Tick-Borne Infections Council of North Carolina, Inc.

2015 NEWSLETTER, Volume 1

Quote of the Season: **"It's likely that many ailments in human history for which doctors had no explanation have been caused by tick-borne disease." George Poinar, Jr, Professor, OSU College of Science.**

Highlights…

Scroll down to see these features and more!

State Vector-Borne Disease Task Force Meeting Schedule

February 13, 2015 May 8, 2015 Aug. 14, 2015 Nov. 13, 2015
(Check with us before going to confirm date as they occasionally change.)

Location:
Office of the Chief Medical Examiner Photo ID required.
4312 District Drive
Raleigh, NC 27607

Links to Letters to Medical Providers from the State Department of Public Health on Lyme Disease and Rickettsial Diseases

These links are to the letters the state Department of Public Health issues every year to medical providers on Lyme disease and the Rickettsial diseases such as RMSF:

2014 Rickettsial Disease Memo
2014 Lyme Disease Memo

North Carolina Data on Reportable Tick-borne Infections

Disease	Total cases by year of report 2012 Final Confirmed + Probable (Confirmed/Probable/Suspected)	Total cases by year of report 2013 Preliminary Confirmed + Probable (Confirmed/Probable/Suspected)*	Cases between 1/1/14 and 6/30/14 (Probable/Confirmed)**
Lyme disease	122 (27/95/80)	180 (39/141/89)	143/7 confirmed
Rickettsioses	591 (12/579/341)	426 (11/415/193)	153/1 confirmed
Ehrlichia	105 (18/91/56)	78 (24/54/22)	19 4 confirmed
Anaplasma	21 (0/21/21)	15 (1/14/14)	4/ 0 confirmed

*This is the year of report, not year of illness onset
** Illness onset may be prior to 1/1/14

Note**: Alleghany and Wilkes Counties now have a second confirmed case of Lyme disease in a person who had not traveled out of the county for 30 days after their tick exposure.** Therefore, these counties are now considered endemic for Lyme disease bringing the total of endemic counties in NC to five (Wake, Guilford, Haywood, Alleghany, and Wilkes).

Counties with one case of locally acquired Lyme disease: Cleveland (2008), Wilson (2009), Pitt (2009), Carteret (2009), Gates (2011), Perquimans (2011), Rowan (2013), Union (2013), Caldwell (2013), Franklin (2014), Stanley (2014).

Starting with this volume of the TIC-NC Newsletter, articles from North Carolina and the Southeast will be in their own special section.

»» North Carolina and Southeast Section ««

TIC-NC's Distribution of Materials & Presentations during 2014

Throughout the year TIC-NC board members deliver our brochures to many different venues to help spread the word about the control, treatment, and understanding of ticks and tick bites. Our board members also make presentations to social and educational groups. We are available for presentations or can deliver a supply of our brochures – our contact information is on our website and at the bottom of this newsletter, if you would like more information for your group or a gathering. The chart at the right shows many of the places where we distributed our information and made presentations during 2014. The distribution of the TIC-NC school flyer is the continuation of the Yahoo! Educational Foundation Grant project.

TIC-NC School Flyers Delivered to all Chatham County Schools, May 2014:

North Chatham Elementary
Perry W. Harrison Elementary
Pittsboro Elementary
Siler City Elementary
Virginia Cross Elementary
Bennett School
Bonlee School
J. S. Waters School
Moncure School
Silk Hope School
Chatham Middle
Horton Middle
Margaret B. Pollard Middle
Chatham Central High
Jordan-Matthews High
Northwood High
SAGE Academy

TIC-NC's School Flyer to a Middle School in Raleigh via their e-newsletter

TIC-NC's Brochure:
NC State Employee Expo at the Raleigh Fairgrounds
Outdoor Group in Pittsboro
NC DOT Employee Expo in Greenville
Chatham County Library
UNC Health Expo
Shakori Hills
Caswell County's Annual Health Fair
Country store in Chatham
Various outdoor sites in Hillsborough and Graham
NC Botanical Gardens
Senior Center in Burlington
Various Outdoor Outfitter Retailers
NC Cooperative Extension, Chatham County Center

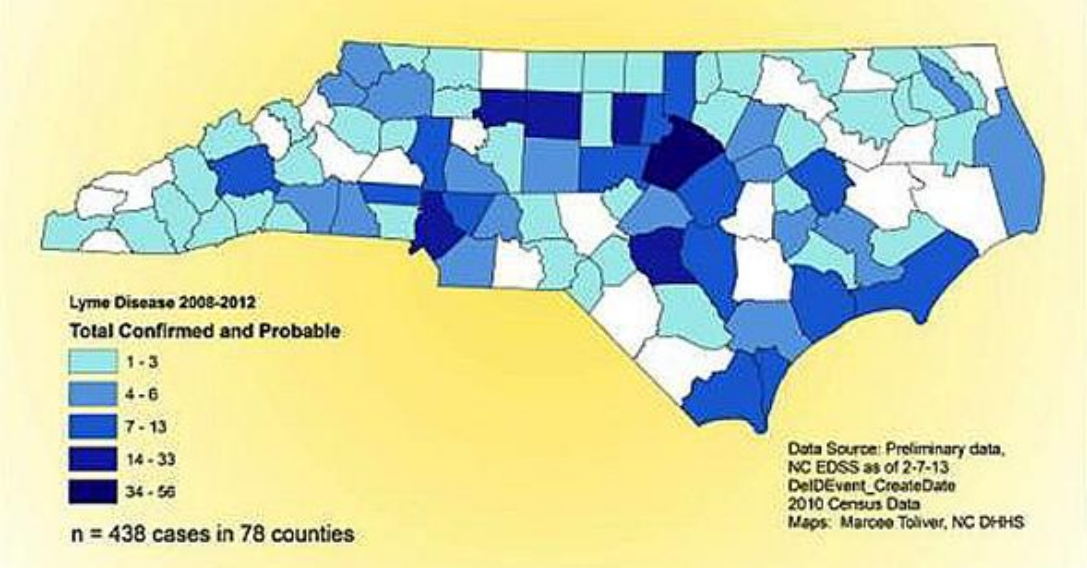
Talks: AARP Seniors, Chatham Senior Center, Eno Veterinary Hospital

Article in Davidson News.net on Lyme Disease in NC

Despite spike in NC cases, Lyme disease awareness lags
Posted By Christina Ritchie Rogers June 20, 2014

Lyme disease is a tricky disease. It is hard to diagnose, its treatment can be difficult, and it seems to be suffering from a serious PR problem in North Carolina.
The latter is perhaps the most concerning to both patients and experts. Patients don't always know what to look for and doctors aren't always looking for the right things. And there's not a consensus among doctors or public health officials about the prevalence or seriousness of the disease in North Carolina.

"Patients have to be their own doctors and their own advocates," said **Marcia Herman-Giddens**, PA, MPH, DrPH. She serves on the Tick-borne Infections Council of North Carolina, is an adjunct professor in the Gillings School of Global Public Health at UNC-Chapel Hill, and a child and family health consultant. "They're going to have to learn about the disease in order to get the care they need, until medical providers have better information."



Entire article at: http://davidsonnews.net/healthandfitness/2014/06/20/despite-spike-in-nc-cases-lyme-disease-awareness-lags/

NC's ABC Channel 11's Report on Lyme Disease, Summer 2014

The ABC-11 Report:
http://abc11.com/health/i-team-controversy-over-lyme-disease-in-north-carolina/153878/

Be aware that the report mentions a couple of things that are not accurate:

- The state health department officially recognizes 78 out of 100 counties as having Lyme – they must mean there are reports from 78 counties.
- They say to watch out for symptoms of Lyme such as a bulls-eye rash. In fact, most rashes from Lyme disease are solid red and may never develop a target appearance. Twenty to 40 percent of people infected may not develop the rash at all.

Florida Man Dies from Heartland Virus, May 2014

Story by Sheila Stogsdill, World Correspondent
GROVE – An Army veteran and a lifelong outdoorsman, Johnny Lee Mitzner was not a sickly man. So when Mitzner, 76, of Grove, suddenly came down with flu-like symptoms and died May 21, his family was shocked to learn his death was due to the Heartland virus, a rare tick-borne disease. The state Health Department confirmed he was the 10th person in the country to have the virus and the state's first case of the virus.

His three surviving children — Morgan and Mark Mitzner and Melissa Crowther — want the public to be educated about the Heartland virus and be aware if they discover a tick bite.
Symptoms can include fever, fatigue, headaches, muscle ache, loss of appetite, nausea, bruising easily and diarrhea. About a month before his death, Mitzner began stumbling, losing his memory and started losing his speech, she said.

"He thought he had the flu symptoms — he was really tired and very dizzy," Crowther said.

When Mitzner went to the doctor, his white blood cell count and his platelets were so low that he was taken to the Integris Grove Hospital emergency room, she said.

The Heartland virus is thought to be found in the Lone Star tick, also known as Amblyomma americanum, and is likely spread through tick bites, said Becky Coffman, state Health Department epidemiologist. The illness is newly identified — it was first diagnosed in Missouri in 2009 using Centers for Disease Control and Prevention lab protocol, she said. The virus has also been reported in Tennessee. At this point only the CDC can run the tests to identify it, she said. "There is not treatment or a cure yet," Coffman said. "Prevention is very important."

Detection of Bacterial Agents in *Amblyomma americanum* (Acari: Ixodidae) from Georgia, USA, and the use of a Multiplex Assay to ifferentiate *Ehrlichia chaffeensis* and *Ehrlichia ewingii*

Abstract: *Amblyomma americanum*, the lone star tick, is the most common and most aggressive human biting tick in the Southeastern United States. It is known to transmit the agents of human ehrlichioses, *Ehrlichia chaffeensis* and *Ehrlichia ewingii*. In addition, it carries agents of unspecified pathogenicity to humans, including *Rickettsia amblyommii*, *Borrelia lonestari*, and the newly emerging Panola Mountain *Ehrlichia* (PME). Surveillance of these ticks for recognized or emerging pathogens is necessary for assessing the risk of human infection. From 2005 to 2009, we surveyed *A. americanum* ticks from four locations in the state of Georgia.

Ticks (1,183 adults, 2,954 nymphs, and 99 larval batches) were tested using a multiplex real-time polymerase chain reaction (PCR) assay designed to detect and discriminate DNA from *Rickettsia* spp., *E. chaffeensis*, and *E. ewingii*. This assay was capable of detecting as few as 10 gene copies of the aforementioned agents. Ticks were also tested for PME and *B. lonestari* by nested PCR. The prevalence of infection ranged from 0 to 2.5% for *E. chaffeensis*, 0 to 3.9% for *E. ewingii*, 0 to 2.2% for PME, 17 to 83.1% for *R. amblyommii*, and 0 to 3.1% for *B. lonestari*. There were 46 (4.1%) individual adults positive for two agents, and two females that were each positive for three agents. Two larval batches were positive for both *B. lonestari* and *R. amblyommii*, indicating the potential for transovarial transmission of both agents from a single female. Although infrequent in occurrence, the dynamics of coinfections in individual ticks should be explored further, given the potential implications for differential diagnosis and severity of human illness. L. F. Killmaster, A. D. Loftis, G. E. Zemtsova and M. L. Levin, CDC

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Cost of Doxycycline Staying High

Poughkeepsie Journal editorial: rein in skyrocketing cost of doxycycline and take other actions about Lyme disease. Editorial, August 20, 2014

Whatever the cause, it is abundantly clear something must be done to rein in the skyrocketing costs of the prime antibiotic used against Lyme disease. In its ongoing investigation about Lyme disease, the Poughkeepsie Journal has reported that the price of doxycycline has climbed at an alarming rate. For instance, 500 pills that once cost about $25 can now cost hundreds of dollars.
Several companies have stopped producing doxycycline and that, in part, could be the reason for the price spike under the laws of supply and demand. While alternatives exist, health experts have said that

doxycycline is an optimum treatment. But this might need a much broader solution from the federal government. The complete editorial can be seen on the website for the Poughkeepsie Journal. More on the topic: http://articles.latimes.com/2013/mar/07/business/la-fi-lazarus-20130308
http://www.poughkeepsiejournal.com/story/news/investigations/2014/08/03/doxycycline-lymedisease-antibiotic-petspeople/13554829/

FDA to Start Regulating Lab-Developed Tests

Four senators sent a letter in early July 2014 to the Obama administration's OMB director asking for immediate FDA regulation of a number of lab tests for various diseases including Lyme disease tests. Some have suggested that labs will be forbidden to conduct the Western Blot test for Lyme disease unless the patient first shows an equivocal or positive ELISA. However, we at TIC-NC do not know if this is true.

Related to this is the action the FDA is planning to take. The entire release is at:
http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm407321.htm

The details of the proposal "For the Purpose of Notification to Congress Only, Anticipated Details of the Draft Guidance for Industry, Food and Drug Administration Staff, and Clinical Laboratories," are at:
http://www.fda.gov/downloads/MedicalDevices/ProductsandMedicalProcedures/InVitroDiagnostics/UCM407409.pdf

On January 8-9, 2015, a **Public Workshop - Framework for Regulatory Oversight of Laboratory Developed Tests** (LDTs) was held in Bethesda to discuss FDA's proposal for a risk-based framework for addressing the regulatory oversight of a subset of in vitro diagnostic devices (IVDs) referred to as LDTs, which are intended for clinical use and designed, manufactured and used within a single laboratory, and provide an additional opportunity for public comment. Feedback from all stakeholders on FDA's proposal was sought so that it can be refined in the best interest of public health.

In Cape Cod Study 4-Poster System to Control Ticks Not Very Effective

The effectiveness of permethrin-treated deer stations for control of the Lyme disease vector Ixodes scapularis on Cape Cod and the islands: a five-year experiment

The use of animal host-targeted pesticide application to control blacklegged ticks, which transmit the Lyme disease bacterium between wildlife hosts and humans, is receiving increased attention as an approach to Lyme disease risk management. Included among the attractive features of host-targeted approaches is the reduced need for broad-scale pesticide usage. In the eastern USA, one of the best-known of these approaches is the corn-baited "4-poster" deer feeding station, so named because of the four pesticide-treated rollers that surround the bait troughs. Wildlife visitors to these devices receive an automatic topical application of acaricide, which kills attached ticks before they can reproduce.

Forty-two 4-posters among seven treatment sites in Cape Cod, Martha's Vineyard, and Nantucket were studied for 5 years. Relative to controls, blacklegged tick abundance at treated sites was reduced by only 8.5%.
Grear JS, et al. *Parasites &Vectors* 2014, **7**:292 doi:10.1186/1756-3305-7-292, Published: 25 June 2014

Two Large National Lyme Disease Organizations Merge

Merger of the Lyme Research Alliance and Tick-Borne Disease Alliance Creates Leading Voice for Lyme & Tick-Borne Diseases

The Tick-Borne Disease Alliance (TBDA) and the Lyme Research Alliance (LRA), two of the most influential voices on Lyme and tick-borne diseases, announced today their intention to merge. The merger was approved in May 2014 by each of the respective Board of Directors, pending regulatory approval.

The merger will result in the formation of the largest tick-borne disease organization in the country, allowing for greater resources to be applied to research on urgently needed improvements in diagnostics and treatments, while maintaining awareness programs for the general public and physicians. The groups plan to rename the merged non-profit upon final completion of the merger. http://tbdalliance.org/

CDC Webinar Available to View on Tick-borne Diseases of the U.S.

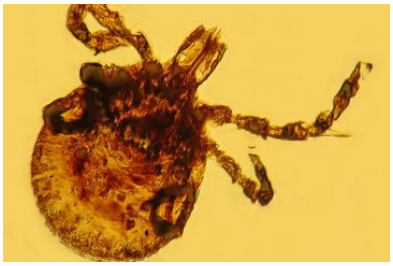
Novel and Emerging Tick-borne Diseases – Agents, Clinical Features, and Surveillance
This information is from the point of view of the Centers for Disease Control and the Infectious Diseases Society of America.
CDC: In the United States, some ticks carry pathogens that can cause human disease, including:

- **Anaplasmosis** is transmitted to humans by tick bites primarily from the blacklegged tick (*Ixodes scapularis*) in the northeastern and upper midwestern U.S. and the western blacklegged tick (*Ixodes pacificus*) along the Pacific coast.
- **Babesiosis** is caused by microscopic parasites that infect red blood cells. Most human cases of babesiosis in the U.S. are caused by *Babesia microti*. *Babesia microti* is transmitted by the blacklegged tick (*Ixodes scapularis*) and is found primarily in the northeast and upper midwest.
- ***Borrelia miyamotoi*** infection has recently been described as a cause of illness in the U.S. It is transmitted by the blacklegged tick (*Ixodes scapularis*) and has a range similar to that of Lyme disease.
- **Colorado tick fever** **[PDF - 21 pages]** is caused by a virus transmitted by the Rocky Mountain wood tick (Dermacentor andersoni). It occurs in the Rocky Mountain states at elevations of 4,000 to 10,500 feet.
- **Ehrlichiosis** is transmitted to humans by the lone star tick (*Ambylomma americanum*), found primarily in the southcentral and eastern U.S.
- **Heartland virus** infection has been identified in eight patients in Missouri and Tennessee as of March 2014. Studies suggest that Lone Star ticks may transmit the virus. It is unknown if the virus may be found in other areas of the U.S.
- **Lyme disease** is transmitted by the blacklegged tick (*Ixodes scapularis*) in the northeastern U.S. and upper midwestern U.S. and the western blacklegged tick (*Ixodes pacificus*) along the Pacific coast.
- **Powassan disease** is transmitted by the blacklegged tick (*Ixodes scapularis*) and the groundhog tick (*Ixodes cookei*). Cases have been reported primarily from northeastern states and the Great Lakes region.
- ***Rickettsia parkeri* rickettsiosis** is transmitted to humans by the Gulf Coast tick (*Amblyomma maculatum*).
- **Rocky Mountain spotted fever (RMSF)** is transmitted by the American dog tick (*Dermacentor variabilis*), Rocky Mountain wood tick (*Dermacentor andersoni*), and the brown dog tick (*Rhipicephalus sanguineus*) in the U.S. The brown dog tick and other tick species are

associated with RMSF in Central and South America.

- **STARI (Southern tick-associated rash illness)** is transmitted via bites from the lone star tick (*Ambylomma americanum*), found in the southeastern and eastern U.S.
- **Tick-borne relapsing fever (TBRF)** is transmitted to humans through the bite of infected soft ticks. TBRF has been reported in 15 states: Arizona, California, Colorado, Idaho, Kansas, Montana, Nevada, New Mexico, Ohio, Oklahoma, Oregon, Texas, Utah, Washington, and Wyoming and is associated with sleeping in rustic cabins and vacation homes.
- **Tularemia** is transmitted to humans by the dog tick (*Dermacentor variabilis*), the wood tick (*Dermacentor andersoni*), and the lone star tick (*Amblyomma americanum*). Tularemia occurs throughout the U.S.
- **364D rickettsiosis** (*Rickettsia phillipi*, proposed) is transmitted to humans by the Pacific Coast tick (*Dermacentor occidentalis* ticks). This is a new disease that has been found in California.

Ancient Lyme Disease Bacteria Found in 15-Million-Year-Old Tick Fossils



This tick trapped in ancient amber from the Dominican Republic is between 15 million and 20 million years old. Before it died, it was carrying the type of bacteria that causes Lyme disease. Credit: Photo by George Poinar, Jr., courtesy of Oregon State University.

The oldest known evidence of Lyme disease may lie in ticks that were entombed in amber at least 15 million years ago, scientists announced. The researchers investigated four fossilized ticks that had been trapped in chunks of amber found in the Dominican Republic. Inside the ticks' bodies, the scientists saw a large population of cells that looked like the squiggly shaped spirochete cells of the *Borrelia* genus — a type of bacteria that causes Lyme disease today.
Bacteria, which arose on the planet 3.6 billion years ago, rarely survive in the fossil record. But amber, the hardened resin from oozing trees, can preserve soft tissues and microscopic cells that would otherwise degrade over time.
By Megan Gannon, News Editor, LiveScience | May 30, 2014 05:18pm ET

More on the 'New' Black-legged Tick Disease *Borrelia miyamotoi*

Borrelia miyamotoi sensu lato Seroreactivity and Seroprevalence in the Northeastern United States

Borrelia miyamotoi sensu lato, a relapsing fever *Borrelia* sp., is transmitted by the same ticks that transmit *B. burgdorferi* (the Lyme disease pathogen) and occurs in all Lyme disease–endemic areas of the United States. To determine the seroprevalence of IgG against *B. miyamotoi* sensu lato in the northeastern United States and assess whether serum from *B. miyamotoi* sensu lato–infected persons is reactive to *B. burgdorferi* antigens, we tested archived serum samples from area residents during 1991–2012. Of 639 samples from healthy persons, 25 were positive for *B. miyamotoi* sensu lato and 60 for *B. burgdorferi*. Samples from ≈10% of *B. miyamotoi* sensu lato–seropositive persons without a recent history of Lyme disease were seropositive for *B. burgdorferi*. Our results A suggest that A human *B. miyamotoi* A sensu lato A infection may be common in southern New England and that *B. burgdorferi* antibody testing is not an effective surrogate for detecting *B. miyamotoi* sensu lato infection. Krause et al. *Emerging Infectious Diseases*, CDC, June 2014.

Etymologia: *Borrelia miyamotoi* [bə-rel′e-ə mi″a-mo-to′e]

A genus of gram-negative, anaerobic spirochete bacteria, *Borrelia* was named after French biologist Amédée Borrel. In 1995, Masahito Fukunaga et al. isolated a novel *Borrelia* species and named it *Borrelia miyamotoi*, in honor of Kenji Miyamoto, who first isolated spirochetes from ixodid ticks in Hokkaido, Japan. Human cases of*B. miyamotoi* infection were subsequently found in Russia in 2011 and North America in 2013.

Etymologia: *Borrelia miyamotoi*. Emerg Infect Dis [Internet]. 2014

Borrelia miyamotoi in host-seeking Ixodes ricinus ticks in England.

This paper reports the first detection of Borrelia miyamotoi in UK Ixodes ricinus ticks. It also reports on the presence and infection rates of I. ricinus for a number of other tick-borne pathogens of public health importance. Ticks from seven regions in southern England were screened for B. miyamotoi, Borrelia burgdorferi sensu lato (s.l.), Anaplasma phagocytophilum and Neoehrlichia mikurensis using qPCR. A total of 954 I. ricinus ticks were tested, 40 were positive for B. burgdorferi s.l., 22 positive for A. phagocytophilum and three positive for B. miyamotoi, with no N. mikurensis detected. The three positive B. miyamotoi ticks came from three geographically distinct areas, suggesting a widespread distribution, and from two separate years, suggesting some degree of endemicity. Understanding the prevalence of Borrelia and other tick-borne pathogens in ticks is crucial for locating high-risk areas of disease transmission. Hansford KM, et al.Epidemiol Infect.2014 Jul 14:1-9.

Human infections with *Borrelia miyamotoi*, Japan.

Infection of 2 patients with *Borrelia miyamotoi* in Japan was confirmed by retrospective surveillance of Lyme disease patients and detection of *B. miyamotoi* DNA in serum samples. One patient also showed seroconversion for antibody against recombinant glycerophosphodiester phosphodiesterase of *B. miyamotoi*. Indigenous relapsing fever should be considered a health concern in Japan. Emerg Infect Dis [Internet]. 2014 Aug [*date cited*]. http://dx.doi.org/10.3201/eid2008.131761

Two Abstracts of Interest from the 2014 the Council of State and Territorial Epidemiologists (CSTE) Conference

The **Council of State and Territorial Epidemiologists** (CSTE) was organized in the USA in the early 1950s in response to the need to have at least one person in each **state and territory** responsible for public health surveillance of diseases and conditions of public health significance.

Potential Role of Deer Tick Virus in Powassan Encephalitis Cases in Lyme-Disease Endemic Areas of New York, USA

Jennifer L White , New York State Department of Health, Albany, NY
Marc Y El Khoury , New York Medical College, Valhalla, NY
Jose F Camargo , New York Medical College, Valhalla, NY

BACKGROUND**:** Powassan virus, a member of the tick-borne encephalitis group of flaviviruses, encompasses two lineages with separate enzootic cycles. The prototype lineage of Powassan virus (POWV) is principally maintained between *Ixodes cookei* and the groundhog (*Marmota momax*) or striped skunk (*Mephitis mephitis*), while the deer tick virus (DTV) lineage is believed to be maintained between *Ixodes scapularis* and the white footed mouse (*Peromyscus leucopus*). We present a detailed description of the clinical presentation, laboratory diagnosis and outcome of the 14 cases of POWV/DTV encephalitis diagnosed between 2004 and 2012 in New York State, and review the literature to provide epidemiological evidence suggesting that many of these cases were specifically due to DTV rather than POWV.
METHODS**:** This was a retrospective review of the medical records of all POWV/DTV cases that were diagnosed by the New York State Department of Health (NYSDOH) during the period 2004 through 2012; in addition, published reports of six of these cases were reviewed for additional details. POWV/DTV virus neuroinvasive infection was defined using the 2011 United States surveillance case definition.
RESULTS**:** Fourteen cases of POWV/DTV encephalitis were identified in New York State from 2004 through 2012 with an all-cause mortality of 36%. Ten patients (72%) were from counties located in the Lower Hudson Valley (LHV), a highly endemic region for Lyme disease in which *I. scapularis* ticks account for most human tick bites. This finding suggests that many of these cases were caused by DTV rather than POWV. In two patients, DTV infection was confirmed by genetic sequencing.
CONCLUSIONS**:** Distinguishing between POWV and DTV infection provides epidemiologically relevant information from a public health perspective. Given the high morbidity and mortality associated with these infections and its evolving epidemiology, molecular analysis is essential in the evaluation of POWV/DTV infections. cste.confex.com/cste/2014/webprogram/Session2016.html

Serologic Evidence for Infection of Humans by Multiple Spotted Fever Group (SFG) *Rickettsiae* in Tennessee

Josie Mae P. Delisle , Tennessee Department of Health, Nashville, TN
Nicole L. Mendell , University of Texas Medical Branch at Galveston, Galveston, TX
Karen C. Bloch , Vanderbilt University School of Medicine, Nashville, TN
Donald H. Bouyer , University of Texas Medical Branch at Galveston, Galveston, TX
Abelardo C. Moncayo , Tennessee Department of Health, Nashville, TN

BACKGROUND**:** Rocky Mountain Spotted Fever (RMSF) is the most common tick-borne disease reported in the state of Tennessee and is caused by *R. rickettsii*. It belongs to the Spotted Fever Group (SFG) *rickettsiae* that includes numerous other species such as *R. montanensis*, *R. parkeri*, and *R. amblyommii*. However, serologic cross-reactivity is common within the SFG *rickettsiae* and *R. rickettsii* has rarely been isolated from endemic ticks, suggesting SFG rickettsioses in Tennessee may be caused by other Rickettsial species. This study aims to investigate exposure to four *Rickettsia* species in sera from humans tested for RMSF to better understand the etiology of SFG rickettsioses in Tennessee.
METHODS**:** A total of 45 human serum samples that tested positive for *Rickettsia* were obtained from diagnostic labs in 2010 and 2011 and from the Tennessee Unexplained Encephalitis Study (T.U.E.S.). Clinical signs and symptoms were identified from review of medical records and case report forms. Using an indirect immunoflourescent-antibody assay (IFA), reactivity of the sera to *R. rickettsii*, *R. montanensis*, *R. parkeri* and *R. amblyommii* were tested and a comparison of endpoint titers was used to determine the probable antigen that stimulated the antibody response. For samples whose endpoint

titers were less than 4-fold different between species, cross-absorptions with the *Rickettsia* antigens were performed and the supernatants were retained for IFA and Western blotting.
RESULTS**:** In the initial IFA, 4 (9%) samples had a highest endpoint titer to *R. amblyommii* and 2 (4%) samples had a highest endpoint titer to *R. parkeri.* The rest of the samples (n=39) had titers with less than 4-fold difference between species. Among the latter set of samples, 26 (58%) had similar titers for all four species, 6 (13%) for *R. montanensis, R. parkeri* and *R. amblyommii*, 2 (4%) for *R. rickettsii, R. parkeri* and *R. amblyommii*, and 5 (11%) for *R. parkeri* and *R. amblyommii*. Cross-absorption of some samples with similar titers resulted in 3 samples positive for *R. amblyommii* and 1 was indeterminate.
CONCLUSIONS**:** Significant serologic cross-reactivity was observed in the majority of the samples with higher titers to *R. amblyommii* and *R. parkeri* compared to *R. montanensis* and *R. rickettsii*. To our knowledge, this is the first time *R. amblyommii* and *R. parkeri* have been reported as possible causative agents of rickettsioses in Tennessee. Further investigation is needed to determine if the differences in titers correlate with clinical characteristics or severity of illness.
cste.confex.com/cste/2014/webprogram/Paper3724.html

Co-infection and Blacklegged Ticks in a County in New York

Co-Infection of Blacklegged Ticks with Babesia microti and Borrelia burgdorferi is Higher than Expected and Acquired from Small Mammal Hosts

Humans in the northeastern and midwestern United States are at increasing risk of acquiring tick-borne diseases – not only Lyme disease, but also two emerging diseases, human granulocytic anaplasmosis and human babesiosis. Co-infection with two or more of these pathogens can increase the severity of health impacts. Medical practitioners should be aware of the elevated risk of B. microti/B. burgdorferi co-infection. Michelle H. Hersh, Richard S. Ostfeld, Diana J. McHenry et al.
Entire paper free at: http://www.plos.org/wp-content/uploads/2013/05/pone-9-6-hersh.pdf

Plea by UK doctor to halt surge in Lyme disease

A leading doctor has called on landowners to help combat a debilitating and potentially deadly disease, cases of which have dramatically increased.

Dr. John Gillies, chairman of the Royal College of General Practitioners in Scotland, has urged organizations that own and manage public footpaths to put up warning notices about Lyme disease, a chronic bacterial infection caused by tick bites.
He made the call after his return home from a rambling holiday in England, where he saw posters giving information about the illness and how to prevent it. Between 2001 and 2010 the number of confirmed cases of Lyme disease in Scotland soared from 28 to 308, though experts believe the true figure could be 10 times that number.

Kathleen Nutt Monday 9 June 2014 Entire story: http://www.heraldscotland.com/news/home-news/plea-by-doctor-to-halt-surge-in-lyme-disease.24441297

More Evidence on the Limitations of the CDC's Two-tiered Test for Lyme Disease

Characteristics of seroconversion and implications for diagnosis of post-treatment Lyme disease syndrome: acute and convalescent serology among a prospective cohort of early Lyme disease patients

Two-tier serology is often used to confirm a diagnosis of Lyme disease. One hundred and four patients with physician diagnosed erythema migrans rashes had blood samples taken before and after 3 weeks of doxycycline treatment for early Lyme disease. Acute and convalescent serologies for Borrelia burgdorferi were interpreted according to the 2-tier antibody testing criteria proposed by the Centers for Disease Control and Prevention. Serostatus was compared across several clinical and demographic variables both pre- and post-treatment. Forty-one patients (39.4 %) were seronegative both before and after treatment. The majority of seropositive individuals on both acute and convalescent serology had a positive IgM western blot and a negative IgG western blot. IgG seroconversion on western blot was infrequent. Among the baseline variables included in the analysis, disseminated lesions ($p < 0.0001$), a longer duration of illness ($p < 0.0001$), and a higher number of reported symptoms ($p = 0.004$) were highly significantly associated with positive final serostatus, while male sex ($p = 0.05$) was borderline significant. This variability, and the lack of seroconversion in a subset of patients, highlights the limitations of using serology alone in identifying early Lyme disease. Furthermore, these findings underline the difficulty for rheumatologists in identifying a prior exposure to Lyme disease in caring for patients with medically unexplained symptoms or fibromyalgia-like syndromes. *Clinical Rheumatology,* Rebman AW, et al. June 2014

Granulomatous hepatitis associated with chronic Borrelia burgdorferi infection: a case report

Although Lyme borreliosis has been linked to hepatitis in early stages of infection, the association of chronic Borrelia burgdorferi infection with hepatic disease remains largely unexplored. We present the case of a 53-year-old woman diagnosed with Lyme disease who developed acute hepatitis with elevated liver enzymes while on antibiotic treatment. Histological examination of liver biopsy tissue revealed spirochetes dispersed throughout the hepatic parenchyma, and the spirochetes were identified as Borrelia burgdorferi by molecular testing with specific DNA probes. Motile spirochetes were also isolated from the patient's blood culture, and the isolate was identified as Borrelia burgdorferi sensu stricto by two independent laboratories using molecular techniques. These findings indicate that the patient had active, systemic Borrelia burgdorferi infection and consequent Lyme hepatitis, despite antibiotic therapy. Marianne J Middelveen, et al. International Lyme and Associated Diseases Society, Bethesda, MD, www.labome.org/research/Granulomatous-hepatitis-associated-with-chronic-Borrelia-burgdorferi-infection-a-case-report.html

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