

Tick Bite Prevention in NC  
NC Division of Public Health

### Introduction

Ticks are small arachnids that are very common in NC. They are ectoparasites that feed on the blood of birds, reptiles and mammals, including humans. Unfortunately they can transmit diseases to people in NC such as Rocky Mountain Spotted Fever, Anaplasmosis and Lyme Disease.<sup>1</sup> Ticks will always be with us, but fortunately there are methods to reduce your chance of acquiring a tick borne illness including:

- ❖ Avoid tick infested areas
- ❖ Dress appropriately
- ❖ Perform tick checks and remove ticks promptly
- ❖ Use topical insect repellents
- ❖ Seek medical attention if you become ill after a tick bite

### Avoid tick infested areas

Walk in the center of trails to avoid ticks on brush. It is also important to keep your yard free of suitable tick habitat. Keep your grass cut and trim shrubs and brushes, especially near areas where your family walks or plays. Minimize sources of attraction for deer and mice which can serve as a reservoir for ticks and bring them into your yard. Adopt landscaping techniques with gravel, mulch or wood chip to create a 3-foot or wider border between lawn and woods or stonewalls.<sup>2,3,4</sup>

*Image courtesy of Dr. Kirby Stafford III, Connecticut Agriculture Experiment Station*



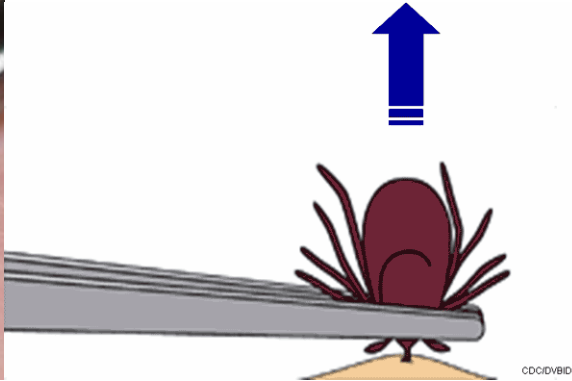
### Appropriate Dress

Ticks do not jump, fly or drop from trees, but rather grasp passing hosts from leaf litter or tall grass. This behavior is referred to as questing and occurs in response to stimuli such as movement, heat or increased concentrations of carbon dioxide.

- ❖ Wear clothing that is light in color and with long sleeves and pant legs. This allows the tick to be visualized and keeps them off your skin.
- ❖ Tuck pant legs into your socks for additional protection.
- ❖ Remove any ticks from clothing prior to going inside, then wash and thoroughly dry your clothes on a high temperature setting.
- ❖ Apply insect repellent to exposed portions of skin in accordance with the manufacturer's recommendations.



Image Courtesy of Nancy C. Hinkle  
University of Georgia



### **Perform Tick Checks and Remove Ticks Promptly**

When you return home or go inside check yourself and your family members (including dogs and cats) for ticks. Tick bites are typically painless and therefore people and pets may not be aware that a tick has attached itself. If you find a tick remove it promptly. Use a thin tipped tweezers to grasp the tick as near to the skin as possible. Pull the tick off by applying steady gentle pressure. Note the site and date of the bite should you develop any symptoms of a tick borne illness.

### **Use Topical Insect Repellents**

The EPA defines insect repellents as products that people use on skin, clothing, or in our immediate surroundings, to repel or keep away annoying insects.<sup>5</sup> Whenever using any insect repellent it is important to use the product according to the manufacturer's directions. While ticks are not insects, the products discussed are indicated by the EPA and to provide repellent activity against some species of insects and ticks.

Although several repellents are discussed below, none have demonstrated the efficacy and safety that have been associated with the use of DEET and permethrin over the course of many years. If the use of DEET is objectionable, only Icaridin and IR3535 have been listed by the EPA to have any repellent activity against ticks.



### **THE LABEL IS THE LAW!**

- Repellent labels provide instructions about proper handling use, and application rates to protect people.
- Label directions are derived from scientific testing by manufacturers, and evaluation by EPA to ensure the products can be used with minimal risk.

### **DEET**

DEET is the active ingredient in many well known insect repellent products. It was developed by the US Army in the 1940's and was first registered for use by the public in 1957. In 1998 a reregistration eligibility decision (RED) was released by the EPA which concluded that, as long

as consumers follow label directions and take proper precautions, insect repellents containing DEET do not present a health concern.<sup>6</sup>

Nonetheless, the safety of DEET is a great concern to many persons. In the DEET RED, the EPA noted up to 46 cases of potential DEET-associated seizures, including 4 deaths. The EPA concluded that some cases are likely related to DEET toxicity, but observed that with 30% of the US population using DEET, the likely seizure rate is only about one per 100 million users. In general human exposure is expected to be brief, and long-term exposure is not expected. Based on extensive toxicity testing, the Agency believes that the normal use of DEET does not present a health concern to the general population.<sup>6</sup>

DEET is available in numerous concentrations, but products containing greater than 30% DEET do not appear to offer enhanced repellent activities or a longer duration of repellent activity. DEET is applied directly to the skin and can provide repellent activity against ticks for three to eight hours depending on the concentration used. DEET is safe for use on children greater than two months of age so long as the concentration of DEET in the product does not exceed 30%<sup>7</sup> and the manufacturer's directions are strictly adhered to.

Using DEET on exposed skin in conjunction with permethrin treated clothing appears to be very efficacious. In a study by the US Army, when used in conjunction with proper clothing and other personal protective equipment, these repellents provide the best known protection available and are critical in minimizing the occupational health threat of arthropod-borne diseases to troops in the field.<sup>8</sup>

#### Icaridin (Picaridin)

Picaridin is a topical insect repellent developed by the Bayer corporation (and marketed as Saltidin® by Lanxess following the spin off of Lanxess AG from Bayer) and recently recommended by the CDC for the prevention of mosquito bites<sup>9</sup> and is registered by the EPA as a mosquito and tick repellent<sup>10</sup>. The product can be applied directly to the skin and the manufacturer states the product causes less skin irritation than DEET. However, this product may only be used on children greater than two years of age, in contrast to DEET which can be used on children as young as two months of age.

#### IR3535 (listed as a biopesticide repellent by EPA, meaning it is derived from natural materials)

IR3535 was originally developed by Merck and has been used as an insect repellent in Europe for 20 years with no substantial adverse effects. The active ingredient can be used as an insect repellent against mosquitoes, deer ticks, body lice, and biting flies. Products containing this active ingredient are applied to exposed human skin. No harmful effects to humans or the environment are expected.<sup>11</sup> Note this product is listed for use as a repellent against deer ticks, which is a common name for ticks in the genus Ixodes, which can transmit Lyme Disease. There is no indication if this product would be efficacious against ticks in the genus Dermacentor (which transmit RMSF in NC) or ticks in the genus Amblyomma (the most common tick in NC).

#### Repellents used on clothing – Permethrin

Permethrin is a synthetic pyrethroid that repels as well as kills insects and ticks. Permethrin is the only repellent labeled by the EPA for use on clothing but is not to be applied directly to the

skin.<sup>12</sup> Various products are available to treat clothing, but do not apply permethrin to clothing while it is being worn.

#### Children and repellents

- Keep repellents out of the reach of children.
- Don't allow children to apply repellents themselves. Adults should apply repellents to children
- Use only small amounts of repellent on children.
- Don't apply repellents to the hands of children. Doing so may result in accidental eye contact or ingestion.
- Reduce the use of repellents by dressing children in long sleeves and long pants tucked into boots or socks when possible.

#### **Seek Medical Attention if you become Ill Following a Tick Bite**

In the event you become ill within one month of a tick bite you should consult your health care provider and notify them that you had exposure to ticks. Treatment and diagnostic guidelines are published and available for reference.<sup>13,14</sup>

1. Tick Borne Illness. Accessed 7/3/08  
<http://www.epi.state.nc.us/epi/tick/>.
2. Keeping your yard tick free. Accessed 7/3/08  
<http://www.health.state.nh.us/disease/communicable/lyme/yard.php>
3. Control ticks around your home and in your community. Accessed 7/3/08  
[http://www.cdc.gov/ncidod/dvbid/lyme/Prevention/ld\\_Prevention\\_Control.htm](http://www.cdc.gov/ncidod/dvbid/lyme/Prevention/ld_Prevention_Control.htm)
4. Tick control around the home. Accessed 7/3/08  
<http://chppm-www.apgea.army.mil/ento/facts/TickControlAroundTheHome.pdf>
5. Active ingredients found in insect repellents. Accessed 7/3/08  
[http://www.epa.gov/pesticides/health/mosquitoes/ai\\_insectrp.htm](http://www.epa.gov/pesticides/health/mosquitoes/ai_insectrp.htm)
6. EPA RED FACTS – DEET. Accessed 7/3/08 <http://www.epa.gov/oppsrrd1/REDs/factsheets/0002fact.pdf>
7. AAP Parenting Q&A: Insect repellents. Accessed 7/3/08 [http://www.aap.org/publiced/BR\\_Repellents.htm](http://www.aap.org/publiced/BR_Repellents.htm)
8. Young, G.D. and S. Evans. 1998. Safety and efficacy of DEET and permethrin in the prevention of arthropod attack. *Mil. Med.* 163: 324-330.
9. CDC Press Release. Accessed 7/3/08 <http://www.cdc.gov/od/oc/media/pressrel/r050428.htm>
10. EPA New pesticide fact sheet. Picaridin. Accessed 7/3/08  
<http://www.epa.gov/opprd001/factsheets/picaridin.pdf>
11. EPA Fact Sheet. IR3535. Accessed 7/3/08  
[http://www.epa.gov/opbppd1/biopesticides/ingredients/factsheets/factsheet\\_113509.htm](http://www.epa.gov/opbppd1/biopesticides/ingredients/factsheets/factsheet_113509.htm)
12. EPA RED FACTS – Permethrin. Accessed 7/6/08  
[http://www.epa.gov/oppsrrd1/REDs/factsheets/permethrin\\_fs.htm](http://www.epa.gov/oppsrrd1/REDs/factsheets/permethrin_fs.htm)
13. The Clinical Assessment, Treatment, and Prevention of Lyme Disease, Human Granulocytic Anaplasmosis, and Babesiosis: Clinical Practice Guidelines by the Infectious Diseases Society of America. *Clinical Infectious Diseases* 2006; 43:1089–134.
14. Diagnosis and Management of Tickborne Rickettsial Diseases: Rocky Mountain Spotted Fever, Ehrlichiosis, and Anaplasmosis --- United States. *MMWR* March 31, 2006 / 55(RR04);1-27. Accessed 7/6/08 <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5504a1.htm>