



Tri-County Ground Search and Rescue Group Inc. Occasional Paper # 1

Protection from Wood Ticks

by

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Ticks pose infection and disease risks to searchers. Ground Search and Rescue members should understand the risks and the measures required to reduce the danger of being bitten and subsequent infection. This paper outlines some of the issues associated with ticks as well as some simple methods to counter the threat.

Of all the risks in the woods of New Brunswick, the most pernicious and often overlooked are diseases contracted from ticks. In Canada, ticks can transmit infections responsible for Lyme disease, Rocky Mountain spotted fever, Tularemia, Human babesiosis, and Human ehrlichiosis.

This document outlines the dangers posed by ticks, methods to guard against being bitten and procedures to remove a tick should you be bitten.

Danger from Ticks

During their life cycle, a tick will eat only a few times. The actual feeding events can be considerably separated in time. Although the literature suggests that the risk is higher in spring and early summer, ticks can also be active throughout mild winters. Some research indicates that ticks can delay meals for up to a year.

Although folklore suggests ticks hibernate, they do not. A tick will seek shelter during cold winter days within ground mulch and leaf litter, but a warm winter day will put an unfed tick on the prowl for a host. Weather controls the activity levels of ticks to some degree, but their feeding success is more a result of the activity of potential hosts being affected by the weather. Since Deer ticks can't fly, jump or even pursue, they simply wait. If hosts are not active this denies the tick access to feed.

When a tick feeds on an diseased host, it will pick up the infection. When it subsequently bits the

searcher, saliva and any back-flow of blood from the tick can transmit the infection.

Deer ticks are very small in size and include the Western Black-legged tick (west coast) and the Black-legged tick (mid west and east coast). More commonly they are known as Bear, Deer or Wood ticks. Ticks, in their immature nymphal stage, are the more dangerous, specifically due to their small size (about the size of a poppy seed). Nymphs account for approximately 80% of the Lyme disease cases in humans. They seek out (quest) from very low vegetation generally less than ankle height. They can feed for days without being noticed and then drop off unceremoniously.

The adult tick is the size of an apple seed. Adults quest somewhat higher than the nymph and make contact mostly below the knee. Still small, they are much larger than the nymph and subsequently are noticed more often prior to feeding, or early in their feeding cycle. This early detection and prompt removal may minimize risk of infection. Once on the host's clothing, ticks walk around (progressing upward) sometimes for several hours before finding access to feed. When the tick has gorged itself, it detaches its mouth parts with saliva. This expels fluids into the feeding wound. Once loose, it falls to the ground and continues with its life. The tick will salivate during the entire feeding process, but its the final ejection during release that is a major occasion for infection. If the saliva contains bacteria responsible for one of the diseases listed above, symptoms can appear within two to five days, or longer.

Avoid Getting Bitten

When the United States sent troops to Somalia in 1992 under Operation Restore Hope, initial estimates were that some 10,000 soldiers would contract malaria unless they were well protected. Only 47 cases were eventually reported. The astonishingly low figure was the result of the "DOD Repellent System," a three-pronged regimen designed for mosquitoes but just as effective against ticks. Nearly 100% protection rates have been observed with this system and make it a good candidate for a Ground Search and Rescue protocol.

Use DEET-based repellent

Although there have been recent health concerns about DEET¹, no other topically applied repellent matches its performance against ticks, or mosquitoes for that matter. DEET by itself tested 85%-88% effective against ticks.

Health Canada has recently revised its guidelines on DEET-based insect repellents. Since the only difference between medium and high concentrations of DEET is the length of time they remain effective, Health Canada will order DEET based repellents with more than 30% DEET removed from the market. They will also order the elimination of combination sun-screen and DEET insect repellents.

DEET based repellents with between 22% and 30% DEET will remain effective for up to six hours. Only after the six hours are up should you reapply these products, and then only if you remain seriously exposed to biting insects. Once the threat of insect/tick bite is over, repellent should be washed off the skin.

Insect repellents with up to 30% DEET can be used on adults and individuals older than 12 years of age. Health Canada has particular guidelines for the use of DEET based repellents by children under the age of 12 years.

Wear proper clothing.

Wear light coloured clothing that will allow you and others to see any ticks that might land on your clothing.

Minimise the amount of exposed skin, which ticks seek out. Tuck pants cuffs inside your socks or tie them to the top of your boots.

Pullover shirts with a fold-over collar with sufficient tail to be tucked in at the waist are recommended. This provides an added obstacle to ticks that successfully climb the lower body. Ticks reaching the waistband can't get under the shirt and must climb the upper body to access skin. Fold-over collars add an additional barrier because ticks become trapped under it and will not climb downward. Long sleeved shirts are also recommended, and, as per our standard operating procedure, short pants are to be avoided. Chaps provide additional protection.

Regardless of the products used or clothing worn, it is critical that body inspections be done. Performing daily skin inspections (and have a friend check hard-to-see places like the back of your thighs, your head, and your back) should be part of your routine. Since tick bites are painless, you'll never know one is attached unless you see it. Remember, ticks prefer recessed areas protected by hair.

Treat outer clothing with permethrin.

Permethrin is a synthetic form of the natural pyrethrin extracted from chrysanthemum flowers. It's used in lice-killing shampoos and scabicides, and it also repels and kills ticks, chiggers, and mosquitoes when applied to clothing. In laboratory tests, ticks have died after crawling over as little as 12 inches of permethrin-treated cloth.

Although highly toxic to arthropods, permethrin is considered safe for humans because skin rapidly converts it into simple proteins. For this reason, permethrin offers no repellency when applied to your flesh, but it bonds strongly to clothing fibres and can remain active for up to two weeks. There's no odour, nor does it stain or harm vinyl, plastic, or other fabrics. It's unaffected by body moisture and weather conditions, and it can withstand two machine washings. Permethrin also can be safely applied to tent fabrics and sleeping bags.

Its safety and effectiveness are well documented by world health organisations. Tests on ticks conducted in Massachusetts concluded that 100% protection is provided against Deer ticks, which are the primary vector of Lyme disease. The product is available under the trade names Duranon (*Coulston Products*), Permanone (*Wisconsin*

¹ DEET's chemical name is N-diethyl-m-toluamide. Exposure to high concentrations of DEET is suspected of posing a health hazard. Some individuals experience allergic reactions to the compound.

Pharmaceutical), and Permethrin Tick Repellent (*Sawyer*).

Removing A Tick If Bitten

Daily body checks

As noted above, daily checks are the only method that can guarantee a tick does not feed for extended periods. Check carefully the groin area, skin folds, scalp, neck, and into the hairline and ears. Ticks can be difficult to see but are not invisible. They can often be mistaken for warts and moles. Make certain that you inspect carefully.

Pluck properly and promptly

Despite your best defences, if you discover a tick feeding on you, don't panic but, at the same time, don't be complacent. The longer a tick feeds, the greater the chance the tick will pass along any disease it's carrying. Research into transmission process indicates that infection can occur at something less than 24 hours and increases the longer the tick feeds. Some research shows infection in as little as 12 hours. Poor removal techniques also increase risk.

You can avoid most risk of infection by doing two things: conduct thorough body inspections after outdoor activity and, if a feeding tick is encountered, remove it promptly by mechanical means.

Do not use folk remedies

Don't try to suffocate an imbedded tick with nail polish or grease, or burn it with a cigarette or match. Not only are these methods usually ineffective, they make the tick regurgitate, defecate, and spread vile secretions near the wound, all of which increase the chances of you getting a disease.

Do not use improper tools

Resist the urge to grab the nearest pair of common eyebrow "plucker" tweezers. These have a large gripping surface that makes it easy to crush the tick's body, which you want to avoid. Salivary secretions and gut contents can be injected back through its mouthpart and under your skin. The tick's cuticle can also rupture, spreading pathogens externally. Tweezers also have sharp edges, which are perfect for separating body from mouthpiece, leaving a piece of the tick in your skin.

Touching a disease-carrying tick with your fingers will increase the risk of contaminating whatever you contact afterwards. If you must touch it, use a tissue or latex gloves, and always wash your hands afterward.

Specialized tools

Your best bet is to use a specialized tick-removal tool. Follow these procedures in removing a tick:

1. Carefully position the tool underneath the tick and as close to your skin as possible.
2. Gently grasp the tick by its mouthpart, taking extreme care not to grab or squeeze the body.
3. Apply only as much pressure as needed to hold it without slipping.
4. Pull directly away from the point of attachment, lifting the tick with enough steady, gentle, upward force to "tent" the skin surface.
5. Hold until the tick lets go. This may take several seconds. Twisting, jerking, or even pulling too hard can separate the tick's mouthpart from its body.
6. If you do break off a portion of its mouthpart, don't panic. Simply remove the extended portion of mouthpart as you would a splinter.
7. Cleanse the wound with soap and water. Follow with an antiseptic such as povidone iodine or benzalkonium chloride, and bandage the area. Be sure to clean and disinfect your tick removal tool with alcohol when finished.
8. Place the tick in a small vial with a piece of damp paper to prevent dehydration. If possible, try to keep it alive. Record the date and time the bite occurred.
9. Watch for symptoms of disease in the upcoming weeks and see a physician if you suspect a problem. Inform the doctor of the contact with the tick; a physician may not suspect a tick-borne illness unless you tell him that you've been exposed. Even though sometimes difficult to diagnose, most tick-borne diseases can be easily treated with antibiotics, if identified early.

One reason ticks are so difficult to remove is that some species inject latex-like cement into your skin to anchor themselves. This cement is what's attached to the tick's mouthpart after removal; you probably assumed it was a bit of flesh. Removing this cement with the tick allows the wound to heal faster with less irritation.

Nymphal (pre-adult) ticks are the most serious concern, since they account for up to 80 percent of Lyme disease cases. Because they're so small, they are also the hardest to remove. Most conventional tools may not be effective, or you may not have the steady hand and keen eye needed to wield a precision instrument on such a tiny object. If you find one on you, see a physician.

Lyme Disease

A tick bite can cause infection in humans. Searchers must take precautions to reduce the risk of being bitten, monitor that ticks are not attached to their body, and promptly and properly remove any ticks that may be found.

Lyme disease symptoms are similar to those of the flu, and include chills and fever, headache,

muscle and joint pain and swollen lymph nodes. The disease often causes a telltale rash that looks like a red round patch around where the tick bit you. It will usually appear within three days to one month after you are bitten. The centre of the rash can become clear as it gets larger and looks like a bull's-eye. The rash can be warm but is usually not painful.

If Lyme disease is not treated, you could develop arthritis, meningitis, nervous system abnormalities and cardiac arrhythmia.

Lyme disease can be treated with antibiotics. In a few people, the symptoms may continue or come back. If this happens, antibiotics are given again. Lyme disease can be fatal, but this is very rare.

At least one drug company has developed a vaccine for Lyme disease, but its use is only indicated in situations where a person is continuously at high risk of infection. There are no areas in New Brunswick that are considered high-risk areas.

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Health Canada² recommendations for the use of DEET:

Adults and individuals older than 12 year of age

Products containing DEET at concentrations above 30% will no longer be acceptable for registration, based on human health risk assessment that considered daily application of DEET over a prolonged period of time.

Studies show that products with lower concentrations of DEET are as effective as the high concentration products, but they remain so for shorter periods of time. Products containing no more than a 30% concentration of DEET will provide adults with sufficient protection.

Children between 2-12 years of age

- The least concentrated product (10% DEET or less) should be used.
- Do not apply more than three times per day. Do not apply to the face and hands.
- Prolonged use should be avoided.

Children ages 6 months to 2 years.

- In situations where a high risk of complications from insect bites exist, the use of one application per day of DEET may be considered for this age group.
- The least concentrated product (10% DEET or less) should be used.
- The product should be applied sparingly and not be applied to the face and hands.
- Prolonged use should be avoided.

Children under 6 months of age.

- **DO NOT use personal insect repellents containing DEET on infants.**

² ISBN:0-662-31924-9 Catalogue Number H113-6/2002-2E-IN. Copies of the full technical document are available from the Health Canada Web site at <http://www.hc-sc.gc.ca/pmra-arla/english/pdf/rrd/rrd2002-01-e.pdf>
