



Tick-Borne Illness Prevention

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NOLS - WRMC

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Bay Area Lyme
FOUNDATION



What's our mission?

- To make Lyme disease... easy to diagnose and simple to cure
- Funding 27 institutions & 37 projects
- Raised \$16m in 5 years

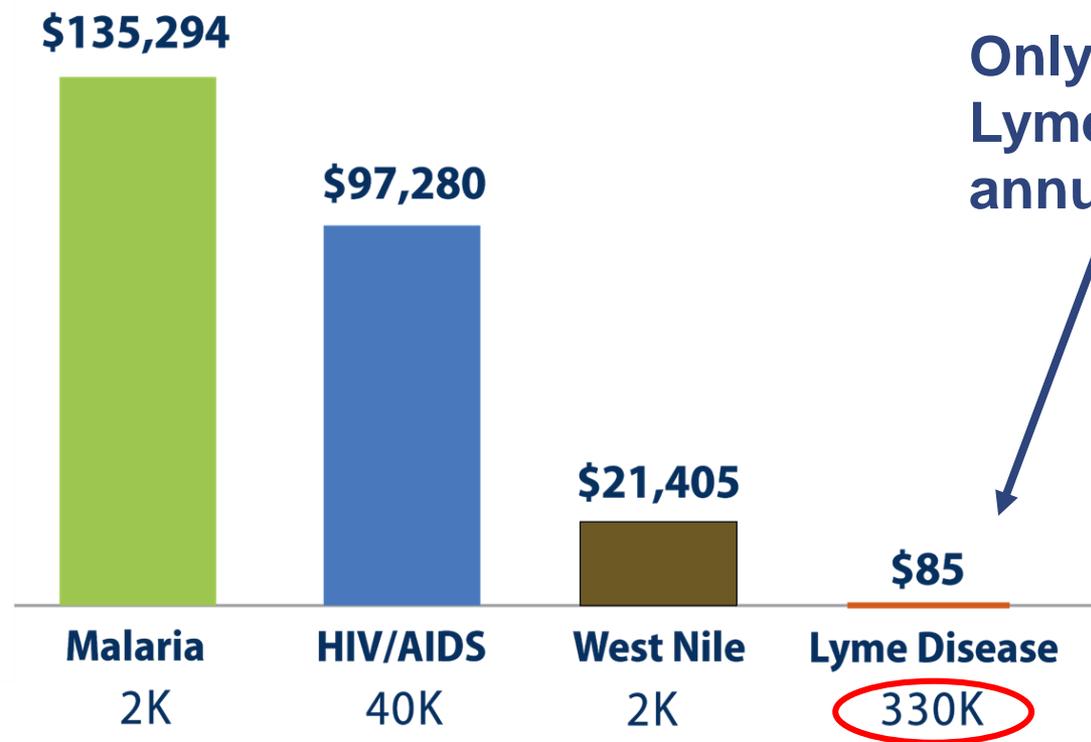




Why Funding is Needed

Annual NIH
Spending per
New US Patient*

*Estimated in 2016



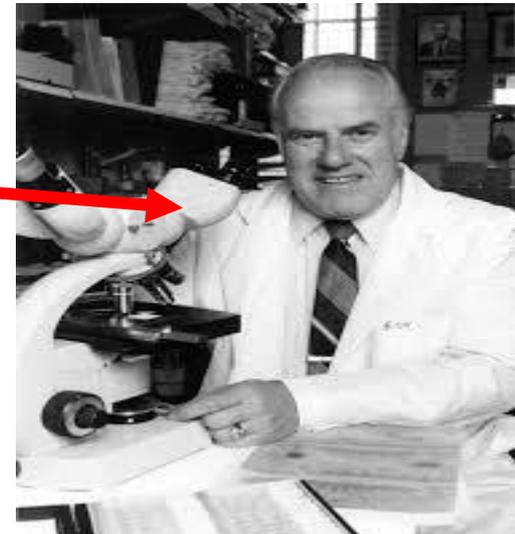
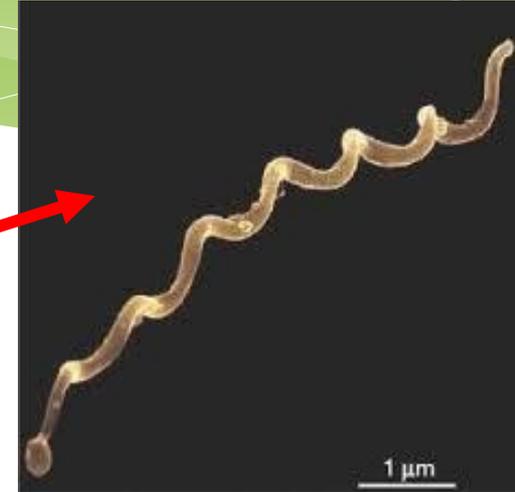
Only \$85 per
Lyme patient
annually

Number of NEW cases
annually in U.S.



So, what is Lyme disease?

- Bacterial infection
- Transmitted to humans by a **tick bite**
- Spiral shaped bacteria (spirochete)
- Very similar to syphilis
- Identified in 1975 in Lyme, CT
- Disease agent discovered in 1982 by Dr. Willy Burgdorfer
- Scientific name: *Borrelia burgdorferi*
- Acute flu-like illness in summer and fall on the East Coast – elsewhere can be year-round





Lyme disease – Fast Facts

- **Fastest-growing** vector-borne infectious disease in US
- Cases reported in **49** states
- **330,000** new cases per year
- People who work or play outdoors are particularly at risk
- **Frequently misdiagnosed** by doctors especially W. Coast
- Tick season is **YEAR ROUND** in California/Southern U.S.





Ticks of the United States



American Dog Tick



Lone Star Tick



Blacklegged Tick



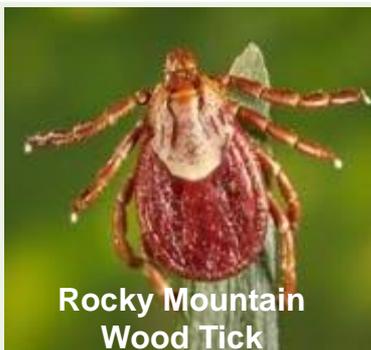
Brown Dog Tick



Groundhog Tick Steve Jacobs
PSU Entomology



Gulf Coast Tick



Rocky Mountain
Wood Tick



Soft Tick



Western Blacklegged
Tick



Tick-Borne Diseases in the US

- **Anaplasmosis**
- **Babesiosis**
- **Bartonella**
- **Lyme disease (*Borrelia burgdorferi*)**
- ***Borrelia miyamotoi***
- ***Borrelia mayonii***
- Bourbon virus
- Colorado Tick Fever
- **Ehrlichiosis**
- Heartland virus
- Powassan virus
- Southern Tick-Associated Rash Illness
- Spotted Fever Group Rickettsia
- Tick-borne Relapsing Fever
- Tularemia

One bite can transmit **multiple** infections that can be very serious and debilitating



American Dog Tick



Lone Star Tick



Black-Legged Tick

Key findings from our tick-testing study...



- Ticks in 83 counties in 24 states where previously undetected
- 16,000 ticks collected from 49 states
- All life stages of three major tick species were infected

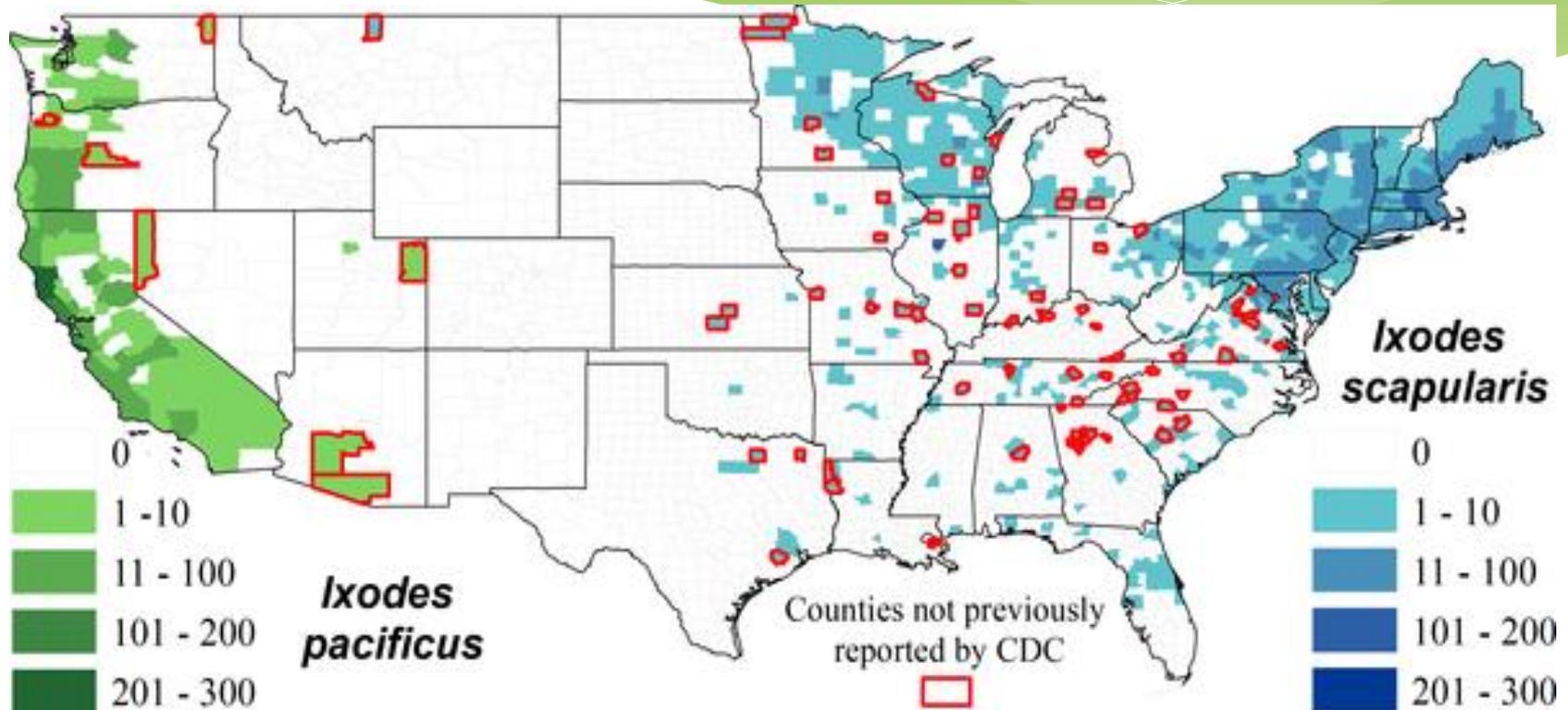


Nieto NC, Porter WT, Wachara JC, Lowrey TJ, Martin L, et al. (2018) Using citizen science to describe the prevalence and distribution of tick bite and exposure to tick-borne diseases in the United States. PLOS ONE 13(7): e0199644.

<https://doi.org/10.1371/journal.pone.0199644>

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Research shows ticks in NEW places



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Where is the bacteria coming from?

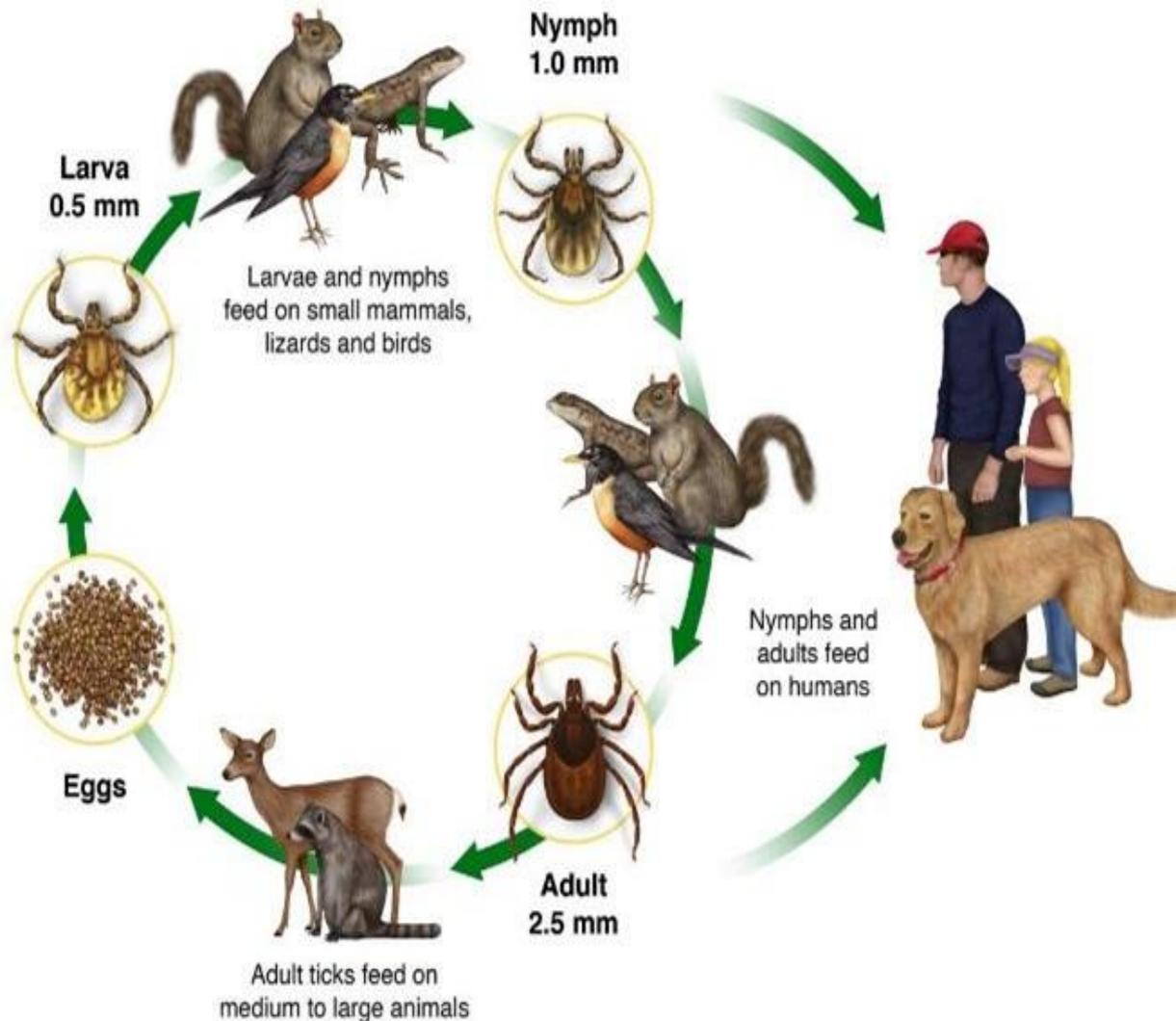


Engorged ticks

- The bacteria is in the blood of wild mammals – mice, voles, squirrels and deer
- The ticks get infected when they feed on the blood of infected mammals
- Bacteria transmitted to humans from other animal reservoirs

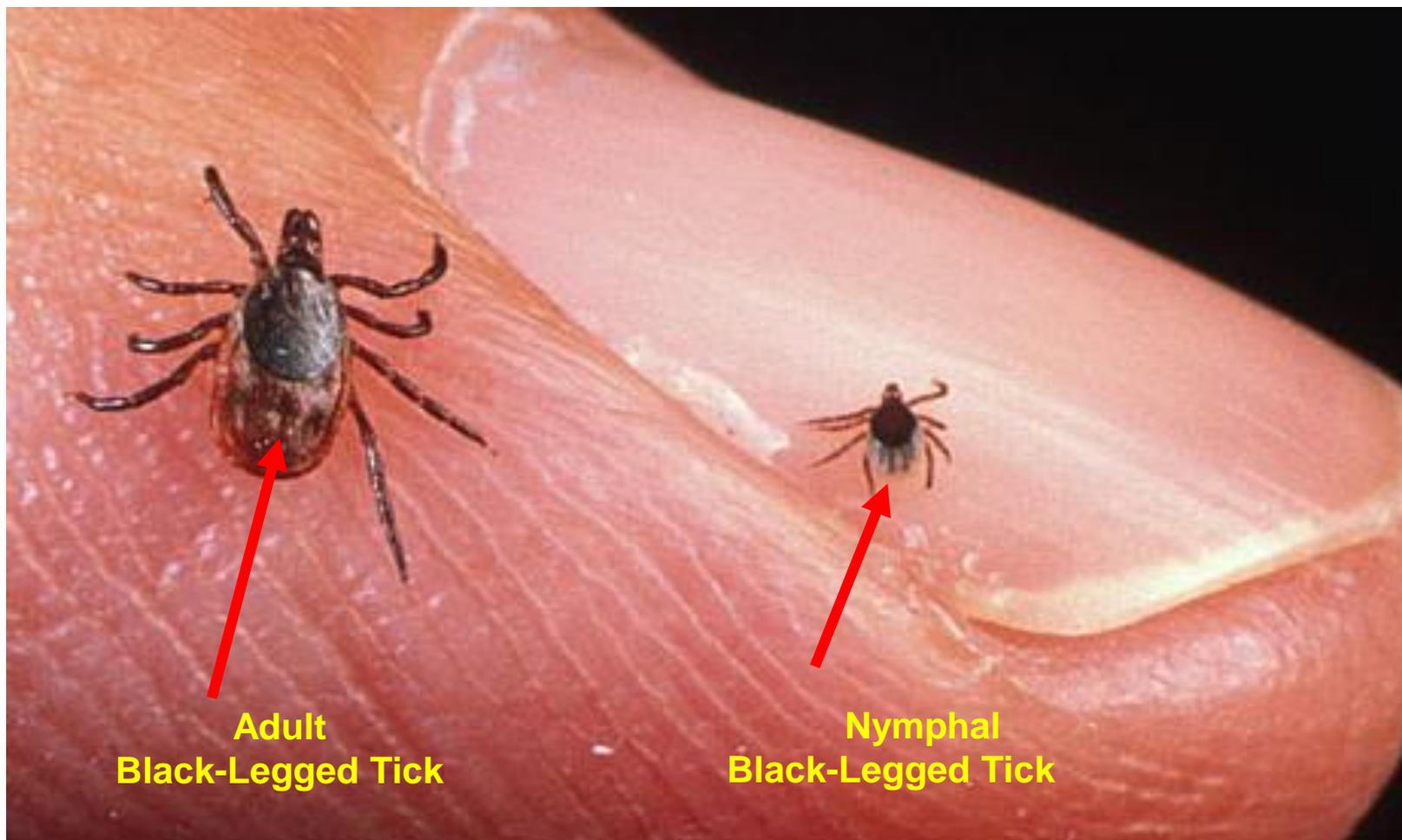


Lifecycle of a tick: two years



1. Ticks must get blood meal to develop
2. Opportunistic – feed on most animals
3. If feed on a mammal carrying bacteria, they become infected

Ticks are really small ...





Why tick bites are *very* difficult to detect



- Ticks are so tiny, they are easily missed with the naked eye
- 40-50% of people diagnosed never recall a tick or a bite

Transmission times are controversial



Engorged tick

- There's really no "safe" time period for a tick to be attached to you
- Bacteria may be in salivary glands or get transmitted during feeding
- Never squish a tick on your bare skin! The bacteria can penetrate it!



Visual signs of Lyme Disease:

- Expanding rash 3-30 days following tick bite*
- Round, oval, triangular, irregular shaped rash
- Rash is not normally itchy or painful



This rash may be confused with allergic reactions to tick bites. (However, allergic reactions occur within 24 hours of the bite and they do not spread)

***The rash does not appear on everyone who has been exposed to Lyme disease—it's only 43-70% of cases**



Be alert to expanding rashes...



Classic "bull's-eye" rash which doctors will typically recognize



A more common rash from a tick bite



Not just “bull’s-eye” rashes...



- Some rashes have a blue cast
- The photo to the right shows multiple rashes



Other signs of Lyme disease:

Within days of exposure:

- Flu-like symptoms - fever, chills, fatigue, muscle aches, joint pain, headache, swollen lymph nodes

Within weeks to months of exposure:

- Musculo-skeletal: arthritis in one or more joints
- Nervous system problems: fallen face, numbness, tingling, or pain in the arms and legs
- Heart problems (<10%): disturbances in the heart rhythm

Within months to years of exposure:

- Musculo-skeletal: severe joint pain & swelling (60% of patients)
- Neurologic complaints: shooting pains, numbness, tingling, problems with short-term memory

Issues in the Lyme disease field



Unreliable Diagnostics

- **50%** chance of **misdiagnosis**
- No validated “direct detection” methods

Unreliable Therapeutics

- Long-term antibiotics are currently prescribed, but **more data is needed** as to optimal regimen

May be **millions** suffering with “Chronic Lyme”/post-treatment Lyme Syndrome and the cause is still unclear

Epidemic is misunderstood especially in the Western United States



Currently, no reliable diagnostic test exists



- The average patient sees 5 doctors over nearly 2 years before being properly diagnosed
- Fewer than 50% of patients remember a tick bite
- Fewer than 50% of patients recall any rash
- And again ... 35%-50% of Lyme disease missed by current tests





Common Misdiagnoses

- 'Flu
- Lupus
- Fibromyalgia
- Epstein Barr Virus
- Chronic Fatigue Syndrome
- Multiple Sclerosis
- Rheumatoid arthritis
- Thyroid disorders
- Psychiatric disorders
- Crohn's disease
- Early ALS
- Early Alzheimer's
- Dementia
- Depression and/or anxiety
- Hormonal imbalances
- and so on





Risk: For individuals

- Your job puts you at high risk for exposure
- Be **ALERT** to ticks!
- Educate yourself about the dangers of tick bites
- Know what to do if you or a colleague/client are bitten
- Advocate for yourself with medical professionals and **INSIST** on early treatment



Risk: Organizations



- * Landmark case against Hotchkiss School in 2017 - \$41m negligence case upheld
- * Organizations exposed to tick-borne disease suits





Prevention 1: Treat CLOTHES



\$9.00



- Ticks DIE if they crawl on clothing treated with permethrin as it's an *insecticide* - harmless to humans
- You can do it yourself for under \$10, or...
- Get clothing treated through www.insectshield.com



Prevention 2: Repel ticks ...

- Use repellent with **> 20% DEET**

Use **reliable** sources when researching alternatives to DEET:

- **National Pesticide Information Center** npic.orst.edu
- **Centers for Disease Control and Prevention** cdc.gov
- **Environmental Protection Agency** epa.gov

Insect repellents can be very effective when re-applied *frequently*



Prevention 3: Learn CORRECT way to remove a tick!



- Grasp tick as close to skin as possible
- Use needle-nose tweezers or tick-removal tool
- Pull firmly but gently away from skin
- Do not twist or yank – you may shock the tick
- **Avoid** “alternative” methods
- **SAVE** the tick for testing



Prevention 4: Practical tips



- If possible, wear light-colored clothing
- Wear long pants and sleeves
- Tuck pants into socks
- Run clothing through DRYER before washing!
- **AVOID** doing this if you have been in Poison Oak

Prevention 5: Tools for risk mitigation



People need information and reminders to protect selves and organization:

- policies & waivers
- training
- signage
- tools





Prevention 6: Check for ticks

- Head/hair
- Ears
- Folds of neck
- Armpits
- Waistband
- Groin
- Backs of knees
- Check your pets, too!
Ticks can be hitch-hikers

Check for ticks **EVERY DAY!**



Prevention 7: If you get bitten or develop symptoms



PREVENT LYME BY...

- Seeing a doctor as soon as possible
- Asking for antibiotic doxycycline (28 days)
- Continuing to monitor yourself for symptoms, even *after* completing antibiotics





Prevention Tips Summary

- Remove ticks **IMMEDIATELY!**
- Save ticks for testing
- **TREAT** clothing with permethrin
- Use >20% DEET on exposed skin
- Tuck long hair up into hat
- Long-sleeved shirts/pants
- Run clothing through hot dryer **10-15** minutes **BEFORE** washing
- **Watch** for symptoms
- Go to Dr. if you get bitten



TICK CHECK EVERY DAY!



Questions?

www.bayarealyme.org



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