

THE ULTIMATE  
**TICK AND LYME DISEASE**  
HIKERS POCKETBOOK



*MIA KOSEM*

# LYME DISEASE

is the most common vector borne disease in the USA and is steadily rising, nearly doubling reported cases in the past 20 years. It is an infection characterized with an Erythema Migrans rash (see fig.1) and fever, but can also have more serious symptoms and complications (like neurological and cardiac symptoms).

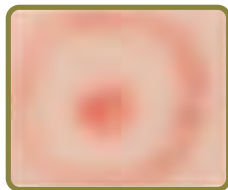


fig. 1

**As a hiker** in the northeast/midwest (fig. 2) you will be at a higher risk for Lyme Disease or other tick borne diseases. Around 30% of ticks are infected with Lyme Disease. Will you risk it?

**The good news is** that it can be easily prevented with tick personal protective measures and when recognized/treated.



fig. 2 (CDC)



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Adult Female



Adult Male



Nymph



Larva

## BLACKLEGGED TICK

The blacklegged tick, also known as the deer tick (*Ixodes scapularis*), is the primary vector for Lyme disease (LD) in the US and the sole tick of concern in the eastern half of the US, where LD is by far the most prominent. Males and larva are not known to transmit LD, so keep an eye for both sesame size females and poppy seed size nymphs. **See below the lifestages compared to a penny.**

## LYME DISEASE RISK VS ENGORGEMENT

By using the engorgement/time feeding guide, you can estimate your risk of contracting Lyme disease (LD).

### THE STATISTICS

You are most likely to be at risk after the 24 hour mark. By 72 hours your risk of contracting LD from infected ticks approaches 100%. Keep in mind roughly 30% of ticks are infected with either LD and other tick borne diseases have different transmission times.



**0 hrs** (no risk)



**24 hrs** (low risk)



**36 hrs** (moderate risk)



**72 hrs** (high risk)



# THE QUEST

KNOW THEIR BEHAVIOR SO YOU  
CAN STAY TWO STEPS AHEAD

TICKS AND LYME DISEASE

7.

## THE HUNT

A common misconception is that ticks can climb high into trees or can jump. Neither is true.

Instead, ticks **quest**. This means they climb up vegetation and wait for their prey with their first pair of legs raised, ready to grab onto prey that will come in contact with them.



## HOW TICKS HUNT YOU DOWN

Ticks have a unique sensory organ called the Haller's organ which are located on the ticks first pair of legs.

Humans, deer, mice, and other hosts leave behind an invisible footprint of carbon dioxide, odors, and heat that ticks can detect and follow in order to find the most optimal hunting spot.

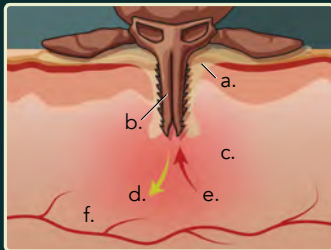


## WHATS IN THE SPIT?

Ticks pump a specialized cocktail of agents into your skin that helps them stay undetected by their host, allowing them time to spew disease and have their fill of blood.

Ticks inject their saliva and expel excess fluid content from your own blood in a alternating pattern with feeding.

This includes the *Borellia* bacteria that causes infection. Excretions also contain cement, which securely attaches the tick to the skin. Agents also promote bleeding and hinder the natural healing process to create a feeding pit. Most notably, agents can block both itch and pain, which can make the tick virtually undetectable if not seen by eye.



a. cement; b. mouthparts; c. feeding cavity; d. saliva; e. blood; f. capillary



## PROTECT YOURSELF

The most effective way to fight against tick bites and Lyme disease is through personal protective measures (PPM) when entering tick hot spots. Using multiple PPM will be significantly more protective, but one is better than none!

### *BE AWARE OF TICK HOT SPOTS!*

It is important to know where ticks are most active, so you can either avoid them or use other PPM! Remember, HIGH!



**H**eat. Ticks are most active during warmer months (April-September) and times throughout the day.

**I**ncrease in traffic. Ticks concentrate in areas where they are more likely to find prey, such as deer trails.

**G**rassy or forested areas. Avoid brush, leaf litter, or tall grass. Stay on cleared trails and clear yard debris.

**H**umidity. Ticks are particularly active in more humid environments or days after rainfall.

## BEFORE YOU GO

### *REPELLENTS*

are applied on skin and sometimes clothes to repel insects.

**See page 13**



### *PERMETHERIN*

is a insecticide for clothing and gear that kills insects on contact which lasts multiple washings.

*Always read and follow individual labels.*

### *CLOTHES*

Wear long sleeves and pants. By tucking your socks into your pants, and shirt into your pants, it creates a "seal" on most of your body so ticks cannot bite. Light colored clothes are recommended and can help you see ticks better.



### *EXTRA TIPS!*

Apply sunscreen first, wait 10 minutes, and then apply insect repellent. Do not mix DEET and sunscreen.

Instead of directly spraying on your face, spray on your hands and then apply around your ears.

Focus application on openings of clothing. Do not apply underneath your clothing.

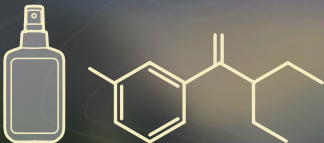

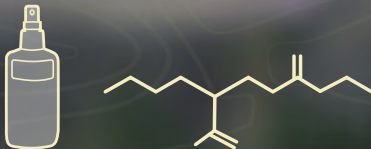



# REPELLENT

## WHAT WORKS BEST FOR YOU?

### PERSONAL PROTECTIVE MEASURES

13.

REPELLENT	 <b>DEET</b>	 <b>PICARIDIN</b>	 <b>IR353</b>	 <b>OIL OF LEMON EUCALYPTUS</b>
APPLICATION	<p>Effective for 2-10 hours depending on concentration.</p> <p>10-35% deet concentrations are safe and sufficient for bite protection, &gt;30% for children 2 years and older.</p>	<p>Effective for up to 12 hours. More effective than deet, and works for a broader range of insects.</p> <p>7-20% concentration recommended.</p>	<p>Effective for up to 3 hours.</p>	<p>Effective for up for 3 hours.</p> <p>Effective in preventing blood feeding and attachment of most disease carrying ticks.</p>
EFFICACY	<p>Potentially toxic (in high concentrations, when ingested or when applied under sunscreen).</p> <p>Could damage synthetic materials.</p>	<p>No proven toxicity, doesn't damage materials.</p> <p>Resembles naturally occurring compound in black pepper plants.</p>	<p>No proven toxicity.</p> <p>Naturally occurring amino acid.</p>	<p>No proven toxicity.</p> <p>Naturally occurring essential oil.</p>



## WHEN YOU GET HOME

Since you may have brought home a passenger (or many), it is wise to find them and dispose of them. Do this before they have a chance to infect you with Lyme Disease (12-24hrs).

### THE DRYER IS YOUR FRIEND

After you return home, you can put your clothes in the dryer for 15-20 minutes on high. This will be hot enough to kill any ticks that are lingering behind.



### GET IN THE SHOWER

Showering can lower your risk of getting infected by washing off any unattached ticks and help you find ticks that have bitten you.



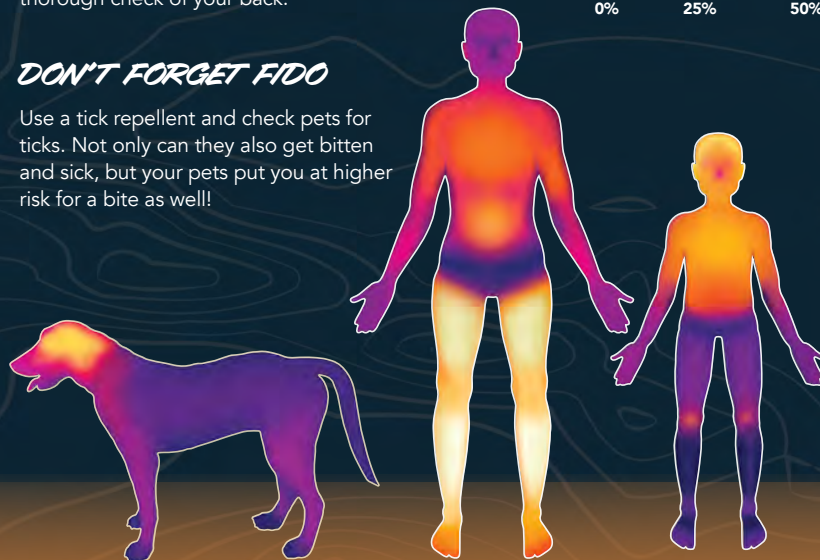
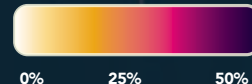
### TICK CHECK

Ticks are most likely to migrate to warm, dark, humid places. Find a partner, or use a handheld and full length mirror to get a thorough check of your back.

### DON'T FORGET FIDO

Use a tick repellent and check pets for ticks. Not only can they also get bitten and sick, but your pets put you at higher risk for a bite as well!

**Tick Distribution**  
(percentage of likelihood)



# REMOVAL

## REMOVING A FEEDING TICK

GOT BIT, WHAT NEXT? 17.

### DO IT RIGHT THE FIRST TIME

Removing the tick correctly can mean the difference between prevention and infection. If you do not grasp the tick by the mouthparts or head, you risk expelling diseased saliva into your system.

#### *FISHING LINE/FLOSS METHOD*

Tie a loose knot, and without pulling it closed, put it around the tick. Tighten the ends keeping the string close to the skin. Ensure the knot closes around either the tick's mouthparts or head.



Once the knot is secured, gently tug the string upwards. The more gentle, the more likely you are to remove all of the tick's mouthparts.



#### *BLUNT TWEEZER METHOD*

Using blunt tweezers, grab the tick as close to the skin as possible. Only apply enough pressure to grasp the tick.

Without squishing the tick, gently tug the tick to lower the likelihood of mouth parts being left in the skin.

### EARLY SYMPTOMS

If you know the signs and symptoms and receive medical attention early, you can ensure nearly 99% effective treatment. This minimizes the risk of more severe complications. Most early symptoms may resemble the flu. If left untreated, neurological, cardiac, or arthritis type symptoms may appear.

### WHAT NEXT?

Record your symptoms, your time/place of exposure and take pictures of any rashes and ticks.

Go to a walk in clinic and/or contact your PCP to evaluate symptoms and receive timely treatment.



Fever



Fatigue



Chills



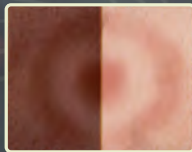
Swollen  
Lymph nodes



Joint and  
Muscle aches



Headache



#### Classic "Bullseye"

Rash has expanded, resembling a target.



#### Central Clearing

Expanding rash without the target appearance.



#### Disseminated

Multiple rashes are present.



#### Blue/Red Lesion

No central clearance present, blue hue.

### EM RASH

or Erythema migrans (EM) rash is the defining symptom of LD which can appear 3-30 days after the bite. Although not everyone will present with one, 70-80% will and it is often what leads to a correct diagnosis. Although it has a "classic" presentation, its appearance may vary case from case. For examples on how a EM rash could present, **see above.**

*FISHING LINE FOR REMOVAL  
AND REPELLENT WIPE*

## ADDITIONAL RESOURCES



**<https://www.cdc.gov/ticks/index.html>**

Learn more about different tick species and other tick-borne diseases.

**<https://urgentcare.com/>**

Find the nearest urgent care/walk in clinic near you.





