



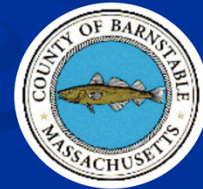
Deer Ticks ...*One bite can
change your life...*



National Seashore Homeowners Association

July 31, 2016

Larry Dapsis
Deer Tick Project Coordinator - Entomologist
www.capecodextension.org
508-375-6642



Lyme Disease, the Ecology of a Complex System, Richard Ostfeld, Cary Institute of Ecological Studies, NY – This is a great book. Rick has been very generous in helping me with my education on ticks and tick-borne diseases. He challenges dogma and is a mythbuster...things that are key to supporting our educational objectives.

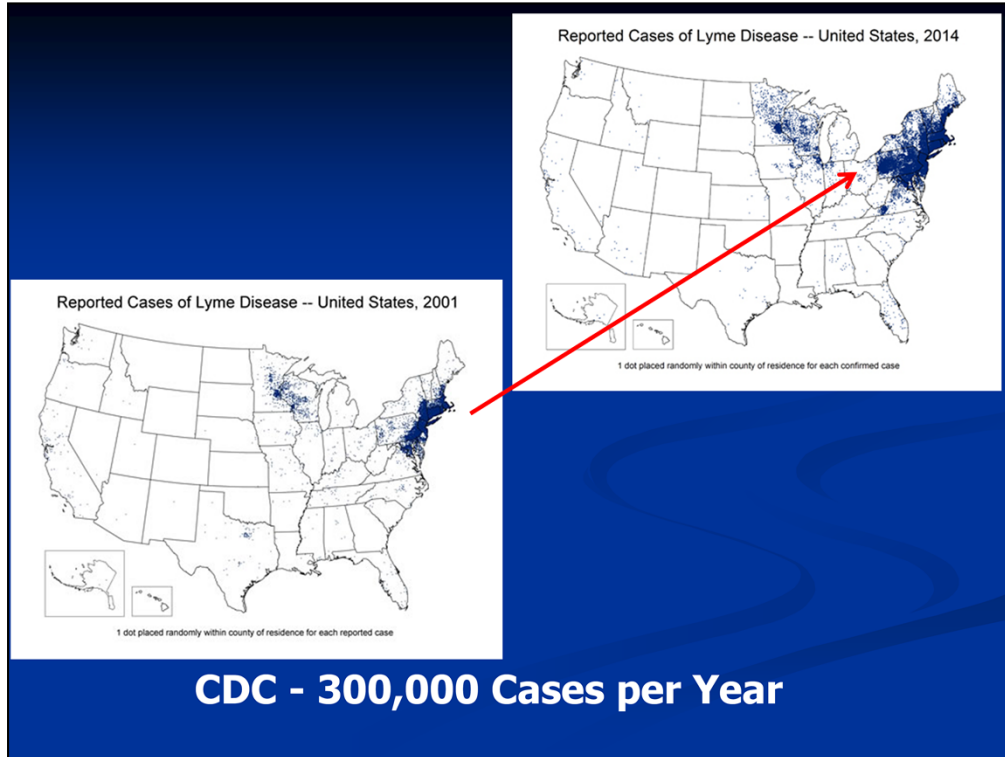
Ticks have NO friends...



- *"I love everything in the world...except for ticks..."*



“Actually, NFL Commissioner Roger Goodell is TIED with ticks on my list of the unworthy...”



CDC updated their number in 2015 from 30,000 to an estimated 300,000 case per year, a 10-fold underreporting problem. 14 states account for 90+% of all cases. Lyme has been confirmed in 49 out of 50 states (not in Hawaii).

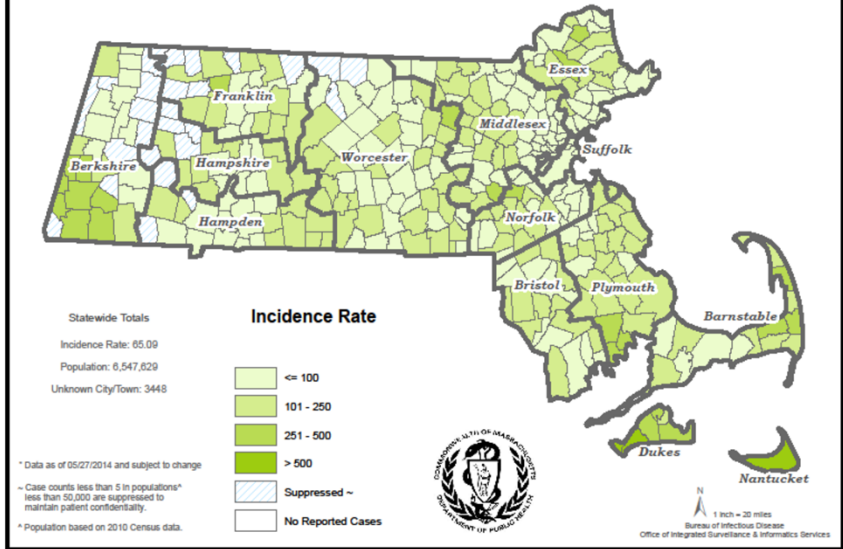
Incidence Rate Lyme: 2014 *State Ranking*



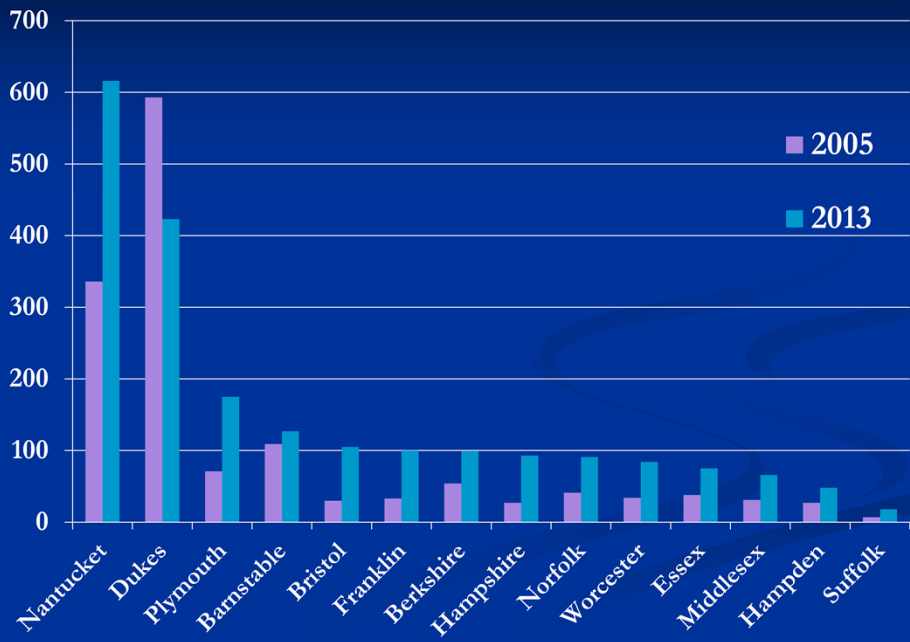
1 – Maine	88*
2 – Vermont	71
3 – Massachusetts	54
4 – Rhode Island	54
5 – Pennsylvania	51
6 – Connecticut	48
7 – New Hampshire	47
U.S.	8

* Confirmed cases
Per 100,000

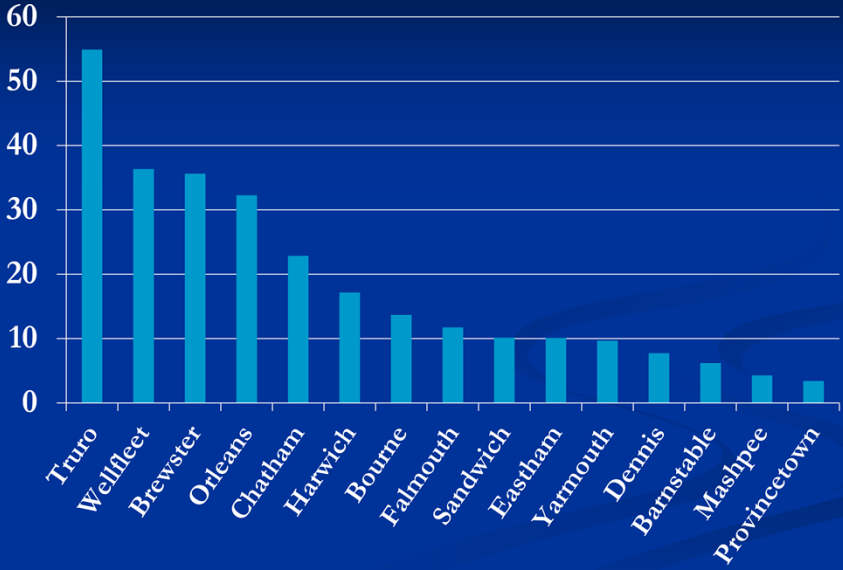
**Incidence Rates (per 100,000 population[^]) for Confirmed and Probable Lyme Disease
in Massachusetts 2009-2013***



2005/2013 - MA Lyme Incidence per 100,000



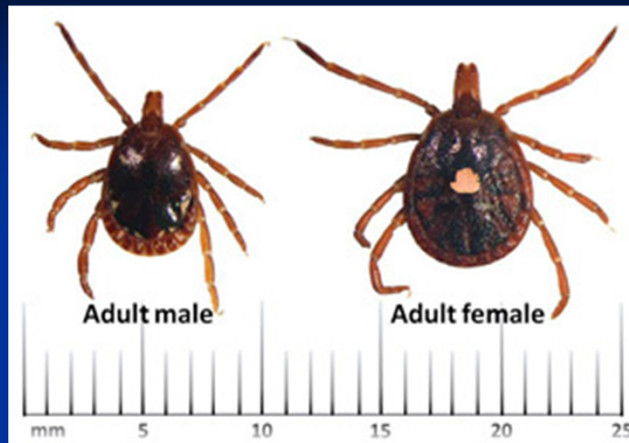
2014 Lyme Incidence Rate per 10,000



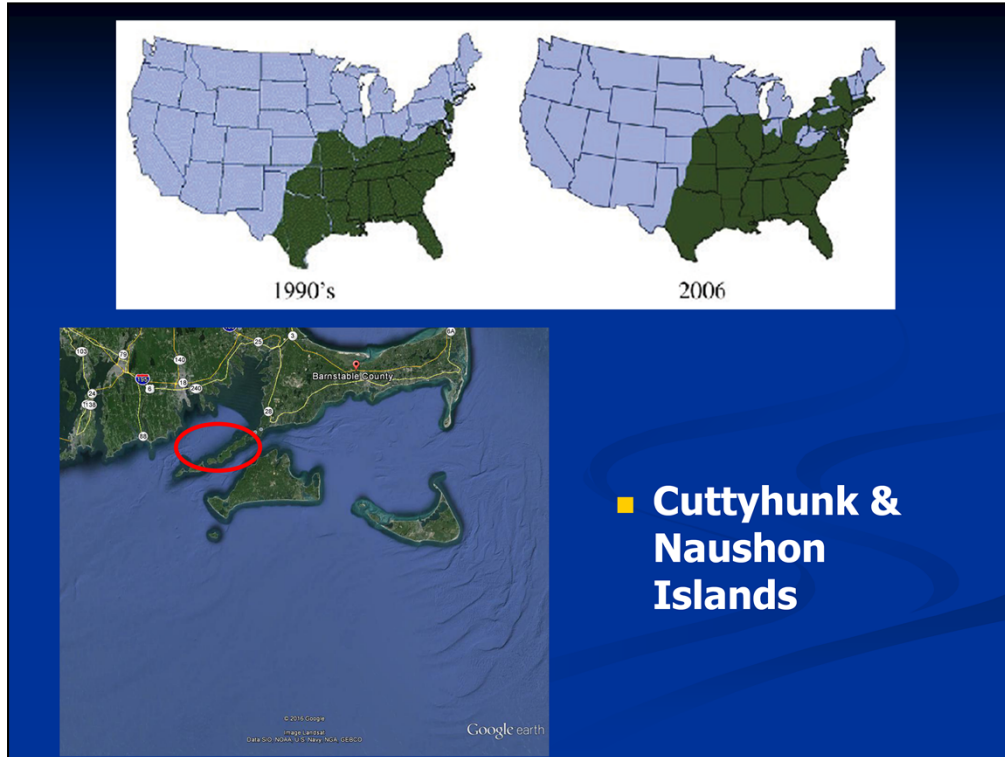


American Dog Tick
Dermacentor variabilis

More annoying than a health threat on the Cape. While they can transmit the pathogens that cause Rocky Mountain Spotted Fever and Tularemia...those diseases are quite rare in MA.



Lone Star Tick
Amblyomma americanum



Has been moving steadily north for many years...Climate change? ...perhaps. Up until 2014 the northern most established populations were found on the Elizabeth Islands.



Cape Cod Mosquito Control works in Sandy Neck Beach Park and brought lone star to the attention of L. Dapsis. Sampling the park end to end (about 6 miles) confirmed the first established population of lone star on the MA mainland.

Lone Star Tick

- **Aggressive biter**

- Erlichiosis
- STARI*
- *Falmouth*
- Tularemia



Bite can trigger allergy to red meat consumption

Beef, Pork, Lamb and by-products...gelatin

Lone star adult female ticks lay their eggs in a cluster which hatch into very small larvae August into September. They can very quickly swarm feet and ankles. The allergy can range from hives to anaphylaxis.

Deer Tick, or Blacklegged Tick



...name Blacklegged Tick is more accurate...deer are part of the equation

Cape Cod Winters: *Kill Ticks?*



No Impact. Winters on the Cape are overall relatively mild.



A Wisconsin

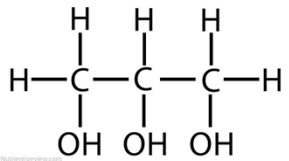
Winter

LD was in the cranberry industry for 24 years and often travelled to Wisconsin. -25 F for extended periods of time is quite common. In WI deer ticks are widely distributed...winter does essentially nothing to them. WI is quite endemic for Lyme disease.

OCTOBER 1, 2011

*The Lyme disease spirochete feasts on tick
antifreeze*

Glycerol (Glycerin)

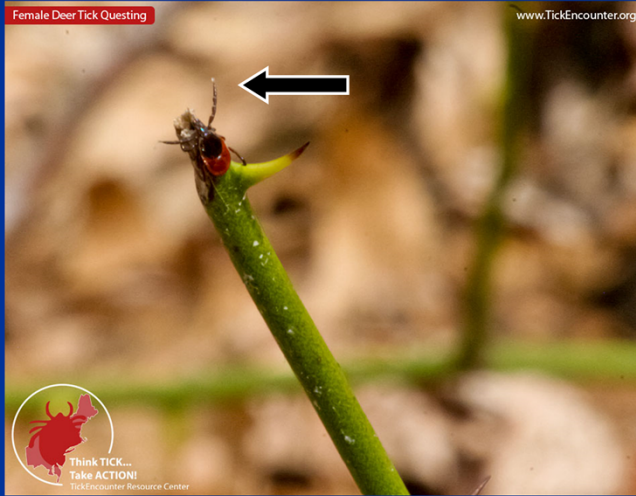


Glycerol prevents ice crystal formation in cells

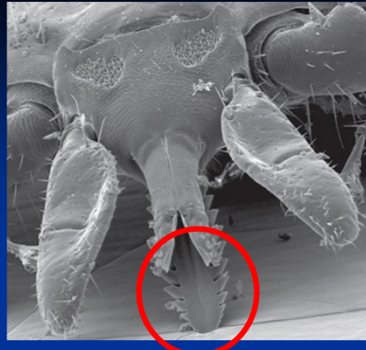
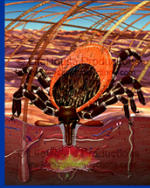
Lyme bacteria use glycerol as a carbon (= energy)
source

The Lyme disease bacteria and deer ticks are a well engineered package!

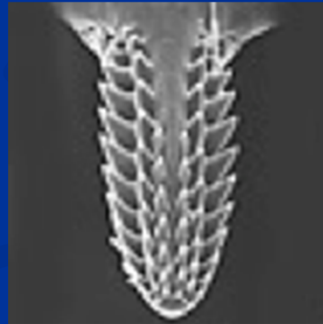
Ambush Predator Questing Behavior



Ticks are found at ground level (larvae, nymphs) or on vegetation up to 2 feet off the ground. They do not run, jump or fall out of trees.



Ticks are designed to stay a while...



The beak has recurved barbs to help hold it in place. Ticks may feed for 3-5 days to fully engorge.

About Hosts...

125 vertebrate species

Complex Ecosystem...

Rodents are **KEY** infective hosts – Mice, chipmunks,
rats are extremely “competent”

Birds play a role

“Incompetent” hosts – Deer, raccoons, dogs, people

Birds can harbor Lyme, e.g. American robin. Incompetent hosts do not carry Lyme, this includes deer.

Risk of infection is year round, but the
greatest risk...

is NOT the tick adults

Fall thru Spring, 50% infected

Bite more likely to be detected

...it's from the nymph stage

Late May into August, 25%
infected

Bite is difficult to detect



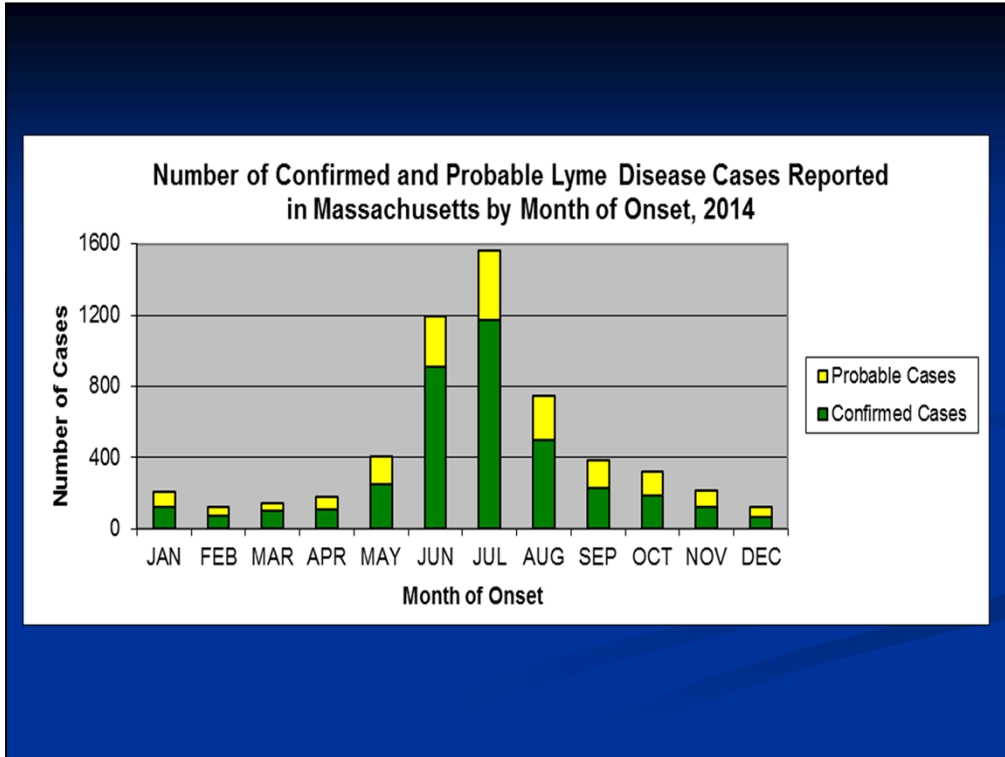
Tick SIZE WISE ?
check your bagels

Adult

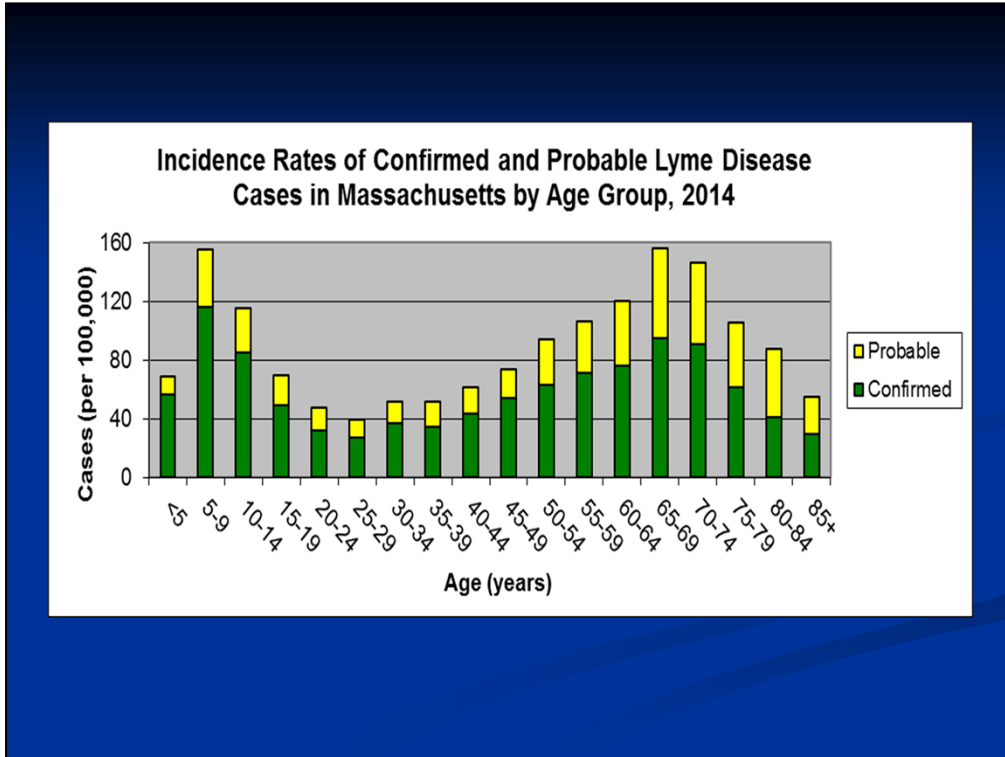


Nymph





85% of Lyme cases occur during May to August when the nymph stage is active. Adult stage ticks are out from Sept. to April...active during winter when temps are above freezing



Kids – High Risk Group!!! In addition to older people.

“Upon further examination the complexity of this problem continues to grow....”



For many years it was just about Lyme disease...the picture is changing

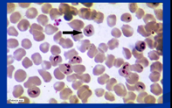
Other Diseases Transmitted by
Deer Ticks

Babesiosis

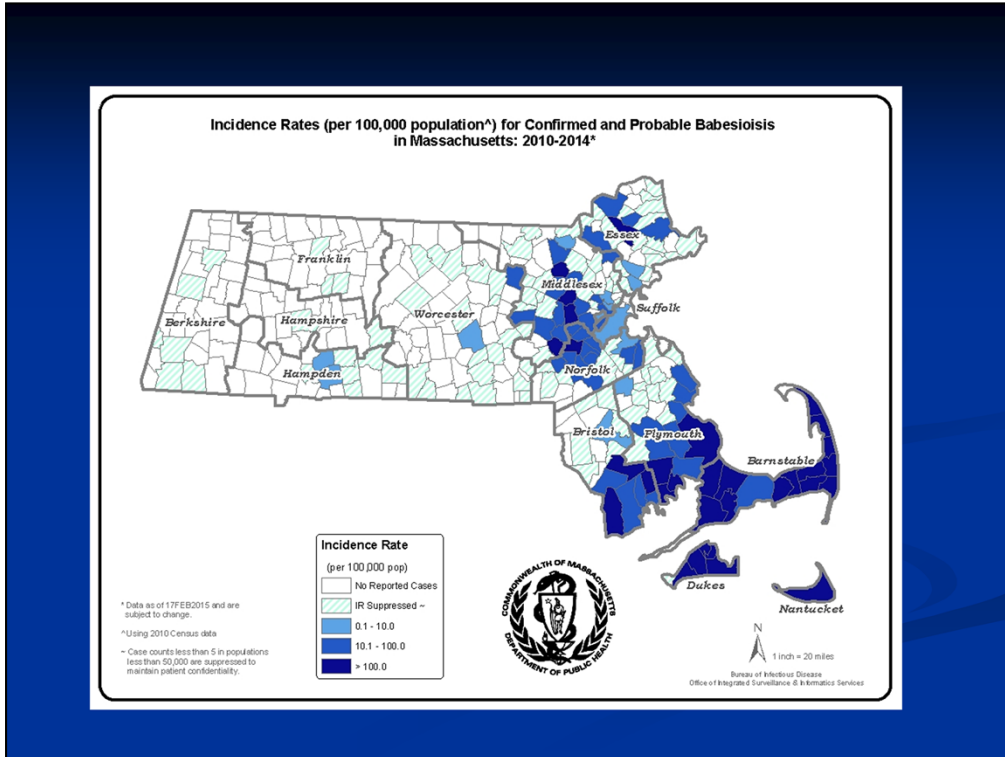
Invades Red Blood Cells

Symptoms include
fever/chills, severe
anemia

Blood Transfusion



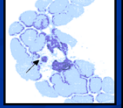
Serious and can be directly fatal. Blood supply quality is a major concern.



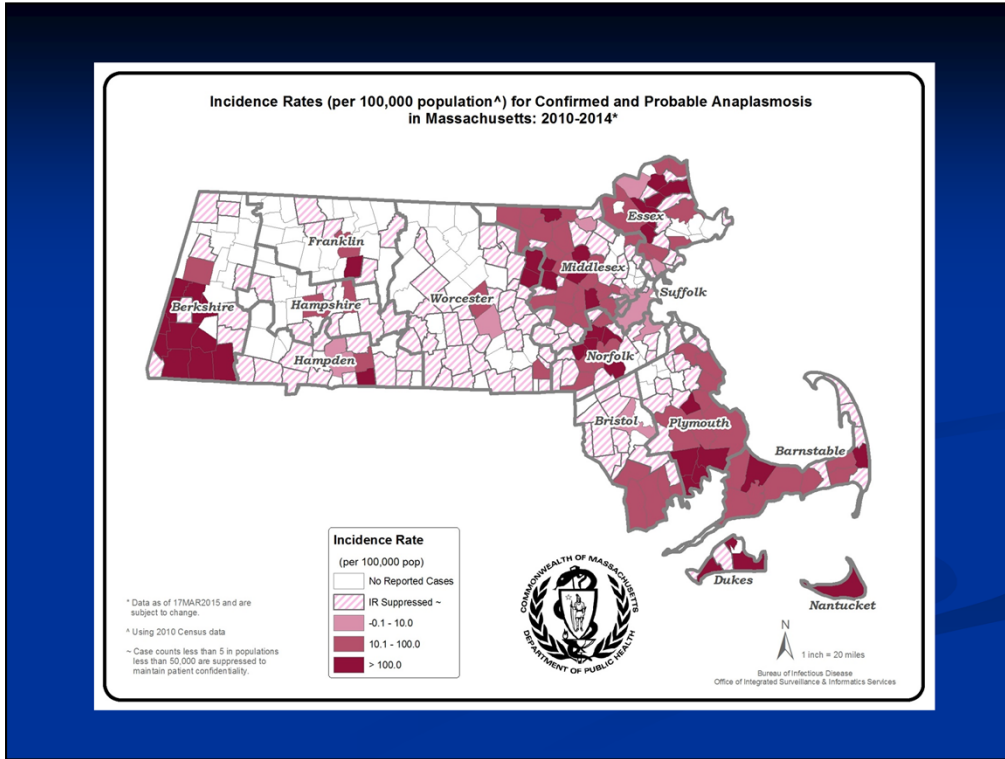
On the increase...over half of the cases of Babesiosis in Southeastern MA.

Other Diseases Transmitted by
Deer Ticks

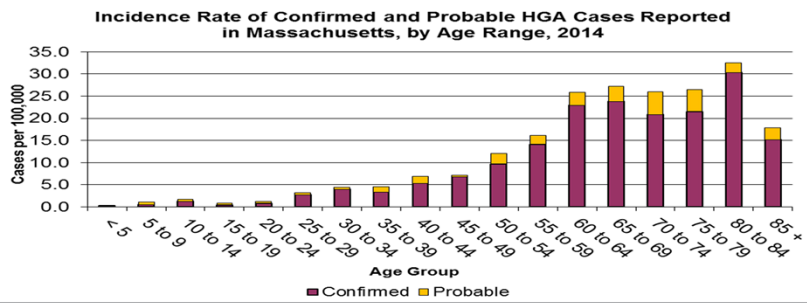
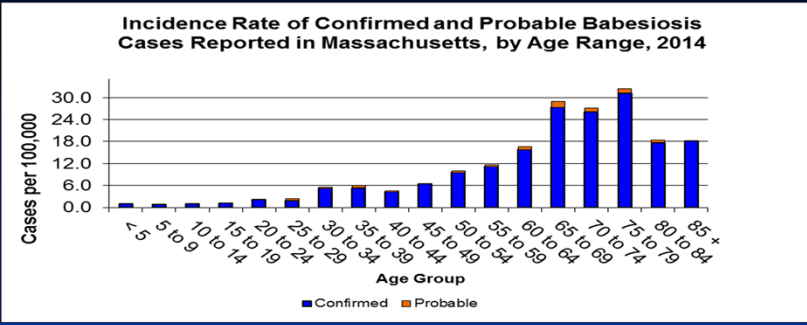
- Anaplasmosis (HGA)
- Invades White Blood Cells
- Symptoms include fever, nausea, headache, muscle pain, abdominal pain, confusion...



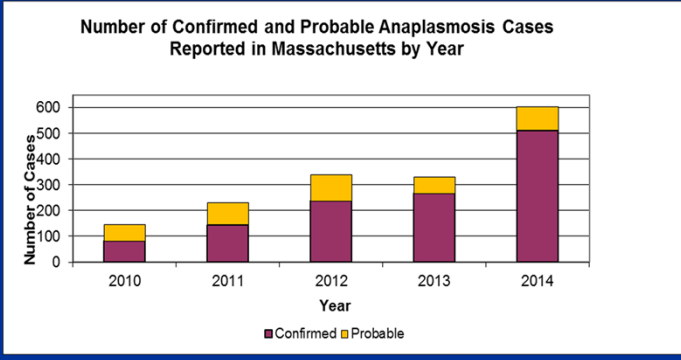
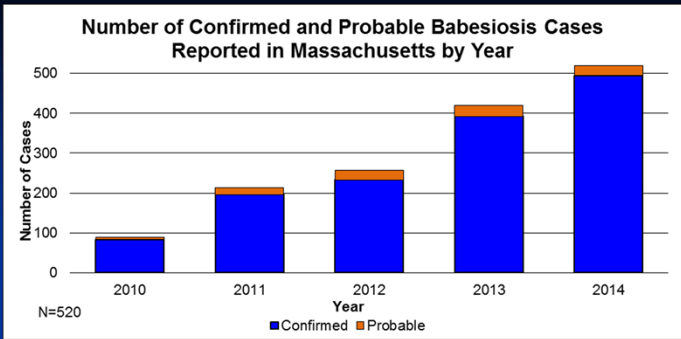
Symptoms can appear "lyme-like" which challenges proper diagnosis.



More widespread than Babesiosis and, also on the increase.

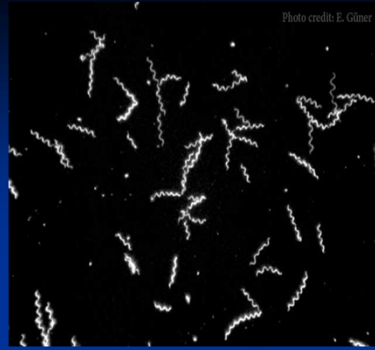


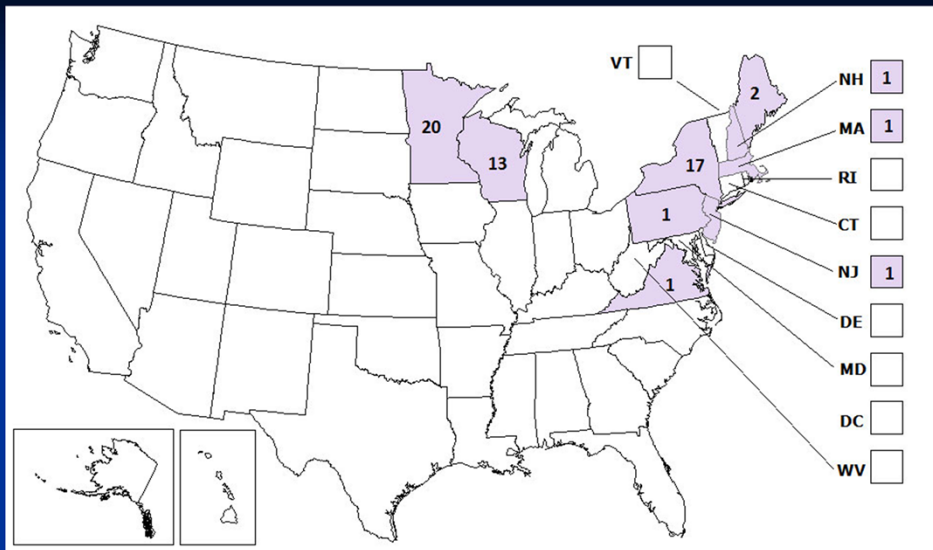
Not common in younger people.



Borrelia miyamotoi

- **First linkage to human disease in 2012 – Russia**
- **U.S. cases followed...Relapsing Fever**
 - **Misdiagnosed as Anaplasmosis**
- **Found in 3% of ticks collected on Cape**



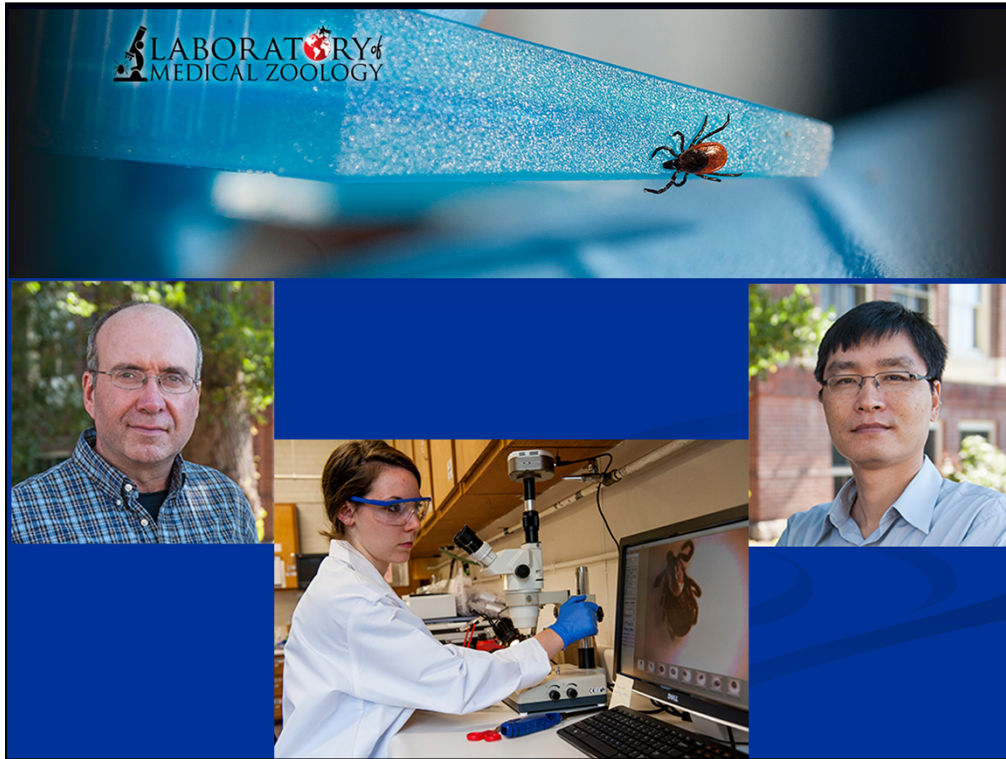


Powassan Virus – 2004 to 2013 CDC

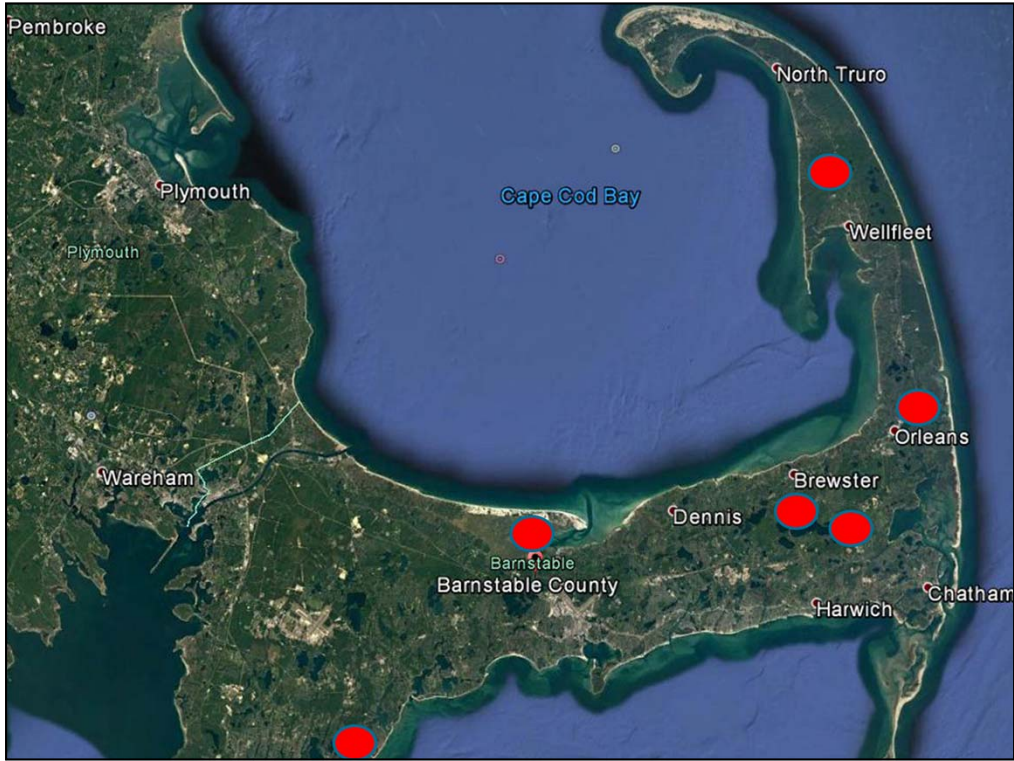
Powassan Massachusetts, 2013- September, 2015

- 9 Cases
- Residents of
Barnstable, Essex, Middlesex and Norfolk
counties
- Exposure occurred in Massachusetts
- Encephalitis requiring hospitalization
 - No fatalities

Neuroinvasive infection is fatal about 10% of the time. Like West Nile many people can be exposed and do not become infected. So while it can be extremely serious it is rare.



LMZ - Major research collaborators with CC Coop Extension. Dr. Steve Rich (left), Dr. Guang Xu (right). Center, Emily, one of Steve's grad students.



Adult stage ticks collected in the spring of 2016. LMZ had to develop a test from scratch in short order...they succeeded.

	% Infection	Number of Ticks Tested
Truro	10.4	115
Orleans	2.5	118
Brewster 1	7.0	129
Brewster 2	0	114
Barnstable	0	38
Falmouth	4.0	101

Expanded surveillance is CC Extension's next step...

Phase 1 Game Plan- Protect Yourself



An “average” family that needs protection....

Protect Yourself

- Long pants - tucked into socks
- Light colors...easier to see ticks
- Tumble-dry clothes for 20 minutes
- Shoes



Standard recommendations. High school science student found out 5 minutes in the dryer will kill ticks...they do survive a wash machine cycle.

- Deet, Picaridan, IR3535, Oil of Lemon Eucalyptus to treat *exposed skin*



- “All Natural”?



All natural are NOT EPA registered unlike Deet, etc. Therefore producers of the all natural products are not required to show ANY proof that they work...

Tick Repellent Clothing – Permethrin



Fabric only...Active
thru 6 washings

Brands

- *Ben's*
- *Coleman*
- *Sawyer*



**Note, Permethrin is an insecticide
that repels and kills ticks. Read the
Label...**

By far, the most effective tool in the box. LD found that 60 seconds of exposure is sufficient to kill ticks. Treating footwear is very important since nymph stage ticks (poppy seed sized) are in the leaf litter. If treating pants, after the spray dries turn them inside out and treat the bottom 6" of cuff.

Pre-treated Tick Repellent Clothing



- 70 Washings EPA Claim
- Many brands...one supplier

Or, send clothing to Insect Shield for treatment

Same performance as do-it-yourself, just longer lasting. If you send your own clothing to Insect-Shield they will treat them for you...same 70 washings performance claim applies. www.insectshield.com

Permethrin Facts

- 2,250 times more toxic to ticks than humans
- EPA: Reasonable certainty that permethrin-treated clothing poses no harm to infants, children, pregnant women or nursing mothers
- Low skin absorption...metabolized quickly
- Exposure data also studied by National Academy of Sciences
- Also used for scabies and head lice control

NAS study assumed exposure from all clothing, 18 hours/day for 10 years...no adverse effects anticipated. Active ingredient in treating infants for scabies mite and kids for head lice. Consider very low risks from exposure vs. long-term consequences of a tick-borne disease. L.Dapsis wears treated clothing year-round...not a single tick bite (knock-on-wood).

Phase 1 Game Plan- Protect Yourself

- Proper Tweezers
- Proper Removal
- Record Date...Save the Tick



- Infection Test Available
 - Laboratory of Medical Zoology...UMass-Amherst
 - www.TickReport.com



Pointy tweezers. UMass can test ticks for all pathogens...unlike the human blood test for Lyme, this is spot-on accurate. People generally get the results in 3 – 5 days. Good info for talking with your doctor.

BE INFORMED

* TICK-BORNE DISEASES ARE PREVENTABLE *

An Ounce of Prevention

There are ways to protect yourself and your family. Tick checks are important, and consider repellents. Deet-based for exposed skin and Permethrin-based for clothing including footwear. Visit www.tickreport.com/exposure to learn more.

Once Bitten, Don't Be Shy

Prompt removal of an attached tick is highly recommended. The longer the tick is attached the higher the risk of disease transmission. Check yourself, your family, and pets often.

Lyme Isn't the Only Concern

Lyme disease is the most prevalent vector-borne infectious disease in the U.S., but ticks carry other pathogens as well. Anaplasmosis, Babesiosis, and Relapsing Fever are also important and increasing. Visit our website www.capecodextension.org to learn more.



HOW TO SUBMIT A TICK FOR TESTING

* TICK-BORNE DISEASES ARE PREVENTABLE *

The Laboratory of Medical Zoology (LMZ) tests thousands of ticks from all over the country. Having your tick tested couldn't be easier. Just follow five simple steps:

1. Place the tick in a sealable plastic bag.
2. Complete the online submission form at www.TickReport.com. Pay the \$15 fee online with a credit card or enclose a check.
3. Label the bag with the order number assigned by TickReport.
4. Send the labeled tick in an envelope to:
Laboratory of Medical Zoology
Fernald Hall, University of Massachusetts
270 Stockbridge Rd.
Amherst, MA 01003
5. Results of the tick test will be sent to you in 5 business days or less.

DON'T LET ONE BITE CHANGE YOUR LIFE

* TICK-BORNE DISEASES ARE PREVENTABLE *

Cape Cod Tick Testing Program

2016



\$15

www.TickReport.com

Tests for these agents carried by deer ticks.

Lyme
Babesiosis
Anaplasmosis
Relapsing Fever



Submit Online Form



Mail Tick



Receive Results

Cape Cod Cooperative Extension

Larry Dapsis, Entomologist

ldapsis@barnstablecounty.org

Funding provided by
Cape Cod Healthcare



CAPE COD HEALTHCARE




UMASS
AMHERST

LABORATORY
MEDICAL ZOOLOGY

Tests Ordered			
Pathogen	Date Ordered		Result
Borrelia mayonii	4/6/2016		NEGATIVE
Borrelia burgdorferi	3/30/2016		POSITIVE
Anaplasma	3/30/2016		NEGATIVE
Babesia	3/30/2016		POSITIVE
Borrelia miyamotoi	3/30/2016		NEGATIVE

Patient Information:
 Host Source: human
 Gender: male
 Age: 3
 City: Norwell
 State: MA
 Zip: 02061
 Attached: Yes
 Site of Attachment: Head
 Rash Present: No

Tick Information
 Species: *Ixodes scapularis*
 Sex: female
 Stage: adult
 Feeding State: engorged



This tick was co-infected...people can get more than one disease at the same time. In our research we found that 8% of nymph stage ticks are co-infected.

Phase 2 Game Plan - Protect Your Yard

- Wildlife and habitat management ???
- Perimeter sprays effective
...NOT the entire yard
Consider all “edges”



Note: plant material that does not attract deer...but, white footed mice have territorial ranges that occupy up to 4 acres...ca. 417' X 417'

Phase 3 Game Plan - Protect Your Pets

- Tick check
- Topical products: K9 Advantix II, Frontline
- Seresto collar



Compare price points topicals vs collar. Collar is the better value.



I make this vest look GOOD!!!

insect shield
repellent technology



Don't Let...*one bite* *change your life...*

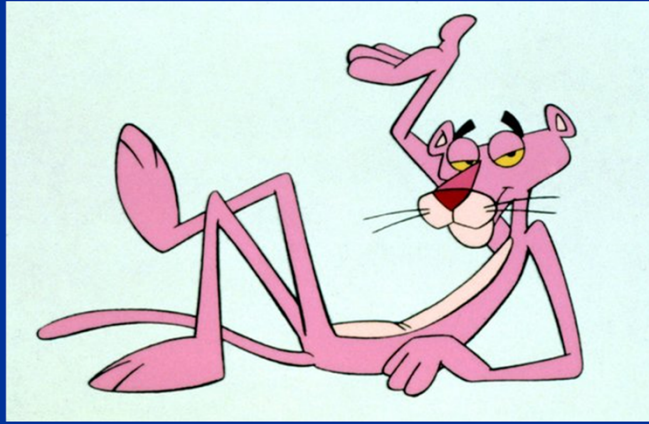
Simplified Game Plan Summary

- Tick Checks and Use of Permethrin-Treated Clothing
- Perimeter Yard Spray
- Pet Protection



1, 2, 3 – Doing #1 alone will significantly reduce your risk of getting a tick bite and potentially having your life changed significantly....

Questions?



Damminix Tubes – Eco-Health, Inc.



Permethrin-treated cotton balls...mice self-treat. Safe and easy to use but, do they really work?

Damminix Tubes

- Several initial university studies looked promising
 - Fewer ticks on mice
- Follow-up studies, NY & CT
 - Replicated, multi-year
 - No significant effect on *nymph* tick populations
 - ...not all tick-carrying animals take cotton
- Company website – testimonial driven, no baseline data in company trial

Two well executed studies Stafford (CT Ag Stn) and Daniels (Fordham U., NY)...demonstrated significant lack of performance for reasons cited. If you use this product and it makes you sleep better at nite, have at it but I do not believe that it materially lowers risk of tick-borne diseases.