

# TICK BORNE ILLNESS

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**A LONG TIME AGO, IN A VALLEY FAR, FAR AWAY**



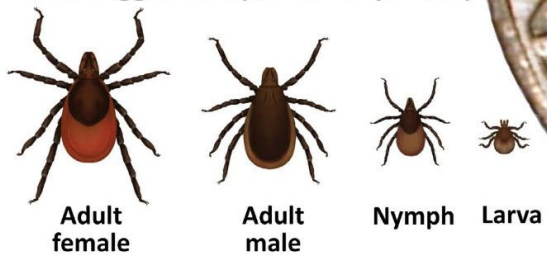
# HISTORY

- **EARLY 1900'S ... FIRST REPORTED IN EUROPE**
- **1975...OUTBREAK IN LYME, CONNECTICUT**
- **1982...SPIROCHETE IDENTIFIED IN MIDGUT OF BLACK LEGGED TICKS NAMED BORRELIA BURGDORFERI**
- **TODAY IT'S THE MOST COMMON TICK BORNE DISEASE IN USA, CANADA AND EUROPE**
- **IN USA LYME DISEASE 69%, OTHER TICK BORNE 25%**
- **MOSQUITO BORNE IS 6%**

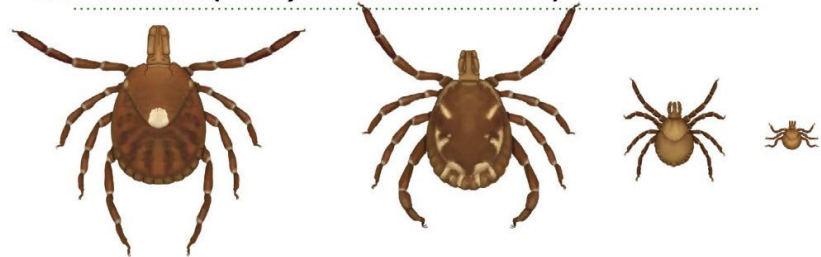


TICKS THAT COMMONLY BITE HUMANS

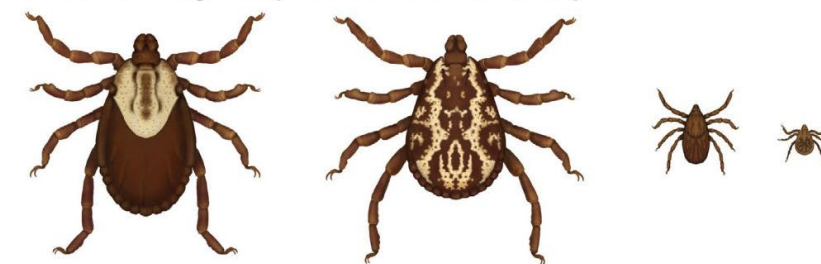
Blacklegged Tick (*Ixodes scapularis*)



Lone Star Tick (*Amblyomma americanum*)



American Dog Tick (*Dermacentor variabilis*)



**NOTE:** Relative sizes of several ticks at different life stages.

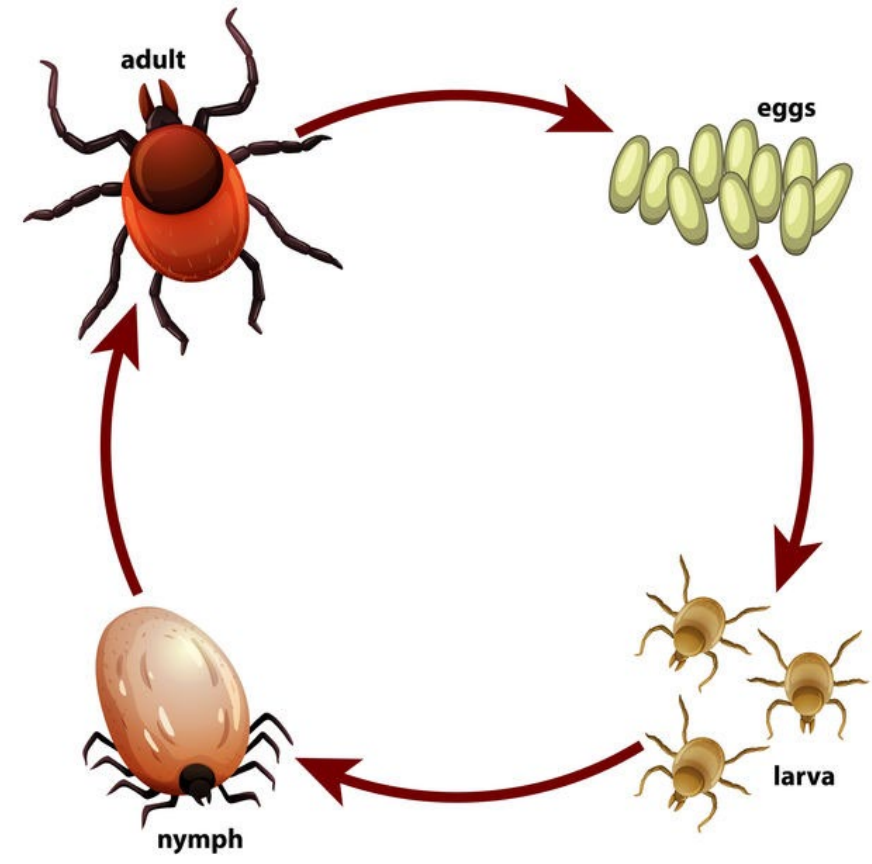
Engorged female *Ixodes scapularis* tick. Color may vary.



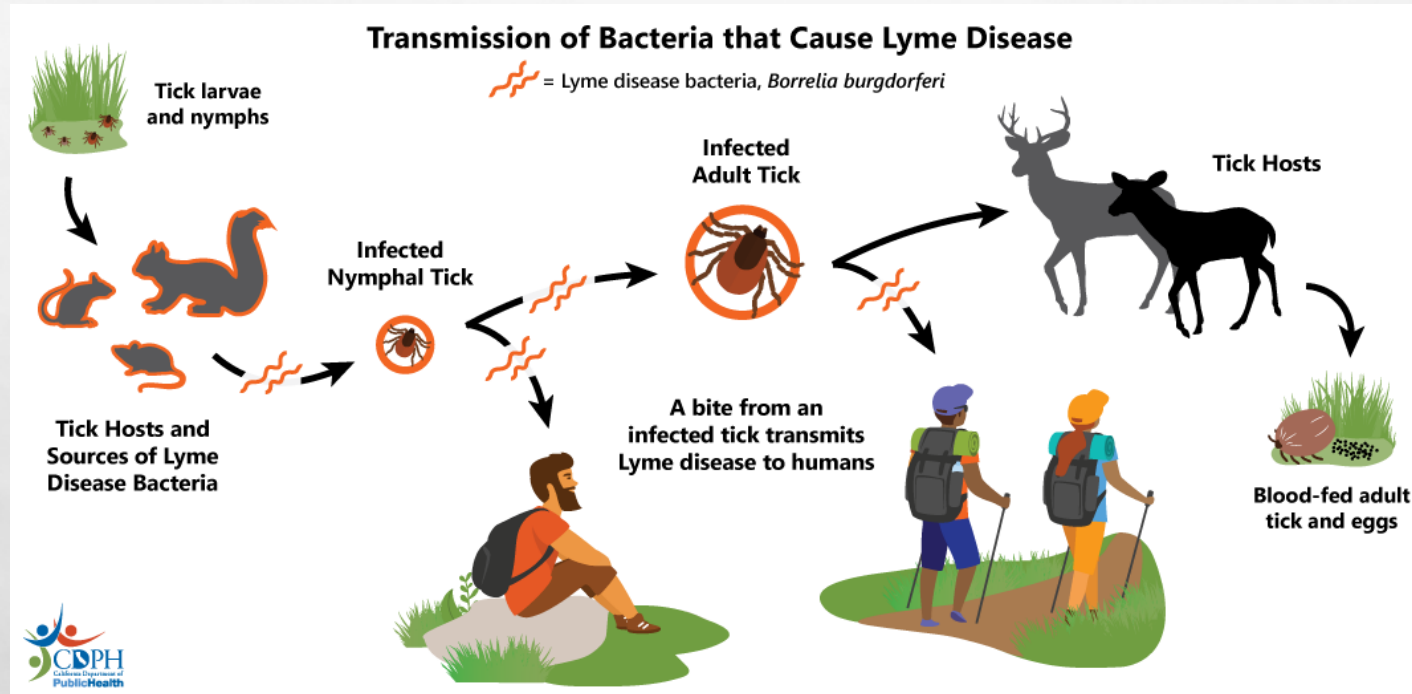
# Ticks that commonly bite humans

<https://news.azpm.org/p/news-npr/2025/6/23/225250-tick-risks-vary-by-region-heres-where-diseases-have-spread-and-how-to-stay-safe/>

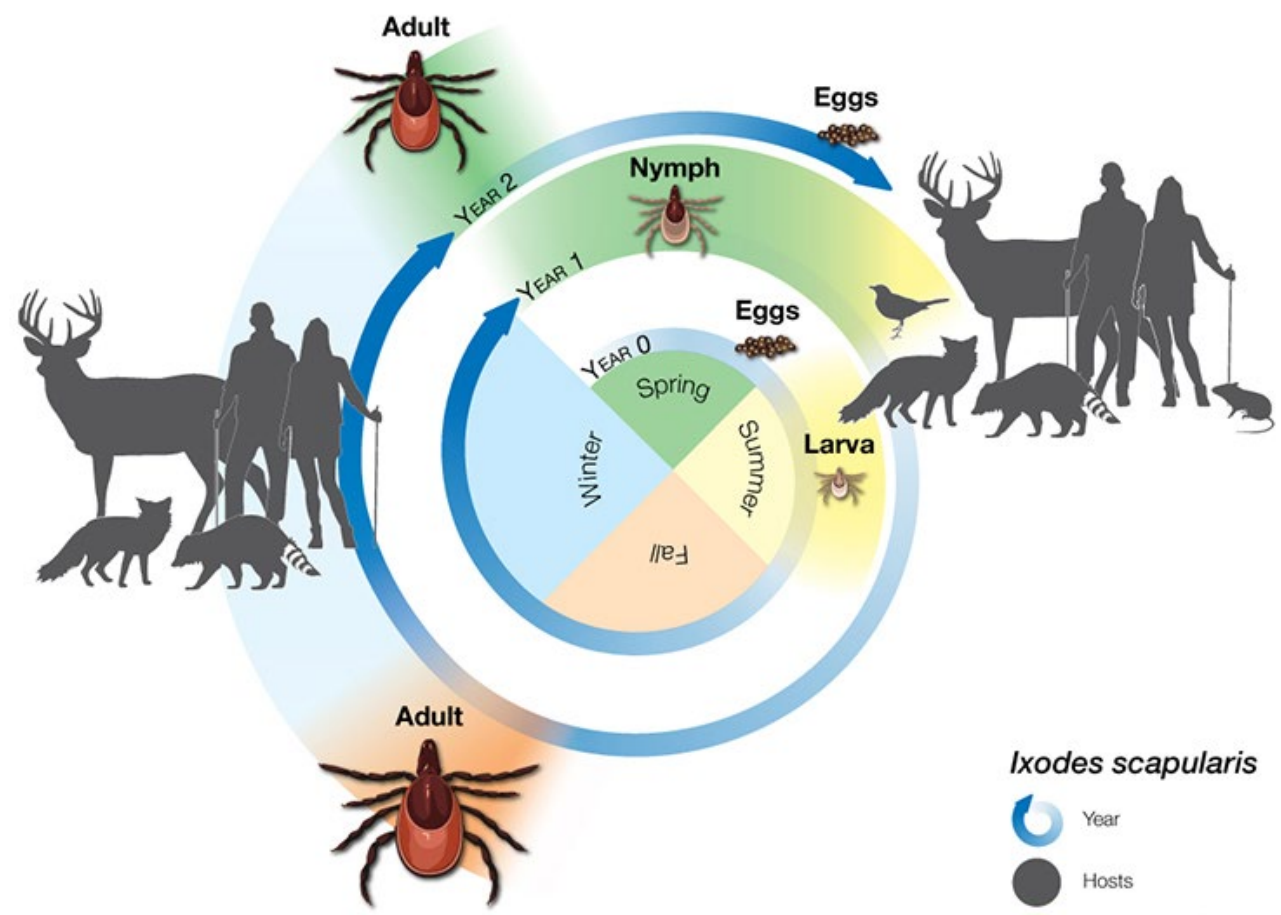
# Tick Life Cycle



# TRANSMISSION



# Life Cycle



**Two-year life cycle**  
**egg**  
**larva**  
**nymph**  
**adult**

*Ixodes scapularis*

- Year
- Hosts
- Host-seeking/  
Blood-feeding



# **PATHOGENESIS**

- **NO TOXINS UNLIKE OTHER BACTERIA**
- **CAUSE INFECTION BY MIGRATING THROUGH TISSUES ADHERING TO HOST CELLS AND THEREBY EVADING IMMUNE CLEARANCE**

# SYMPTOMS

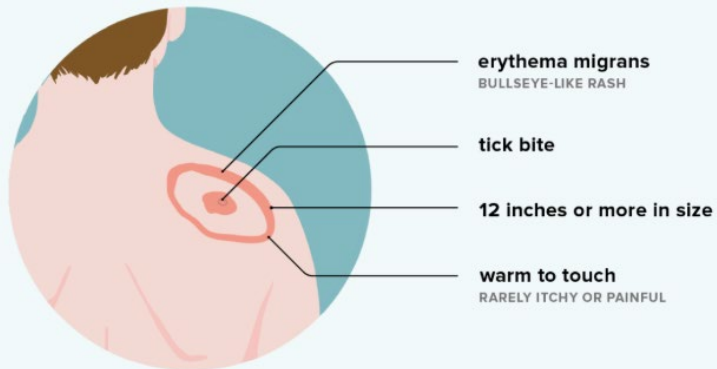
## STAGE 1

### ERYTHEMA MIGRANS

#### LOCALIZED

#### LYME DISEASE SYMPTOMS

3 to 30 days after tick bite



## STAGE 2

**EARLY DISSEMINATED, CAN HAVE MULTIPLE LESIONS**

**ALSO NONSPECIFIC SYMPTOMS**

**PERSISTENT OR LATE INFECTION**

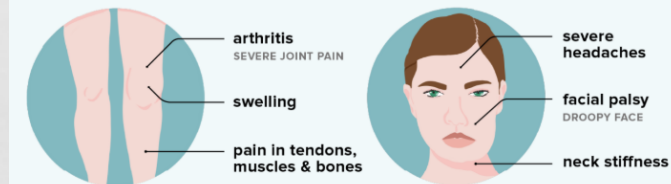
**NEUROLOGIC SYMPTOMS**

**CARDIAC**

**CHRONIC INFLAMMATORY EYE DISEASE**

#### LYME DISEASE SYMPTOMS

days to months after tick bite



## STAGE 3

**MONTHS AFTER PRIMARY SKIN LESIONS**

**SWELLING AND PAIN IN LARGE WEIGHT BEARING JOINTS**

**CHRONIC ARTHRITIS**

**IF LEFT UNTREATED...YEARS AFTER INITIAL INFECTION LEADS TO LATE NEUROLOGICAL SYNDROME**

**POST LYME..PERSISTENT DISEASE AFTER TREATMENT IS CONTROVERSIAL**



# DIAGNOSIS

## ■ SEROLOGY

- IMMUNOFLUORESCENT ASSAY
- ELISA
- IMMUNOBLOT

## ■ DIRECT ISOLATION

- BIOPSY OF SKIN LESION

## ■ False positive results

- Syphilis
- Leptospirosis
- HIV
- Mononucleosis
- Autoimmune disorders





## Western blot interpretation for Lyme disease

Isotype	Timing of appearance after exposure	Bands to be considered
IgM	First few weeks	Two of the following: ospC (24), 39, 41
IgG	After first few weeks	Five of the following: 18, 23, 28, 30, 39, 41, 45, 58, 66, 93

Criteria for a positive Western blot (immunoblot) test. The Western Blot test should always be used in conjunction with a concomitant quantitative serologic test. A positive Western Blot test should not be used alone to confirm the diagnosis. Alternate criteria for IgM reactivity were proposed at a Centers for Disease Control and Prevention conference. Other points noted at that conference were the need for standardization of the antigen preparation and techniques used.

IgG: immunoglobulin G; IgM: immunoglobulin M.

*Criteria derived from: Dressler F, Whalen JA, Reinhardt BN, Steere AC. Western blotting in the serodiagnosis of Lyme disease. J Infect Dis 1993; 167:392.*

# **TREATMENT**

**DOXYCYCLINE**

**Ceftriaxone**



# OTHER TICK BORNE DISEASES

- ❖ **ANAPLASMOSIS**
- ❖ **BABESIOSIS**
- ❖ **BORRELIA MIYAMOTOI DISEASE**
- ❖ **EHRILICHIOSIS**
- ❖ **POWASSAN ENCEPHALITIS**



# **HUMAN EHRLICHIOSIS AND ANAPLASMA**

- **HUMAN MONOCYTTIC EHRLICHIOSIS**
- **EHRLICHIA CHAFFEENSIS**
- **LONE STAR TICK**
- **SPRING AND SUMMER**



- **HUMAN GRANULOCYTIC ANAPLASMOSIS**
- **ANAPLASMA PHAGOCYTOPHILUM**
- **IXODES SCAPULARIS IN EAST USA**
- **IXODES PACIFICUS IN WESTERN USA**



# **IXODES PACIFICUS**

- **INCUBATION 1 TO 2 WEEKS**
- **FEVER, CHILLS, MALAISE, HA**
- **RASH IN 30% OF HME**
- **LABORATORY..LEUKOPENIA,  
THROMBOCYTOPENIA, ELEVATED LIVER  
ENZYMES**
- **DIAGNOSIS: PAIRED ACUTE AND  
CONVALESCENT SEROLOGY BY IFA**
- **PCR**



# TREATMENT

- **RECOMMENDED...DOXYCYCLINE IN NON PREGNANT AND ADULTS**
- **SUGGESTED...DOXYCYCLINE IN PREGNANT POPULATION AND CHILDREN**
  - **TOXICITY AND STAINED TEETH IN CHILDREN FOUND TO BE RARE**
- **RECENT GUIDELINES RECOMMEND DOXYCYCLINE TO ALL PATIENTS**

## Doxycycline saves lives!

### A good reason to smile:

Doxycycline is the #1 recommended treatment for suspected rickettsial infections in patients of all ages.

New research shows NO evidence of tooth staining when used in short courses.



Click to learn more.



# ALTERNATIVE TREATMENTS EHRILICHIA

- **RIFAMPIN AND CHLORAMPHENICOL**
- **CONTINUE FOR THREE DAYS AFTER DEFERVESCENCE**
- **TREAT ANYWHERE FROM 7 TO 14 DAYS**
- **MORTALITY LESS THAN 1%, HOWEVER INCREASED RISK IN IMMUNOCOMPROMISED**



# BABESIA



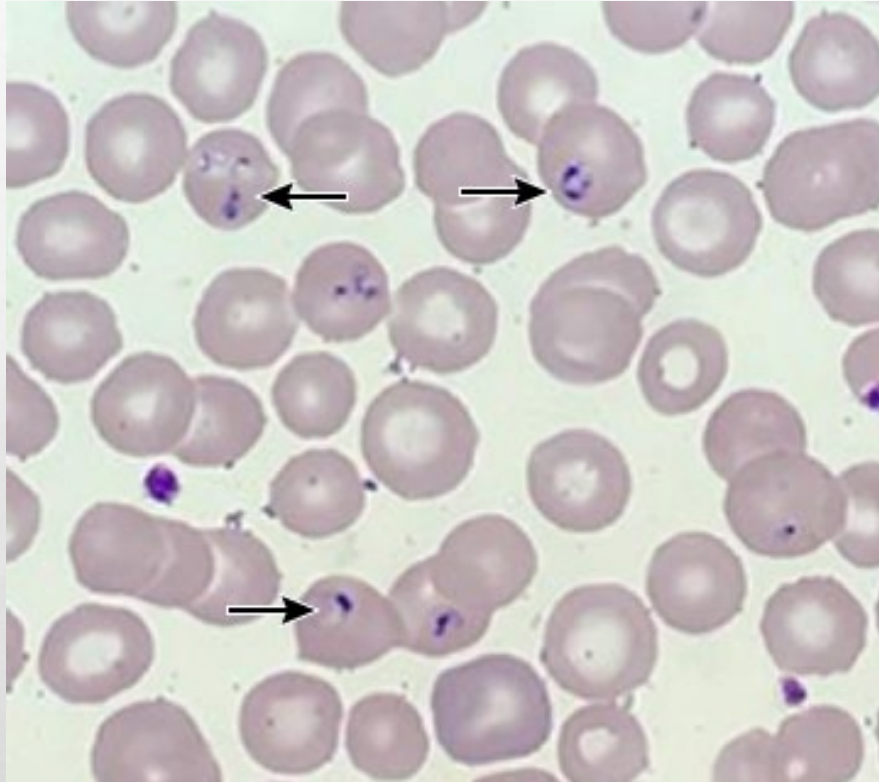
## SYMPTOMS

- **ASYMPTOMATIC TO SEVERE**
- **BABESIA MICROTI, B. DUNCANI**
- **INCUBATION 1 TO 4 WEEKS AFTER BITE**
- **3 TO 7 WEEKS AFTER TRANSFUSION**
- **MILD TO MODERATE SYMPTOMS WHEN LESS THAN 4% PARASITEMIA**
- **FATIGUE, FEVER, HA, MYALGIA**
- **PERSISTENT OR RELAPSING & SEVERE SYMPTOMS WHEN MORE THAN 4% PARASITEMIA**
- **WHEN SEVERE COMPLICATION INCLUDE ARDS, CHF, DIC, SPLENIC RUPTURE, COMA**

## DIAGNOSIS

- **MAY OBSERVE HEMOLYSIS**
- **WRIGHT-GIEMSA STAINED THIN SMEAR**
- **INTRAERYTHROCYTIC MEROZOITES**
- **MALTESE CROSS TETRADS**
- **PCR**
- **SEROLOGY..ACUTE AND CONVALESCENT TITERS**

## PARASITES --- BABESIOSIS



# TREATMENT

- **ASYMPTOMATIC, NO TREATMENT**
- **MILD TO MODERATE DISEASE**
  - **AZITHROMYCIN PLUS ATOVAQUONE**
- **ALTERNATIVE**
  - **CLINDAMYCIN PLUS QUININE**
- **SEVERE CASES**
  - **EXCHANGE TRANSFUSION**



# TICK BORNE DISEASE ABROAD

- **AFRICAN TICK BITE FEVER**
- **RICKETTSIA AFRICAE**
- **AMBLYOMA HEBRAEUM AND VARIEGATUM**
- **FEVER, HEADACHE, RASH , VESICULAR**
- **PCR SWAB OF THE ESCHAR OR BIOPSY**
- **DOXYCYCLINE**

# **TICK BORNE DISEASE ABROAD**

**EUROPE AND ASIA**

**BORRELLIA AFZELLI , B. GARINII, B. SENSU STRICTO**

**ENCEPHALITIS**

# ALPHA- GAL SYNDROME

- **IGE MEDIATED HYPERSENSITIVITY TO ALPHA GALACTOSE**
- **MAMMALIAN MEAT, TICK SALIVA**
- **LONE STAR TICK**
- **LONG ISLAND, NY CITY**
- **RASH, HIVES, GI SYMPTOMS**
- **HYPOTENSION, SYNCOPE**
- **ALPHA GAL SPECIFIC IGE ANTIBODY**

# PREVENTION

- ✓ **Decreasing human contact with ticks, personal protection**
- ✓ **20 to 30% Deet on exposed skin and clothing**
- ✓ **Wear permethrin treated clothing**

# **THANK YOU**

- **SPECIAL THANKS TO MY INFECTION PREVENTIONIST ALIDA FOR HELPING ME WITH POWER POINT**
- **DR.SIKDER FOR THE OPPORTUNITY**

## References

**NEJM July 2001;345;115-125**

**CID 2006;43; 1089-1134**

**CDC: [HTTP://www.CDC.gov/lyme](http://www.CDC.gov/lyme)**

**NEJM:2003: 348: 2472-247**

**IDSA guidelines: CID Volume 72, Jan 2021**

