

TICKS: LIFE CYCLES, HABITATS & PREVENTION

Life Cycle of a Tick

- A tick begins its life cycle as an egg.
- A six-legged larva emerges from the egg. Except for missing 2 more adult legs & its size – the larva looks a lot like the full grown adult. Larvas are too small to see with the human eye.
- The larva finds a host mammal, bird or reptile to feed on in order to grow. Ticks need energy from blood in order to grow, develop and lay eggs. Without, blood, ticks can't do any of this.
- After one to three weeks, the larva molts (sheds outer body shell) and becomes a nymph. In nymph stage – the tick is the size of a poppy seed or this period: “. ”
- A tick nymph has 8 legs and looks like a smaller version of an adult tick.
- A nymph has to find another meal from another mammal, bird or lizard before it can molt again.
- Some species of tick molt several times, feeding before each molt.
- After the final molt, the tick is an adult.
- An adult tick has one job – to reproduce. Some species of male ticks die after mating and the females die after laying anywhere from 2,000 to 22,000 eggs. “Soft” ticks may lay eggs several times.
- There approximately 850 species of ticks throughout the world. There are two established families of ticks: “soft” (Argasidae) and “hard” (Ixodidae) ticks. We have both hard and soft ticks in California.
 - “Soft” ticks generally live in animal's nests, caves and burrows. Females lay their eggs in their host's nest. Larvae, nymphs and adults crawl through the nest to find hosts and usually feed at night. They don't spend much time attached to the host. Soft ticks have an uncanny resistant to starvation and can survive many years without a blood meal.
 - “Hard” ticks find food through the behavior known as questing. Some “soft” ticks also quest. This is usually how they get on humans.
 - A questing tick positions itself on a blade of grass or other vegetation and stretches its clawed limbs outward and waits for hosts to pass by.
 - Ticks can't jump or drop down onto their hosts – when a host brushes against a questing tick, the tick simply hangs on. Larvae quest at ground level, nymphs climb a little higher and adults climb highest on vegetation.
 - Ticks use several signals to decide when and where to quest:
 - Many species have eyes and can detect color, heat and movement.
 - Hard and soft ticks can detect carbon dioxide that animals produce as they exhale.
 - Some hard ticks stay on a host their whole lives. Some only have two hosts but most hard ticks are three host ticks.

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- Hard ticks can survive for several months without feeding if not stressed by environmental conditions.
- Life span of a tick: some live only 3 months, others can live for several years.
- Few measurements are available to scientists to explain how tick populations expand and contract with the seasons. There needs to be more research.
- **Ticks are a year-round threat, so we must be diligent.**

TICK HABITAT – MAKE YOUR HOME UNINVITING

“The answer is not in treating us or vaccinating us; it’s getting rid of all the ticks.” Jill Auerbach, Lyme Warrior/Activist from “Coping with Lyme Disease” by Denise Lang with Kenneth Liegner, M.D. So focus on your environment.

- Ticks feed on mammals, birds and reptiles.
- Tick infestation is higher in those areas that are unmaintained - woods, borders or natural landscaping.
- Ticks love moist, humid environments.
- Remove wood piles, rock walls and bird feeders as these attract tick-carrying small animals.
- Ticks love ornamental shrubs.
- Ticks love dead leaf litter – so clean up dead leaves.
- Use insecticides. See the section on repellents and insecticides.
- To reduce risk of tick attraction:
 - Increase lawn size – an open lawn has lowest rate of tick infestation
 - Cut back on the number of shade trees close to the house
 - Push hedges and ornamental shrubs away from the house
 - A 3 foot wide wood-chip or gravel border separating woods, stone walls, shrubby areas and tall grass has shown a 50% reduction of ticks on a lawn.
- Heavy acorn production (oak trees) cause outbreaks of mice the next summer and outbreaks of ticks two summers later. So clean up the acorns in your yard.
- Discourage deer by removing plants that attract them and construct physical barriers.
- Migrating birds carry billions of ticks. Get rid of birdhouses and bird feeders.
- Mice serve as an important host for ticks. Set bait boxes and secure all areas around your house with wire mesh or other material. In winter, mice seek the warmth of your home.

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- FOR YOUR CHILDREN:
 - Locate sandboxes and swing sets in open, sunny area clear of trees, shrubs or other vegetation rather than a shady area. Use an umbrella to protect them from the sun but keep the unit in an open sunny area.
 - Ticks can be readily collected via dry ice traps. Blocks of dry ice emit large amounts of carbon dioxide which as we know attracts ticks. Some parents use this to test playgrounds and areas where children play. Caution: you must be very careful in the handling of dry ice.
 - Disseminate information to both children and parents regarding personal protection at schools, camps, day care, parks and other child-centered programs.

Practical Tick Bite Prevention

“Remember, it’s not the ticks that you find that are the ones likely to give you trouble... The successful ticks are the ones you don’t see.” Dr. Fish, Director, Lyme Disease Center for New York Medical College, from “Coping with Lyme Disease”.

- Don’t walk barefoot or in open sandals outside. Even short grass can harbor infected ticks.
- If you are going to walk through woods or tall vegetation wear:
 - a hat to protect your head, tuck in hair if possible
 - gloves to protect your hands
 - light colored clothing so ticks are more visible upon inspection
 - long sleeved shirts
 - long pants tucked into socks/hiking boots
 - Use a Deet-type repellent on exposed skin (more info under repellents & insecticides section)
 - Use Permethrin tick repellent on clothing or wear clothing that has permethrin tick repellent built-in (more info under repellents & insecticides section)
 - Check yourself every several hours during a long outing
 - Walk in the middle of trails; avoid sitting on logs, stone walls and leaning on trees
 - Do tick checks immediately and 3 days after outdoor activity
- Areas of the body to check for ticks (where ticks like to hide – they prefer warm, moist areas):
 - Base of the neck
 - Waistbands and bras
 - Under arms
 - Behind the knees
 - In and around the ears
 - In and around the hairline

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- Around ankles
- Underwear and pubic hair
- Hairline (supposedly the most common site for children)
- Ticks can remain on the skin for several hours before attaching. They do not wash off in the shower, particularly if attached.
- After hiking, shower/shampoo and brush hair thoroughly to discourage attachment of any ticks.
- To carry firewood into the house, consider using a repellent sprayed carrier instead of holding the wood against your body.
- Teach your children how to inspect for ticks particularly in the “private” areas of their bodies.
- For younger children going outside or hiking, parents should apply DEET-based repellants by placing a small amount of the repellent on your hands and then rubbing your hands on the child’s face and exposed neck. Be careful not to apply repellent to the hands or any other part of the body that may wind up in the little one’s mouth. See more on this in the Repellents and Insecticides section.
- Keep pets that have had possible tick exposure outdoors off the furniture, particularly your beds.
- Take any clothing you are concerned about and throw it into the dryer for fifteen minutes on high heat. This will kill any ticks on the clothes. Ticks have been known to live underwater for days so putting clothes in the washing machine is ineffective. Dry clothes first to kill the ticks, then wash.
- If camping – when changing clothes, seal those clothes that have been worn in a plastic bag until you can get them home to put in the dryer.
- Insecticide should be used on camping gear, your body and clothing if you are going camping and hiking. See the section on Repellents and Insecticides for more information.

To Protect Your Household Dogs & Cats from Ticks

Please work with your veterinarian on the best strategy for your pets. Suggestions:

- Check your pets daily for ticks.
- A yearly lyme vaccine is available for dogs but it is controversial in that it is unclear that it really prevents lyme disease. There is currently no other lyme vaccines available other than for dogs.
- Use tick collars – cut up left over collar pieces and put them into the lining of your pet’s bed. Get a tick collar from a licensed vet.
- Use Frontline monthly for cats or dogs – flea & tick protection.
- Or use K9 Advantix for dogs monthly – topical prevention and treatment of ticks, fleas, mosquitoes and biting flies. You can get this through a licensed vet.
- When walking & exercising your pet – keep in the middle of trails and out of vegetation.

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- After a walk, spot check your pet for ticks before allowing them inside. Brush their fur coats before letting them inside.
- Have your yard treated for ticks regularly by a professional.
- Use all the tips in the Make Your Home Uninviting section.
- Check out <http://www.healthypets.com/ticks.html> for more info.
- Signs of lyme disease in your dog or cat:
 - Arthritis (lameness)
 - Lethargy
 - Sudden onset of severe pain
 - Fever
 - Loss of appetite
 - Depression
 - Other temperament & personality changes

About Tick Repellents and Insecticides

“You have a choice between being exposed to insecticides or Lyme disease. It’s your decision.” Dr. Durland Fish, Director of the Lyme Disease Center for New York Medical College.

Repellents are an important part of your personal protection strategy. The best protection you can achieve is by using a repellent that contains Permethrin on your clothes/camping equipment and one that contains DEET for your skin.

- DEET products are to protect your skin. Repellents containing DEET are not sufficient to protect against tick bites. DEET disrupts the ability of biting insects to detect the source of carbon dioxide – the gas naturally given off by our skin and in our breath – which is what attracts biting insects to us (mosquitoes, ticks, flies etc.). DEET only repels ticks to areas where the tick could bite and that little protection does not last long.
 - Some DEET- based products:
 - Repel line – has varying strengths for specific purposes
 - 3M – Deep Woods Off and Ultrathon – tests conducted by Consumer Reports repelled ticks for up to ten hours.
 - Follow manufacturer instructions carefully. Apply products in well-ventilated areas and never put on cuts or broken skin.
- Permethrin kills ticks on contact. This is a clothing/equipment only repellent – not for your skin. The military found this to be 100 percent effective in Saudi Arabia. Clothing containing permethrin are very effective and provide long lasting protection. One website you can check out for these clothes is www.tickcounter.org
 - Permethrin available products:
 - Repel, Permanone, Permethrin and Duranon. A single application to clothing or camping equipment is effective for up to two days.

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- Remember that safe application consists of spraying the clothing while the clothing is OFF the body – then allowing it to dry in a well-ventilated area before wearing.

Your property should be treated with a product designed to target the rodents that carry ticks-bait boxes and a product called “Damminix” can be used. Getting a professional’s help is recommended. The Lyme Disease Center for New York Medical College reported that an insecticide application of Sevin (carbaryl), Dursban (chlorpyrifos) and Permethrin was 97 percent effective in controlling ticks for the entire nymphal season. Permethrin worked the best but is not available in all states. Sevin and Dursban have good safety records. The granular form of the insecticides was most effective on lawns.

TICK REMOVAL

- Wear gloves and grasp the tick with fine (pointed) tweezers only, as close to the skin as possible. Any other attempt to remove a tick such as using nail polish kerosene etc. will cause the tick to inject more poison into the body. There are also special tick removal tools available.
- Pull the tick gently, straight out with steady even traction. Don’t twist or jerk the tick, this may make the tick mouth parts break off and remain in the skin. These mouth parts are supposedly not infectious (per www.medscape.com).
- Save the tick in an escape proof container like a plastic bag.
- Have the tick tested for Lyme and co-infections. Igenex, Inc. will test ticks. (795 San Antonio Rd., Palo Alto, CA 94303 or www.igenex.com) Check out www.tickcounter.org for labs that can test a tick in other areas or find other sources on the internet.
- Call your doctor immediately. Ask for a minimum of 6 weeks of antibiotic therapy up front.
- When you get the tick test results back, ask for additional treatment necessary for any co-infections present.

Resources used:

- “Coping with Lyme Disease, A Practical Guide to Dealing with Diagnosis and Treatment” by Denise Lang with Kenneth Liegner, M.D.
- <http://roomfordebate.blogs.nytimes.com/2009/07/27/more-ticks-more-misery/>
- <http://www.tickcounter.org/> (University of Rhode Island)
- <http://www.medscape.com/features/slideshow/ticks>
- <http://www.cdc.gov/Features/StopTicks/>
- <http://animals.howstuffworks.com/arachnids/tick2.htm>
- <http://www.igenex.com>
- <http://www.healthypets.com/ticks.html>
- <http://entomology.ucdavis.edu/faculty/rbkimsey/tickbio.html>
- <http://www.bio-medicine.org/medicine-news-1/Migrating-Tick-Populations-Pose-Year-Round-Disease-Threat-for-People-and-Pets-3384-1>
- http://www.ilads.org/lyme_disease/B_guidelines_12_17_08.pdf
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