

What Every Minnesotan Should Know About **Lyme Disease**

Annandale Improvement Club

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Elizabeth L. Maloney, MD

Topics

- Lyme Awareness
 - Disease statistics
 - Risk factors
 - Illness
- Lyme Prevention
 - Ticks
 - Reducing exposure
 - Preventing bites
 - Bite Management

Conflicts of interest: nothing to disclose

Awareness: Why Lyme?

- Most common vector-borne illness in US
- Serious/chronic illness for some
- Risk higher than thought
 - Surveillance case reports = “tip of the iceberg”
 - ~ 30,000 cases annually



CDC estimates incidence **> 300,000**

Knowledge is Power



Where's the Risk?

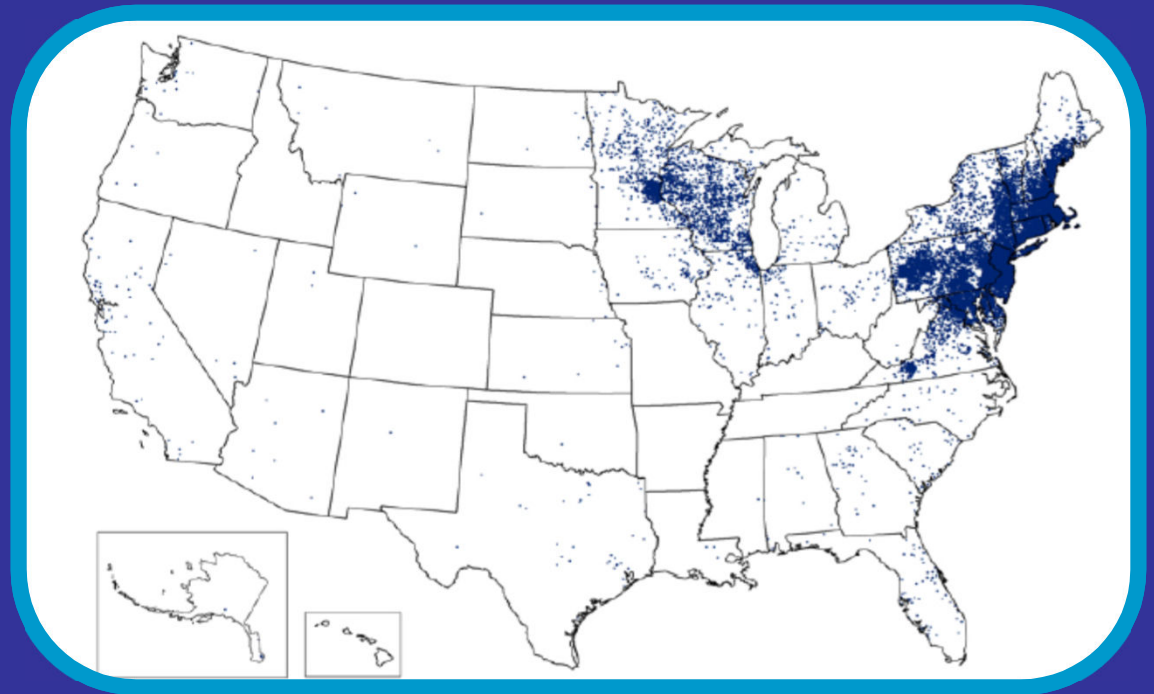
- Concentrated

- Northeast
- Upper Midwest

- Pockets

- Seattle
- San Francisco
- Gulf coast
- South coast

- Scattered

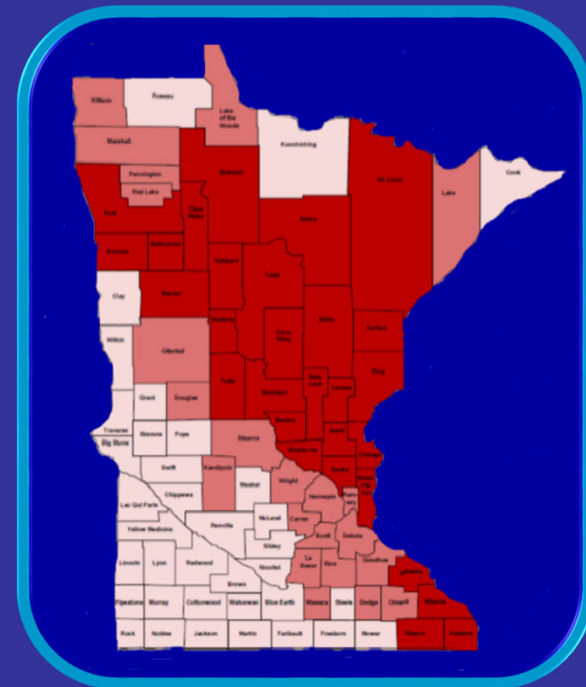


www.cdc.gov/ncidod/dvbid/LYME/ld_Incidence.htm

MN Risk

- A “top 10” state
 - 18% increase over 5 years
 - 12 -15,000* cases yearly
- Tick locations varied
 - Greater MN and metro
 - Examples
 - Golf courses
 - City parks
 - Camp sites
 - Backyards

Lyme/Anaplasmosis Risk



<http://www.health.state.mn.us/divs/idepc/diseases/lyme/highrisk.pdf>

*Based on current CDC estimates

Forest Fragmentation



Kirby Stafford, Ph.D.

- Humans, animal hosts closer
- Reservoir hosts proliferate
 - Small mammals – white footed mice, chipmunks, shrews



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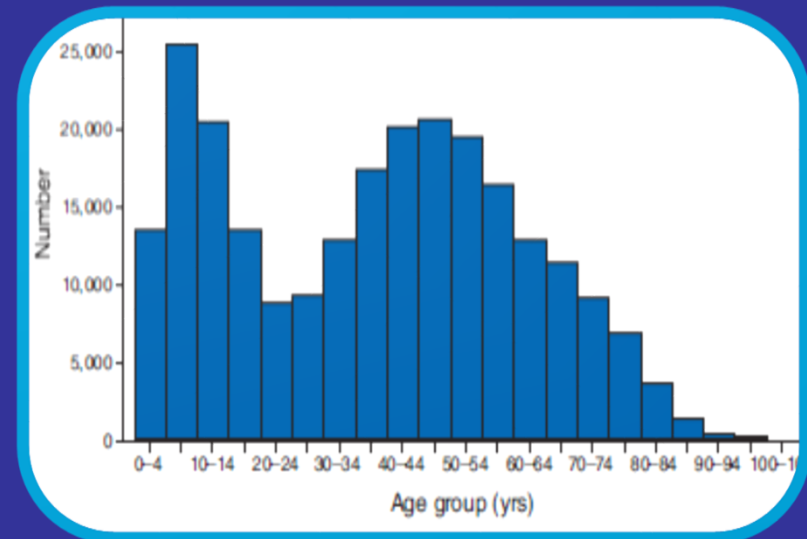
Who's at Risk?

Most Minnesotans

- Reside/visit high-risk areas
 - Wooded developments
- Pet owners
- Outdoors enthusiasts
- Sports with tick exposure

Age-related risk

- Highest: kids
next: middle-aged



Serious Illness

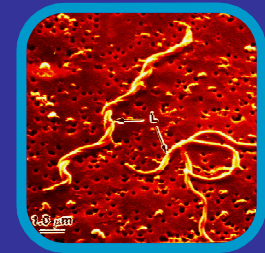
- Disability and lost production
 - Advanced cases: 65% cut back or quit school/work
25% received disability payments

\$\$\$ Costs per patient vary

- All cases: \$8400
 - Late disease: > \$16,000*
- Limited access to care for complicated cases
 - Few physicians trained to provide innovative care
 - Patients to leave state for care

Lyme disease ?

- Bacterial infection – *Borrelia burgdorferi*
- Transmitted by deer ticks
- Multiple stages
 - Early: bacteria only in skin
 - Late: bacterial spread to other sites
 - Post-treatment disease
 - Represents treatment failure
 - Not everyone goes through each



Wadsworth Center, N.Y.
State Dept. of Health



CDC



Paul Auerbach, MD



Bernard Cohen, © DermAtlas;
<http://www.DermAtlas.org>



CDC

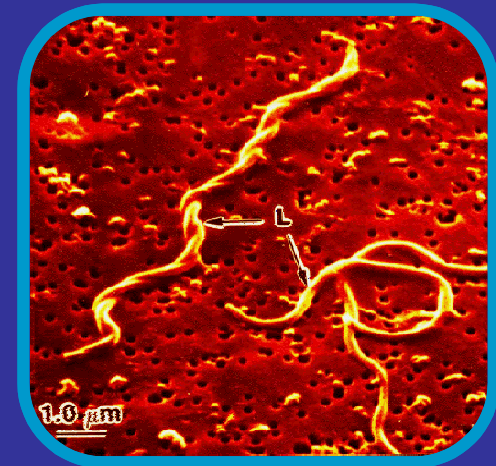


CDC

Bugs in Bugs

Borrelia burgdorferi

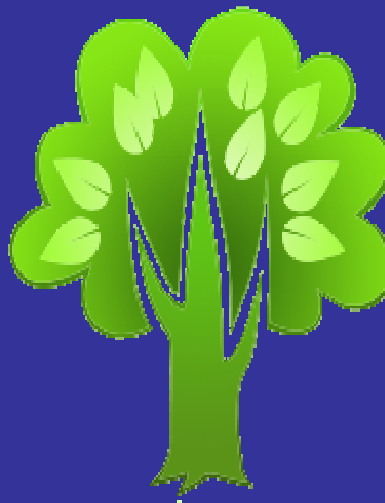
- Adaptable
 - Infects humans, animals, ticks
- Preferred body locations
- Family of bacteria
 - US species: *B. burgdorferi sensu stricto*



Wadsworth Center, N Y State Dept. of Health

B. afzelii

B. garinii



B. andersonii

B. bissettii

B. japonica

B. lusitaniae

B. sinica

B. tanukii

B. turdi

B. valaisiana

Early Lyme

- Begins 2-30 days after bite
- Multiple presentations
 - Asymptomatic
 - Erythema migrans rash (EM)
 - “Flu-like” illness
 - Rash + “flu”
- Blood tests not recommended
 - Too many **false negative** results

Erythema Migrans Rash

- Expands/clears over weeks
- Diagnostic if ≥ 5 cm in diameter

SmithKline Beecham biologicals @
www.lyme.org



Paul Auerbach, MD



KB Liegner, MD



Bernard Cohen; <http://www.DermAtlas.org>



M. Patmas

- $< 20\%$ have bull's-eye
- 30% of patients have no rash

Late Disease

- Bacteria spreads to other body areas
- Symptoms: days to weeks after bite:
 - Multiple EM
 - Joint pain
 - Headache
 - Stiff neck
 - Bell's palsy
 - Light sensitivity
 - Emotional swings
 - PAIN
 - Constitutional symptoms
 - Swollen lymph glands
 - Cranial nerve symptoms
 - Heart problems
 - Memory difficulties
 - Concentration problems
 - FATIGUE

Common/well-known Types

- Multiple EM
 - Return of bacteria to skin
 - Individual EMs often < 5cm
- Facial nerve palsy
 - 25-50% cases in kids
 - Bilateral FN palsy = Lyme
 - Lyme likely if
 - Onset June-Oct and
 - Fever, HA, no shingles/cold sore lesions



Bernard Cohen, © DermAtlas;
<http://www.DermAtlas.org>



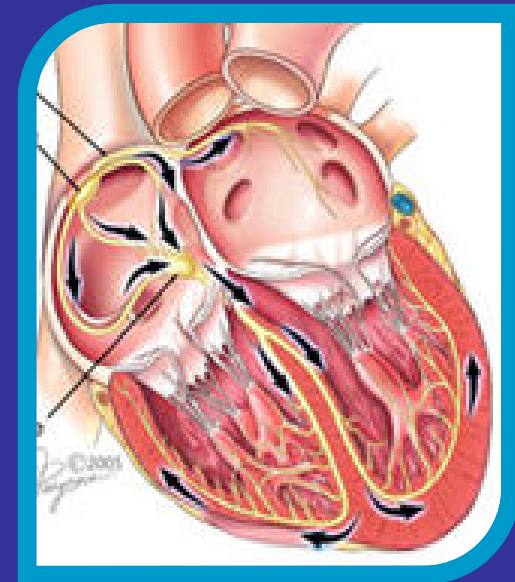
CDC

■ Meningitis

- Smoldering symptoms
 - Headaches > 7days; stiff neck, fever,
 - +/- cranial nerve problems
- Often misdiagnosed as viral meningitis

■ Carditis – inflammation of heart

- Electrical system malfunctions
- Heart muscle weakness
- Inflammation of heart's covering



■ Arthritis

- Months – years post-bite
- Multiple brief episodes
- Knee most common
 - Small joints occasionally; may look like rheumatoid arthritis
- 60% of untreated cases



CDC

■ Late Neurologic

- Months – years after bite
- True incidence unknown
- Any part of nervous system

■ Peripheral nerves

- Sensory changes, neuropathic pain
- Muscle weakness, twitching

■ Autonomic nervous system

■ Brain

- Trouble thinking
- Dementia
- MS, ALS, Parkinson-like
- Movement disorders

- Psychiatric conditions
 - Depression
 - Anxiety

Tricky Diagnosis

- Symptoms are variable
- No specific “look”
 - Hard for doctors to recognize disease patterns
- Lyme mimics other diseases
- Blood tests not always reliable
 - Find certain types of cases **but not all** cases
 - Positive results confirm diagnosis
- Negative results **DO NOT** rule out Lyme

Getting the Diagnosis Right

Distinguish Lyme from:

Fibromyalgia	Chronic fatigue syndrome	RA
Diabetes	Degenerative arthritis	MS
Vasculitis	Hypothyroidism	ALS
Sarcoidosis	Psychiatric disorders	Sleep Apnea
B12 deficiency	Heavy metal toxicity	
Anaplasmosis	Babesiosis	Bartonellosis
Ehrlichiosis	Epstein-Barr virus	Mycoplasma
Parvovirus	West Nile virus	Syphilis
Relapsing fever	B. miyamotoi	

Goal is not to be diagnosed with Lyme,
it's to be diagnosed correctly

Antibiotic Treatment

- Most effective in early disease
- Treatment failures not rare
 - Treatment failure = Post-treatment disease
- Post-treatment disease controversial
 - Causes uncertain
 - Bacterial survival documented
 - Treatment options not worked out
 - Antibiotic retreatment benefits some
 - Many physicians unaware of this

Deer Ticks Spread Lyme

- Distinctive appearance
 - Black “cape” red-brown body
- 2 year life cycle
 - 4 stages
 - Eggs, larva, nymph, adult
 - 3 feedings – chance to become infected



- Feed on small mammals
 - Mice, chipmunks, shrews
- Once infected, always infected
 - Only nymphs, adults transmit

CDC

Tick Habitat

- Moisture a must
 - Dehydrate quickly
- Locations:
 - Non-residential
 - Long grasses, leaf litter, fallen logs, woods edge
 - Home
 - Birdbaths, birdfeeders, wood piles

Tick Travels

- Don't travel far on their own
 - Don't fall from trees or jump
- Long-range transport - deer and birds
- People and pets bring ticks inside



CDC/Emerging Infectious Diseases 1997;Vol
3(2)

Questing

- Passive search for meal
 - Front legs grab what brushes by

Tick Comparisons



Dog



Lone star



Dog



Deer



Both photos: Maine Medical Center
Research Institute, South Portland, ME

Co-infections

- Other diseases spread by black-legged ticks
 - Potentially many diseases from single bite

Black-legged tick	
Lyme	Anaplasmosis
Babesiosis	Bartonellosis
Ehrlichia muris-like disease	Powassan encephalitis
Borrelia miyamotoi disease	

American dog (wood) tick	
Rocky Mountain spotted fever	Tularemia

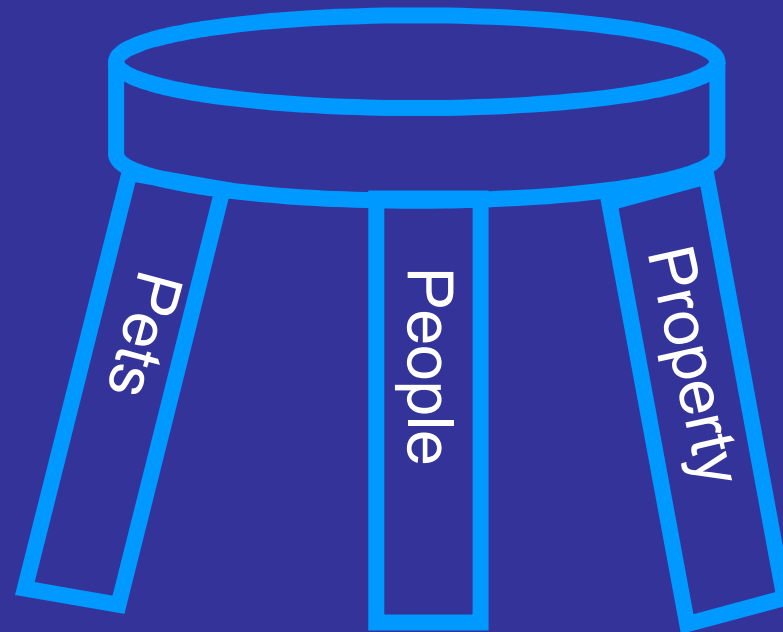
Lone star tick	
Ehrlichiosis	Tularemia

Co-infections Complicate

- Diagnosis
 - Symptoms of co-infections overlap with Lyme
- Treatment
 - May need combinations of antibiotics
 - Unrecognized co-infections mistaken for Lyme
“treatment failures”

Prevention

Focused
strategies



People

Layered Protection

Selective antibiotic prophylaxis

Risk assessment required

Prompt tick removal

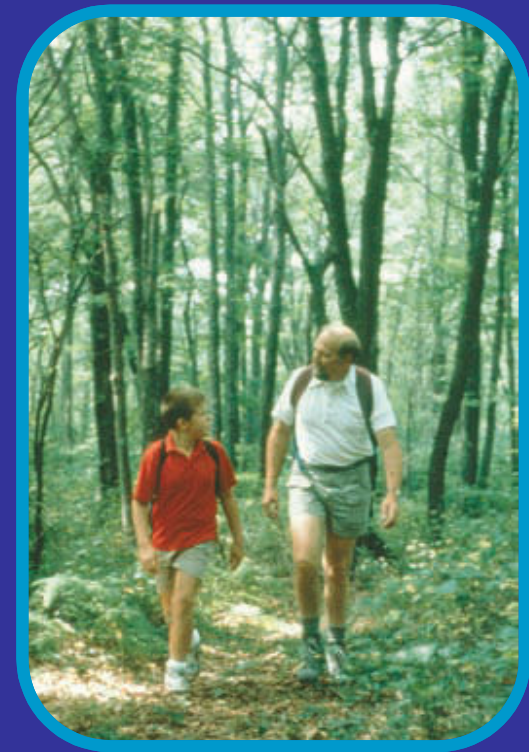
Tick checks, clothes dryer
post-exposure showers

Avoiding blacklegged tick bites

Habitat awareness, smart clothing choices
insecticide/repellant use

Limit Exposure

- Avoid tick habitat
 - Wooded areas, brush, long grasses
 - Rough of golf courses,
 - Unmowed playing fields
- While in tick habitat -
 - Stay away from leaf litter, fallen logs
 - Stay in center of trails



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Clothing

- Maximal skin coverage
 - Light-colored
 - Pants tucked into socks;
 - +/- tick gaiters
 - Hats/ponytails
- Pretreated with permethrin
- After exposure, into dryer
 - High heat for 60 min



A. Mears

Permethrin – Insecticide

- **Kills ticks on contact**
- **Long-lasting protection**
 - Apply to clothes, camping gear; **NOT** skin
 - Bonds to fabrics; no transfer to skin
 - Lasts 2 – 6 weeks; multiple washings
- **Very safe**
 - Passed EPA safety tests, extensive use by US military
 - Applied to skin to treat scabies
- **Multiple product types/manufacturers**

Repellents

	DEET	Picaridin	Bio UD
For use on:	Skin; some fabrics: wool, cotton	Skin; all fabrics, materials	Skin; all fabrics, materials
Product types:	Spray, lotion, wipes	Spray, lotion, wipes	Spray, lotions
Concentration:	30 – 40%	10 – 20%	7.75%
Human Safety:	US EPA: kids > 2 mo; Health Canada: no kids	US EPA/Health and Canada: no age limits	US EPA: no use limits
Years of use:	60 years	~ 10 years	~ 5 years

Tick Checks



EL Maloney

- Body-wide
 - Post-shower
 - Thorough
 - **After each exposure**
- Small targets



IgeneX, Inc., Reference Laboratory, Palo Alto, CA

Tick Removal

- Grasp tick close to the skin
- Avoid squeezing body
- Pull tick straight out
- Don't try
 - Burning
 - Covering with substances
- Save tick for inspection



California Dept. of Health Services

Management of Tick Bites

- Clean bite site
- Contact medical provider ASAP
 - Discuss antibiotics for prevention
 - Don't base care on test results
- Watch for rashes, “flu-like” symptoms
 - Immediate rash: think allergy to tick saliva
 - EM rash or “Flu”: **think Lyme**

Post-bite Prevention

Options

- “Wait and see” approach
 - Risky; 30% never get a rash to “see”
- Doxycycline for 10 - 20 days
 - Wisconsin Medical Journal 2011; 110(2): 78-81.
 - Expert Review of Anti-infective Therapy;
- Doxycycline, single 200 mg dose
 - Not very effective
 - May throw off tests

Companion Animals

- Avoid roaming in high-risk areas
 - Control dogs' outdoor range
 - Cats indoors only
- Tick checks
 - Pets bring ticks inside



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Discuss with Veterinarian

- Vaccine: dogs only
- Tick collars: dogs and cats
- Monthly topical agents: dogs and cats
 - Some dog products cannot be used on cats
- Frequently applied topical gels
 - Every 3 days or so
 - Dogs, cats, horses
- Sprays, powders, dips

Property

- People-friendly but tick, mouse, deer-hostile
- Clean-up
 - Leaf litter, woodpiles, birdbaths
- Increase sunlight
 - Place play structures/furniture in sunlit areas
- Landscape appropriately
 - Reduce plants that attract deer, protect ticks
 - Move birdfeeders to edge of property
 - Keep grass short
 - Peripheral buffer zone
 - Insecticides

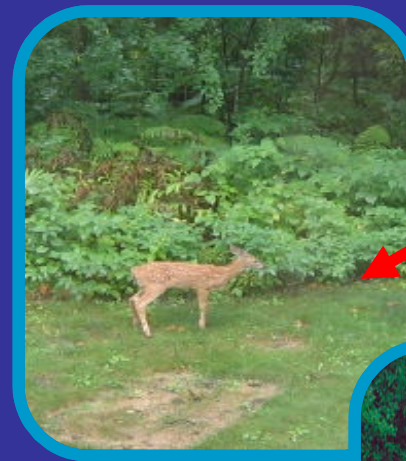
Proper Placement & Buffer Zones



Kirby Stafford, Ph.D



Kirby Stafford, Ph.D.



EL Maloney



Kirby Stafford, Ph.D.

Plantings

- May attract deer or protect mice
 - Deer preferences
 - Suburban deer prefer ornamental over native species
- Remove deer attractants
 - Replace with graze-resistant plants



Remove

- Golden sunflower
- Perennial sunflower
- Hosta, Lilies
- Tulip, Yew
- Arborvitae, Phlox
- Bolton's aster, Daylily
- Euonymus, Impatient
- Miniature hollyhocks



Add

- Alyssum, Dusty miller
- Forget-me-not, Marigold
- Spiderflower, Vinca
- Catmint, Foxglove
- Goldenrod, Lady's mantle
- Lamb's ears, Lavender
- Lily of the valley, Mint
- Mayapple, Monkshood
- Oregano, Poppy
- Russian sage, Yarrow
- Silvermound, Thyme

Landscape Insecticides

- Tick Management Handbook

- Kirby Stafford III, Ph.D.

- Focus on tick habitat

- Stonewalls, woodpiles

- Border between lawn and woods

- Spraying lawns unnecessary

- Life cycle-based applications

- Nymphs: May - early June

- Adults: October

<http://www.cdc.gov/ncidod/dvbid/lyme/resources/handbook.pdf>



- Insecticides: Pyrethroid or carbamate-based

- Liquid and Granular forms
- Commercial or Owner Application
- 85-90% or better control

- Precautions

- Chemicals are toxic
- Protective gear
- Stay off treated area for 12-24 hours
- No use near water
 - Highly toxic to fish and other aquatic life

Lyme Summary

- Lyme is a complex and significant illness
 - Diagnosis/treatment tricky
 - Costly and disabling
- Risk in MN significant and growing
 - Tick exposures increasing
- Prevention works when used
 - Multi-layered; strategies for people, pets, property

Resources

- Minnesota Lyme Association
www.mnlyme.org
- Columbia University Lyme Research Center
www.columbia-lyme.org
- Lyme Disease Association
www.lymediseaseassociation.org
- LymeDisease.org
www.lymedisease.org
- Tick Management Handbook
www.cdc.gov/ncidod/dvbid/lyme/resources/handbook.pdf

Some Parting Wisdom



*An ounce of permethrin
is worth a pound of antibiotics*

