



# THE CITY OF NEW YORK

DEPARTMENT OF HEALTH AND MENTAL HYGIENE

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## 2007 DOHMH Advisory # 14: Tick-borne Disease Advisory

- During the spring, summer and fall, DOHMH asks New York City (NYC) clinicians to be on the alert for and report tick-borne diseases, including Lyme disease, Rocky Mountain spotted fever, babesiosis, ehrlichiosis, and anaplasmosis.
- Tick-borne diseases in NYC residents have increased in recent years and this alert provides important information regarding the following concerns:
  - Rocky Mountain spotted fever continues to be locally-transmitted in NYC;
  - Lyme disease, babesiosis, ehrlichiosis, and anaplasmosis are associated primarily with travel outside of NYC;
  - A locally-acquired babesiosis case was recently reported from the Bronx;
  - Visit our website at <http://home2.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, Hematology, Cardiology, Neurology, Rheumatology, Critical Care and Emergency Medicine:*

August 6, 2007

Dear Colleagues,

From June through October, NYC clinicians should be on the alert for tick-borne diseases (Figure 1). Tick-borne disease reports have increased in recent years (Figure 2), due in part to improved electronic laboratory reporting, and possibly to increased testing or 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.

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

- Reports of Rocky Mountain spotted fever (RMSF), ehrlichiosis (human monocytic ehrlichiosis or HME), anaplasmosis (human granulocytic anaplasmosis or HGA, formerly known as human granulocytic ehrlichiosis) and babesiosis have risen since 2002 (Fig 2). This rise may be attributable to new methods of reporting, especially electronic laboratory reporting, increased physician testing, and/or increased incidence of disease.
- 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 frequency of travel to endemic areas near NYC where the deer tick is prevalent, or in part to testing or reporting biases.

### **Rocky Mountain Spotted Fever (RMSF)**

- RMSF continues to be transmitted locally in all five NYC boroughs. Rates of locally-acquired RMSF cases appear to be highest in the South Bronx, Washington Heights/Inwood section of Manhattan and in Brooklyn near Prospect Park and Greenwood Cemetery.

### **Anaplasmosis and Ehrlichiosis**

- HGA is more common in NYC than HME, but reports of HME have increased steadily in recent years. Both HGA and HME are usually acquired outside NYC.

- In New York State, most cases occur in Westchester County, the lower Hudson Valley, and Long Island.

### **Lyme Disease**

- *Borrelia burgdorferi* does not appear to be commonly transmitted within NYC based on interviews of patients with erythema migrans, among whom 95% reported travel to known enzootic areas during the 30 days prior to onset in 2005-2006.
- Lyme disease transmission only occurs if a tick is attached for longer than 24 hours.

### **Babesiosis**

- In July 2007, DOHMH received a report of the first locally-acquired babesiosis case in NYC. The patient was a 59 year old resident of the Bronx who presented to a Queens hospital with fever, severe thrombocytopenia, hemolytic anemia and jaundice. A blood smear was confirmed as positive for *Babesia* at both the hospital and DOHMH Public Health Laboratory. There was no travel history outside New York City during the 30 days prior to onset of illness. The only reported outdoor exposures were at the Pelham Bay golf course and the New York Botanical Garden. Transmission of babesiosis from ticks to humans has been reported occasionally in Westchester and possibly, in one case, in Queens during recent years.
- 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.
- Transfusion-associated babesiosis continues to occur in NYC residents; several cases of transfusion-associated babesiosis were investigated and confirmed just in the past year.

### **Travel and Tick Exposures among Patients with Tick-borne Disease**

- The majority of Lyme disease (95%) and HME and HGA cases (85%) reported a history of travel, compared to fewer than 50% of RMSF cases. Travel destinations include recognized Lyme disease endemic areas and areas where the deer tick is prevalent including Upstate NY, Long Island, CT, NJ, and MA.
- Only a small percent of cases recalled a tick bite: 16% (RMSF), 31% (HME), and 25% (HGA). A history of tick bites is not necessary to include these diseases in the differential diagnosis for patients with clinically compatible illness.

### **Common Ticks and Diseases**

Information on tick populations in NYC is based on unpublished data from limited tick surveillance efforts conducted by Fordham University in collaboration with the DOHMH in 1996 and 2001 and by the DOHMH Bureau of Veterinary and Pest Control Services in 2006.

- *Dermacentor variabilis* (the American dog tick) is the vector for **RMSF**, and has been detected in great abundance in all boroughs of NYC.
- *Ixodes scapularis* (the deer tick or black-legged tick) transmits the agents of **Lyme disease, babesiosis, and HGA**. Based on limited surveys conducted in NYC, there is no evidence that the black-legged tick is established in NYC with the exception of limited areas of the Bronx. Alternatively, significant numbers have been reported in counties and states surrounding NYC. Nymphs, the tick stage most often associated with human disease, are active between May and August.
- *Amblyomma americanum* (the Lone Star tick), is the vector for **HME**. Surveillance suggests that this tick is also not established in NYC.

### **New Guidelines on Diagnosis, Management and Prevention of Tick-borne Diseases**

Evidence-based guidelines for the diagnosis and management of Lyme disease, HGA and babesiosis were recently published by the Infectious Disease Society of America<sup>1</sup> and are recommended for your review.

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<sup>1</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).

They include evidence-based recommendations regarding the limited use of single dose doxycycline (200 mg for adults and 4 mg/Kg for children aged  $\geq 8$  yrs with max. of 200 mg) as prophylaxis for Lyme Disease when ALL of the following conditions are met:

1. The patient has traveled to a Lyme-endemic area (*>20% of ticks infected with B. burgdorferi – of note, many of areas surrounding NYC do meet this criteria, including CT, MA, Long Island and upstate NY*)
2. Tick has been attached for  $\geq 36$  hours, based on engorgement or history,
3. Prophylaxis can be started within 72 hours of the time tick is removed,
4. Tick can be reliably identified as *Ixodes scapularis*, and
5. Patient does not have contraindication to treatment with doxycycline.

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

**Lyme Disease:** The vast majority of NYC patients reported in 2006 (57%) presented with the characteristic erythema migrans (EM) or target lesion. The presence of EM alone is sufficient to make the diagnosis of Lyme disease. Cases with late manifestations (arthritis, carditis, or neurologic disease for example), require laboratory confirmation. Laboratory confirmation requires demonstration of diagnostic IgM or IgG antibodies to *B. burgdorferi* in serum or CSF. A two-test approach using a sensitive enzyme immunoassay or immunofluorescence antibody followed by 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 Lyme disease Supplemental Letter sent to them by the DOHMH. Information on the patient's clinical presentation is used to determine if patients meet the CDC clinical criteria for Lyme disease. Patients who present with physician-confirmed erythema migrans from April 1 - Nov 1 are interviewed to determine travel exposure history during the incubation period.

**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 to assist with the diagnosis. Confirmatory testing, including a review of blood smears and Babesia PCR, is available through the NYC Public Health Laboratory. A request form must be completed for specimen submissions. For more information, call Dr. Adeleh Ebrahimzadeh at (212) 447-6951 or 447-2972 during business hours. Currently, there is no screening of the blood supply for *Babesia*. Babesiosis should also be considered in persons with a recent history of blood transfusion with acute onset of fever and hemolytic anemia.

**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.

**Ehrlichiosis and Anaplasmosis:** HME is caused by *Ehrlichia chafeensis*, 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 four-fold rise in antibody levels using IFA. Serologic specimens should be drawn at least two weeks apart. Serology may not be helpful in the acute phase of illness; molecular methods, such as PCR, are recommended for testing persons with recently acquired infections. Specimens for PCR testing should be drawn 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 a 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.
- 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>

### **Tick Prevention**

Patients can do the following to prevent tick bites and tick borne illnesses:

- 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
- Quickly 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 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, 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 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.

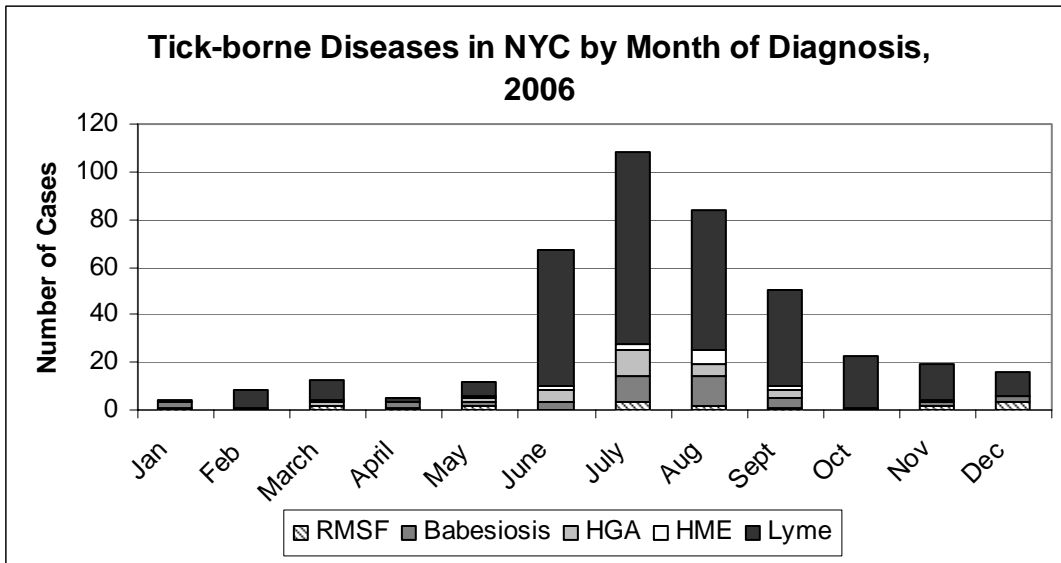
**As always, we appreciate your continued collaboration with our efforts to monitor public health issues in New York City.**

**Sincerely,**

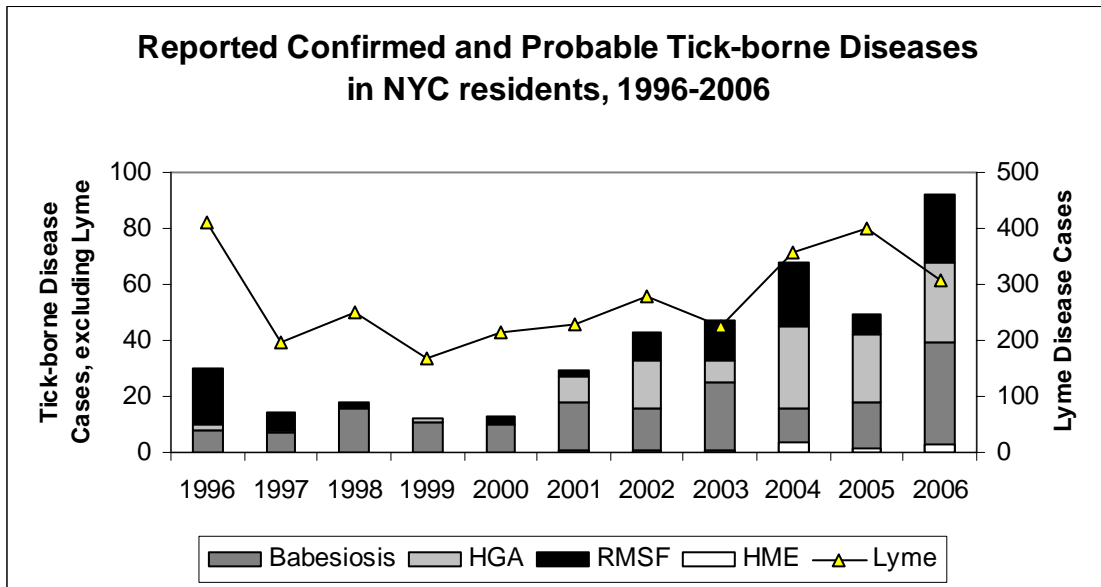
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**FIGURE 1.**



**FIGURE 2.**



*Note: The increase in Lyme diseases cases starting in 2004 is likely due to the initiation of electronic laboratory disease reporting. The subsequent decrease in 2006 is likely due to a change in the surveillance case definition in NYC. Starting in 2006, reports of patients with late manifestations required a positive Western blot in addition to a positive EIA/ELISA to be considered a case. Prior to 2006, patients with late manifestations and a positive EIA/ELISA and/or Western Blot were counted as cases.*