

Tick-borne Diseases in Humans



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Nominations for the Missouri State Tick

✓✓✓ for TICKS



TICKS CARRY DISEASE.



Missouri Department of
Health and Senior Services

www.dhss.mo.gov



2007 Tick Season in the News

- 🕸 *'Tick bite victim, officials urge outdoor precautions* 6/25/07
Columbia Daily Tribune
- 🕸 *Tiny pests, big problems – How to battle blood-sucking bug. Experts push repellent that they say wrongly got a bad name.* Post Dispatch 6/23/2007
- 🕸 *Reports of tick-borne illness diseases on the rise in the state*
Kansas City, AP 8/12/2007
- 🕸 *Lyme disease on rise, new treatment sought.* Columbia Tribune
8/15/2007

Increased Activity as of August 27, 2007

- ✿ DHSS has received increased reports in 2007 of several tick-borne diseases.
- ✿ Provisional data from the DHSS Zoonotic Disease Report for Week 34 run on 8/27/2007:
 - for RMSF 213% increase in counts at Week 34 compared to the 5 year median (238 compared to 76 probable & confirmed cases) .
 - for Ehrlichiosis HME 225% increase in counts at Week 34 compared to the 5 year median (114 compared to 35 probable & confirmed).

Flu-like Symptoms, more

- ✦ Fever, chills
- ✦ Body aches
- ✦ Headache
- ✦ Fatigue
- ✦ Weakness

**But, am I feeling
bad enough to
see my doctor?**





Flu-like Symptoms, more

Consider consulting a health care provider when:

- ✖ Fever with severe headache, muscle or joint aches, or nausea, vomiting, or diarrhea
- ✖ Following a tick bite, unexplained itch, or exposure to tick habitat, spreading rash, tell the health care provider!!!



Flu-like Symptoms, more

What times of the year can you expect tick-borne diseases?

- ☀️ Ticks can be active on winter days when the ground temperatures are about 45⁰ Fahrenheit
- ☀️ Spring and fall are peak nymph activity time



Tick-borne Diseases in Missouri

**Prompt removal of attached ticks
– preferably with tweezers**

All Are Treatable With Antibiotics



Emerging Tick-borne Diseases

Changes in land use

Reforestation

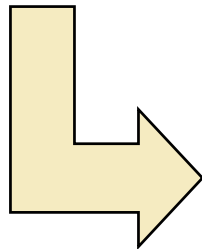
Patterns of human settlement

Changing vector-host ecology

More abundant tick populations

Increasing rates of infections in ticks

Increasing contact with human populations



How Do Ticks Get on a Person?

Highly responsive to host stimuli, e.g., feet hitting the ground or by CO₂ from a recently stopped car

- Chemicals (CO₂, NH₃, phenols, humidity, aromatics)

(Ixodes scapularis)

- Airborne vibrations

- Body temperature





How Do Ticks Get on a Person?

- ✂ Ticks do not jump, fall, or fly
- ✂ Generally found within three to four feet of the ground (deer height)
- ✂ Some species use an ambush strategy – brushed by a moving animal or person, let go of the vegetation, grasp the host

and . . .

How Do Ticks Get on a Person?

- ☼ Some species hunt for a host – they emerge and run toward the host when they are nearby
- Some (lone star tick) both quest and hunt
- Ticks crawl around on a host until they find a favorable site to feed



How Do People Get Ticks Out of Them?

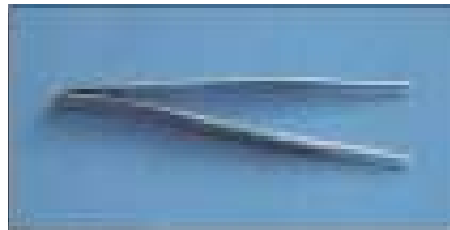
Do not
work!!!

- ✘ Fingernail polish
- ✘ Petroleum jelly
- ✘ Glowing hot match
- ✘ Rubbing alcohol
- ✘ Campho-Phenique
- ✘ Ointments
- ✘ Ether
- ✘ Gasoline

In a laboratory trial, *none* of these initiated self detachment in adult lone star or American dog ticks!

How Do People Get Ticks Out of Them?

Ohio State University Acarology Laboratory



<http://www.biosci.ohio-state.edu/~acarolog/tickgone.htm>

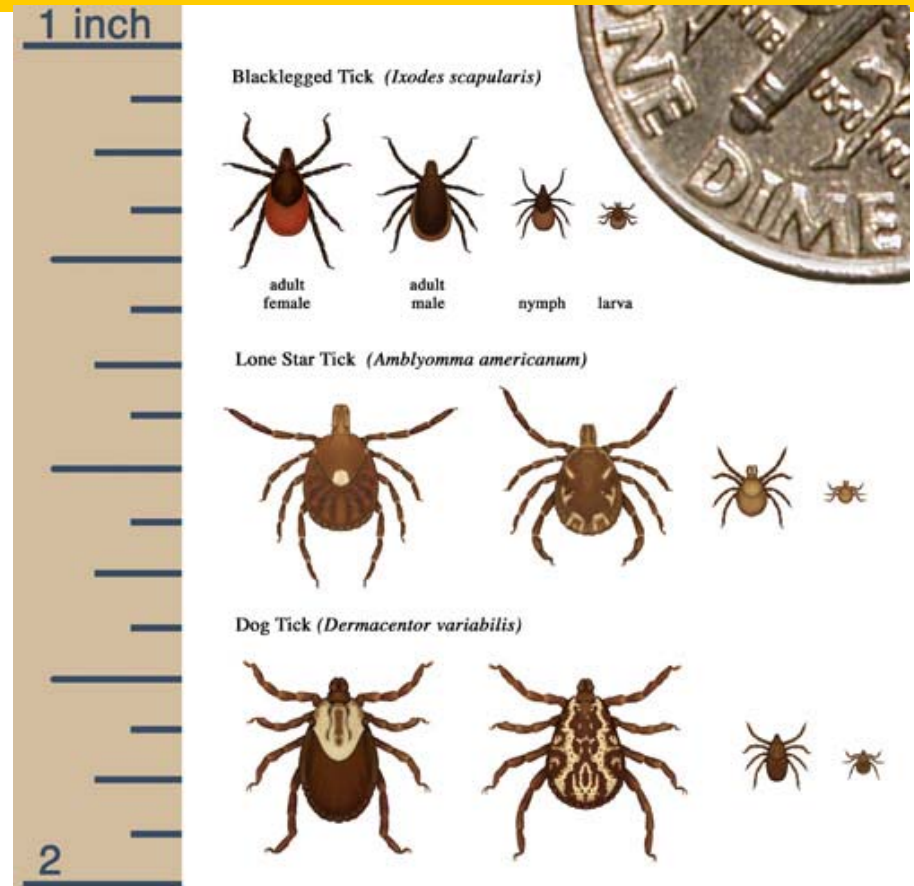


Tick Removal Technique

- ✂ Use tweezers to grab the tick close to the skin.
- ✂ Pull the tick firmly, straight out, away from the skin (do not jerk, twist, or burn the tick)
- ✂ Wash your hand and bite site with soap and water after the tick is removed and apply an antiseptic to the bite site.
- ✂ The sooner a tick is removed, the less likely it is for a person to become infected.

Overview

- 🦋 Lyme/Lyme-like/STARI
- 🦋 Rocky Mountain Spotted Fever
- 🦋 Ehrlichiosis
- 🦋 Tularemia



Lyme/Lyme-like/STARI

Bull's Eye Rash
Most Reported in U.S.
Controversial





Lyme/Lyme-like/STARI

- ✦ *Borrelia burgdorferi* has yet not been isolated from any of Missouri's cases
- ✦ Missouri erythema migrans rashes are indistinguishable from those in other areas of the United States
- ✦ Some patients do meet the "case definition" established by CDC



Lyme-like

Bacterial Agent

- *Borrelia burgdorferi*, Sensu Lato
- Other *Borrelia*???

Vector Unknown

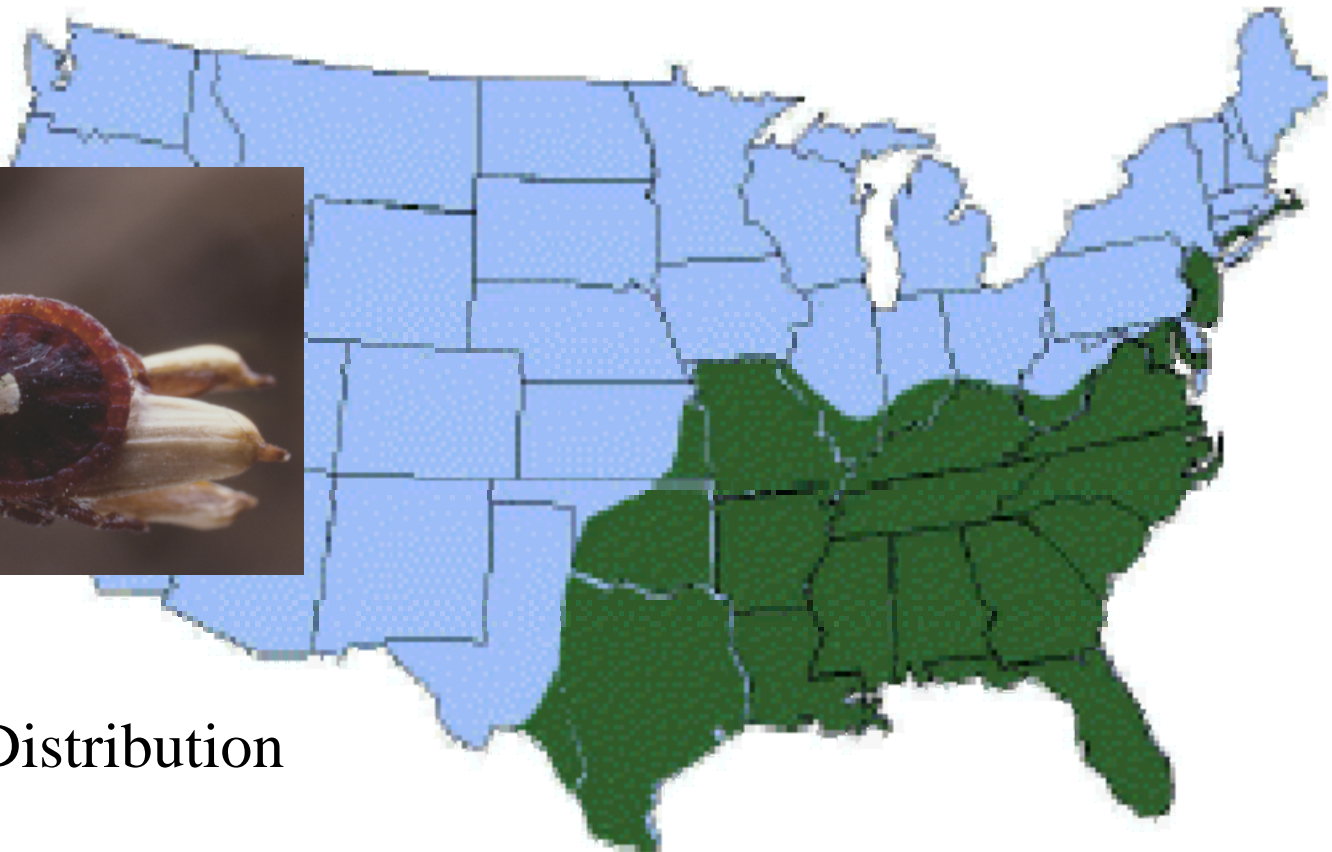
Signs and Symptoms

- Acute phase: EM rash
- Chronic phase – poorly described in the scientific literature

STARI

Lone Star Tick

Amblyomma americanum



U.S. Distribution



Rocky Mountain Spotted Fever

Acute Onset

Sometimes No Rash

Most Life Threatening

Incubation 2 to 14 days

Rocky Mountain Spotted Fever Signs and Symptoms

Abrupt onset of:

- ✦ Fever
- ✦ Headache
- ✦ Muscle aches
- ✦ Nausea, vomiting
- ✦ Rash (initially, small spots on wrists and ankles, spreading to trunk, face, palms and soles)



Rocky Mountain Spotted Fever

🕷️ RMSF has a higher disease rate in children.





Rocky Mountain Spotted Fever

Follow-up studies found that significant long-term health problems common in patients with severe illness due to RMSF

Approximately 10–15% of patients have Rocky Mountain spotless fever (often older or African American); substantial proportion of deaths occur in patients without a rash

Ehrlichiosis

Lone Star Tick
Immune Status
Dog Possible Reservoir
More frequent in Adults





Ehrlichiosis Risk Factors

- ✖ Most cases diagnosed after a moderate-to-severe illness
- ✖ Two thirds of infected people have no symptoms
- ✖ No data on whether previous infection creates protective immunity

Two Childhood deaths in 2007

- ✦ DHSS reported two tick-borne disease (TBRD) related fatalities in children during 2007. Both deaths were Ehrlichiosis cases.
- ✦ Early tick-borne disease signs and symptoms are nonspecific and can be difficult to diagnose.
- ✦ Because TBRD can be severe, especially if untreated, health care practitioners should not delay treatment with doxycycline.
- ✦ See DHSS June 2007 Health Advisory:
www.dhss.mo.gov/BT_Response/HAdIncreaseInReportedTickCases.pdf

Tularemia

People can get tularemia many different ways:

- ✂ infected tick, deerfly, horsefly, or other insect
- ✂ handling infected animal carcasses (a.k.a. "rabbit fever")
- ✂ eating or drinking contaminated food or water

and...



Tularemia

- ✦ Breathing in the bacteria, *Francisella tularensis*
(Category A Bioterrorism Disease Agent)





Tick-borne Disease Basics

- 🚫 Avoid tick bites!!!
- 🚫 Watch for “flu-like symptoms” and rashes following a tick bite, unexplained itch, or exposure to tick habitat for the next 30 days!
- 🚫 If you develop symptoms - let your physician know that you were bitten by a tick or in tick habitat (including your backyard)
- 🚫 Don't let fear of ticks keep you from enjoying the outdoors!!!

Prevention – Think Like a Tick

Remember tick questing and hunting strategies

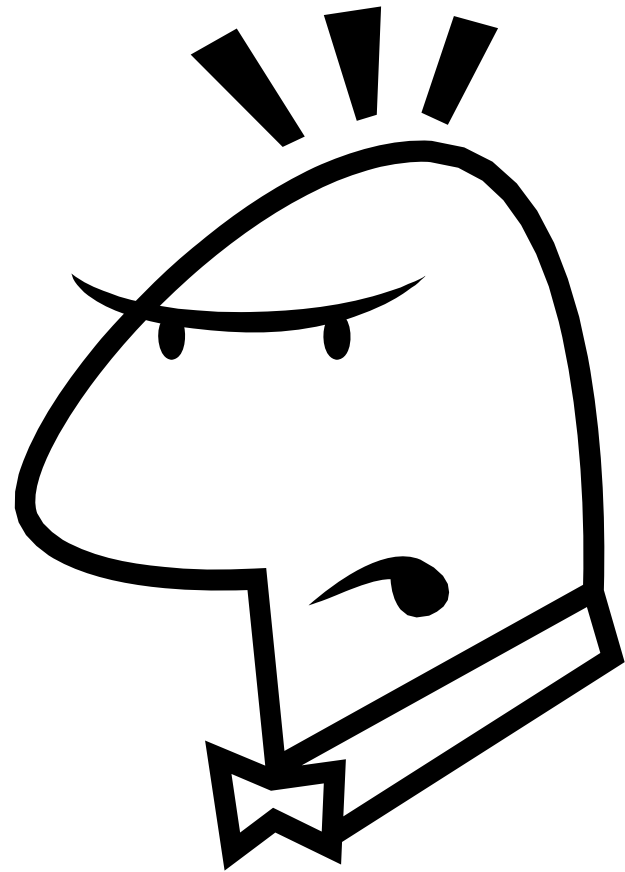
- Walk in the center of trails to avoid ticks on brush, tall grass, leaf litter
- Avoid sitting on the ground or on logs



Prevention – Think Like a Tick

Get ticked off!!!

- 🪲 20 – 50% DEET discourage tick attachment
- 🪲 Permethrin KILLS ticks!
- 🪲 Repellents are safe when you follow label directions





What about DEET?

- ✦ American Academy of Pediatrics (AAP):
insect repellent containing DEET is the most effective.
- ✦ 30% DEET is the maximum amount currently recommended by AAP for children > two months of age or older.

How Do I Choose an Insect Repellent?

How Do I Choose an Insect Repellent?

HOW DO I CHOOSE AN INSECT REPELLENT?



1- 2 hours

2-4 hours

5 – 8 hours

ON EXPOSED SKIN

MOSQUITOES

Choose the appropriate repellent for the length of time you'll be outdoors. Reapply according to product instructions

Protection varies by species of mosquito.	<10% DEET	~15% DEET	~20%-50% DEET
Most mosquitoes that transmit diseases in the US bite from dusk-dawn.	<10% picaridin	~15% picaridin/KBR 3023	
		~30% oil of lemon eucalyptus/PMD	

TICKS

Generally, repellent with 20 – 50% DEET is recommended to protect against tick bites.

Other factors affecting efficacy include: individual chemistry, sweat, numbers of bugs. Apply creams and lotions 15 to 20 minutes before going outdoors.

In areas where both mosquitoes and ticks are a concern, repellents with 20 – 50% DEET may offer best, well-rounded protection.

The American Academy of Pediatrics has recommended that repellents containing up to 30% DEET can be used on children over 2 months of age.

The repellents shown here meet CDC's standard of having EPA registration and strong performance in peer-reviewed, scientific studies. They reflect products currently available in the U.S.

ON CLOTHING AND GEAR

Permethrin



www.dhss.mo.gov/WestNileVirus
www.dhss.mo.gov/TicksCarryDisease



Permethrin treatment of clothing and equipment can provide protection against mosquitoes and ticks through multiple washings. Follow label instructions.

Prevention – Think Like a Tick

Ticks On Parade

- ☛ Wear long sleeves and long pants in solid, light colors to spot ticks easily.

Tuckered Out Ticks

- ☛ Tuck pants into socks or boots to keep ticks out.



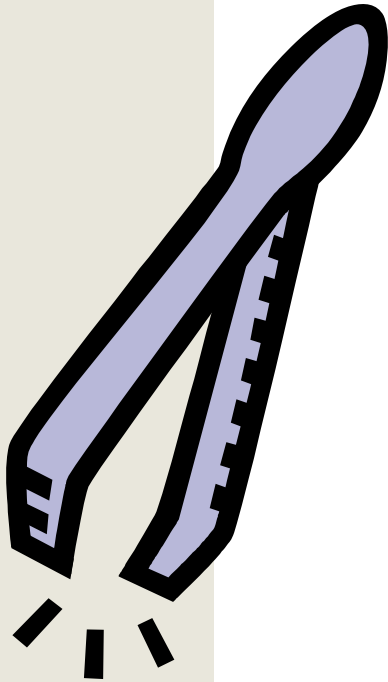
Prevention – Think Like a Tick

Honey, will you give me a tick check before bedtime. . . .

- ✂ Before feeding, a tick may wander around on its host for several hours.
- ✂ Perform frequent tick checks!!!



Prevention – Think Like a Tick



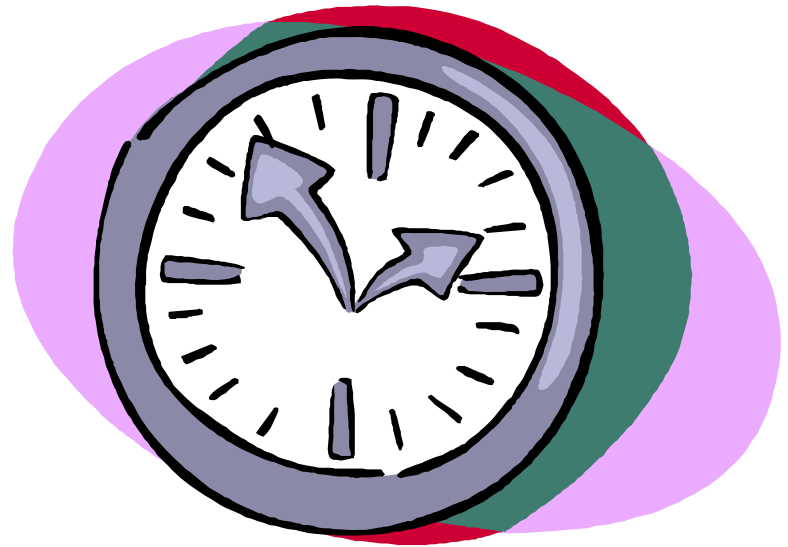
Remove Attached Ticks Immediately!!!

- 🕷️ Tweezers and tick removal tools help prevent you from accidentally squeezing tick-borne bacteria into yourself

Prevention – Think Like a Tick

Clock Tick Talk

The sooner a tick is removed, the less likely it is for a person to become infected.



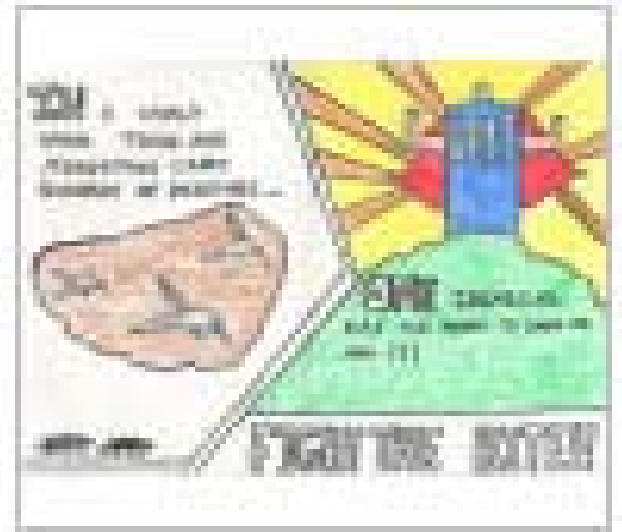
I NEED YOUR HELP!



Weekly Reader & CDC 's
Fight The Bite Poster Contest

Opportunity in January 2008 to
teach 5th and 6th grade students
about tick and mosquito bite
prevention

2007 Missouri Fight the Bite Winners



<http://www.fightthebitecontest.org/>

DEET Education Program: info@deetonline.org,
1-888-NO-BITES (1-888-662-4837)



Where to Get More Information

www.cdc.gov

www.dhss.mo.gov/TicksCarryDisease

www.emedicine.com

www.dhss.mo.gov/WestNileVirus

www.dhss.mo.gov/BT_Response/HAdIncreaseInReportedTickCases.pdf

<http://www.dhss.mo.gov/CDManual/CDManual.htm>

<http://www.journals.uchicago.edu/CID/journal/issues/v32n6/000509/000509.html>

Ticks and tickborne bacterial diseases in humans: an emerging infectious threat. (comprehensive review article)

Clin Infect Dis. 2001 Mar 15;32(6):897-928. Epub 2001 Mar 14.