USACHPPM
Readiness thru Health

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Just the Facts...

Tick Paralysis

Q. *What is tick paralysis?*
A. Tick paralysis is a tick-borne disease affecting both humans and other animals, and it is characterized by the sudden onset of a progressive, ascending (starting in the lower body and moving up) paralysis. Unlike other tick-borne diseases, such as Rocky Mountain spotted fever, tick paralysis is not caused by an infectious agent (pathogen) but rather, is induced by a chemical substance that attacks the nervous system (neurotoxin). This neurotoxin is secreted by the salivary glands of certain tick species as they feed. Tick paralysis is relatively rare, but it can be fatal if the attached tick is not found and removed. The majority of cases occur in children.

Q. *Do all ticks transmit tick paralysis?*
A. No. Although tick paralysis is associated with over 40 species of ticks worldwide, only two species are most often to blame in North America. They are *Dermacentor andersoni* (Rocky Mountain wood tick) in British Columbia and the northwestern United States, where the largest numbers of human cases are reported, and *Dermacentor variabilis* (American dog tick) in the southeastern U.S. Other species may occasionally be involved. They include: *Ixodes scapularis* (blacklegged tick), *Ixodes pacificus* (western blacklegged tick), and *Amblyomma americanum* (lone star tick). In Australia, *Ixodes holocyclus* (Australian paralysis tick) is the culprit. Additional tick species account for the sporadic cases that occur in Europe, Africa, and South America. Only adult female ticks appear to produce the toxin responsible for causing tick paralysis.

Females of the two tick species most commonly associated with tick paralysis in North America. Left: ***Dermacentor andersoni*** (Rocky Mountain wood tick). Right: ***Dermacentor variabilis*** (American dog tick).

Q. *How does a person get tick paralysis?*
A. Once attached to a host (human or animal), a female tick feeds for many days in order to acquire enough blood to produce her large brood of eggs. It is during this prolonged feeding process that the female tick manufactures a paralysis-inducing toxin in her salivary glands. This chemical is then transmitted to the host in the tick's saliva. While pathogens can proliferate and continue to cause disease in an individual long after an infective tick has been removed, tick paralysis can only occur while a tick is attached and pumping toxin into the bloodstream. Therefore, once the tick is removed, symptoms resolve and recovery is usually rapid.

Q. *What are the symptoms of tick paralysis?*
A. Approximately five to seven days after a tick has become attached, a person begins to feel restless, weak, and irritable. Numbness begins to be experienced in the legs, then paralysis rapidly develops and moves from the lower to the upper extremities. This is followed by paralysis of the tongue and face. The most severe complications may include convulsions, respiratory failure as the muscles that control breathing become paralyzed, and death. If the offending tick is not located and removed, tick paralysis may be fatal in approximately 10-percent of cases.

Q. *How is tick paralysis diagnosed?*
A. There are no laboratory tests to diagnose tick paralysis. Therefore, diagnosis is based on symptoms and a history of known or likely exposure to ticks (e.g. finding an attached tick; recreational activities such as camping; living in a tick-infested area; or having pets that spend time outdoors). If a tick is found and removed, rapid improvement of symptoms confirms the diagnosis.

Q. *What is the treatment for tick paralysis?*
A. There are no specific treatments for tick paralysis, other than supportive care and tick removal. **Tick paralysis is cured by quickly finding and removing the tick**. Therefore, if exposure to ticks is a possibility, it is crucial to check the body carefully and thoroughly for an attached tick. Ticks are often attached to the head and neck where they may be concealed by hair. If breathing is impaired, oxygen therapy or mechanical ventilation may be necessary. Removing the tick removes the source of the neurotoxin, and symptoms generally improve rapidly.

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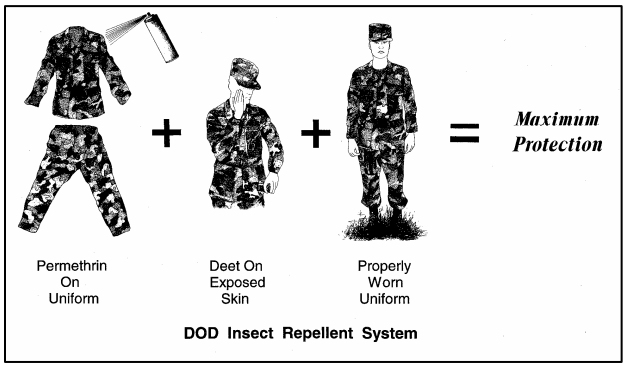
Q. ***How can I protect myself against tick paralysis?***

A. There are no vaccines or medicines to protect against tick paralysis. The only sure way to prevent tick paralysis, as well as the host of other tick-borne diseases that ticks can transmit, is to **prevent tick bites**. When in tick habitat (tall grass and weeds, scrubby areas, woods and leaf litter), follow these precautions:

- Examine your clothing and body frequently, and **remove any attached ticks immediately**.
- Wear proper clothing as a physical barrier against ticks – long pants tucked into boots or tightly-woven socks; long sleeve shirt; shirt tucked into pants; and light-colored clothing so as to more easily spot ticks.
- Use both skin and clothing repellents that have been approved by the Environmental Protection Agency (EPA). They are safe and effective.
  - For your skin, use a product that contains 20-50% **DEET** (N,N-diethyl-meta-toluamide). **DEET** in higher concentrations is no more effective.
  - Apply **DEET** lightly and evenly to exposed skin; do not use underneath clothing. Avoid contact with eyes, lips, and broken or irritated skin.
  - To apply to your face, first dispense a small amount of **DEET** onto your hands and then carefully spread a thin layer.
  - Use **DEET** sparingly on children, and don't apply to their hands, which they often place in their eyes and mouths.
  - Wash **DEET** off when your exposure to ticks, mosquitoes, and other arthropods ceases.
  - For your clothing, use a product that contains **permethrin. Permethrin**-treated clothing is especially effective against ticks. **Permethrin** is available commercially as 0.5% spray formulations. Clothing that is factory-impregnated with permethrin may also be purchased commercially. Permethrin will withstand numerous launderings.
  - **Permethrin** should only be used on clothing, never on skin.
  - When using any insect repellent, always FOLLOW LABEL DIRECTIONS.
  - Do not inhale aerosol formulations.
- For optimum protection, soldiers should utilize the **DOD INSECT REPELLENT SYSTEM**. In addition to proper wear of the field uniform (ACUs, BDUs, DCUs)(pants tucked into boots, sleeves down, undershirt tucked into pants), this system includes the concurrent use of both skin and clothing repellents:
  - Standard military skin repellent: 33% **DEET** lotion, long-acting formulation, one application lasts up to 12 hours, **NSN 6840-01-284-3982**.
  - Standard military clothing repellents: either aerosol spray, 0.5% **permethrin**, one application lasts through 5-6 washes, **NSN 6840-01-278-1336**; or impregnation kit, 40% **permethrin**, one application lasts the life of the uniform (at least 50 washes), **NSN 6840-01-345-0237**. Factory permethrin-treated ACUs are also available via contract [Contact the Armed Forces Pest Management Board (AFPMB) for details, DSN 295-7476; CM (301) 295-7476].



Q. What should I do if I find a tick attached to my skin?

A. Remove attached ticks as soon as they are found.

- Use tweezers to firmly grasp the tick's mouthparts up against the skin, and pull back firmly and steadily. Be patient – the tick's central mouthpart called the hypostome is covered with sharp barbs, sometimes making removal difficult. Don't pull back sharply, as this may tear the mouthparts from the body, leaving them embedded in the skin. If the mouthparts do break off, don't panic – the mouthparts alone generally cannot transmit disease because the tick can no longer pump saliva into the skin. However, to prevent secondary infection from germs that may be on the mouthparts, remove the mouthparts as you would a splinter.
- Never squeeze the body of the tick or use such things as petroleum jelly, fingernail polish remover, or a lighted match: these methods could force more infective/toxic fluid into the skin.
- After removal, wash the wound site and apply an antiseptic.
- Since ticks can carry a wide range of pathogens in addition to producing paralytic toxin, you should be alert for any signs of illness following the bite. Although tick paralysis occurs while the tick is still attached to the body, other tick-borne diseases may take up to a month to display symptoms. Therefore, preserve the tick by placing it in a sturdy, clean, dry jar, or other well-sealed container, and keeping it in your freezer. Should you develop disease symptoms, take the tick with you to the physician's office; identification of the tick species may assist the physician with your diagnosis and treatment.

The majority of specific information on tick paralysis contained in this fact sheet was obtained from: Goddard J, *Tick Paralysis*, Infect Med 15(1):28-31, 1998; CDC, *Tick Paralysis – Washington, 1995*, MMWR, 45(16):325-6, 1996; Merck Manual - Second Home Edition online, *Tick Paralysis*, April 2003; and NIH, Medline Plus online, *Tick Paralysis*, updated 10/23/2003. Further information on personal protective measures against ticks, as well as other arthropods, can be obtained from the USACHPPM (http://chppm-www.apgea.army.mil) or the Armed Forces Pest Management Board (AFPMB) (http://www.afpmb.org).