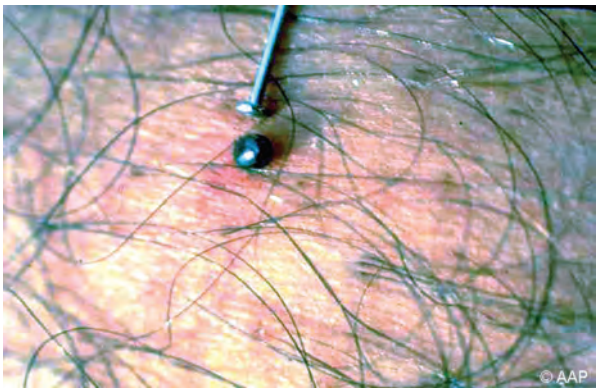
Lyme Disease (and Other Tick-borne Diseases)

What is Lyme disease?

An infection caused by a type of bacteria called a *spirochete* that is transmitted when particular types of ticks attach to a person's skin and feed on that person's blood. These ticks are very small—only a few millimeters (about the size of a freckle). The ticks that transit Lyme disease are found mainly in 3 areas of the United States: in the New England and eastern mid-Atlantic regions, in the upper Midwest, and on the West Coast. Also, they are seen in Europe, China, Japan, Canada, and in the countries that were part of the former Soviet Union. In the United States, the spirochete causing Lyme disease is called *Borrelia burgdorferi*.



AAP, COURTESY OF GEORGES PETER, MD

Child with a deer tick attached to skin (compared with the head of a sewing pin)

What are the signs or symptoms?

- Gradually expanding, large, circular or oval-shaped skin lesion (rash) with central clearing that appears after a tick bite. The individual lesion gets very large—usually 5 cm or greater in size. This lesion is present in children with early Lyme disease.
- Fever.
- Headache.
- Mild neck stiffness.
- Flu-like signs or symptoms.
- Inability to move some of the muscles in the face (facial palsy).
- Untreated Lyme disease usually resolves by itself, but a few infected people develop late Lyme disease with arthritis, neurologic problems, or meningitis.

What are the incubation and contagious periods?

- Incubation period: 1 to 32 days (usually around 11 days) from tick bite to appearance of rash.
- Contagious period: Lyme disease is not contagious except through blood transfusions or organ donation.

How is it spread?

When infected ticks attach to and feed on humans long enough (minimum of 36 hours)

How do you control it?

- Avoid tick habitats (eg, tall grassy areas, bushes, wooded areas) if possible. Walk in the center of trails to limit brushing against trees, bushes, and high grasses.
- If children will be in tick-infested areas, dress them with hats, light-colored clothing, long sleeves, long pants tucked into socks, and closed shoes.
- Spray permethrin on clothing to prevent tick attachment. Apply the spray to the clothing when it is off the child in a well-ventilated area outdoors. Be sure to let the sprayed clothing dry before anyone wears it. Permethrin should not be applied directly to skin. Some clothing comes from the manufacturer permethrin treated. Permethrin-treated clothing offers better protection against ticks than diethyltoluamide (DEET) applied to the skin. DEET offers better protection than permethrin against mosquitoes.
- DEET may be applied to exposed skin according to Centers for Disease Control and Prevention (CDC) instructions (www.cdc.gov/westnile/faq/repellent.html) and the US Environmental Protection Agency (EPA) (www.epa.gov/insect-repellents/deet).
- DEET is safe when used according to the instructions on the product label. Be careful not to get it into the eyes or mouth because it can irritate these tissues. DEET is available in different concentrations. The concentration determines the length of time DEET will provide protection. Products with less than 10% active ingredient may only offer protection for 1 to 2 hours. Newer formulations of DEET that offer sustained-release or controlled-release (microencapsulated) formulations, even with lower active-ingredient concentrations, may provide longer protection times, up to 12 hours. Concentrations of

DEET above 50% do not offer much more protection time than those that contain 50% DEET. The CDC recommends using products containing 20% to 30% DEET on exposed skin to reduce biting by ticks that may spread disease.

- Products that combine DEET with sunscreen should not be used. Sunscreens need to be reapplied at least every 2 hours because they can be washed off by water play or sweating. Repeated application may increase the potential toxic effects of DEET.
  - Apply DEET sparingly on exposed skin; do not use under clothing. If repellent is applied to clothing, wash or dry-clean treated clothing before wearing again.
  - Do not use DEET on the hands of young children; avoid applying to areas around the eyes and mouth.
  - Do not use DEET over cuts, wounds, or irritated skin. Wash treated skin with soap and water after returning indoors; wash treated clothing.
  - Avoid spraying in enclosed areas; do not use DEET near food.
  - According to the EPA, there is no age restriction for DEET use. For infants and young children, use of products with the lowest effective DEET concentrations (ie, between 20% and 30%) seems most prudent. For infants and young children, DEET should be applied sparingly—preferably applied to clothing when possible. If DEET is used on the skin of infants and young children, it should be applied as a very small amount to exposed skin and only to skin children cannot put into their mouths.
  - Obtain written permission from the parent/guardian to use tick repellent and follow the instructions on the label. A pediatric health professional note is not required.
- Picaridin (also known as icaridin) is a repellent that will not damage certain fabrics and plastics that are stained by DEET. Picaridin products have a similar protection time to DEET of 2 to 12 hours.
- Lyme disease is treatable with antibiotics.

What are the roles of the educator and the family?

- Locate play areas away from heavily treed areas. Keep play areas mowed, leaves raked, and underbrush cleared. Put a barrier of dry wood chips or gravel between play areas and heavily treed areas to separate people from the bushes and tree leaves where ticks wait for a warm body to come by.

RICHARD F. JACOBS, MD

Rash of Lyme disease. The rash of erythema migrans in a 4-year-old with infection caused by *Borrelia burgdorferi*.

- Inspect children's skin and scalps after possible tick exposure. Tick checks should occur right after a possible exposure to an area that might have ticks. The sooner the ticks are removed, the better.
  - How to inspect for ticks: Look for these small insects on outer clothing. Then check the child's skin. If the outer clothing has ticks on it, the ticks can be killed by putting the clothing in a dryer on high heat for an hour. Ticks seek warm areas of the body to attach and get a blood meal. Inspect the scalp, the neck, behind the ears, and areas where clothing is closely held against the skin, like the sock and belt lines, armpits, and groin. Ticks are small before they feed but become as large as a kernel of corn when full of blood.
  - Removing ticks: Grasp the tick with tweezers close to the skin and use steady gentle traction without any twisting motion. Avoid crushing the tick or pulling too quickly so that none of the germ-containing insides or mouth parts are left behind. If fingers are used to remove ticks, protect the skin of the person removing the tick with facial tissue or cloth. After the tick is removed, thoroughly wash the bite area and the hands of anyone who might have touched the tick.
- Be sure to tell parents/guardians that the child has had a tick bite. Saving the tick for testing or identification is not recommended.

Exclude from educational setting?

No, unless

- The child is ill with a tick-borne disease, is unable to participate, and staff members determine they cannot care for the child without compromising their ability to care for the health and safety of the other children in the group.
- The child meets other exclusion criteria (see Conditions Requiring Temporary Exclusion in Chapter 4).

Readmit to educational setting?

Yes, when all the following criteria are met:

When exclusion criteria are resolved, the child is able to participate, and staff members determine they can care for the child without compromising their ability to care for the health and safety of the other children in the group

Other Tick-borne Diseases

Different types of ticks can transmit other diseases. They tend to be area specific and known to public health authorities in the local area. Tick-borne diseases may be caused by parasites, bacteria, or viruses the tick puts into a bite wound as it feeds. Control measures and exclusion and readmission criteria are the same for these tick-borne diseases as for Lyme disease. Infected individuals may not be aware of a recent tick bite.

Some of the following conditions are caused by bacteria and are treatable with antibiotics:

- Rocky Mountain spotted fever
  - Signs or symptoms: Severe headache, fever, muscle aches, nausea, vomiting, and a red, bumpy rash that begins on wrists and ankles and proceeds toward the center of the body. The illness may be severe or fatal in some cases.
  - Occurs more commonly than in the rest of the United States in these areas: along the Atlantic seaboard as far north as New Jersey and Pennsylvania and in the southeastern and south-central regions of the United States.
  - Incubation period: 2 to 14 days (average 1 week) after bite from dog tick or wood tick.
- Ehrlichiosis
  - Signs or symptoms: Similar to Rocky Mountain spotted fever, except the rash is less common. Less severe than Rocky Mountain spotted fever.
  - Occurs primarily in the southeastern and south-central regions of the United States, but occasionally may occur in other regions.
  - Incubation period: 5 to 14 days after bite from deer tick or lone star tick.
- Anaplasmosis
  - Signs or symptoms: Similar to Rocky Mountain spotted fever and ehrlichiosis, except rash is less common and disease is less severe
  - Occurs primarily in upper Midwest and northeastern United States, as well as northern California
  - Incubation period: 5 to 21 days after black-legged (deer) tick bite
- Tularemia
  - Signs or symptoms: Fever, chills, muscle aches, and headache. May involve painful bite site with swollen and draining lymph nodes; can also cause respiratory disease.
  - Occurs from tick or wild animal contact; handling dead animals, most commonly rabbits; ingestion of contaminated water or inadequately cooked meat; and other means (eg, it is considered by the CDC to be a bioterrorism agent).
  - Incubation period: Usually 3 to 5 days (range, 1–21 days) from exposure to the bacteria.
- Babesiosis (caused by a single-celled organism with a nucleus)
  - Signs or symptoms: Fever, chills or sweats, muscle or joint aches, and nausea or vomiting. Anemia may be severe, and disease can last for weeks or months.
  - Transmitted by the deer tick.
  - Incubation period: 1 to 5 weeks following tick bite.

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