



Tick-Borne Infections Council  
of North Carolina, Inc.

## NEWSLETTER 2016, Volume 2



**Quote of the Season:** [T]he threat is that a polarized group may nourish an interest in advancing the position and views of the group, and that this interest may come to be a main criterion and goal for the choice of methods, the reporting of findings and the provision of policy advice. This interest may well be based on an honest conviction that one is right and thus not be in any way morally reprehensible, but even honestly held convictions can introduce potential biases in research and reporting.

-- from Ploug, T., & Holm, S. (2015). Conflict of interest disclosure and the polarisation of scientific communities. *Journal of Medical Ethics*, 41, 356-358.

### Highlights...

Scroll down to see these features and more!

- New book out by Duke physician who survived a heart transplant needed due to Lyme disease
- Study on Cost of Lyme Disease in the US
- New Tick-borne Virus Discovered
- Study on Why the Lyme Spirochete Affects Certain Tissues
- Does Prescribed Burning Keep Down Ticks
- Tick-borne Powassan Virus in Maine
- A Rocky Mountain Spotted Fever Medical Cost Study From Arizona
- Odd Trend Found in Medical Publications on Lyme Disease

## State Vector-Borne Disease Task Force Meeting Schedule

February 12, 2016 May 13, 2016 August 12, 2016 November 18, 2016  
(Check with us before going to confirm date as they occasionally change.)

### **Location:**

Office of the Chief Medical Examiner, 4312 District Drive, Raleigh, NC 27607

Photo ID required

## 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:

[2015 Rickettsial Disease Memo](#)

[2015 Lyme Disease Memo](#)

[2015 Arboviral Disease Memo](#)

Disease	Total cases by year of report 2012 Final	Total cases by year of report 2013	Cases 2014 Preliminary
	Confirmed + Probable (Confirmed/Probable/Suspected)	Confirmed + Probable (Confirmed/Probable/Suspected)*	(Confirmed/Prob/Suspect) **
Lyme disease	122 (27/95/80)	180 (39/141/89)	27/145/87
Rickettsioses	591 (12/579/341)	426 (11/415/193)	10/496/281
Ehrlichia	105 (18/91/56)	78 (24/54/22)	11/61/34
Anaplasma	21 (0/21/21)	15 (1/14/14)	0/12/12

\*This is the year of report, not year of illness onset

\*\* Illness onset may be prior to 1/1/14

**These counties are now declared endemic for Lyme disease bringing the total of endemic counties in NC to six: Wake, Guilford, Haywood, Alleghany, Wilkes, Buncombe. As of August 2015.**

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), Duplin (2014).

## TIC-NC Talks and Materials Distributed to Early 2015

Brochures and/or Visits:

Piedmont Health Center                      Durham Health Department  
El Centro Hispano in Carrboro and Durham

### §§ North Carolina and Southeast Section §§

#### **New Book: “Gone in a Heartbeat: A Physician’s Search for True Healing” by Duke’s Dr. Spector Who Survived Lyme Disease Thanks to a Heart Transplant**

Neil Spector, an oncologist and researcher at Duke University Medical Center, has written a memoir of his survival of a near fatal illness, “Gone in a Heartbeat: A Physician’s Search for True Healing” (Triton Press, \$14.95, paperback 2015).

Spector was in peak physical condition when he began experiencing cardiac arrhythmias, joint pain and other symptoms. His doctors attributed the symptoms to stress, but Spector suspected he had a serious underlying medical condition and fought within the medical system to find the cause. Years of inconclusive results, lack of a diagnosis and no treatment resulted in irreparable heart damage. Doctors told Spector he had 72 hours to live and that he needed a heart transplant. Spector chronicles how he survived, but also encourages patients to be their own advocates in the medical system. For more information about this book, visit [www.nautiluspublishing.com](http://www.nautiluspublishing.com)

#### **Lyme Disease Estimated to Cost the U.S. Healthcare System Between \$712 Million and \$1.3 Billion a Year**

##### **Hopkins Study: Health Care Costs, Utilization and Patterns of Care following Lyme Disease**

Lyme disease is the most frequently reported vector borne infection in the United States. The Centers for Disease Control have estimated that approximately 10% to 20% of individuals may experience Post-Treatment Lyme Disease Syndrome – a set of symptoms including fatigue, musculoskeletal pain, and neurocognitive complaints that persist after initial antibiotic treatment of Lyme disease. Little is known about the impact of Lyme disease or post-treatment Lyme disease symptoms (PTLDS) on health care costs and utilization in the United States.

This study utilized retrospective data on medical claims and member enrollment for persons aged 0-64 years who were enrolled in commercial health insurance plans in the United States between 2006-2010. 52,795 individuals treated for Lyme disease were compared to 263,975 matched controls with no evidence of Lyme disease exposure.

Lyme disease was associated with \$2,968 higher total health care costs (95% CI: 2,807-3,128, p<.001) and 87% more outpatient visits (95% CI: 86%-89%, p<.001) over a 12-month period, and is associated with 4.77 times greater odds of having any PTLDS-related diagnosis, as

compared to controls (95% CI: 4.67-4.87, p<.001).

Lyme disease was associated with increased costs above what would be expected for an easy to treat infection. The presence of PTLDS-related diagnoses after treatment is associated with significant health care costs and utilization. PLoS One. 2015; 10(2): e0116767. Adrion ER et al. Entire paper available at: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4317177/>

## **Newly Discovered Tick-borne Virus, Named Bourbon Virus, Fatal to Kentucky Man**

### **Novel Thogotovirus Associated with Febrile Illness and Death, United States, 2014**

A previously healthy man from eastern Kansas, USA, sought medical care in late spring because of a history of tick bite, fever, and fatigue. The patient had thrombocytopenia and leukopenia and was given doxycycline for a presumed tickborne illness. His condition did not improve. Multiorgan failure developed, and he died 11 days after illness onset from cardiopulmonary arrest. Molecular and serologic testing results for known tickborne pathogens were negative. However, testing of a specimen for antibodies against Heartland virus by using plaque reduction neutralization indicated the presence of another virus. Next-generation sequencing and phylogenetic analysis identified the virus as a novel member of the genus Thogotovirus. Kosoy OL et al. Emerging Infectious Diseases, May 2015. Entire article: [dx.doi.org/10.3201/eid1207.060253](http://dx.doi.org/10.3201/eid1207.060253)

## §§ National Section §§

### **Lyme Disease Has Spread Across Pennsylvania**

#### **Ticks infected with the Lyme disease bacteria found in all Pennsylvania counties**

All of Pennsylvania's 67 counties have deer (black-legged) ticks carrying Lyme disease, according to the state departments of health and environmental protection. In a study conducted by the DEP, in collaboration with Indiana University of Pennsylvania, researchers across the state located blacklegged tick, *Ixodes scapularis*, and the bacteria it carries, *Borrelia burgdorferi*, which causes the infectious disease. The ticks are carried by deer. Freda R. Savana Staff Writer, Bucks County Courier Times, April 26, 2015

### **Effectiveness of DEET Against the Black-legged Tick and Its European Counterpart**

#### **Repellent efficacy of DEET, Icaridin, and EBAAP against *Ixodes ricinus* and *Ixodes scapularis* nymphs (Acari, Ixodidae)**

Repellent efficacy of 10% EBAAP (3-[N-butyl-N-acetyl]-aminopropionic acid, ethyl ester) and 10% Icaridin ((2-(2-hydroxyethyl)-1-piperidinecarboxylic acid 1-methylpropyl ester)) were evaluated against 20% DEET (N,N-diethyl-3-methylbenzamide) in human subject trials against ticks. Responses of host-seeking nymphs of the European castor bean tick (*Ixodes ricinus* L.; Acari: Ixodidae) and the North American blacklegged tick (*I. scapularis* Say; Acari: Ixodidae)

were compared. Tests were carried out according to the US-EPA standard protocol with ethanolic solutions of the active ingredients of repellents being applied to the forearm of 10 volunteers. The upward movement of ticks was monitored until repellent failure taking up to 12.5 h. Application of 20% DEET resulted in median complete protection times (CPT; Kaplan–Meier median) between 4 and 4.5 h, while 10% EBAAP yielded CPTs of 3.5–4 h. No significant differences were found between the efficacies of two repellents nor between the two species tested. The median of the CPT of a 10% Icaridin solution was 5 h in nymphs of *I. scapularis*, but 8 h in those of *I. ricinus* ( $P < 0.01$ ). Based on these studies, EBAAP and Icaridin are efficacious alternatives to DEET in their repellent activity against nymphs of the two *Ixodes* ticks with Icaridin demonstrating particularly promising results against *I. ricinus*. Future research should investigate whether similar results occur when adult *Ixodes* ticks or other tick species are tested. Büchel, et al. *Ticks and Tick-borne Diseases*, April 2015

Ed note: EBAAP, commonly known as IR3535 was developed by Merck & Co., Inc. in the mid-1970s and has been used in Europe for more than 20 years. See this link for more information: <http://www.medicaldaily.com/four-best-bug-repellents-deet-ir3535-picaridin-oil-lemon-eucalyptus-most-effective-says-ewg-247785>

## **The Gulf Coast Tick ‘Mothers’ Transmit Rickettsia Parkeri to Their ‘Babies’—the Eggs Hatch into Infected Larva**

### **Experimental Vertical Transmission of Rickettsia parkeri in the Gulf Coast tick, Amblyomma maculatum**

*Rickettsia parkeri*, an obligate intracellular bacterium, is a member of the spotted fever group of rickettsiae (SFGR), and is transmitted to humans and other animals by invertebrate vectors. In the United States, the primary vector of *R. parkeri* is the Gulf Coast tick, *Amblyomma maculatum* Koch. This study investigates the vertical transmission dynamics of *R. parkeri* within a field-derived, naturally infected colony of *A. maculatum*. Transovarial and transstadial transmission of the pathogen was observed over three generations, with transovarial transmission efficiency averaging 83.7% and transstadial transmission rates approaching 100%. Fitness costs were determined by comparing reproduction values of the *R. parkeri*-infected *A. maculatum* colony to values from a *R. parkeri*-free colony. No significant reproductive fitness costs to the host ticks were detected in the *R. parkeri*-infected *A. maculatum* colony. Significantly fewer engorged F<sub>1</sub> nymphs and F<sub>2</sub> larvae of the *R. parkeri*-free colony succeeded in molting, suggesting that there may be some advantage to survival conferred by *R. parkeri*. The results of this study indicate that *R. parkeri* is maintained in *A. maculatum* populations efficiently by transovarial and transstadial transmission without any noticeable effects on tick reproduction or survival. CL Wright, et al. *Ticks and Tick-borne Diseases*, April 2015

## **Some Understanding of Why the Lyme Disease Spirochete Affects Certain Tissues**

### **A short-term Borrelia burgdorferi infection model identifies tissue tropisms and bloodstream survival conferred by adhesion proteins**

*Borrelia burgdorferi*, the causative agent of Lyme disease in the United States, is able to persist

in the joint, heart, skin, and central nervous system for the lifetime of its mammalian host. *Borrelia* species achieve dissemination to distal sites in part by entry into and travel within the bloodstream. Much work has been performed *in vitro* describing the roles of many *B. burgdorferi* outer surface proteins in adhesion to host cell surface proteins and extracellular matrix components, though the biological relevance of these interactions is only beginning to be explored *in vivo*. A need exists in the field for an *in vivo* model to define the biological roles of *B. burgdorferi* adhesins in tissue-specific vascular interactions. We have developed an *in vivo* model of vascular interaction of *B. burgdorferi* in which the bacteria are injected intravenously and allowed to circulate for 1 hour. This model has shown that the fibronectin binding protein BB0347 has a tropism for joint tissue. We have also shown an importance of the integrin binding protein, P66, in binding to vasculature of the ear and heart. This model also revealed unexpected roles for *Borrelia* adhesins BBK32 and OspC in bacterial burdens in the bloodstream. The intravenous inoculation model of short term infection provides new insights into critical *B. burgdorferi* interactions with the host required for initial survival and tissue colonization. Ritchie and Coburn, *Infection and Immunity*, July 2015, Volume 83, Issue 7 <http://iai.asm.org/content/early/2015/05/19/IAI.00349-15>

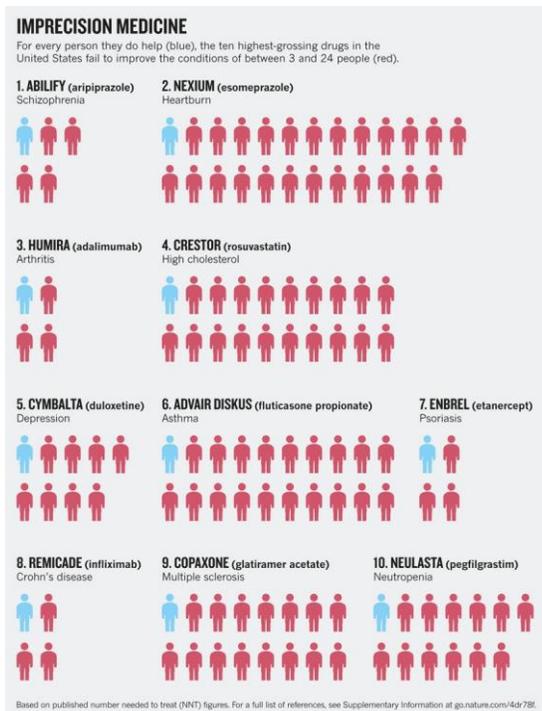
## Not About Ticks and Tick-Borne Infections but an Interesting Concept

**Precision medicine requires a different type of clinical trial that focuses on individual, not average, responses to therapy.**

Every day, millions of people are taking medications that will not help them. The top ten highest-grossing drugs in the United States help between 1 in 25 and 1 in 4 of the people who take them. For some drugs, such as statins — routinely used to lower cholesterol — as few as



1 in 50



may benefit<sup>1</sup>. There are even drugs that are harmful to certain ethnic groups because of the bias towards white Western participants in classical clinical trials<sup>2</sup>. Recognition that physicians need to take individual variability into account is driving huge interest in 'precision' medicine. In January, US President Barack Obama announced a US\$215-million national Precision Medicine Initiative. This includes, among other things, the establishment of a national database of the genetic and other data of one million people in the United States.

Stork N, *Nature* **520**, 609–611 doi:10.1038/520609a. Entire article: <http://www.nature.com/news/personalized-medicine-time-for-one-person-trials-1.17411> April 2015

## UGA research links prescribed burning to reduced tick populations

From spring through fall, lone star ticks, the most common type of tick in Georgia, spike in activity. They may transmit pathogens that cause disease in humans. According to newly published University of Georgia research, tick populations can be managed through a technique called prescribed burning.



Elizabeth Gleim, a former graduate student in the Warnell School of Forestry and Natural Resources and co-author on the PLOS One article, performed the research over several years. She visited 21 plots in Georgia and Florida to collect tick samples monthly. Most of those plots had been subjected to long-term prescribed burning, a way to manage and control the growth of plant and animal species on a specific area of land.

Gleim, now a visiting assistant professor at Emory University's Oxford College, found that repeated prescribed burning over a long period of time effectively reduced tick populations and changed the landscape of the burned areas. At plots where there was no burning, tick counts were 10 times greater in the warm season than sites where prescribed burning occurred. In total, over 47,000 ticks were collected among the 21 sites over two years. Conner et al. Available online at <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0112174>

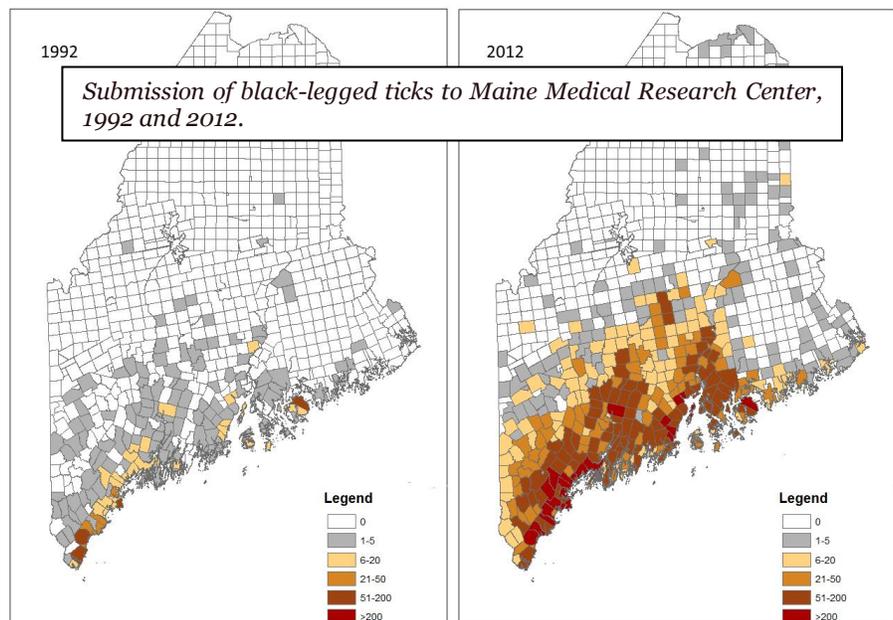
## Report from Maine-- The Latest on Powassan: It's in 2-4% of Black-Legged Ticks Around Us, and On The Rise

First, in Maine, *most black-legged (deer\*) ticks carry disease-causing pathogens*. Depending on your source, between 40% and 70% carry Lyme, which is bacterial. Some carry anaplasmosis, also bacterial. Some carry babesiosis, a protozoan. And between 2% and 4% of deer ticks carry Powassan, the only tick-borne virus in the United States, according to surveillance projects in various parts of the northeast

(including Connecticut). So, if you do the math, about 80% (or more) of deer ticks are carrying some pathogen that can seriously hurt or kill you. The tick population in Maine has increased hugely over the last 20 years, and continues to grow every year. Deer ticks are now in all of

Maine's 16 counties, but they're more heavily concentrated in the southern half of the state and Midcoast.

- Some 60 cases over the last 20 years – Powassan is fatal in about 10% of reported cases. An additional 40% to 50% suffer lifelong severe neurological damage.
- Studies from Tennessee show transmission time to be a couple of minutes or so. Other studies show a somewhat longer transmission time.



- There is no vaccine for Powassan, and no cure. Adapted from <http://hotstove.bangordailynews.com/2015/05/01/home/tick-borne-powassan-virus-on-the-rise/>, accessed May 6, 2015.

Ed note: 'Deer' tick is not a good term for the black-legged tick (*Ixodes scapularis*), especially in the south, as lone star tick (*Amblyomma americanum*) also feed on deer and many people call them 'deer' ticks. Now that lone star ticks are in the NE it is especially helpful to use clearer names for these two species of ticks.

### **And on *Borrelia Miyamotoi* Disease**

The first recognized cases of *Borrelia miyamotoi* disease (BMD) in North America were reported in the northeastern United States in 2013. Acutely febrile patients from the northeastern United States in whom the treating health care providers suspected and ordered testing for tick-transmitted infections presenting to primary care offices, emergency departments, or urgent care clinics in 2013 and 2014 were studied.

Of 11 515 patients tested, 97 BMD cases were identified by PCR. Most presented with nonspecific symptoms, including fever, headache, rigors, myalgia, and arthralgia. Laboratory confirmation of BMD was possible by PCR on blood from acutely symptomatic patients who were seronegative at presentation. *Borrelia miyamotoi* may be an emerging tickborne infection in the northeastern United States.

### **A Captive Chimpanzee Gets Lyme Disease**

#### **Suspected Lyme Borreliosis in a Captive Adult Chimpanzee (*Pan Troglodytes*)**

An 18-yr-old female captive-born chimpanzee (*Pan troglodytes*) presented with an intermittent history of inappetence, lethargy, and lower limb stiffness. No notable abnormalities were found on exam or complete blood cell count and serum biochemistry analysis. Serologic testing was strongly positive via indirect fluorescent antibody testing and Western blot for *Borrelia burgdorferi*. Treatment with doxycycline was initiated, and a clinical response was seen within 1 wk. Convalescent serum exhibited an eightfold increase in titer. Serologic testing was performed on several conspecifics with banked serum; while some low positive titers were present and presumed indicative of past exposure, no titer was elevated to the extent of the affected chimpanzee during its course of disease. To the authors' knowledge, this is the first report of suspected Lyme borreliosis in a great ape species, and the case originates from an area of the United States with a high incidence of human borreliosis. Wack et al. *Journal of Zoo and Wildlife Medicine* / Jun 2015 / pg(s) 423-426

### **An Idea E-magazine, *Aeon*, Has Section on Lyme Disease**

From the website: Founded London September 2012, *Aeon* has been publishing some of the most profound and provocative thinking on the web. It asks the biggest questions and finds the freshest, most original answers, provided by world-leading authorities on science, philosophy and society. It is free. An offshoot, *Aeon Ideas*, has a section on Lyme disease: <http://ideas.aeon.co/questions/why-do-doctors-keep-fighting-about-lyme-disease> The e-magazine belongs to *Aeon Media Ltd*. It is not affiliated with any other organization or political group. *Aeon* is committed to big ideas, serious enquiry, a humane worldview and good writing.

That's it.

## **Lyme Disease Diagnosis, Treatment, and Reporting Practices Among Healthcare Providers in New Hampshire, 2014**

**BACKGROUND:** Lyme disease (LD) is a common tick-borne disease in New Hampshire (NH). Incidence has increased significantly in the last 5-10 years, with NH recording the highest in the nation in 2012. Expert panels have published widely-accepted LD diagnosis and treatment guidelines for healthcare providers; some groups have published alternate guidelines, the extent to which they are referenced by NH providers is unknown. In 2014, the NH Department of Health and Human Services (DHHS) administered a survey to characterize knowledge, attitudes, and practices for LD among NH healthcare providers.

**METHODS:** A web-based survey was distributed via email to all 3,041 physicians, physician assistants, and nurse practitioners in NH's health alert network communication system. The survey contained 47 questions on diagnosis, treatment, reporting, information sources, and patient education practices for LD. Data were analyzed and compared, where possible, to a similar survey of 296 NH physicians conducted in 1999.

**RESULTS:** A total of 136 (5%) providers responded to the survey, including 89 physicians, 27 physician assistants, and 20 nurse practitioners. The majority of providers (84%) had diagnosed a patient with LD in the last year, compared to 37% in the 1999 survey ( $p < 0.001$ ). Most providers referred to IDSA guidelines (80%) with a small minority (4%) referring to alternative guidelines published by ILADS. To assist with the diagnosis of LD, 88% of providers reported using the recommended two-tier testing strategy, 21% reported tick testing, and 7% reported using a non-FDA approved western blot test. Sixteen percent of providers reported ever treating a patient for LD in response to a patient's concern, even when the provider did not think the patient had LD, compared to 45% in the 1999 survey ( $p < 0.001$ ). Few providers (25%) reported proactively reporting LD to DHHS and instead waited for DHHS to request information following a positive laboratory test result. More than half (62%) of providers were interested in continuing education opportunities if provided by DHHS. Less than one third of providers (29%) routinely provide LD prevention information to patients.

**CONCLUSIONS:** Healthcare providers in NH have significant experience assessing and treating patients for LD. While limited by a poor response rate, the survey did identify important provider knowledge and practice gaps that DHHS will use to increase public and provider education through promotion of evidence-based clinical guidelines and control measures, dissemination of a state LD Prevention Plan, and targeted distribution of educational materials and training programs. Daly et al. New Hampshire Department of Health and Human Services, CSTE Conference, Boston, June 15, 2015

## **Medical and Indirect Costs Associated With a Rocky Mountain Spotted Fever Epidemic in Arizona, 2002–2011**

Rocky Mountain spotted fever (RMSF) is an emerging public health issue on some American Indian reservations in Arizona. RMSF causes an acute febrile illness that, if untreated, can cause severe illness, permanent sequelae requiring lifelong medical support and death. We describe costs associated with medical care, loss of productivity, and death among cases of RMSF on two American Indian reservations (estimated population 20,000) between 2002 and 2011. Acute medical costs totaled more than \$1.3 million. This study further estimated \$181,000 in acute productivity lost due to illness, and \$11.6 million in lifetime productivity lost from premature

death. Aggregate costs of RMSF cases in Arizona 2002–2011 amounted to \$13.2 million. We believe this to be a significant underestimate of the cost of the epidemic, but it underlines the severity of the disease and need for a more comprehensive study. Drexler NA, et al, Rickettsial Zoonoses Branch, Division of Vector-borne Diseases, National Center for Emerging and Zoonotic Infectious Diseases, Centers for Disease Control and Prevention

ED. note: There are not many studies on the costs to society of tick-borne illnesses.

## **Ehrlichiosis has Increased Since 1999**

### **Epidemiology of Ehrlichiosis Caused By Ehrlichia Chaffeensis and Ehrlichia Ewingii in the United States, 2008–2012**

**BACKGROUND:** Human ehrlichiosis is a potentially fatal tickborne disease caused by *Ehrlichia* species, including *E. chaffeensis* and *E. ewingii*. Symptoms may include fever, headache, or rash. Early and empiric treatment with doxycycline is recommended for patients of all ages whenever ehrlichiosis is suspected. The primary vector in the U.S. is the lone star tick, *Amblyomma americanum*. Ehrlichiosis was made nationally notifiable in 1999. In 2008 the case definition changed to include categories for *E. chaffeensis* and *E. ewingii* infections. Presented here is a summary of passive surveillance of *E. chaffeensis* and *E. ewingii* infections in the U.S. during 2008–2012.

**METHODS:** Cases of ehrlichiosis are reported to CDC through two national surveillance systems: the Nationally Notifiable Diseases Surveillance System (NNDSS) and Case Report Forms (CRF). Demographic data were reported through NNDSS and used to calculate incidence rates. Additional data were reported through CRFs including immunosuppressive conditions, patient outcome, and laboratory results.

**RESULTS:** During 2008–2012, 4,563 cases of *E. chaffeensis* infection were reported through NNDSS (56.4% male, 64.2% white, 2.0% Hispanic). The incidence rate (IR) was 3.2 cases per million person-years (PY). States with the highest IR included Oklahoma (30.9), Missouri (26.3), Delaware (19.8), and Arkansas (19.4). The IR was highest among persons ages 65–69 (IR=7.9). Most cases were reported in May–July (n=2,947, 64.6%). The hospitalization rate was 57.4%, and the case fatality rate (CFR) was 1.0%. Children aged <5 years had the highest CFR of 3.6%. During 2008–2012, 53 cases of *E. ewingii* infection were reported through NNDSS (50.9% male, 66.0% white). The national IR was 0.04 cases per million PY. The hospitalization rate was 76.9%; no deaths were reported. Immunosuppressive conditions were reported by 26.3% of patients.

**CONCLUSIONS:** The overall rate for ehrlichiosis has increased since 1999. Although previous literature suggests *E. ewingii* primarily affects those who are immunocompromised, this report shows most cases occurred among immunocompetent cases. This is the first report to show children aged <5 years with ehrlichiosis have an increased CFR, relative to older patients. A recent survey demonstrated clinicians may be less willing to prescribe doxycycline to children aged <8 years compared to adults for suspected cases of Rocky Mountain spotted fever. A similar gap between recommendations and practice may explain part of the increased CRF among children with suspected ehrlichiosis. Ongoing surveillance and reporting of tickborne diseases are critical to inform public health practice and guide disease prevention efforts. Heitman et al. CDC, June 20, 2015

## Did *Bartonella Henselae* Contribute to the Deaths of Two Veterinarians?

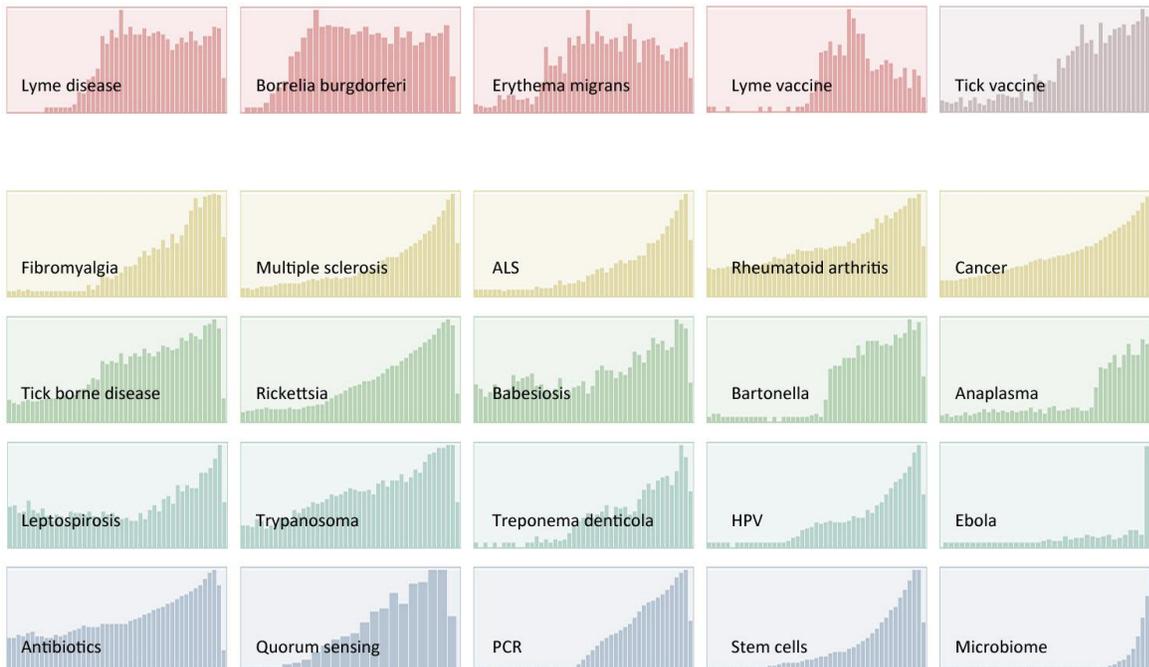
*Bartonella henselae*, a flea-transmitted bacterium, causes chronic, zoonotic, blood stream infections in immunocompetent and immunocompromised patients throughout the world. As an intra-erythrocytic and endotheliotropic bacterium, *B. henselae* causes a spectrum of symptomatology ranging from asymptomatic bacteremia to fever, endocarditis and death. Veterinary workers are at occupational risk for acquiring bartonellosis. As an emerging, and incompletely understood, stealth bacterial pathogen, *B. henselae* may or may not have been responsible for the deaths of two veterinarians; however, recent evidence indicates that this genus is of much greater medical importance than is currently appreciated by the majority of the biomedical community. Breitschwerdt E, Letter to the Editor [Open Access Did Bartonella henselae contribute to the deaths of two veterinarians?](#) *Parasites & Vectors* 2015, **8** :317 (12 June 2015)

## Odd Leveling Off of Papers on the Lyme Disease and the Causative Bacteria

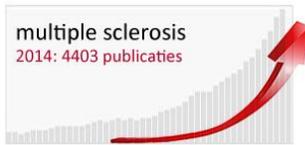
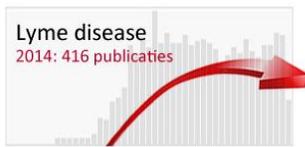
The graphs below are from PubMed which has 'subjects by year' charts on the right of each page with certain types of searching. If you look at the chart for e.g. "Lyme disease" or "Borrelia burgdorferi" you see something peculiar: the publication volume increases up to a certain point, peaks in one year and then levels off or (depending on search terms) even slightly declines over the remaining years. The peak for Lyme related research is 1993. The vertical bar that is furthest to the right is mid-2015 [it is shorter (fewer publications) because this year isn't finished].

Move one bar to the left and you have one year earlier. Most charts run from about 1970 until 2015, some cover fewer years because the subject has a shorter history.

This pattern seen with Lyme disease and *B. burdoferi* seems very unusual for biomedical research. Usually the volume of publications increases linearly or even exponentially (e.g. some DNA related research) over the years, but Lyme research certainly appears to be different. The question is why? What are the reasons? Contributed by Niek Haak, Microbiologist, Netherlands



Credit: Niek Haak, Scientific Advisor, Stichting Tekenbeetziekten (Foundation) [www.tekenbeetziekten.nl](http://www.tekenbeetziekten.nl)



NH

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*TIC-NC is grateful for the financial contributions of Insect Shield International, LLC.*

*Tick-Borne Infections Council of North Carolina is a non-profit 501(c)3 organization formed to improve the recognition, treatment, control, and understanding of tick-borne diseases in North Carolina. We are all-volunteer and appreciate donations.*

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