks inside their own houses. In spite of careful tick checks, ticks are easy to miss. So, even with the best methods many people will still get ticks and will be at risk of disease.

If an embedded tick is found, it is important to grasp it as close to the skin as possible with sharply pointed tweezers and pull it out slowly. Matches, Vaseline and other such methods do not make the tick let go and only serve to irritate it, which can increase the risk of disease transmission. It is important to **save the tick** because if an illness follows, identifying the tick can help sort out which infection(s) may be causing the illness. The easiest way to save the tick is to Scotch tape it on an index card and write the date and place on the body. Most studies show that ticks need to feed for several hours or even days before infections can be transmitted, though the amount of time is controversial and varies with the tick and the organism.

Tick populations are growing in our state along with the deer population. Deer serve as hosts to some of the ticks. Awareness helps. And staying out of tick infested areas.

PROTECTING YOURSELF OUTDOORS

- Avoid woods or other areas with ticks during March to October.
- Decrease the deer population.
 - Develop a dry border clear of brush around your lawn. (www.cdc.gov)
- Use repellants.
- Wear long light-colored clothes, tuck pants in socks.
- Conduct frequent tick checks.

Tick-borne Infections Council of North Carolina, Inc (TIC-NC), was started two years ago by several NC residents concerned about the ever increasing accounts of people sick with tick-borne infections (TBIs) and the lack of public awareness of the problem. The mission of TIC-NC is to improve the recognition, treatment, control, and understanding of tick-borne diseases in North Carolina. The organization also seeks to encourage the public health system to develop programs to protect the public. Marcia E. Herman-Giddens, PA, MPH, DrPH, President, became interested in TBIs many years ago while practicing pediatrics at Duke University Medical Center. Her interest and experience was further peaked when she moved to Chatham County 13 years ago and witnessed the changing environment and increase in tick diseases among her fellow Chathamites.

www.tic-nc.org

TIC-NC, Inc is a 501(c)(3) organization.