Tick-borne Diseases in Connecticut

Presented by
The Brookfield Health Department

Vector-borne Diseases

Introduction to tick-borne illness

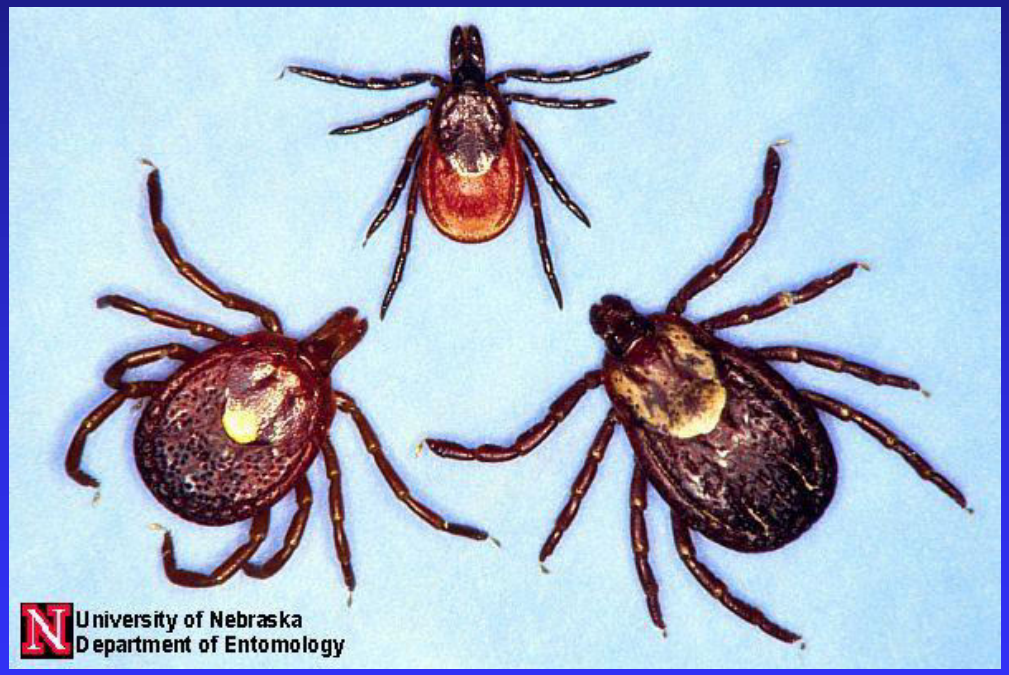
- An organism that carries a disease and can transmit it to another organism
- Ticks can be “vectors” of disease
- Biting is the mechanism of transmission
- Transmission is potentially the beginning of human infection

Tick Species

Three primary tick species

Deer tick

Lone Star Tick

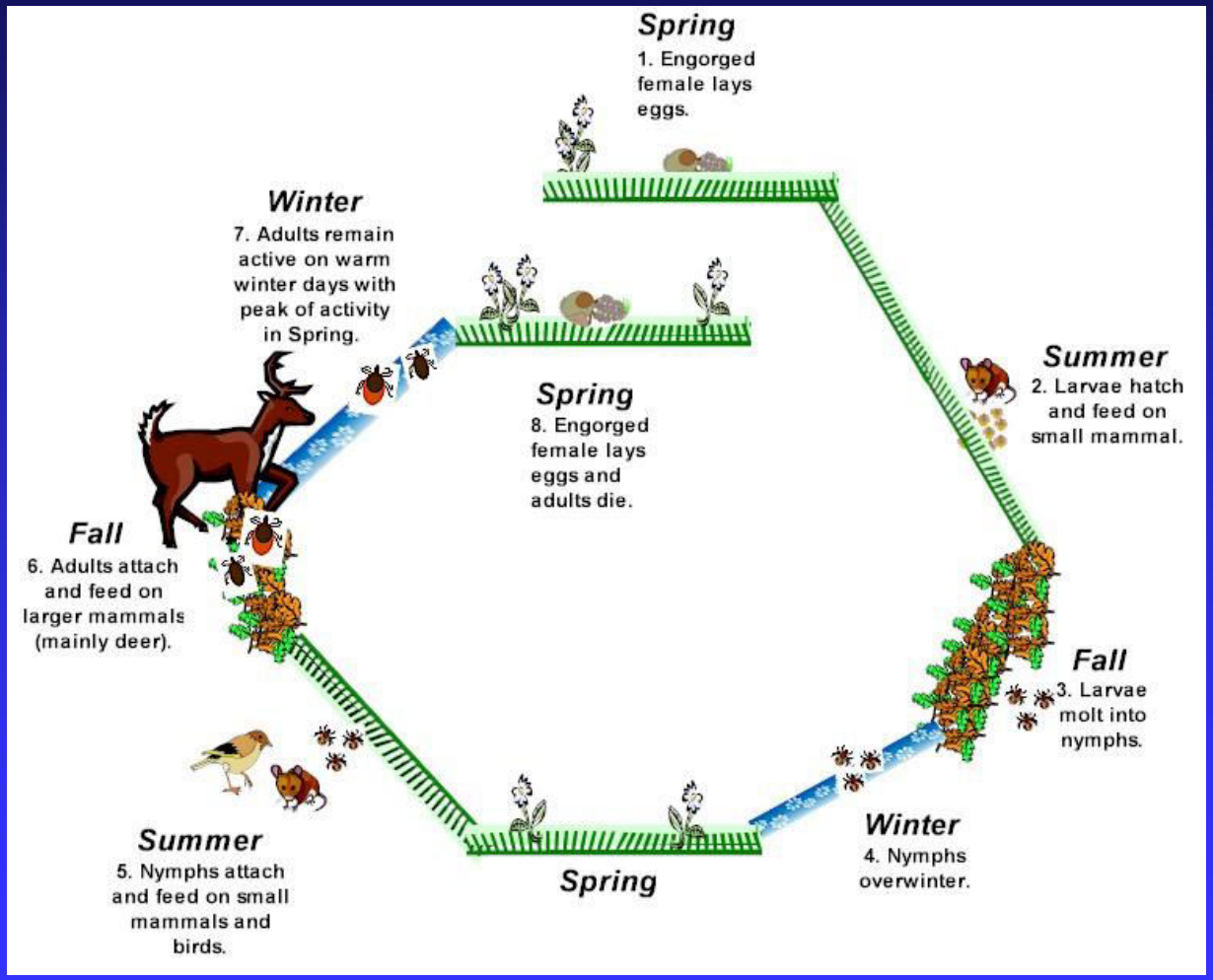


Dog tick

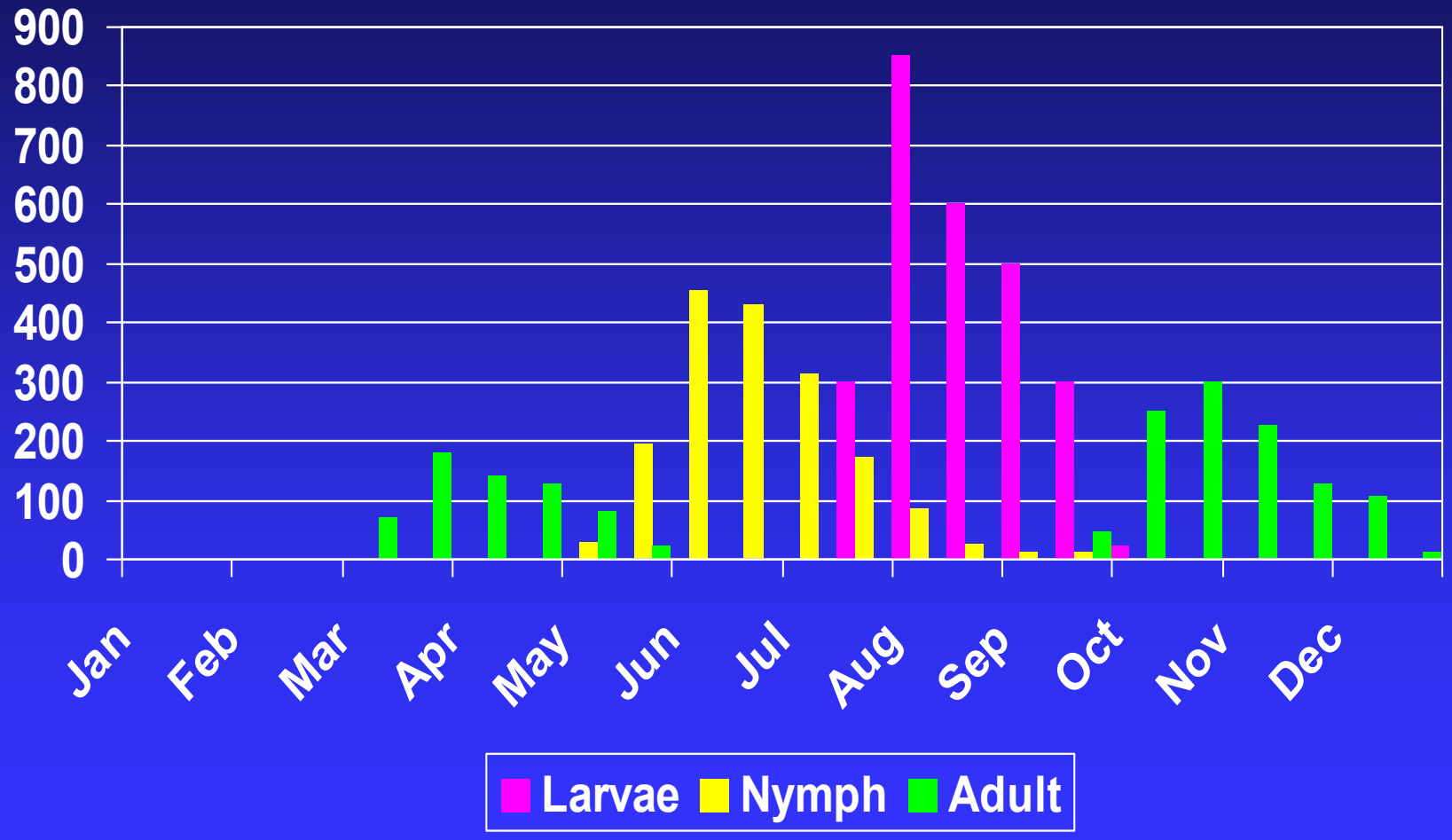
Photo: Department of Entomology, University of Nebraska-Lincoln - Jim Kalisch, UNL Entomology

Tick Species

Tick 2-year life cycle



Number of Deer Ticks Collected by Life Stage



Tick-borne Disease

Found in Connecticut

- There are 4 primary tick-borne diseases found in CT transmitted by 2 tick species
  - Lyme disease
  - Human granulocytic anaplasmosis
  - Babesiosis
  - Rocky Mountain spotted fever

Tick-borne Disease

Transmitted by 'deer ticks'

- 3 diseases are transmitted through the bite of infected black-legged ticks (deer ticks), *Ixodes scapularis*
  - Lyme disease
  - Human granulocytic anaplasmosis
  - Babesiosis
- These diseases can be transmitted simultaneously through one bite

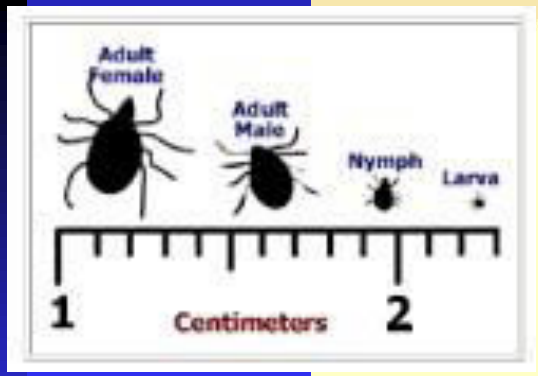
Tick-borne Disease

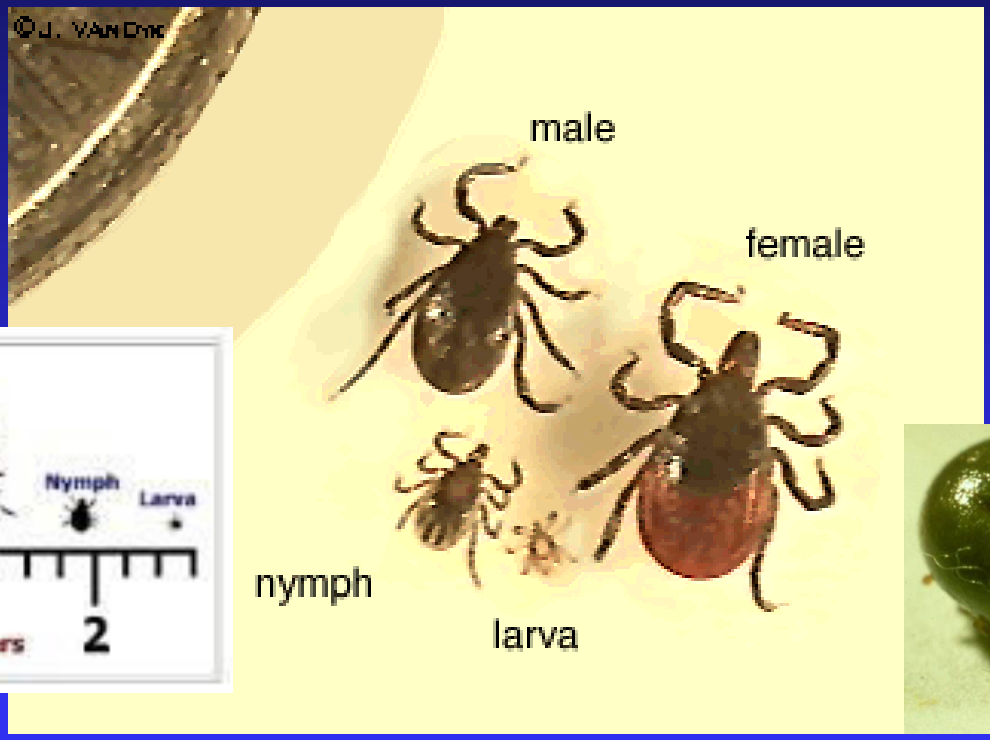
Transmitted by American dog ticks

- RMSF is transmitted through the bite of infected American dog ticks, *Dermacentor variabilis*

Tick Species

Deer tick (Ixodes scapularis)





Notice the tear drop shape of the body.

Photos: All life stages- Iowa State University / Female laying eggs – CAES, Kirby Stafford, III

Tick Species

Deer tick (Ixodes scapularis)

Photo: Scott Bauer, USDA

Lyme Disease

Introduction


Deer tick

- First recognized in Lyme, CT in 1975
- Symptoms mimic many other illnesses
- Can attack various organ systems
  - Musculoskeletal
  - Neurologic
  - Cardiac

Lyme Disease

Introduction

- A bacterial infection caused by *Borrelia burgdorferi*

Lyme Disease

Symptoms of early infection


Deer tick

- Erythema migrans (expanding red rash)
- Fatigue, headache, stiff neck
- Pain or stiffness in muscles or joints
- Fever
- Swollen glands

Lyme Disease

Early localized infection

Bull's eye

Multiple EM

John Hopkins University

Lyme Disease

Symptoms of disseminated infection


Deer tick

- Lyme arthritis
- Bell's palsy, radiculoneuropathy, lymphocytic meningitis, or encephalitis
- 2nd or 3rd degree AV block
- Multiple EM rashes

Lyme Disease

Disseminated infection

Lyme arthritis


Swollen knee of a youth with Lyme arthritis.

Swollen knee

Photo: National Library of Medicine

Lyme Disease

Disseminated infection

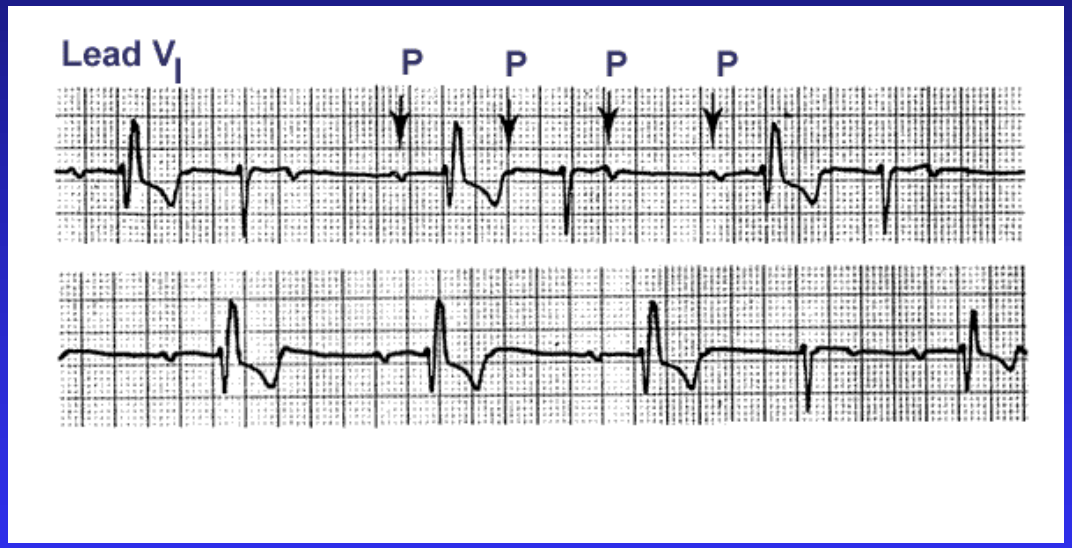
Neurologic

Bell's palsy

Lyme Disease

Disseminated infection

Cardiac



library.med.utah.edu/

2nd degree AV block

Lyme Disease

Other information


Deer tick

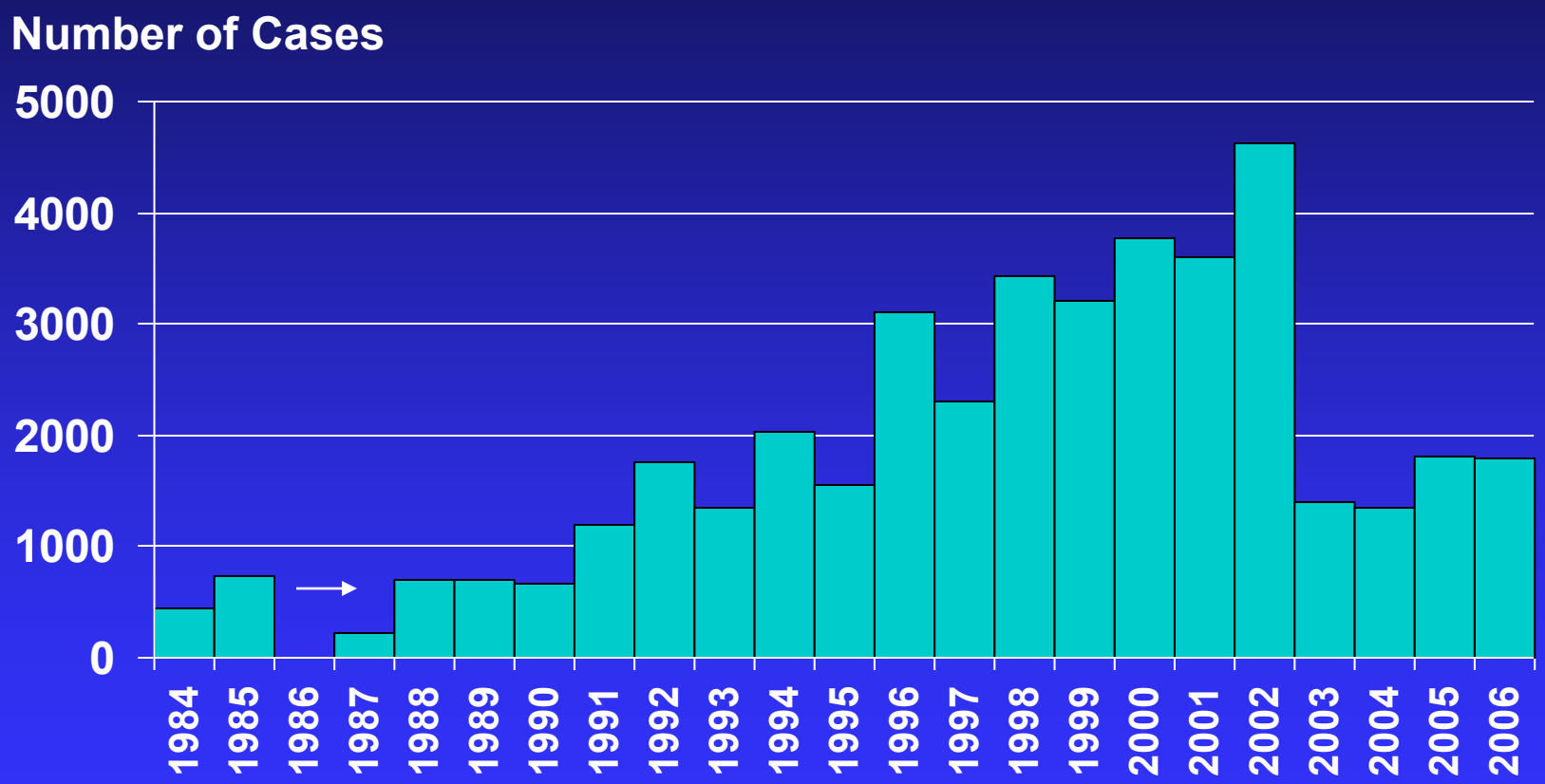
- EM occurs in the majority of those infected
- EM appears generally within 3-30 days after the bite
- About 60% of those infected who have not been treated experience arthritis several months after the bite
- Few of the untreated patients may develop chronic neurological complaints months to years after infection

Lyme Disease

Other information

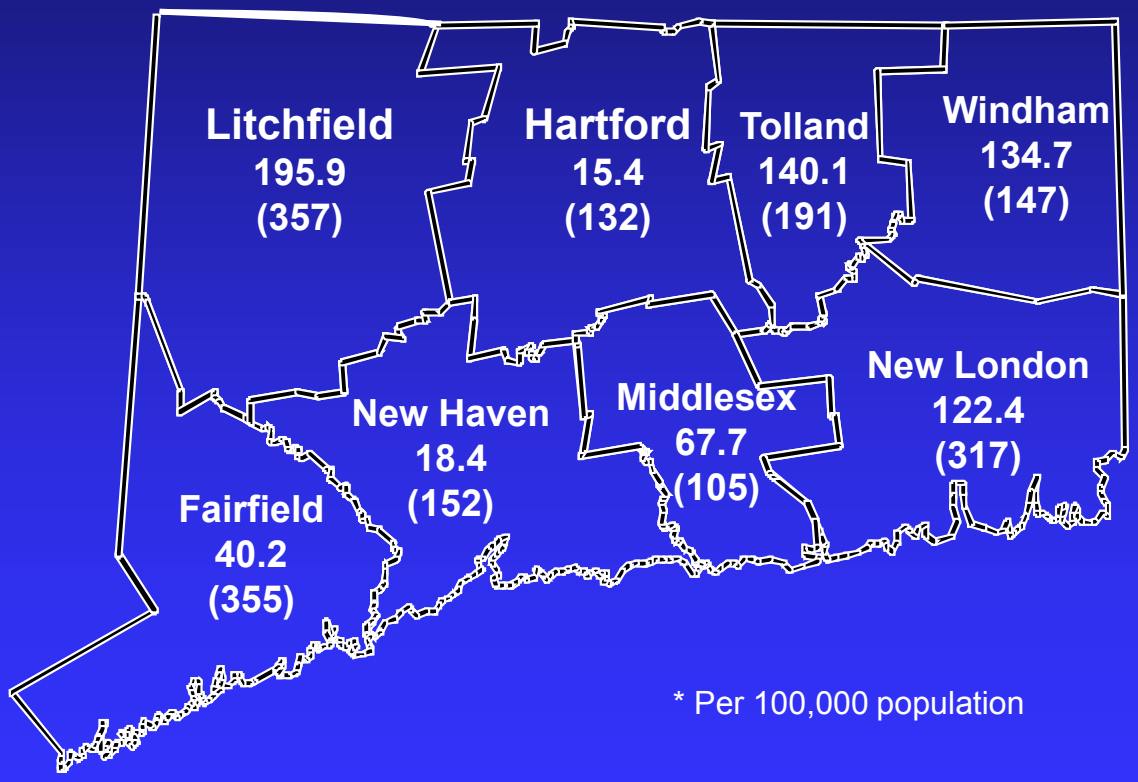
- Lyme disease symptoms may be more severe in patients who are co-infected with other tick-borne diseases
- Most cases can be cured with early antibiotic treatment
- Some patients may experience symptoms for months to years after delayed treatment
- Most cases are thought to be acquired in their own back yard

Lyme Disease Cases Statewide Connecticut, 1984 – 2006*



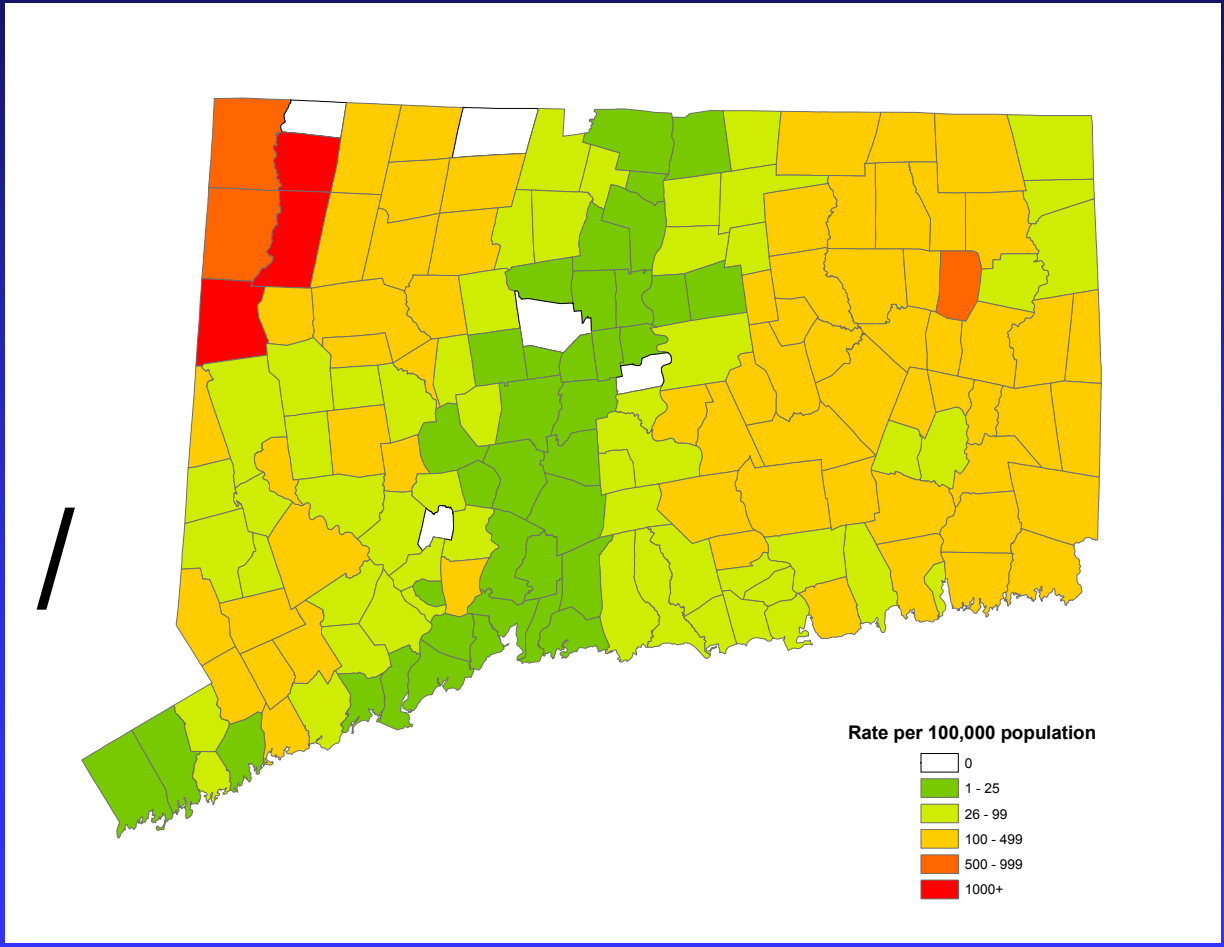
* Reduction in cases after 2002 is due to a change in surveillance.

Lyme Disease Rates* (Cases) Connecticut, 2006



* Per 100,000 population

Lyme Disease Rates by Town Connecticut, 2006



Human granulocytic anaplasmosis

Introduction

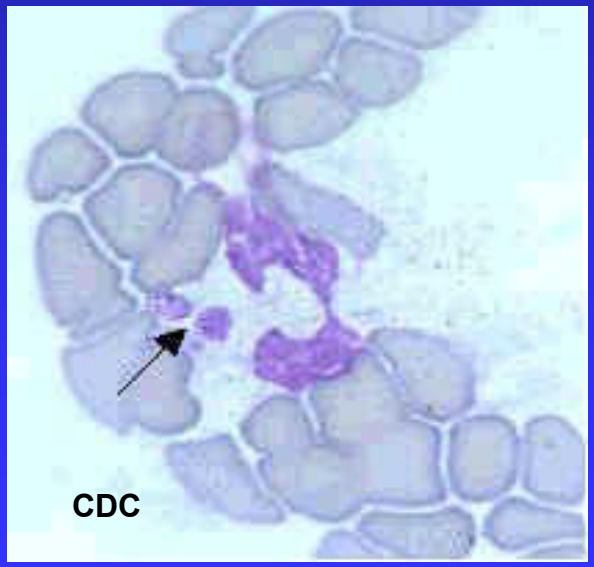

Deer tick

- Formerly known as Human granulocytic ehrlichiosis (HGE)
- Illness ranges from mild to severe
- Affects white blood cells (neutrophils)

Human granulocytic anaplasmosis

Introduction

- A bacterial infection caused by *Anaplasma phagocytophilum*



Morulae *A. phagocytophilum* in cytoplasm of neutrophil

Human granulocytic anaplasmosis


Deer tick

Symptoms of infection

- Sudden high fever
- Severe headache
- Weakness
- Muscle pains
- Rash
- Chills

Human granulocytic anaplasmosis


Deer tick

Severe cases may result in:

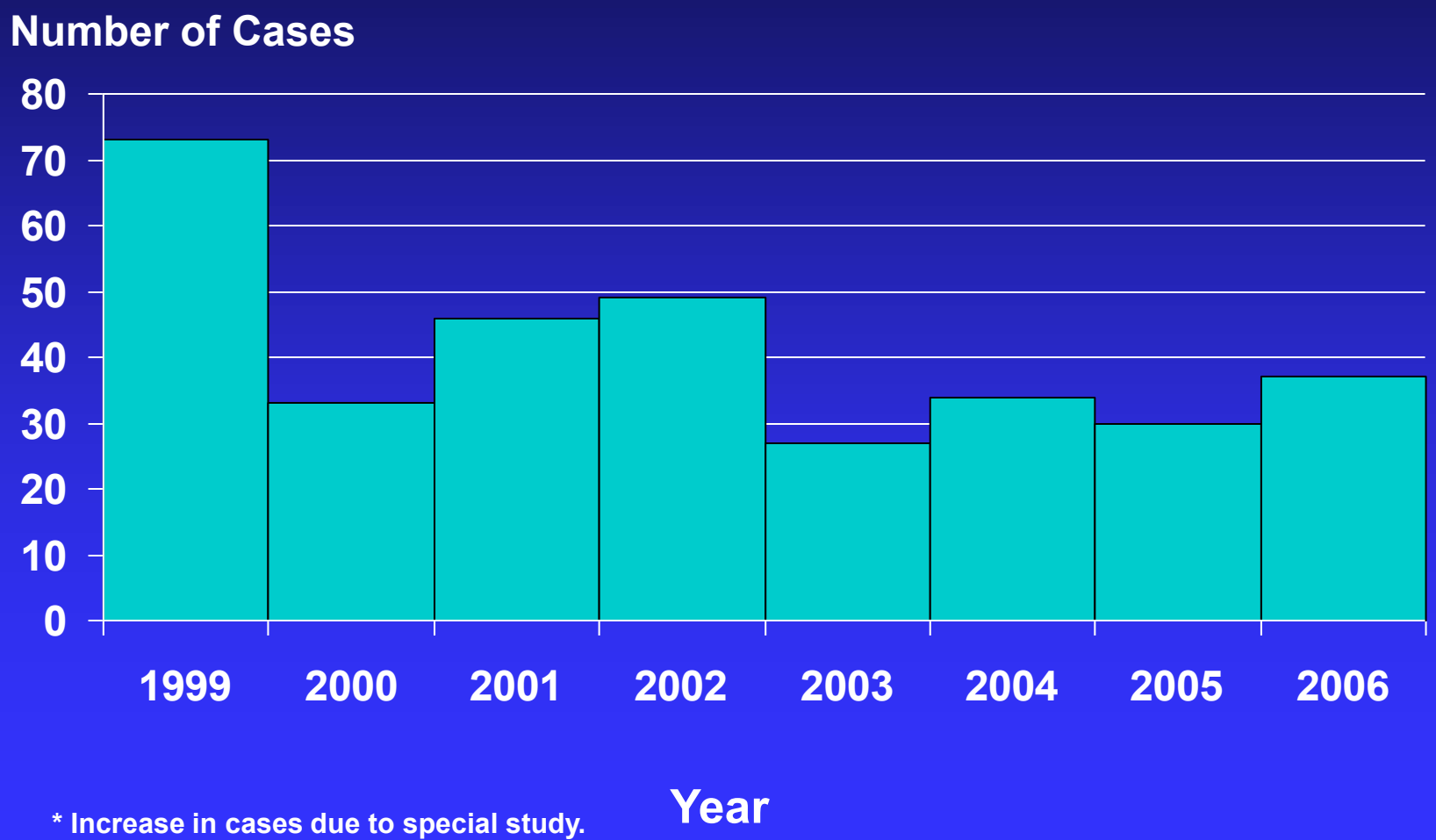
- Low white blood cell count
- Low platelet count
- Hemorrhages
- Renal failure
- Meningitis

Human granulocytic anaplasmosis

Other information

- Symptoms typically occur 7-14 days after an infected tick bite
- The disease is more severe in patients who are elderly, and/or immunocompromised
- Serology, PCR, or blood smear are used to diagnose HGA.
- Treatment includes tetracycline antibiotics (Doxycycline)

Confirmed Anaplasmosis Cases Connecticut, 1999* – 2006



* Increase in cases due to special study.

Babesiosis

Introduction


Deer tick

- Most infections do not result in symptoms
- Some infections can be severe and sometimes fatal
- Affects red blood cells

Babesiosis

Introduction

- Malaria-like illness caused by infection with a protozoan parasite

Babesia microti infecting human erythrocytes.

Babesiosis

Symptoms of infection


Deer tick

- Many infections are asymptomatic
- Early symptoms may include: fatigue, loss of appetite, weakness.
- Late symptoms may include: fever, chills, drenching sweats, muscle aches, headache, enlargement of the liver, or hemolytic anemia

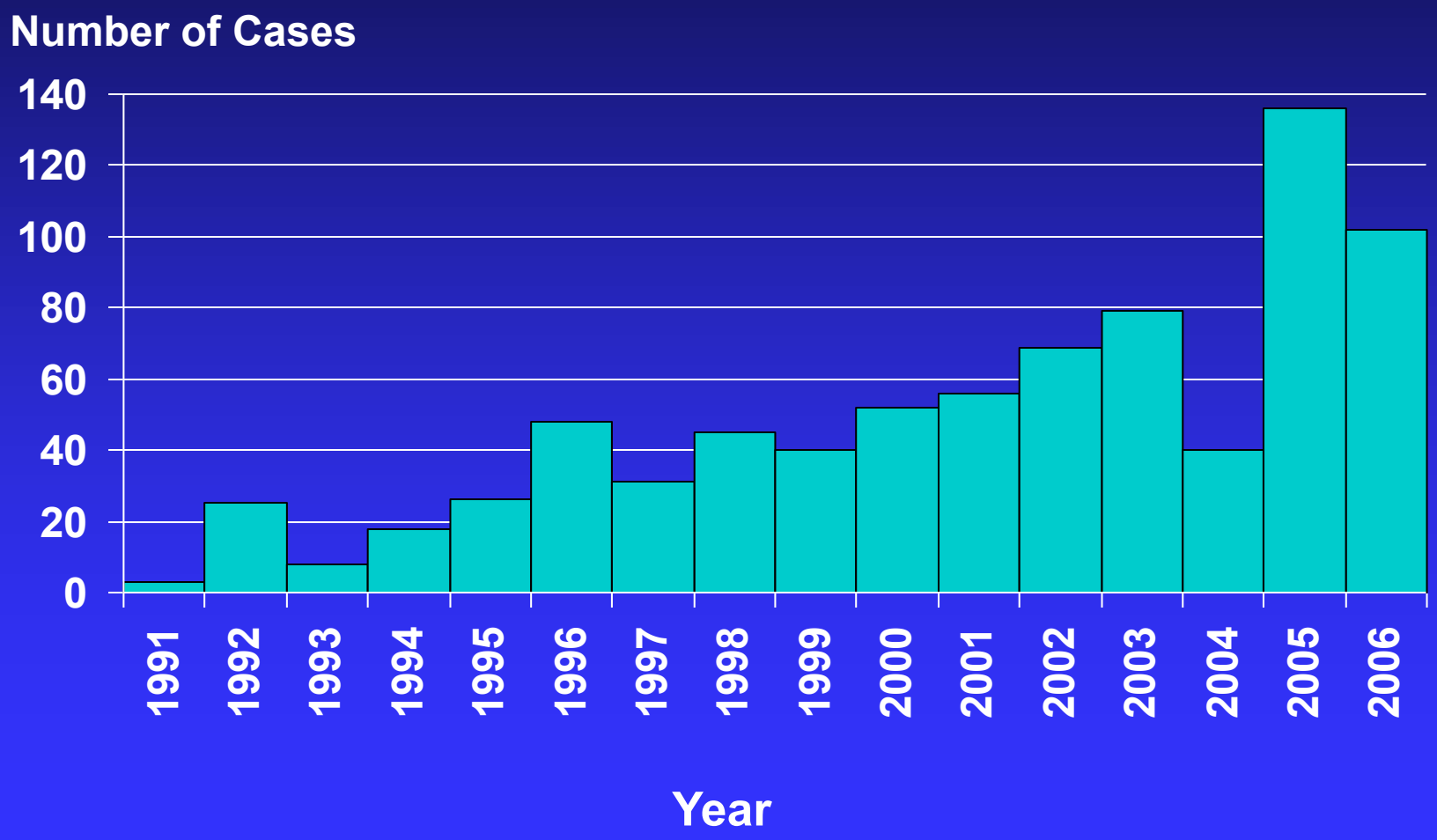
Babesiosis

Other information


Deer tick

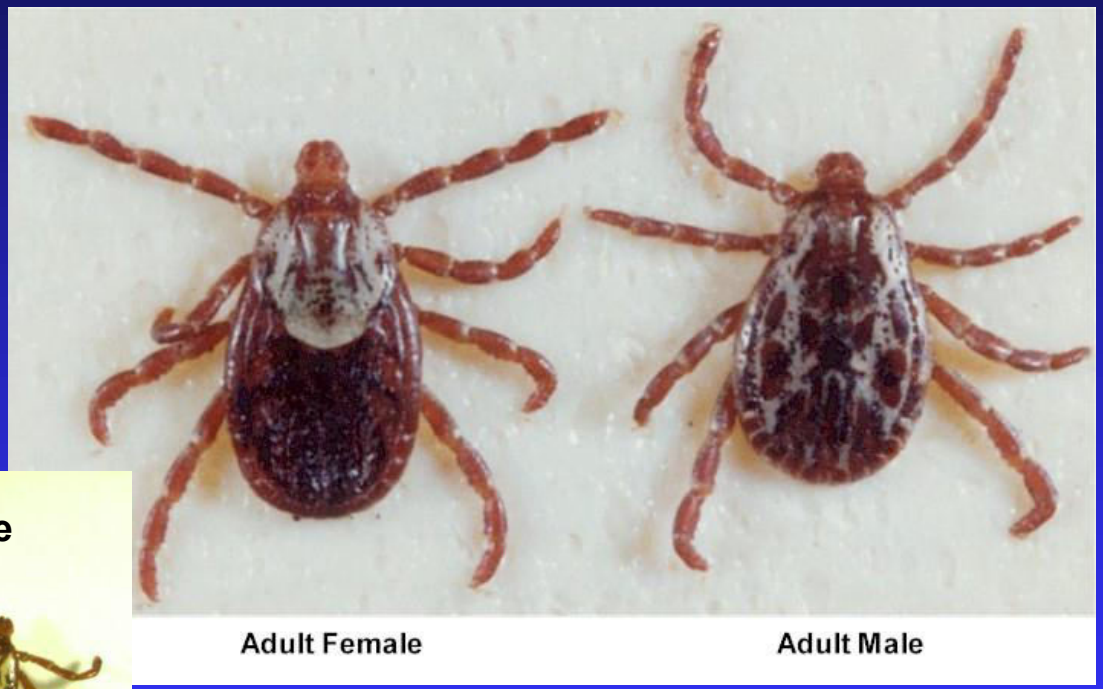
- Initial symptoms may occur 1 to 8 weeks after an infected tick bite
- Serology, PCR, or blood smear are used to diagnose babesiosis.
- Renewed symptoms may occur months to years after initial exposure
- The disease is more severe in patients who are elderly, immunosuppressed, splenectomized, and those with co-infection with Lyme disease

Confirmed Babesiosis Cases Connecticut, 1991 – 2006



Tick Species

American Dog tick (Dermacentor variabilis)



Notice the body resembles a watermelon seed.

Photo: Iowa State University

Rocky Mountain Spotted Fever

Introduction

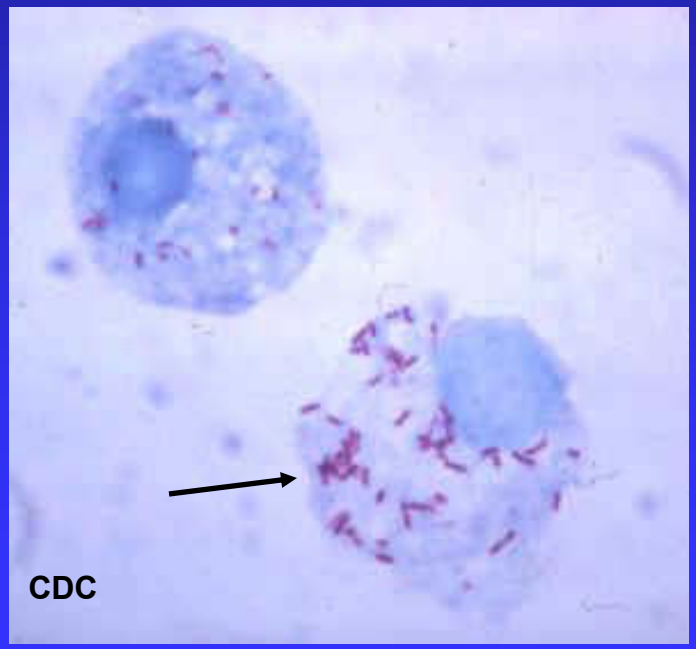
- First recognized in 1896.
- Originally called “black measles”
- Can be fatal without prompt and appropriate treatment
- Grows in the cytoplasm or in the nucleus of the host cell

RMSF

Introduction


Dog tick

- A bacterial infection caused by *Rickettsia rickettsii*


CDC

Rickettsia rickettsii, the causative agent of Rocky Mountain spotted fever.

RMSF

Initial symptoms of infection


Dog tick

- Symptoms begin 5-10 days after the tick bite
- Non-specific, resembling many other diseases
- Sudden onset of fever
- Nausea
- Vomiting
- Severe headache
- Muscle pain

RMSF

Later signs and symptoms


Dog tick

- Rash occurs 4-5 days after onset, generally appears on palms and soles
- Abdominal pain
- Joint pain
- Diarrhea

RMSF

Other information


Dog tick

- One infection may leave lasting immunity
- Can be life-threatening
- Majority of patients hospitalized

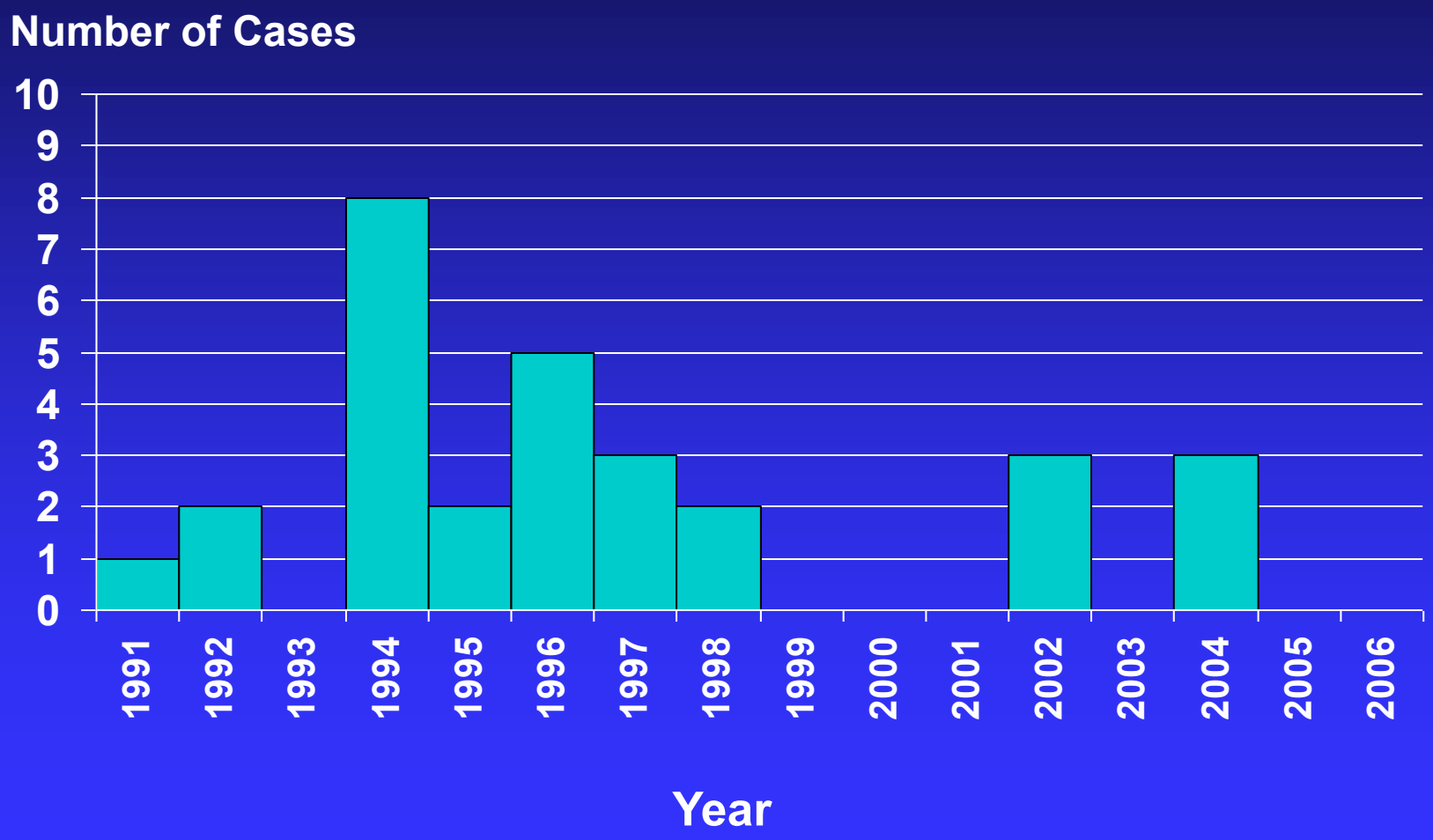
RMSF

Other information


Dog tick

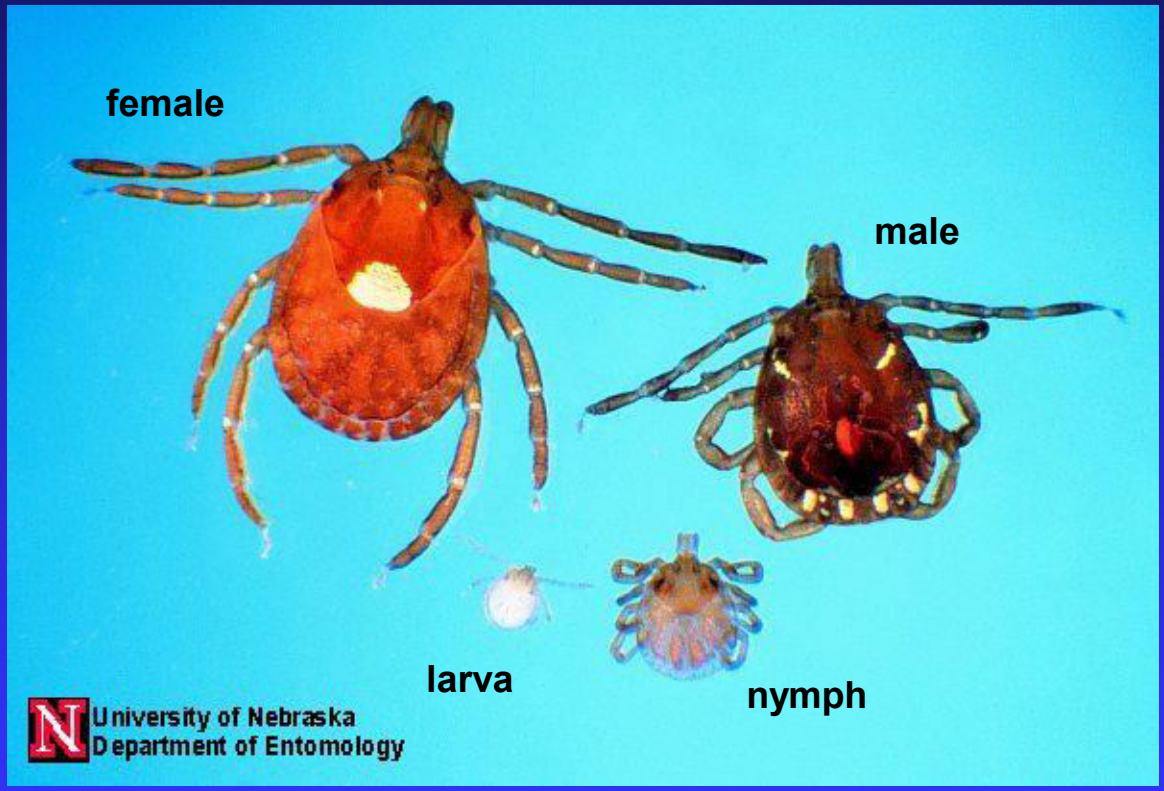
- Treatment includes tetracycline antibiotic (Doxycycline); chloramphenicol may only be used when an absolute contraindication for using tetracyclines exists

RMSF Cases Statewide Connecticut, 1991 – 2006



Tick Species

Lone Star tick (Amblyomma americanum)



Notice the body is rounder than other ticks.

Photo: Department of Entomology, University of Nebraska-Lincoln - Jim Kalisch, Wayne Kramer, UNL Entomology

Tick-borne Disease

Transmitted by Lone Star ticks


Lone Star tick

- *Borrelia lonestari*, the causative agent of Southern Tick-Associated Rash Illness (STARI)
- Can cause a rash similar to that found for Lyme disease

(not reportable in CT)

Cases and Rate of Tick-borne Diseases, Connecticut, 2006

	Cases	Rate*
Lyme disease	1788	52.5
Babesiosis	102	3.0
Anaplasmosis	37	1.1
RMSF	0	-

* Rate per 100,000 population.

Cases of Tick-borne Diseases, Connecticut, 2000 - 2006

	2000	2001	2002	2003	2004	2005	2006
Lyme disease	3,774	3,597	4,631	1,403*	1,348*	1,810*	1788*
Babesiosis	52	56	69	79	40	136	102
Anaplasmosis	110†	46	49	29	34	30	37
RMSF	0	0	3	0	3	0	0

* Reduction in cases is due to surveillance change.
† Increase in cases is due a special study.

Cases of Tick-borne Diseases by County, Connecticut, 2006

	Lyme Disease	Babesiosis	Anaplasmosis	RMSF	Total
Fairfield	355	6	10	0	**371**
Hartford	132	7	0	0	**139**
Litchfield	357	3	14	0	**374**
Middlesex	105	6	0	0	**111**
New Haven	152	3	0	**0**	**155**
New London	317	52	4	0	**373**
Tolland	191	7	0	0	**198**
Windham	147	14	7	0	**168**
Unknown	32	4	2	0	**38**
Total	**1788**	**102**	**37**	**0**	**1927**

Prevention Methods

When in Wooded or Grassy Areas

- Wear light colored clothing to spot ticks easier for faster removal
- Wear long pants
- Tuck pant leg into sock
- Wear closed toe shoes

Prevention Methods

When in Wooded or Grassy Areas

- Use tick repellants containing DEET or permethrin (on clothing only)
- Protect your pets, ask your vet

Prevention Methods

DEET – Use with caution

- DEET (N,N-diethyl-m-toluamide) is absorbed through the skin
- Use products with 30-40% DEET to be effective against tick bites
- Use according to label instructions
- Use sparingly
- Avoid prolonged and excessive use

Prevention Methods

DEET – Use with caution, cont.

- Use on clothing when possible instead of skin
- Avoid inhaling or ingesting DEET
- Keep repellant out of eyes
- Avoid use on damaged skin (sunburn, cuts)
- After returning indoors, wash treated skin with soap and water

Prevention Methods

Upon Returning Indoors

- Check for ticks
- Inspect your body, your children, and pets
- Search through hair, around hairline
- Inspect body folds
- Remove ticks as soon as possible

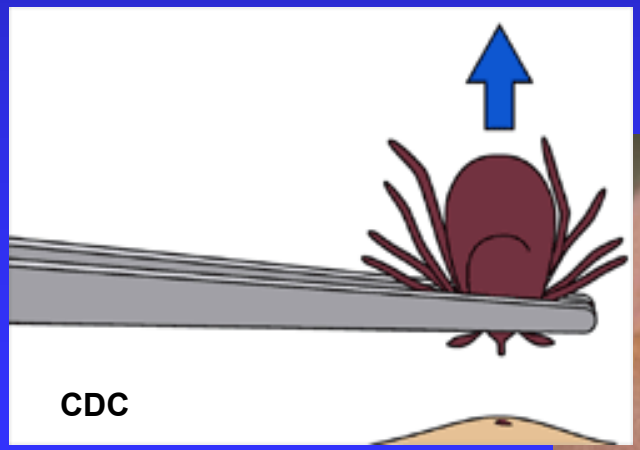
Tick Removal

- Do not use petroleum, hot match heads, nail polish, kerosene, or any other substance
- Use thin-tipped tweezers
- Grasp tick as close to the skin as possible

Photo:www.ventanawild.org/news/fe03/tick_tweeze.jpg)

Tick Removal

- Pull straight upward, slowly and steadily, do not tug or twist
- Avoid rupturing the tick body
- Wash and disinfect bite area



After Removing Tick

- On calendar, record the date and location of tick bite
- Check bite area daily for rash for a month
- Watch for other early symptoms

Tick Control Measures

For Your Yard - Maintenance

- Mow the lawn regularly
- Remove leaves and brush from yard and lawn edge
- Reduce groundcover
- Move bird feeders away from house

Tick Control Measures

For Your Yard - Maintenance

- **Move potential mouse nesting sites (rock walls, wood piles) away from the house**

Wood pile near home

Wood pile away from home

Tick Control Measures

For Your Yard - Maintenance

- Relocate swing sets and picnic tables
- Surround with mulch

Before

After

Tick Control Measures

For Your Yard – Barrier block

- Create a minimum 3 foot barrier
- Reduces ticks on lawn
- Reminder of tick safety zone

Tick Control Measures

Reasons for barrier block

Tick Control Measures

For Your Yard – Barrier block

Example of complete landscape modification.

Before

After

Tick Control Measures

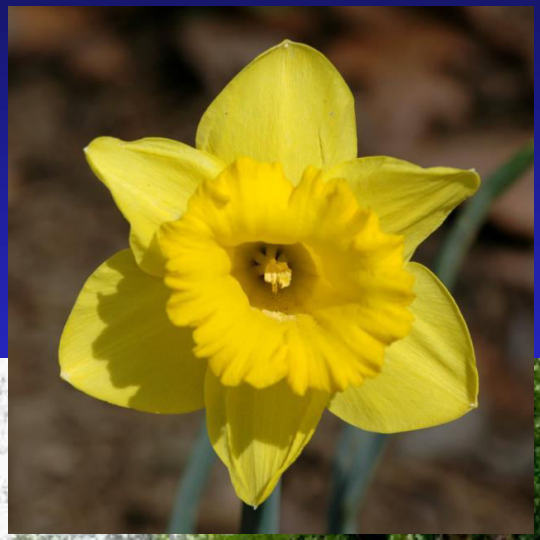
For Your Yard – Ground cover

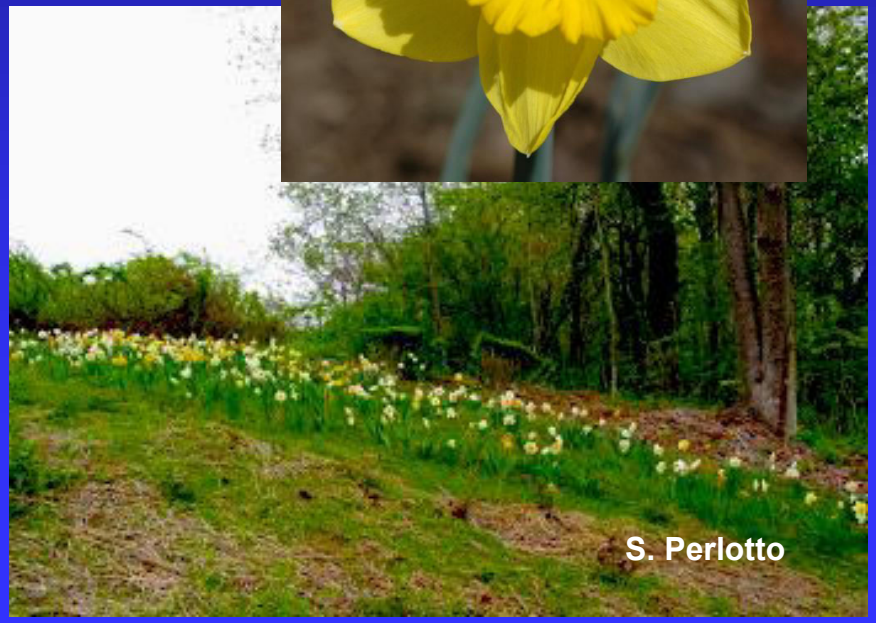
- Try not to use ground cover around the home
- Avoid the use of ivy, myrtle or pachysandra near entryways or outdoor faucets.

Tick Control Measures

For Your Yard – Deer resistant plants

- Don’t invite deer onto your property, use deer resistant plantings like daffodils





Tick Control Measures

For Your Yard – Deer resistant plants

Annuals:
- Alyssum
- Dusty Miller
- Forget-me-not
- Marigold
- Nasturtium
- Pansy
- Sage
- Spiderflower
- Verbena

Perennials:
- Beebalm
- Bleeding Heart
- Catmint
- Columbine
- Foxglove
- Goldenrod
- Lady's Mantle
- Lamb's Ears
- Lavender
- Lily of the Valley
- Mayapple
- Mint
- Monkshood
- Oregano
- Poppy
- Rhubarb
- Russian Sage
- Silvermound
- Thyme
- Yarrow

Vines:
- Wisteria
- Virginia creeper

Shrubs and Trees:
- Andromeda
- Barberry
- Boxwood
- Butterfly bush
- Cotoneaster
- Leucothoes Spruce
- Weigela

Bulbs, Corms, and Other Plants:
- Daffodil (Narcissus)
- Hens &chicks
- Hyacinths
- Iris
- Ornamental chives
- Snowdrops

Tick Control Measures

For Your Yard - Pesticides

- **Selectively use insecticides and pesticides**

Pesticides and Tick Control

A Word About Pesticides

- Acaracides are insecticides or pesticides used for tick and mite control
- Pesticides can be harmful
- The toxic impact affects life species differently
- Insecticides can provide 85-90% or better tick control

Pesticides and Tick Control

Types of Pesticides

- Biologically-based pesticides, (i.e. pheromones, microbial pesticides)
- Pyrethrins and Other Natural Insecticides
- Synthetic insecticides

Pesticides and Tick Control

Pesticide Controls

- All pesticides must be registered with federal and state environmental protection programs
- The decision to use pesticides on your property is up to you.

Selecting a Tick Control Service

- Select 3 services that are registered with the Department of Environmental Protection
- Ask DEP for any violations filed against the business
- Get a written estimate, understand what the job entails
- Contact the BBB

Selecting a Tick Control Service

- Ask the business for a certificate of liability insurance
- Ask to see the license of the employees spraying for ticks
- Ask for references

Questions to Ask the Applicator

- Will signs be posted around the property after application?
- Will the equipment used be safe and up-to-date?
- Will a written pest control plan be provided?

http://www.gemplers.com/safety/labels/lawnturf/CT5X5PK.html

Questions to Ask the Applicator

- Will the plan state exactly what pesticides will be used
- Will information be supplied about various non-chemical landscaping techniques

When Should Pesticides Be Applied

- To protect against ticks, spraying in the Spring will control larvae and nymphs
- An application in October will control the adult ticks

Where Should Pesticides Be Applied

- Spray the perimeter of the areas that are most used by the family; garden, playscapes, picnic table.

Health Education Belief Model

A person is more likely to practice preventive measures if he or she believes:

- The disease is serious;
- He or she is at high risk for acquiring the disease;
- Some course of action will be effective in reducing the risk.

Rosenstock, 1960

Remember

Tick-borne disease is preventable

Being aware of the dangers of tick-borne diseases and following the precautions recommended can greatly reduce your chances of becoming infected with Lyme disease, babesiosis, anaplasmosis, or Rocky Mountain spotted fever!

Remember

Tick-borne disease prevention check list.

- Prevent tick bites
- Do daily tick checks
- Know all the symptoms of tick-borne diseases
- Learn to recognize the EM rash
- Modify your yard as necessary

Remember

Stay away from tick infested areas

- When hiking, stay on trails, do not bushwhack
- Avoid fields with tall grass
- Stay clear of the transition area between the lawn and woodland edge

Remember

Tick-borne disease treatment.

- Call your doctor and seek early diagnosis and treatment
- You may need to be tested for several tick-borne diseases for an accurate diagnosis
- Take all medications prescribed

Remember

Tick Activity

- Ticks are most active in spring and summer
- Most people are bitten during the spring or summer
- Ticks can feed during any season
- Check for ticks and watch for symptoms ALL YEAR

Tick-borne Disease & Pets

Tick-borne illnesses can affect your pets

- Fever
- One or more swollen, hot, painful joints
- Severe pain and/or reluctance to move
- Intermittent lameness
- Poor appetite

Lyme Disease History

A Connecticut Perspective

- 1975 - Unusual arthritis cases reported in Lyme, CT
- 1977 - First 51 cases of Lyme arthritis described
- 1977 - The deer tick, linked to transmission of Lyme disease
- 1982 - *Borrelia burgdorferi*, the spirochete (bacterium) that causes Lyme disease, discovered

Lyme Disease History

A Connecticut Perspective

- 1984 - Lyme disease serologic testing becomes widely available in Connecticut
- 1987 - Lyme disease becomes a reportable disease in Connecticut
- 1991 - Federal funding for Lyme disease becomes available

Sources of Information

Pesticide Information

United States Environmental Protection Agency
www.epa.gov/pesticides

Connecticut Department of Environmental Protection
www.ct.gov/dep/cwp/view.asp?a=2710&q=324262

Connecticut Agricultural Experiment Station
www.ct.gov/caes/lib/caes/documents/publications/fact_sheets/ManagingTicks05.pdf

Sources of Information

Tick-borne Disease: Symptoms, Treatment, Prevention

American Lyme Disease Foundation, Inc

www.aldf.com

Centers for Disease Control and Prevention

www.cdc.gov

Connecticut Agricultural Experiment Station

www.ct.gov/caes/

Connecticut Department of Health

www.ct.gov/dph/

Sources of Information

Tick-borne Disease: Symptoms, Treatment, Prevention

Ledge Light Health District

www.ledgelighthd.org/programs/lyme_prev.html

Torrington Area Health District

www.tahd.org/lyme_disease.htm

Westport Weston Health District

www.wwhd.org/target_lyme_disease.htm

Tick Identification

Connecticut Agricultural Experiment Station

www.ct.gov/caes/cwp/view.asp?a=2837&q=378212

Sources of Information

Deer Resistant Plants

Connecticut Agricultural Experiment Station: Limiting Deer Browse Damage to Landscape Plants (Jeffrey S. Ward)

www.ct.gov/caes/lib/caes/documents/publications/bulletins/b968.pdf

Cornell University: Deer Defenses

www.gardening.cornell.edu/factsheets/deerdef/index.html

Torrington Area Health District

www.tahd.org/lymedeerresist.htm

Sources of Information

Deer Resistant Plants

Carey Institute

www.ecostudies.org/lma_deer_resistant_woodies.html

University of Connecticut

www.hort.uconn.edu/Plants/

Westport Weston Health District

www.wwhd.org/TLD_CD/dwnloads/drplants.pdf

Woodstock Conservation Commission

www.woodstockconservation.org/deer_resistant_plants.htm

Sources of Information

Deer Exclusion Methods and Other Deer Concerns

Connecticut Agricultural Experiment Station
www.ct.gov/caes/lib/caes/documents/publications/fact_sheets/controllingdeer.pdf

University of Connecticut
www.hort.uconn.edu/Ipm/homegrnd/htms/11deer.htm

University of Maryland
http://extension.umd.edu/publications/PDFs/FS655.pdf

Sources of Information

Tick Photographs/Illustrations

American Lyme Disease Foundation

www.aldf.org

Connecticut Agricultural Experiment Station

www.ct.gov/caes

Centers for Disease Control and Prevention

www.cdc.gov

Department of Entomology, University of Nebraska-Lincoln

http://entomology.unl.edu/images/ticks/ticks.htm

Torrington Area Health District

www.tahd.org/lymeyardimprove.htm

Sources of Information

Tick Photographs/Illustrations

Google Images

www.google.com/imghp

Iowa State University

www.ent.iastate.edu/imagegal/ticks

Torrington Area Health District

www.tahd.org/lyme_disease.htm

Westport Weston Health District

www.wwhd.org/target_lyme_disease.htm

Local Resources

For additional information concerning tick-borne diseases in Connecticut, please can contact the following:

Local Health Department	Phone ##
Connecticut Department of Public Health	(860) 509-7994

For tick information contact:

Connecticut Agricultural Experiment Station	(203) 974-8500
Toll-free outside New Haven	1-(877) 855-2237

Thank You!

"We're thinking of moving to another part of the country—somewhere between Lyme disease and killer bees."