



# Ticks and Tick Borne Illnesses

Bug Of The Month June 2014



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# Vector-borne Disease

- Ticks live in and around wooded areas
- They get infected when they feed on mice, squirrels, birds and other small animals that can carry bacteria
- Ticks then spread the bacterium to humans through a bite, causing disease
- Tick bites are usually painless
- Most people do not know that they have been bitten
- People and pets can pick up ticks by brushing against vegetation like grass, shrubs and leaf litter

# Ticks

- Ticks can pass diseases on to humans through bites (Ex. Lyme disease, Anaplasmosis, Tularemia, etc.)
- Two types of ticks are responsible for the spread of Lyme disease in Canada:
  1. The **western blacklegged tick** in British Columbia *Ixodes pacificus*
  2. The **blacklegged tick** *Ixodes scapularis* in other parts of Canada (including Saskatchewan)
- Sometimes called **deer ticks**
- These species are different than the common dog tick *Dermacentor variabilis* (often called wood ticks)
- Small biting arachnids (related to scorpions, spiders and mites) that feed on blood
- Before feeding, adult females are approximately 3-5 mm in length and red - dark brown in colour
- Feed on blood by attaching to animals and people with their mouth parts

# Ticks

- Females are larger than males and when they're full of blood they can be as big as a grape
- Males never expand in size because they do not engorge on blood
- Larvae and nymphs (the juvenile life stages) are smaller and when unfed are lighter in colour than adult ticks
- Blacklegged ticks are smaller than the more common dog/wood tick
- Dog/wood ticks have white markings on their backs while blacklegged ticks do not
- Dog/wood ticks do not transmit the Lyme disease bacteria
- Active from early spring to September

# General Overview – Lyme Disease

- Caused by bacteria *Borrelia burgdorferi*
- Most common vector-borne disease in the temperate zone and occurs in Europe, Asia, and throughout much of North America
- Spread by the bites of certain tick species
- In Saskatchewan, risk is low but not zero

# Blacklegged Ticks

- No white markings on back



Female blacklegged ticks in various stages of feeding. From <http://www.phac-aspc.gc.ca/id-mi/lyme-fs-eng.php#s1>

# Dog (Wood) Ticks

- White markings on back



*Dermacentor variabilis* (dog tick) Female & Male.  
Thanks to J. Occl

<http://www.lymediseaseassociation.org/index.php/about-lyme/tick-vectors/photos>

# Blacklegged Tick

**-NO WHITE MARKINGS on back**

**-SMALLER than a dog tick**



*(L-Top to bottom) Female and male adult American dog ticks; (On Stamp) 2 Nymph deer ticks; (R-Top to bottom) Adult female and adult male deer ticks. (Photo: James Occi, MA, MS)*



*(On paper clip) Adult female American dog tick; (Inside paper clip L-R) Adult male, adult female, 2 nymph deer ticks. (Photo: James Occi, MA, MS)*

# Engorged Blacklegged Ticks



*(L) Three fully engorged, one partially engorged, one unengorged female deer ticks. (Photo: James Occi, MA, MS)*

# In Canada...

- Populations of infected ticks are established in parts of southern Ontario, the southeastern corner of Manitoba, areas along the south shore of Nova Scotia and in BC
- Blacklegged ticks can be found in many parts of Canada, even where tick populations have not been identified
- These ticks are likely introduced into these areas by migratory birds and about 10% of these “bird-borne” ticks are infected with the Lyme disease bacterium
- No established colonies of blacklegged ticks in Saskatchewan as of spring 2012
- 2 cases of Lyme Disease in SK since 2011, 1 endemic, 1 travel related
- In 2009, Lyme disease became a nationally reportable disease
  - 2009: 128 cases
  - 2010: 132 cases
  - 2011: 258 cases
  - 2012: 315 cases
  - 2013: The Public Health Agency of Canada is still validating reports from provinces and territories. However, it is anticipated that over 500 cases were reported in Canada in 2013.

# Surveillance & Testing

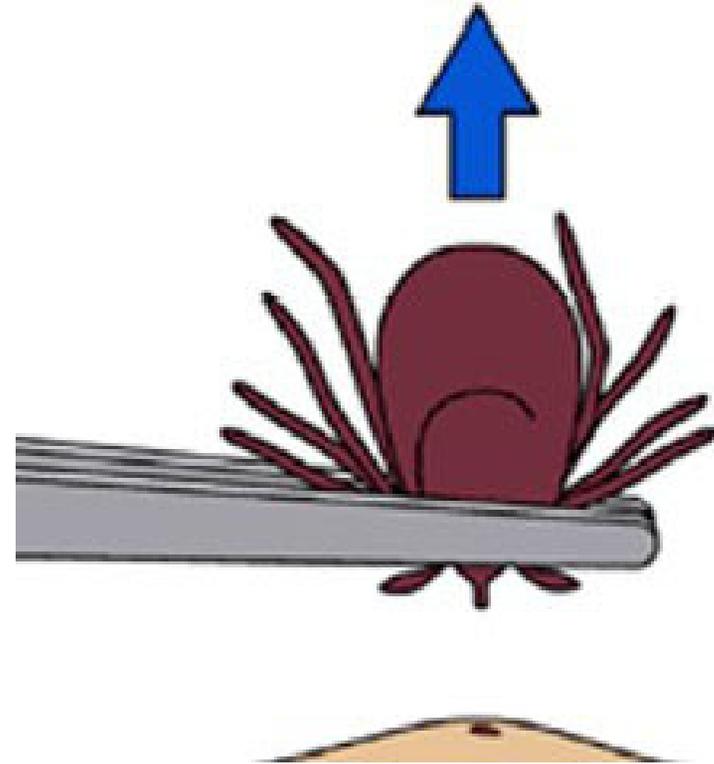
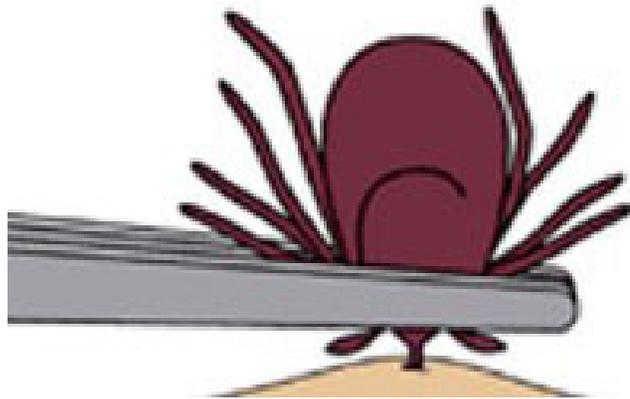
- When possible, ticks should be sent to provincial collaborators for identification who then forward only the blacklegged ticks to the Agency's National Microbiology Laboratory
- Most ticks submitted are dog ticks (>97%)
  - 0.3% are blacklegged ticks
- Blacklegged ticks are tested for *Borrelia burgdorferi* as well as *Anaplasma phagocytophilum* a bacteria that causes Anaplasmosis
- Blacklegged tick from the Qu'Appelle area tested positive for both organisms in the fall of 2013

# Tick Bites

- Both adults and nymphs will bite
- To transmit the disease, the tick must have its mouth parts in the skin for at least 24 hours
- Use fine-tipped tweezers to grasp the tick as close to the skin's surface as possible
- 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.
- After removing the tick, thoroughly clean the bite area and your hands with rubbing alcohol, an iodine scrub, or soap and water
- 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.**

# Tick Removal



# Tick Bites

- If possible, note the date of the tick bite and save the tick
- Contact a doctor immediately if you develop symptoms of Lyme disease, especially when you have been in an area where blacklegged ticks are found
- If you have saved a tick that you found on your body, bring it with you when you visit the doctor
- The incubation period is typically 7-14 days, but can be up to 30 days

# Specimen Collection for Testing

- Once removed, transfer the tick to a collection vial or small container with lid
- Avoid handling ticks with bare hands
- Use disposable gloves, paper towel or tweezers when transferring ticks to the collection vials
- After handling ticks, discard gloves and paper towel and wash hands and tweezers thoroughly

# Collection Containers

Collection vials can be obtained from SDCL:

- They have a yellow top, a spoon and filter paper (labeled “fecal collector”)
- They can be used for unfed and fed specimens.
- For same location or animal you can put more than one tick into the tube.
- To enhance survival of ticks strips of filter paper (1.5 X 10 cm) moistened with tap water must be placed in each collection vial to maintain a humid environment
- Submission form also to accompany specimen

# Labelling of containers

- Collection vials should be clearly labeled using a permanent marker with at least the collector's or submitter's name, specimen ID number, the location and date the tick was collected and type of host the tick was removed from (For example, John Doe, Estevan, Saskatchewan, July 1, 2014, host - dog)
- When ticks are removed from pets (i.e., dogs and cats or livestock) include: pet's name, approximate age, breed, and owner's last name, and the village, town or city where the animal resides.
- For ticks removed from people or pets also indicate whether there was a history of travel in the two weeks prior to discovery of the tick. Provide the specific localities visited (e.g., camping trip to Lyme, Connecticut) when a history of travel occurs
- Submission Form: Passive Surveillance for Blacklegged Ticks Form should accompany each specimen. The specimen identification number and name of the person submitting the specimen will tie the specimen to the report.

# Specimen Storage

- Prior to shipment, ticks (live or dead) can be temporarily stored within the collection vial for 7 to 10 days in a refrigerator
- If tick appears to be dead, based on a lack of movement, or they cannot be shipped for several weeks, they can be stored in a freezer
- If one does not have access to a refrigerator or freezer for several days, ticks in collection vials should retain their quality at room or out-door temperatures
  - However, consider placing ticks in 70% alcohol (isopropyl or rubbing alcohol is suitable) if they have to be maintained at room temperatures for longer than 5 days
  - Storage in alcohol should not affect the ability to test submitted ticks for disease-causing agents
- Regardless of the method of storage, collection vials can be shipped without any further preservatives such as cold packs or dry ice

# Mailing Instructions

- Return the yellow top collection vials with specimen(s) to the Saskatchewan Disease Control Laboratory (SDCL).
- Use the tote system for sending regular specimens.
- Enclose data sheets in a plastic bag and place them inside the tote. If giving the container to the public have them return the container to your district public health office to send back to the SDCL.
- SDCL will identify dog ticks (*Dermacentor variabilis*) and forward other tick specimens to the National Microbiology Laboratory reference laboratory for analysis.

# Diagnoses

- Lyme disease symptoms are similar to symptoms of other illnesses, so diagnosing it correctly usually involves:
  - the doctor's assessment of the patient's symptoms;
  - evidence or history that the patient could have encountered blacklegged ticks which carry Lyme disease; and,
  - the results of laboratory testing.
- Blood tests may be negative in patients with early Lyme disease or in patients who have had antibiotic treatment. This should be taken into consideration during diagnosis. However, the accuracy of blood tests becomes more reliable as the infection progresses.
- Labs use two-tiered testing method which includes an ELISA screening test followed by a confirmatory Western blot test (both tests detects the presence of antibodies to *Borrelia burgdorferi*)
- Blood testing is available for Lyme disease through the Saskatchewan Disease Control Laboratory (SCDL)

# Symptoms – Stage 1

- The first sign of infection is usually an expanding rash called erythema migrans (EM). This rash occurs in about 70-80% of infected people. It often begins at the site of the tick bite after a delay of three days to one month and can persist for up to eight weeks.
- Typical signs of skin irritation such as itchiness, scaling, pain, swelling, or exudation are not normally associated with EM

Common symptoms include:

-fatigue;

-chills;

-fever;

-headache;

-muscle and joint pain;

-swollen lymph nodes

# Erythema Migrans (EM)



Often, the first sign that you've got Lyme disease is a circular rash called erythema migrans (EM), at the site of a tick bite, as shown here on this woman's upper arm.

From <http://www.phac-aspc.gc.ca/id-mi/lyme-fs-eng.php#s1>

# Symptoms – Stage 2

- If untreated, the 2nd stage of the disease, known as disseminated Lyme disease, can last up to several months and the symptoms include:
- central (ex. meningitis) and peripheral (ex. facial nerve paralysis) nervous system disorders;
- multiple skin rashes;
- arthritis and arthritic symptoms;
- heart palpitations; and
- extreme fatigue and general weakness

# Symptoms – Stage 3

- If the disease remains untreated, the 3rd stage can last months to years with symptoms that can include recurring arthritis and neurological problems
- Fatalities from Lyme disease are very rare

# Post-Treatment Lyme Disease Syndrome (PTLDS)

- Approximately 10 to 20% of patients have lingering symptoms of fatigue, pain, or joint and muscle aches
- In some cases, these can last for more than six months
- The exact cause of PTLDS is not yet known
- Most medical experts believe that the lingering symptoms are the result of residual damage to tissues and the immune system that occurred during the infection
- Indistinguishable from chronic fatigue syndrome and fibromyalgia

# Treatment

- Usually treated effectively with antibiotics
- The sooner treatments start, the better
- Most cases can be cured with a two to four week treatment of doxycycline, amoxicillin, or ceftriaxone
- People with certain neurological or cardiac problems may require intravenous treatment with penicillin or ceftriaxone
- Patients diagnosed in the later stages of the disease can have persistent or recurrent symptoms requiring a longer course, up to eight weeks maximum, of antibiotic treatment

# Transmission

- Dogs and cats can contract Lyme disease
  - there is no evidence that they can spread the infection directly to people
  - pets can carry infected ticks into homes and yards
- People can't spread Lyme disease to each other
  - no evidence that Lyme disease can be directly transmitted from person to person through sexual or other common forms of human contact
  - there isn't a licensed test for screening blood donors for Lyme disease; there is a theoretical risk, but infection in humans has never been linked to a blood transfusion
- Lyme disease can not be spread by butchering or eating deer meat or organs

# Precautions – Avoiding Bites

- If there are blacklegged ticks in your area, cover up if you think you might be exposed to them.
  - wear closed-toe shoes, long-sleeved shirts, pants, and a hat when outdoors.
  - pulling your socks over your pant legs prevents ticks crawling up your legs.
  - light coloured clothing makes spotting ticks easier.
- Use insect repellents that contain DEET. Repellents can be applied to clothing as well as exposed skin. Always read and follow label directions.
  - Insect repellents containing DEET alternatives (lemon eucalyptus oil, soybean oil, citronella etc.) do not provide protection from ticks.
- Stay on paths/trails and avoid tall brush
- Shower or bathe within two hours of being outdoors
- Daily “full body” checks for ticks should be performed: ticks attach themselves to the skin so they can be found and removed, which usually prevents infection if this is done early enough (within 24-28 hours)
- Be sure to check children and pets for ticks

# Precautions – Reducing Tick Habitats

- Within the lawn, most of the ticks are located within 3 metres of the lawn perimeter particularly along woodlands, stonewalls, or ornamental plantings
- Keep the grass mowed
- Remove leaf litter, brush and weeds at the edge of the lawn
- Restrict the use of ground cover in areas frequented by the family or pets
- Remove brush and leaves around stonewalls and woodpiles
- Discourage rodent activity, clean up and seal stonewalls and small openings around the home
- Move firewood piles and bird feeders away from the house

# Precautions – Reducing Tick Habitats

- Keep dogs and cats out of the woods or tall grass
- Move children's swing sets and sand boxes away from the woodland edge and place them on a wood chip or mulch foundation
- Trim tree branches and shrubs around the lawn edge to let in more sunlight
- Adopt hard landscape and xeriscape (drier or less water demanding) landscape practices
- Create 3 meter or wider wood chip, mulch or gravel border between lawn and woods or stonewalls
- Consider decking, tile, gravel and border or container plantings on areas nearest the house or frequently travelled
- Widen woodland trails
- Use plantings that do not attract deer or exclude deer by fencing
- Consider a least-toxic pesticide application as a targeted barrier treatment

# What To Do If You Think You Have Lyme Disease

- If you have a history of tick bite, symptoms of Lyme disease, and have traveled to an area where Lyme disease ticks are established sometimes your physician may recommend treatment even before test results are available.
- If you have not traveled outside Saskatchewan, usually it is preferable to wait for the results of testing through the Saskatchewan Disease Control Laboratory (SCDL) as there can be other causes for these common symptoms.

# Addressing Lyme Disease

- The Public Health Agency of Canada is committed to working with provincial health authorities and other partners to address the risks to Canadians posed by Lyme disease through a number of activities:
- Enhanced national surveillance to improve the current data of where the disease is emerging and where populations are at risk;
- Collaboration with family practitioners to enhance their knowledge and capacity for prompt diagnosis and treatment; and
- Development of information for public health practitioners on surveillance, prevention and control.
- Public Health Agency of Canada is currently developing a national strategy

# References

1. Public Health Agency Of Canada *Lyme Disease Frequently Asked Questions* accessed May 12, 2014 <http://www.phac-aspc.gc.ca/id-mi/lyme-fs-eng.php#s1>
2. Government of Saskatchewan *Disease Prevention, Lyme Disease* accessed May 12, 2014 <http://www.health.gov.sk.ca/lyme-disease>
3. Centers for Disease Control and Prevention *Ticks* accessed May 12, 2014 [http://www.cdc.gov/ticks/removing\\_a\\_tick.html](http://www.cdc.gov/ticks/removing_a_tick.html)
4. Public Health Agency of Canada *Infectious Diseases, Lyme Disease, Surveillance* accessed May 12, 2014 <http://www.phac-aspc.gc.ca/id-mi/lyme/surveillance-eng.php>
5. Government of Saskatchewan *Communicable Disease Control Manual, Section 4, Lyme Disease* accessed May 12, 2014 <http://www.health.gov.sk.ca/communicable-disease-control-manual>
6. Saskatchewan Ministry of Health Zoonotic Disease Consultant
7. Centers for Disease Control and Prevention *Tickborne Diseases of the U.S.* accessed May 12, 2014 <http://www.cdc.gov/ticks/diseases/>
8. Public Health Agency of Canada *Ticks and Lyme Disease Guidelines for Removal and Submission of Ticks for Identification and Possible Screening for Disease-causing Agents* accessed May 12, 2014 <http://www.phac-aspc.gc.ca/id-mi/guide-dir-ti-eng.php>