October 9, 2012

Lyme Disease Fact Sheet

1. **What is Lyme Disease? -** Lyme Disease (LD) is a tick-borne zoonosis (a disease shared between animals and people) caused by infection with the spirochete, *Borrelia burgdorferi* that is transmitted to people through the bite of an infected tick. *Ixodes scapularis* (the blacklegged or deer tick) is the type of tick that carries LD in Pennsylvania. The number of annually reported cases of LD in the United States has increased about 25-fold since reporting began in 1982. In the United States, the disease is mostly localized to the northeastern, mid-Atlantic, and upper Midwest regions, and in northwestern California. Close to 4,000 LD cases have been reported annually in Pennsylvania with the highest incidence of disease being located in the south eastern parts of the state.

2. **How serious is it? -** LD is a multi-system, multi-stage, inflammatory illness. In its early stages, the disease is readily cured with oral antibiotics; however, untreated or inadequately treated infection may progress to late-stage arthritic or nervous system complications requiring more intensive therapy.

3. **What are the symptoms of LD**? - LD most often presents with a characteristic bulls-eye rash, Erythema Migrans (EM), accompanied by nonspecific symptoms such as fever, malaise, fatigue, headache, muscle aches and joint pain. The incubation period, the time from infection to onset of EM, is typically 7 to 14 days but may be as short as 3 days and as long as 30 days. EM is observed in 85% or more of patients with early symptomatic infection; however, some infected individuals have no recognized illness, or have only non-specific symptoms suggesting viral illness, such as fever, headache, fatigue, and muscle aches.

4. **How can LD be prevented**? - The first line of defense against LD and any other tick-borne illnesses is avoidance of tick infested habitats, and proper use of personal protective measures such as repellents and protective clothing, and checking for and removing attached ticks. Early diagnosis and treatment of LD prevents late-stage complications.

5. **Is there a LD vaccine**? - A human LD vaccine (LYMErix™, SmithKline Beecham Pharmaceuticals) was licensed in 1998. In February 2002, LYMErix™ was removed from the market. Since that time there is no LD vaccine available to prevent the disease.

6. **How do the LD bacteria cause disease?**

    a. LD bacteria spread from the site of the tick bite by skin, lymphatic and blood-borne routes. The signs of early disseminated infection usually occur days to weeks after the appearance of an EM lesion. In addition to multiple (secondary) EM lesions, early disseminated infection may be manifest as disease of the nervous system, the musculoskeletal system, or the heart. Nervous symptom manifestations include lymphocytic meningitis (inflammation of the fluid covering the brain or spinal cord), cranial neuropathy (especially facial nerve palsy), and inflammation of the nerves. Musculoskeletal manifestations may include migratory joint and muscle pains with or

without objective signs of joint swelling. Cardiac manifestations are rare but may include transient heart rhythm disturbances.

b. *Borrelia burgdorferi* infection in the untreated patient may progress to late disseminated disease weeks to months after infection. The most common manifestation of late disseminated LD is intermittent arthritis of one or a few joints, usually large, weight-bearing joints such as the knee. Less frequently, patients develop chronic axonal polyneuropathy, or encephalopathy, the latter manifested by subtle thought disturbances, sleep disturbance, fatigue, and personality changes. LD morbidity may be severe, chronic and disabling, especially if the disease is treated late. An ill-defined post-LD syndrome occurs in some persons following treatment. LD is rarely, if ever, fatal.

7. **How is LD diagnosed?** – LD is diagnosed based on symptoms, objective findings (such as EM, facial palsy, or arthritis), and a history of possible exposure to infected ticks. Blood tests are also performed to detect the body's immune response to the infection. Not all patients with LD will develop the characteristic bulls-eye rash (EM), and many may not recall a tick bite.

8. **How is LD treated?** – The consequences of LD can be significantly reduced by detecting and treating the infection in its early stages with standard antibiotic regimens, since early and correct treatment almost always results in a prompt and uncomplicated cure. Early and uncomplicated infection, including infection presenting with isolated cranial nerve palsy, almost always responds satisfactorily to treatment with orally administered antibiotics. Intravenous antibiotics are generally recommended for treating meningitis, later stage neurologic LD, and complicated LD arthritis. Late, complicated LD may respond slowly or incompletely, and more than one antibiotic treatment course may sometimes be required to eliminate active infection. A minority of patients have persistent or recurrent symptoms following appropriate antibiotic therapy. These symptoms may be due to causes other than persisting infection.

9. **Who is at most risk of becoming infected?**

a. Season: An individual's risk of developing LD depends on each person's likelihood of being bitten by tick vectors infected with *B. burgdorferi*. This likelihood is primarily determined by the density of vector ticks in the environment (which varies by place and season), the prevalence of *B. burgdorferi* infection in vector ticks, and by the extent of person-tick contact, which is related to the type, frequency, and duration of a person's activities in a tick infested environment.

b. Location: Most *B. burgdorferi* infections are thought to result from exposure to ticks around the home during property maintenance, recreation, and leisure activities. Thus, individuals who live or work in residential areas surrounded by woods or overgrown brush infested by vector ticks are at risk of getting LD.

c. Activities: In addition, persons who participate in recreational activities away from home such as hiking, camping, fishing and hunting in tick habitat, and persons who engage in

outdoor occupations, such as landscaping, brush clearing, forestry, and wildlife and parks management in endemic areas may also be at risk of getting LD. When in highly endemic areas, individuals can reduce their risk of LD by avoiding tick infested habitat. If exposure to tick infected habitat cannot be avoided, individuals may reduce their risk of infection by applying repellents, wearing protective clothing, and regularly checking for and removing attached ticks.

10. **What risk assessment data is available for Pennsylvania?**

    a. An assessment of risk should first consider the geographical distribution of LD. The areas of highest LD risk in the United States are concentrated within a few northeastern and north-central states. The risk of LD differs greatly not only between regions, states and counties, but even within counties and townships. There is often insufficient data available at the State level to make these risk determinations at the local level. Therefore, this fact sheet treats the risk within any particular county as uniform. Local health departments may have access to more detailed information about the distribution of LD risk within a given county. In those cases, the local risk assessments should be used rather than the cruder county-level assessments in this document. A classification of overall LD risk for the counties in Pennsylvania is shown in Figure 2 and Table 1 (Please click on "More on PA Lyme Disease below).

    b. The second step in determining LD risk is to assess the individual's activities. High risk activities are those that involve frequent or prolonged exposure to the habitat of infected ticks at times of the year when the nymphal stages of these ticks are actively seeking hosts (April—July). Typical habitats of *Ixodes* ticks are wooded, brushy, or overgrown grassy areas that are favorable for deer and the tick's rodent hosts. Various recreational, property maintenance, occupational or leisure pursuits that are carried out in tick habitat may be high-risk activities.

11. **What protective actions should I take to prevent LD?**

    a. Anyone bitten by a tick should watch the area where the tick was attached for the next month or so. If a rash develops at the site from which the tick was removed, or if an EM like rash develops elsewhere on the body at any time, consult a physician. If a physician diagnoses EM, antibiotics should be prescribed to treat early LD. LD is nearly always cured by a 10-day to two-week course of oral antibiotics when appropriately treated at this stage (when the rash appears).

    b. The risk of being bitten by an infected tick can be decreased by using the following precautions:

        (1) Use insect repellent containing low concentrations (10 to 30%) of diethyltoluamide (DEET) on clothing and exposed skin (not face):

            (a) Apply DEET sparingly on exposed skin; do not use under clothing.

(b) Do not use DEET on the hands of young children; avoid applying to areas around the eyes and mouth.

(c) Do not use DEET over cuts, wounds or irritated skin. Wash treated skin with soap and water after returning indoors; wash treated clothing.

(d) Avoid spraying in enclosed areas; do not use DEET near food.

(2) Avoid tick-infested areas;

(3) Wear light colored clothing so ticks can be spotted more easily;

(4) Tuck pant legs into socks or boots, and shirts into pants;

(5) Tape the areas where pants and socks meet;

(6) Wear a hat, long sleeved shirt, and long pants for added protection;

(7) Walk in the center of trails to avoid overhanging brush; and

(8) Check yourself, family members and pets for ticks after leaving potentially tick infested areas and promptly remove any ticks detected.

12. **What should I do if I find a tick? -** If you find a tick attached to your skin, there is no need to panic. There are several tick removal devices on the market, but a plain set of fine-tipped tweezers will remove a tick quite effectively. Prompt and proper tick removal is very important for preventing possible disease transmission.

(Please see http://www.cdc.gov/ticks/removing_a_tick.html)

(1) Use fine-tipped tweezers and protect your fingers with a tissue, paper towel, or latex gloves. Avoid removing ticks with your bare hands.

(2) Grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure. Don't twist or jerk the tick; this can cause the mouth-parts to break off and remain in the skin. If this happens, remove the mouth-parts with tweezers. If you are unable to remove the mouth easily with clean tweezers, leave it alone and let the skin heal.

(3) After removing the tick, thoroughly disinfect the bite and your hands with rubbing alcohol, an iodine scrub, or soap and water.

(4) Avoid folklore remedies such as "painting" the tick with nail polish or petroleum jelly, or using heat to make the tick detach from the skin. Your goal is to remove the tick as quickly as possible--not waiting for it to detach.

13. **How can I create a tick-safe zone around my house?**

a. Use landscaping techniques to create a tick-safe zone around homes, parks, and recreational areas. The ticks that transmit LD thrive in humid wooded areas, and quickly die in sunny dry areas. Here are some simple landscaping techniques to help reduce tick populations.

(1) Remove leaf litter and clear tall grasses and brush around homes and edges of lawns.

(2) Place wood chips or gravel between lawns and wooded areas to restrict tick migration to recreational areas.

(3) Mow the lawn and clear brush and leaf litter frequently.

(4) Keep the ground under bird feeders clean.

(5) Stack wood neatly and in dry areas.

(6) Keep playground equipment, decks and patios away from yard edges and trees.

(7) Ticks that transmit LD can be found on deer, therefore:

(a) Do not feed deer on your property.

(b) Construct physical barriers to discourage deer from entering your yard.

(c) Check with garden centers, nurseries, or local extension agents to learn about deer-resistant plants.

(8) Bait boxes that treat wild rodents with acaracide (insecticide that kills ticks) are available for home use. Properly used, these boxes have been shown to reduce ticks around homes by more than 50%. The treatment is similar to control fleas and ticks on pets.

14. **For more information:**

a. CDC Lyme Disease Site

b. More on PA Lyme Disease

c. Lyme Disease Cases & Incidence Reported In PA By County

This fact sheet provides general information. Please contact your physician and/or veterinarian for specific clinical information related to you or your animal.