

Bite Fighting Tips

Preventing tick bites is the best way prevent tick borne illnesses. Teach patients to prevent tick bites by:

- Using insect repellents that contain DEET (follow package directions carefully) when in tick habitats (areas with long grasses, underbrush and leaf litter).
- Wearing long pants and long sleeved shirts. Tuck pants into socks when in areas of high grass, bushes and woods.
- Wearing light colored clothing so you can see ticks.
- Checking body (and children's bodies) for ticks after being outside.
- Removing any attached ticks right away. Disinfect skin and tweezers used to remove ticks and wash hands. Note the date of the bite on the calendar to tell physician if symptoms develop.
- Treat outdoor pets for fleas and ticks at least once a month.

Immunization Rules Changes: Tdap and MMR

Recommendations from the Centers for Disease Control and Prevention's Advisory Committee on Immunization Practices has led to recent changes in the NC administrative rule 10A NCAC 41A.0401. These changes, effective January 1, 2008, are designed to reduce the incidence of pertussis and mumps.

Tdap

A booster dose of Tdap will now be required for the following:

- All public school children entering 6th grade on or after August 1, 2008 if 5 or more years have passed since their last dose of tetanus/diphtheria toxoid.
- All children 12 years of age on or after August 1, 2008 who are in private, non-traditional, or home schools if five or more years have passed since their last dose

of tetanus/diphtheria toxoid.

- Individuals who are entering college or university for the first time on or after July 1, 2008 if they have not received a tetanus/diphtheria toxoid or tetanus/diphtheria/pertussis vaccine within the past 10 years.

Mumps

Individuals are now required to have a second dose of mumps vaccine prior to enrolling in school, college or university for the first time. Most children have already had 2 doses of MMR by age 4 so this will primarily affect children who have only received single antigen doses of the vaccines.

Beginning in the Fall of 2008, students entering school for the first time will need to have these vaccines prior to entry:

- 2 doses of measles
- 2 doses of mumps and
- 1 dose of rubella vaccine

Physicians are encouraged to take advantage of these required vaccine visits to complete a physical exam on pre-teens and teens and offer other recommended vaccines such as a booster dose of varicella, and the vaccines for meningitis and HPV.

For additional immunization information, provider resources, and patient education materials regarding these immunization changes, visit **Immunize North Carolina** at <http://www.immunizenc.com/Rule%20Change.htm>.

Source: **Immunize North Carolina**. <http://www.immunizenc.com/Rule%20Change.htm>. 5/1/08

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Tick Talk

Spring is here and people are heading outside again, meaning that "Tick Season" has begun.

Ticks are considered arthropods (the largest animal phylum), an incredibly diverse group that includes insects, crustaceans, spiders, scorpions, and centipedes. There are over 800 species of ticks worldwide, and ticks are second only to mosquitoes as the vectors that cause the most human disease in the world. Important tick-borne infections to be aware of in Wake County include

- the Rickettsial diseases (Rocky Mountain spotted fever (RMSF),
- human monocytic ehrlichiosis (HME),
- human granulocytic anaplasmosis (HGA), and
- the Borrelioses —Lyme disease and the newly emerging "southern tick-associated rash illness" (STARI).

Treatment of RMSF, HGA and HME		
Drug of Choice	Doxycycline	
Dosage	Adults 100mg PO BID for adults*	Children less than 100 lbs 2.2 mg/kg PO BID **
Length of Treatment	Treatment should continue at least 3 days after the fever subsides; improvement should be noted with 2 days of beginning therapy	
* even in pregnancy, if clinical suspicion is high		
** limited courses of doxycycline do not pose a large threat of tooth staining		

Rocky Mountain Spotted Fever

The tick-borne disease of greatest concern in North Carolina is Rocky Mountain spotted fever (RMSF). North Carolina is the state with the most number of reported cases in the United States. Wake County now averages over 93 RMSF cases per year and has had more cases than any other county in North Carolina over the past several years.

Rickettsia rickettsii is the intracellular bacteria that causes RMSF, living primarily in cells that line blood vessels. The American Dog tick is most commonly identified as the species responsible for transmitting *R. rickettsii* to humans in North Carolina (1%-3% of the tick population carries *R. rickettsii*). It is transmitted through saliva while a tick is feeding and usually requires 6-12 hours of attachment and feeding before transmission to the host can occur.

Patients infected with *R.*

rickettsii generally visit a physician in the first week of their illness, following an incubation period of about 5-10 days after a tick bite. The early clinical presentation of RMSF is nonspecific and may include

- sudden onset of fever
- chills
- headache and
- malaise

The "classic" findings are :

- fever
- history of tick bite
- a rash appearing approximately 2-4 days after the fever onset

Since only about two-thirds of cases report a specific history of tick bite, be sure to include a history of potential tick exposure or other "bites" (i.e. a mosquito or other insect whose bite may be indistinguishable from a tick bite) in recent days.

The rash begins as small, blanching pink macules on

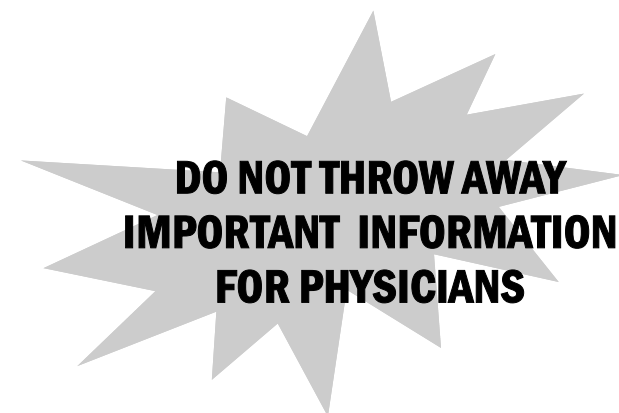
the ankles, wrists, and forearms, often spreading to the soles of the feet and palms of the hands, and can progress to petechiae in more severe cases. Leukopenia, thrombocytopenia, and mildly elevated liver enzymes are common in cases of RMSF. IFA serology is considered the gold standard, and acute and convalescent samples should be taken, since initial titers may be low.

The most important element for a clinician in North Carolina to remember is that antibiotic treatment should be initiated immediately if RMSF is suspected. Therapy should not be delayed while waiting for test results to come back.

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Tick Testing

Patients who have removed a tick often wonder if they should have it tested for disease. As this is often not helpful in clinical decision-making, Wake County does not currently offer this type of tick testing.



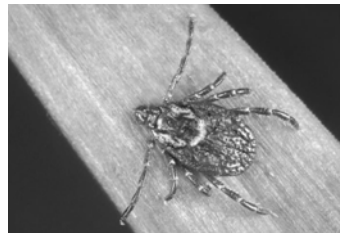
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Rocky Mountain Spotted Fever con't.

Factors associated with severe or fatal Rocky Mountain spotted fever include advanced age, male sex, African-American race, chronic alcohol abuse, and glucose-6-phosphate-dehydrogenase (G6PD) deficiency. The CDC-quoted case-fatality rate is approximately 5-10%.

There may be a few reasons why Wake County's death rate appears to be much lower than that. First, our physicians are well-aware of RMSF, and are most likely doing a good job of treating presumptively. Second, as with many communicable diseases, it is very likely that some infected persons develop no symptoms, or have an illness so mild they do not seek medical attention.

Lastly, *Rickettsia amblyomii*, a recently discovered bacterium very closely related to *R. rickettsii*, may actually be causing some of the illness that is thought to be RMSF. Soon-to-be published data about this emerging disease from North Carolina State University Department of Entomology lends support to this hypothesis.



American Dog Tick
Source: CDC Public Health Image Library.
<http://phil.cdc.gov/phil/details.asp>
5-1-08

Ehrlichiosis and anaplasmosis

Ehrlichia chaffeensis is the organism that causes human monocytic ehrlichiosis (HME), while *Anaplasma phagocytophilum* is responsible for causing human granulocytic anaplasmosis (HGA). The bacteria that cause ehrlichiosis and anaplasmosis are small, gram-negative bacteria that primarily invade monocytes or granulocytes, respectively. The lone star tick is most commonly identified as the species responsible for transmitting *E. chaffeensis* to humans in North Carolina, while the blacklegged tick is the primary vector for carrying *A. phagocytophilum*. In Wake County, there were 10 cases of HME for 2007 (averaging 5-6 cases over the past several years), but Wake County only has averaged 0-1

cases of HGA yearly. Transmission, symptomatology, and treatment of symptoms of HME and HGA are very similar to RMSF, with the exception that a rash is somewhat more uncommon in patients with HME (children are more likely to develop a rash), and is rarely reported with HGA.

Most major medical reference laboratories offer testing for RMSF, HME, and HGA. In addition, the State Laboratory of Public Health also offers this battery of testing at no charge. For specific questions on shipping specimens call Special Serology at 919-807-8623 or visit <http://slph.state.nc.us/VirologySerology/SpecialSerology/default.asp>.

Lyme Disease

Lyme disease is caused by the spirochete, *Borrelia burgdorferi*, and is passed to humans via the bite of the blacklegged tick (deer tick). The presence of Lyme disease in North Carolina has been a somewhat controversial topic since questions have been raised as to whether or not *B. burgdorferi* is endemic to ticks in this area.

An infected tick must be attached to a person for 2-3 days to pass on the infection. The first sign of infection is usually a circular rash called erythema migrans (EM), with a bull's-eye appearance, observed in over 80% of Lyme disease patients at the site of a tick bite after a period 3 to 30 days. People may also experience fatigue, chills, fever, headache, arthralgias, myalgias, and/or lymphadenopathy. Untreated, within weeks to months, the patient may progress to early disseminated Lyme disease, producing a potential array of symptoms, including Bell's palsy, severe headaches, radiculopathies,

meningitis, heart palpitations, and dizziness. Over months to years, many of these symptoms will resolve, even without treatment. However some patients with untreated infections will begin to have recurrent, brief attacks of objective joint swelling in one or a few joints, sometimes followed by chronic arthritis in one or more joints (large joints are most often affected, particularly the knees). In addition, up to 5% of untreated patients may develop chronic neurological complaints, which could include shooting pains, numbness or tingling in the hands or feet, and problems with concentration and short term memory. Interestingly, seroprevalence studies in endemic areas demonstrate that many people (estimates are anywhere from 5-30%) who test positive for Lyme disease antibodies never had any symptoms.

The Centers for Disease Control and Prevention (CDC) strongly recommends a two-test approach for active dis-

ease and for previous infection through use of an EIA or IFA followed by a Western blot as the algorithm of choice. If the EIA or IFA is negative, it is highly unlikely that the person has Lyme disease, and no further testing is recommended. If the Western blot is negative after a positive EIA or IFA, it suggests that the first test was a false positive. Often, both IgM and IgG Western blots are performed. Patients who are positive by IgM Western blot but not IgG should have the test repeated several weeks later, and if they continue to be only IgM positive (and have been ill longer than one month), then this is most likely a false positive. If a patient with suspected early Lyme disease has a negative serology, serologic evidence of infection is best obtained by testing of paired acute- and convalescent-phase serum samples. Serum samples from persons with disseminated or late-stage Lyme disease almost always have a strong IgG response to *Borrelia*

burgdorferi antigens. The State Laboratory of Public Health also offers the Lyme battery of testing at no charge, although it will be routed to the CDC for actual testing. For specific questions on shipping specimens call Special Serology at 919-807-8623 or visit <http://slph.state.nc.us/VirologySerology/SpecialSerology/default.asp>.

In North Carolina, prophylactic treatment is not recommended for an asymptomatic tick bite. Lyme disease treatment guidelines have recently been developed by the Infectious Disease Society of America. Please go to <http://www.journals.uchicago.edu/doi/full/10.1086/508667> for more information.



Blacklegged Tick
Source: CDC Public Health Image Library
<http://phil.cdc.gov/phil/details.asp>
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Selected Features of Rocky Mountain spotted fever, human monocytic ehrlichiosis, human granulocytic anaplasmosis						
Disease	Primary vector	Incubation period (days)	Common initial signs and symptoms	Common laboratory abnormalities	Rash	Case-fatality rate
<i>Rickettsia rickettsii</i> (Rocky Mountain spotted fever)	<i>Dermacentor variabilis</i> (American Dog Tick)	2-14	Fever, nausea, vomiting, myalgia, anorexia and headache	Thrombocytopenia, mild hyponatremia and mildly elevated hepatic transaminase levels	Maculopapular rash approximately 2-4 days after fever onset in 50% -80% of adults (>90% in children); might involve palms and soles	5%-10%
<i>Ehrlichia chaffeensis</i> (human monocytotropic ehrlichiosis)	<i>Amblyomma americanum</i> (lone star tick)	5-14	Fever, headache, malaise, and myalgia	Leukopenia, thrombocytopenia, and elevated serum transaminase levels	Rash in 30% of adults and approximately 60% of children	2%-3%
<i>Anaplasma phagocytophilum</i> (granulocytotropic anaplasmosis)	<i>Ixodes scapularis</i> (blacklegged tick)	5-21	Fever, headache, malaise, myalgia, vomiting	Leukopenia, thrombocytopenia, elevated serum transaminase levels	Rare	<1%

Source: Diagnosis and Management of Tickborne /Rickettsial Diseases: Rocky Mountain spotted fever, ehrlichiosis, and anaplasmosis—United States. MMWR, Recommendations and Reports March 31, 2006 55 (rr04); p.27

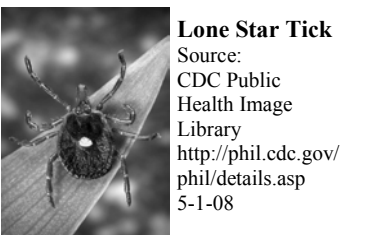
Southern Tick Associated Rash Illness

A rash similar to the rash of Lyme disease has been described following bites of the lone star tick, and some recent media reports have generated confusion about the lone star tick. While the lone star tick does not transmit Lyme disease, some patients bitten by lone star ticks will occasionally develop an expanding "bull's eye" lesion that develops around the site of the bite within 7 days. The cause of this rash has not been precisely found, but all studies

indicate it is not caused by *Borrelia burgdorferi*. Similar to Lyme, the rash may be accompanied by fatigue, headache, fever, and myalgias. This condition has been named southern tick-associated rash illness (STARI). In all cases of STARI to date, the rash and accompanying symptoms have resolved following treatment with doxycycline and STARI has not been linked to any chronic arthritic,

neurological, or chronic symptoms. Another spirochete, *Borrelia lonestari*, was detected in the skin of one patient and the lone star tick that bit him. However, subsequent studies on other patients have not found evidence of *B. lonestari* infection. The North Carolina State Department of Public Health will be conducting additional studies in the upcoming summer in order to learn more about STARI infections and their

prevalence in North Carolina.



Lone Star Tick
Source: CDC Public Health Image Library
<http://phil.cdc.gov/phil/details.asp>
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