Lyme Disease

Misdiagnosed in both directions · tested when it should be treated, then treated far longer than the evidence supports

See the rash, treat the rash
short courses, not long ones

⚠ THE TWO OPPOSITE ERRORS

⚠ DO NOT SEND SEROLOGY FOR ERYTHEMA MIGRANS

In a patient with plausible tick exposure in an **endemic area** and a compatible lesion, **this is a CLINICAL diagnosis** -guidance is explicit. Serology is **frequently NEGATIVE in early localized disease** because antibodies take weeks, so a negative result falsely reassures and delays treatment at the stage where it is most effective. **⚠ Most lesions are UNIFORMLY RED - only a minority show the classic bull's-eye**, so waiting for a target lesion misses the majority. Expanding, usually ≥ 5 cm, 3-30 days after the bite.

⚠ "CHRONIC LYME": LONGER IS NOT KINDER

Persisting fatigue, pain and cognitive symptoms after adequate treatment (**post-treatment Lyme disease syndrome**) are **REAL** -but the evidence shows they are **not driven by ongoing infection**. **Klempner 2001**: 90 days of IV then oral antibiotics was **no better than placebo**. **PLEASE 2016**: longer-term therapy gave **no additional benefit** over shorter. **The harms are not theoretical** -prolonged IV access brings line infection, thrombosis and sepsis, plus *C. difficile*. **Acknowledge the symptoms, treat symptomatically, keep them in follow-up. Dismissing the patient is what drives them elsewhere.**

TRANSMISSION

Borrelia burgdorferi via ***Ixodes*** tick. **⚠ Attachment of ~36 h or more is generally needed to transmit** -which reassures most people presenting with a tick removed the same day, and anchors the prophylaxis decision. Northeast, mid-Atlantic, upper Midwest, plus a Pacific focus. **Remove with fine-tipped forceps**, close to skin, steady upward pull -heat and petroleum jelly just delay removal. **Consider co-infection** (babesiosis, anaplasmosis) if there is high fever, rigors, cytopenias or hemolysis.

THE THREE STAGES

Stage	Timing	Features
Early localized	**3-30 days**	**Erythema migrans** -expanding, usually ≥ 5 cm, painless, not especially itchy. **Mostly uniformly red, NOT a bull's-eye.** With fatigue, headache, myalgia, low-grade fever
Early disseminated	**Weeks-months**	**Multiple secondary lesions. Cranial neuropathy, usually facial palsy and notably often BILATERAL** -bilateral facial palsy is Lyme until proven otherwise in an endemic area. **Lymphocytic meningitis**, radiculopathy, **carditis with AV block**
Late	**Months-years**	**Lyme arthritis** -mono/oligoarticular, large joints, **overwhelmingly the KNEE**, with a strikingly large effusion relative to how well the patient looks
⚠ Carditis	**The presentation that turns fast.** AV block can **fluctuate and progress from first-degree to COMPLETE block within hours**. **Admit and monitor** anyone with a prolonged PR or higher-grade block; some need temporary pacing. **Almost always REVERSIBLE with antibiotics**, so a permanent pacemaker is rarely needed -which is exactly why recognizing it matters	

PROPHYLAXIS & TREATMENT

Decision	Detail
⚠ High-risk bite = ALL THREE	Identified ***Ixodes*** **species + highly endemic area + attached ≥ 36 hours**. **Missing any one means prophylaxis is NOT indicated.** Then: **single oral dose of doxycycline 200 mg** (children 4.4 mg/kg, max 200 mg) **within 72 hours of removal**. Outside that window, observe
Erythema migrans	**Doxycycline 10 days**, or **amoxicillin or cefuroxime axetil 14 days** if doxycycline unsuitable. **⚠ Short courses are recommended explicitly IN PREFERENCE to longer ones** -a longer course is not a safer or more thorough choice, just more adverse effects
Cranial neuropathy · meningitis	**Oral doxycycline is generally sufficient** -IV is not required for isolated facial palsy. Reserve IV ceftriaxone for those unable to tolerate oral or with more severe involvement. **Protect the eye**: lubrication and night taping to prevent exposure keratopathy while the palsy recovers
Lyme arthritis	About **28 days oral**. If the effusion persists, **a second course is reasonable before calling it failure** -a proportion have a post-infectious inflammatory arthritis managed with anti-inflammatories and rheumatology, not more antibiotics
Counsel at prescribing	**Jarisch-Herxheimer**: transient worsening of fever, chills and myalgia in the first day is **killed organisms, not failure or allergy** -patients not warned reasonably stop the drug. Also **doxycycline photosensitivity**, directly relevant in an outdoor illness treated in summer. **Short doxycycline courses are now acceptable in young children**

OTHER TICK-BORNE ILLNESS *when the picture is not erythema migrans*

Illness	Clue	Notes
Anaplasmosis	Fever without rash, **leukopenia + thrombocytopenia + raised transaminases**	Same *Ixodes* vector, so it **co-infects with Lyme**. **Doxycycline treats both** -which is one reason doxycycline is preferred when the picture is ambiguous
Babesiosis	**HEMOLYSIS** -anemia, raised LDH and bilirubin, low haptoglobin- with fever and rigors	An intraerythrocytic parasite, not a bacterium, so **doxycycline does NOT treat it**. Diagnosed on blood smear or PCR. **⚠ Severe and potentially fatal in ASPLENIA, older age and immunocompromise**. Needs antiparasitic therapy
Rocky Mountain spotted fever	**Rash starting at WRISTS and ANKLES, spreading centrally, involving PALMS and SOLES**, with fever and headache	Different vector and a different disease. **⚠ Potentially fatal within days -treat EMPIRICALLY on suspicion, never wait for serology. Doxycycline is the treatment of choice at ALL ages, including young children**, where withholding it has caused deaths
Alpha-gal syndrome	**DELAYED allergic reaction, typically 3-6 h after eating red meat**	A tick-bite-acquired allergy rather than an infection, so it is missed because the delay breaks the usual food-allergy pattern. Worth asking about in unexplained recurrent urticaria or anaphylaxis

SEROLOGY: WHEN IT HELPS AND WHEN IT MISLEADS

HOW TO USE IT

Two-tier testing: sensitive enzyme immunoassay first, then a confirmatory test on positives -classically Western blot, though **modified two-tier algorithms using a second immunoassay** are now accepted. **A first-tier positive alone does not make the diagnosis.** Serology **is** genuinely useful in **disseminated and late** disease, where sensitivity is high and a negative argues meaningfully against Lyme. For neuroborreliosis, paired serum and CSF antibody testing: for Lyme arthritis, serology is almost always strongly positive.

⚠ TWO WAYS IT MISLEADS

(1) It CANNOT be a test of cure. Antibodies persist for **years** after successful treatment, so repeating titers to confirm eradication generates confusion and unnecessary re-treatment. Do not order it for that. **(2) Do not screen non-specific fatigue in a low-prevalence setting.** With low pretest probability **most positives will be false**, and a false-positive attaches a durable, hard-to-remove label to the patient - which is how people end up on months of unnecessary antibiotics.

References: IDSA / AAN / ACR 2020 clinical practice guidelines for the prevention, diagnosis and treatment of Lyme disease · Wormser GP, *N Engl J Med*
2001 (two randomized trials of prolonged antibiotic therapy for persistent symptoms) · PLEASE trial, Berende et al., *N Engl J Med*
2016 (longer-term therapy for symptoms attributed to Lyme disease).

Educational aid; verify against current guidance, local epidemiology and patient factors.