



NEW YORK CITY DEPARTMENT OF  
HEALTH AND MENTAL HYGIENE  
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Commissioner

## 2010 DOHMH Advisory #7: Tick-borne Disease Advisory June 9, 2010

- During the spring, summer and fall, DOHMH reminds New York City (NYC) clinicians to be on the alert for and report tick-borne diseases, including Lyme disease, Rocky Mountain spotted fever (RMSF), babesiosis, ehrlichiosis, and anaplasmosis.
- Reports of Lyme disease and babesiosis in NYC residents have been gradually increasing in recent years. This alert provides important information for providers based on recent surveillance data:
  - RMSF continues to be locally-transmitted in NYC.
  - Lyme disease, babesiosis, ehrlichiosis, and anaplasmosis are associated primarily with travel outside of NYC.
  - In 2009, there was a rise in the number of cases of Lyme disease and babesiosis.
  - Visit our website at <http://www.nyc.gov/html/doh/html/ehs/ehstick.shtml> for more information on ticks and tick-borne diseases.

*Please share with your colleagues in Internal and Family Medicine, Pediatrics, Infectious Disease, Infection Control, Laboratory Medicine, Hematology, Cardiology, Neurology, Rheumatology, Critical Care and Emergency Medicine:*

Dear Colleagues,

From June through October, NYC clinicians should be on the alert for tick-borne diseases (Figure 1). Reports of Lyme disease and babesiosis have been gradually increasing in recent years (Figure 2), due in part to improved electronic laboratory reporting, as well as increased testing and real increases in incidence. This alert presents key epidemiologic findings regarding reportable tick-borne diseases in NYC, and reminds health care providers of laboratory diagnostics and reporting requirements for these diseases.

### **Tick-borne diseases reportable in NYC include**

1. **Lyme disease:** caused by the bacterium *Borrelia burgdorferi*
2. **Anaplasmosis:** caused by the bacterium *Anaplasma phagocytophilum*
3. **Ehrlichiosis (Human Monocytic):** caused by the bacterium *Ehrlichia chaffeensis*
4. **Rocky Mountain spotted fever:** caused by the bacterium *Rickettsia rickettsii*
5. **Babesiosis:** caused by the parasite *Babesia microti* in the United States

The most common tick-borne disease affecting New Yorkers is Lyme disease (LD), but cases of Rocky Mountain spotted fever (RMSF), babesiosis, anaplasmosis (human granulocytic anaplasmosis or HGA) and ehrlichiosis (human monocytic ehrlichiosis or HME) also occur every year (Table 1). Of these, only RMSF is known to be transmitted within all five boroughs of NYC; providers should consider and test for this infection in patients with compatible syndromes even in the absence of a travel history. For all patients with suspected tick-borne disease, a good travel history is critical. Recent travel to upstate New York, Long Island, Connecticut, Massachusetts, Pennsylvania or Rhode Island in particular should prompt consideration

of Lyme disease, babesiosis, HGA and/or HME, and diagnostic testing should be ordered for patients with compatible clinical presentations. Only a small percent of case patients recall a tick bite: 8% (RMSF), 28% (HME), and 33% (HGA)<sup>1</sup>. A history of a tick bite is not a prerequisite for inclusion of these diseases in the differential diagnosis for patients with compatible illness.

### **Tick surveillance data**

Information on tick populations present in NYC is limited. Unpublished data from tick surveillance conducted by Fordham University in collaboration with the DOHMH in 1996 and 2001 and again by DOHMH in 2006 and 2009 are consistent with epidemiologic data from human disease surveillance.

- ***Dermacentor variabilis*** (American dog tick) is the vector for RMSF, and has been detected in great abundance in all boroughs of NYC.
- ***Ixodes scapularis*** (blacklegged tick or deer tick) is the vector for Lyme disease, babesiosis, and HGA. Based on limited data, there is no evidence that this tick is established throughout NYC, although recent surveillance suggests it may be encroaching into the northeastern section of the Bronx and the southwestern section of Staten Island. More importantly, significant numbers have been reported in counties and states surrounding NYC. Tick surveillance conducted by the New York State Department of Health (NYS DOH) identified a large increase in the number of *Ixodes scapularis* ticks collected in counties outside of NYC in both 2008 and 2009. Testing of ticks collected in the Hudson Valley, also done by the NYS DOH, found infections rates as high as 40-50% for *Borrelia burgdorferi*, 1-3% for *Babesia microti* and 7-15% for *Anaplasma phagocytophilum*. Nymphs, the tick stage responsible for most human disease, are active between May and August. Lyme disease transmission only occurs if a tick is attached for longer than 24 hours.
- ***Amblyomma americanum*** (lone star tick), is the vector for HME. Surveillance data suggest that this tick is not established in NYC.

### **Epidemiology of Tick-borne Disease in New York City**

Reports of tick-borne diseases have been rising since 2002, although in 2008 and 2009 only Lyme disease and babesiosis continued this trend. In addition, there continue to be reports of transfusion-associated babesiosis, with 6 cases identified in 2009 (there were also 5 cases in 2008). Reports of HME showed a slight increase from 2008 while reports for RMSF and HGA continued to decline since 2007 (Fig. 2). The gradual increase for some of these diseases may be attributable to electronic laboratory reporting and/or increased physician testing. The large increase in Lyme disease and babesiosis in 2009, diseases transmitted by *Ixodes scapularis*, is likely due to a true increase in the incidence of disease. This is supported by data from NYS DOH which also reported a large increase in the incidence for both diseases along with an increase in the number of *Ixodes scapularis* collected for tick surveillance. In addition, the large number of transfusion-associated cases identified in New York City in 2008 and 2009 is likely a marker for increasing incidence of the disease in the donor population.

Rates of Lyme disease, HGA, HME, and babesiosis are significantly higher in Manhattan residents than in residents of the other boroughs. This is likely due to socioeconomic factors and higher frequency of travel to endemic areas near NYC where the blacklegged tick is prevalent, or in part to testing or reporting biases. The majority of acute Lyme disease (94%), HGA and HME cases (86%) reported a history of travel during the incubation period. Patients with these diseases had traveled most commonly to upstate New York, Long Island, CT, NJ and MA, all areas with endemic Lyme disease and abundant deer ticks.<sup>2</sup>

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<sup>1</sup> Based on data collected by the DOHMH between 2005 and 2008.

<sup>2</sup> Based on data collected by the DOHMH between 2005 and 2007

In contrast, only 61% of RMSF cases reported travel<sup>3</sup>. Locally-acquired RMSF between 1995 and 2009 was reported most frequently from the boroughs of Brooklyn, the Bronx and Staten Island.

Six transfusion-associated babesiosis cases were reported in 2009, continuing the increase from previous years, first noted in 2008. All of the cases had underlying illnesses, including immunosuppressive conditions. Because these patients may have comorbidities, and the potential for infection with a multitude of pathogens, consideration of babesiosis as a possible etiology may be delayed or may not occur at all. The diagnosis may be especially obscure when onset of symptoms occurs during winter months when travel to endemic areas is less common and tick-borne illnesses are not high on providers' list of differential diagnoses. The incubation period for tick-associated babesiosis can range from 1 to 4 weeks and for transfusion-associated babesiosis, 2 to 9 weeks.

Providers are encouraged to consider babesiosis in the differential diagnosis for patients with febrile illnesses and/or hemolytic anemia who have received blood components or transplanted organs in the preceding 3 months. Highly endemic areas for *Babesia microti* in the greater New York City region include Suffolk County (especially Fire Island and Shelter Island) and portions of Connecticut and New Jersey. The 2009 Health Advisory addressing transfusion associated cases can be found online at <http://www.nyc.gov/html/doh/downloads/pdf/cd/2009/09md05.pdf>.

#### **Case Definitions and Laboratory Diagnosis of Tick-borne Diseases**

**Lyme Disease:** The presence of erythema migrans (EM) alone is sufficient to make the diagnosis of Lyme disease; confirmatory laboratory diagnostic testing is not necessary. Fewer than half of NYC patients reported in 2009 (43%) presented with the characteristic erythema migrans (EM) or target lesion. Cases with late manifestations (arthritis, carditis, or neurologic disease, for example) require laboratory confirmation. Laboratory confirmation requires demonstration of diagnostic antibodies to *B. burgdorferi* in serum or CSF. A two-test approach using a sensitive enzyme immunoassay or immunofluorescence antibody followed by the more specific Western blot is highly recommended. Testing is available through most commercial laboratories.

The DOHMH receives most reports of tick-borne diseases from diagnostic laboratories. For laboratory reported cases, it is often necessary for the Department to follow up, by telephone or mail, with the physician who ordered the test to obtain complete clinical information on the patient. For suspected Lyme disease patients, DOHMH requests that physicians complete the DOHMH Lyme Disease Supplemental Letter. Information on the patient's clinical presentation is used to determine if patients meet the CDC clinical criteria for Lyme disease.

**Babesiosis:** Diagnosis can be made by identifying ring forms (which closely resemble *Plasmodium falciparum*) and tetrad forms within red blood cells on a Giemsa or Wright stained blood smear. *Babesia* polymerase chain reaction (PCR) and serologic tests are available commercially to assist with the diagnosis. If deemed necessary, confirmatory testing, including review of blood smears and referral of specimens to the NYS DOH Wadsworth Laboratory for PCR testing is available through the NYC Public Health Laboratory. A request form must be completed for specimen submissions. Please include a brief patient history on the request form and submit a lavender top tube with stained smears. For more information, call the Microbiology Laboratory at (212) 447-6783 during business hours. Forms can be found online at [http://www.nyc.gov/html/doh/downloads/pdf/labs/lab-forms-para\\_f.pdf](http://www.nyc.gov/html/doh/downloads/pdf/labs/lab-forms-para_f.pdf).

Currently, there is no screening of the blood supply for *Babesia*. Babesiosis should also be considered in persons with a history of blood transfusion within the preceding 3 months who develop acute onset of fever and hemolytic anemia.

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<sup>3</sup> Based on data collected by the DOHMH between 2005 and 2009

**RMSF:** Diagnosis of RMSF is confirmed serologically with a fourfold rise in titer by immunofluorescent antibody (IFA). Alternatively, immunohistologic demonstration or identification of *Rickettsia rickettsii* by culture or PCR in biopsy or autopsy specimens can be confirmatory. PCR testing is not recommended for whole blood or serum specimens as low numbers of rickettsiae circulate in the blood in the absence of advanced, severe illness.

**Ehrlichiosis and Anaplasmosis:** HME is caused by *Ehrlichia chaffeensis*, an organism with a predilection for mononuclear cells. HGA, previously known as human granulocytic ehrlichiosis, is caused by *Anaplasma phagocytophilum* and primarily affects granulocytes. Diagnosis is based on detection of a fourfold rise in antibody levels by IFA. Serologic specimens should be drawn at least two weeks apart. Serology may not be helpful in the acute phase of illness and molecular methods, such as PCR, are recommended in conjunction with IFA for testing persons with recently acquired infections. PCR testing should be done on whole blood drawn during the first week of symptoms and prior to antibiotic treatment. Identification of morulae in leukocytes or culture can also be used to document infection.

### **Tick Bite Management**

- Attached ticks should be removed promptly with tweezers, ensuring that mouthparts have not been left in the skin.
- Infection at the site of a tick bite (other than erythema migrans) does not suggest an increased likelihood of exposure to a tick-borne infectious disease.
- Testing ticks for disease agents has no diagnostic value because such testing lacks sensitivity for detecting pathogens. In addition, detection of a pathogen in a tick does not signify transmission of that pathogen to the person bitten.
- Guidelines developed by the Infectious Disease Society of America (IDSA)<sup>4</sup> support limited use of single dose doxycycline (200 mg for adults and 4 mg/Kg for children aged ≥8 yrs with max. of 200 mg) as prophylaxis for Lyme disease when all of the following conditions are met:
  - The patient has traveled to a Lyme-endemic area (>20% of ticks infected with *B. burgdorferi* – of note, many areas surrounding NYC do meet this criteria, including CT, MA, Long Island and upstate NY, particularly the Hudson Valley)
  - Tick has been attached for ≥36 hours, based on engorgement or history
  - Prophylaxis can be started within 72 hours of the time tick is removed
  - Tick can be reliably identified as *Ixodes scapularis*
  - Patient does not have any contraindications to treatment with doxycycline
- The IDSA treatment guidelines for Lyme disease, anaplasmosis, and babesiosis<sup>4</sup> are available on our website at [http://www.nyc.gov/html/doh/downloads/pdf/zoo/idsa\\_guidelines.pdf](http://www.nyc.gov/html/doh/downloads/pdf/zoo/idsa_guidelines.pdf).
  - Of note in 2010, an Independent Review Panel commissioned in 2008 to examine the 2006 IDSA Lyme disease guidelines concluded that they are supported by the best available evidence and remain in effect. The final report is available online at <http://www.idsociety.org/Content.aspx?id=16499>.
- The NY State Department of Health has a tick identification service. It can identify ticks, but will not test ticks for infectious organisms. For more information go to: <http://www.health.state.ny.us/diseases/communicable/lyme/tickid.htm>

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<sup>4</sup> Wormser GP, Dattwyler RJ, Shapiro ED, “The Clinical Assessment, Treatment, and Prevention of Lyme Disease, Human Granulocytic Anaplasmosis, and Babesiosis: Clinical Practice Guidelines by the Infectious Diseases Society of America. CID 2006;43 (000-000).

### **Tick Bite Prevention**

A tick bite prevention brochure from the Health Department is available in English and Spanish on our website at <http://www.nyc.gov/html/doh/downloads/pdf/zoo/zoo-preventing-tick-bites.pdf>. Copies may also be ordered by calling 311.

### **Tips for Patients to Prevent Tick Bites and Tick-borne Diseases:**

- Check for ticks on your body (including your armpits, scalp, and groin) or clothing after returning from wooded or grassy areas. Some ticks are very small (about the size of a poppy seed) so ask for help to inspect areas that you cannot see yourself.
- Immediately remove any ticks you find using fine-tipped tweezers if possible and wash the area thoroughly with soap and water.
- Avoid walking in heavily wooded areas; try to stick to cleared paths.
- Apply insect repellents that contain DEET (use according to manufacturer's instructions). Other repellents such as picaridin, IR3535® and oil of lemon eucalyptus (also used to prevent mosquito bites) may provide some protection, but there is limited information about their effectiveness against ticks.
- Wear light-colored clothing to allow you to better see ticks that crawl on your clothing.
- Wear long-sleeved shirts and tuck your pant legs into your socks so that ticks cannot crawl up the inside of your pant legs.
- Speak to your veterinarian about tick prevention products for your pet dogs and cats.
- Remove leaf litter and debris to reduce the likelihood of ticks around the home.
- If you get a rash or a fever, let the doctor know if you may have been exposed to ticks or spent time in tick habitat, even if you don't remember having a tick bite.

### **Reporting Cases**

Medical providers and laboratories should report all cases of Lyme disease, babesiosis, RMSF, ehrlichiosis, and anaplasmosis to the Bureau of Communicable Disease. Cases of transfusion-associated babesiosis must also be reported to the NYSDOH Blood and Tissue Resources Program at 518-485-5341 and your hospital's transfusion service so they can notify the blood center that supplied the blood components.

**Cases can be reported by telephone (212-788-9830), mail (Bureau of Communicable Disease, 125 Worth Street, CN-22A, New York, NY 10013), or facsimile transmission (212-788-4268) using the Universal Reporting form (URF), or the electronic URF.** The URF and instructions can be obtained from hospital Infection Control Practitioners or downloaded from the DOHMH website at <http://home2.nyc.gov/html/doh/html/hcp/hcp-urf.shtml>. Visit <http://home2.nyc.gov/html/doh/html/hcp/hcp.shtml> to join NYC-MED in order to submit a URF online.

As always, we appreciate your continued collaboration with our efforts to monitor trends in these diseases in New York City. Please call the Bureau of Communicable Disease at **212-788-9830** if you have any questions or comments about tick-borne infectious diseases.

Sincerely,

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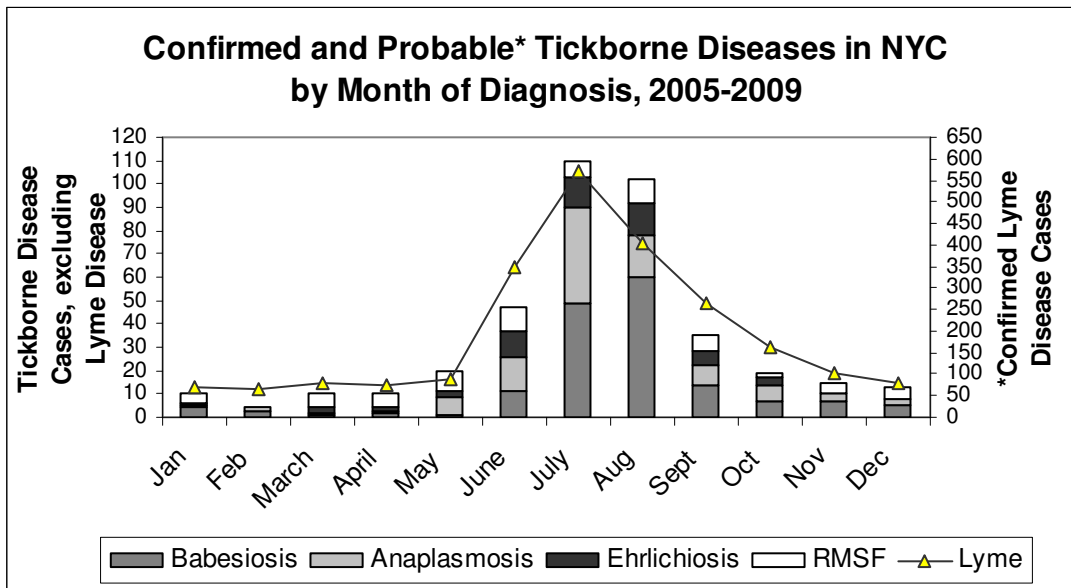
**TABLE 1. Tick-borne Diseases in NYC Residents by Year of Diagnosis\***

	2001	2002	2003	2004	2005	2006	2007	2008	2009
RMSF	2	10	14	23	7	24	28	11	8
Babesiosis	18	16	25	16	18	39	24	39	43
Anaplasmosis**	9	17	8	29	24	29	27	17	9
Ehrlichiosis**	5	3	3	19	6	16	16	5	10
Lyme Disease	228	280	224	357	399	310	416	538	643

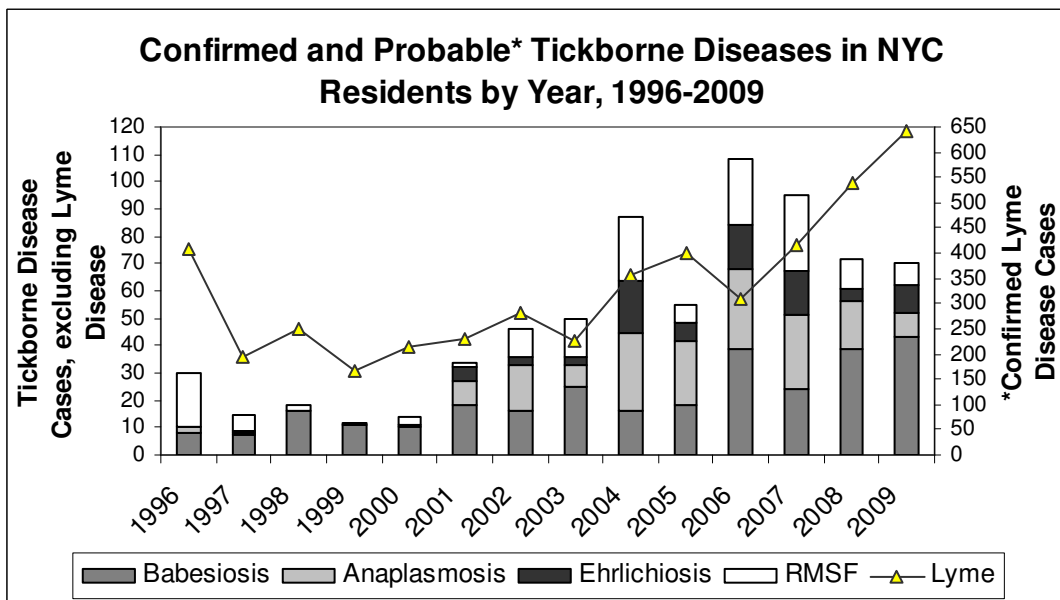
\*Number of confirmed Lyme disease cases and confirmed and probable cases for other tick-borne diseases

\*\*1 case each of ehrlichiosis, type unspecified, from 2008 and 2009 not included

**FIGURE 1.**



**FIGURE 2.**



**Note:** The increase in tick-borne disease cases starting in 2004 is likely due to the initiation of electronic laboratory disease reporting, and may also reflect a true increase in disease.