Tick-Borne Infections Council of North Carolina, Inc.

NEWSLETTER 2016, Volume 5

Quote of the season: "Because patients infected with B. americana can be seronegative for Lyme disease, medical professionals should be willing to pursue molecular analyses and consider treatment for patients with Lyme disease-like symptoms."

From Scott, J.D. and Foley, J.E. (2016) Detection of *Borrelia americana* in the Avian Coastal Tick, *Ixodes auritulus* (Acari: Ixodidae), Collected from a Bird Captured in Canada. Open Journal of Animal Sciences, 6, 207-216. http://dx.doi.org/10.4236/ojas.2016.63027

Highlights…

Scroll down to see these features and more!

State Vector-Borne Disease Task Force 2016 Meeting Schedule

November meeting has been postponed.

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:

2015 Rickettsial Disease Memo
2015 Lyme Disease Memo
2015 Arboviral Disease Memo
No 2016 letters have been issued.

Disease	Total cases by year of report 2014 Final Confirmed + Probable (Confirmed/Probable/Suspected)*	Total cases by year of report 2015 Preliminary Confirmed + Probable (Confirmed/Probable/Suspected)*	2016 Jan1-July 31 (Confirmed/ Probable)*
Lyme disease	170 (27/143/86)	230 (38/192/46)	16/127
Rickettsioses	496 (10/486/278)	459 (5/454/130)	1/224
Ehrlichia	73 (11/62/31)	74 (16/58/18)	5/29
Anaplasma	12 (0/12/12)	19 (4/15/3)	0/5

*This is the year of report, not year of illness onset.
Illness onset may be prior to the year listed.

Note: Six counties now have confirmed cases of Lyme disease in two persons who had not traveled out of the county for 30 days after their tick exposure.
Therefore, these counties are now declared endemic for Lyme disease: Wake, Guilford, Haywood, Alleghany, Buncombe, 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), Duplin (2014), Forsyth (2016).

TIC-NC Talks and Materials Distributed

Brochures:
- **Asheville- parks, Fire Dept, Police, many other places**

North Carolina and Southeast Section

New Borrelia May Be Involved in Lyme Disease in the Southeast

A divergent spirochete strain isolated from a resident of the southeastern United States was identified by multilocus sequence typing as *Borrelia bissettii*.

Background Out of 20 spirochete species from *Borrelia burgdorferi* sensu lato (s.l.) complex recognized to date some are considered to have a limited distribution, while others are worldwide dispersed. Among those are *Borrelia burgdorferi* sensu stricto (s.s.) and *Borrelia bissettii* which are distributed both in North America and in Europe. While *B. burgdorferi* s.s. is recognized as a cause of

Lyme borreliosis worldwide, involvement of *B. bissettii* in human Lyme disease was not so definite yet.

Findings Multilocus sequence typing of spirochete isolates originating from residents of Georgia and Florida, USA, revealed the presence of two *Borrelia burgdorferi* sensu stricto strains highly similar to those from endemic Lyme borreliosis regions of the northeastern United States, and an unusual strain that differed from any previously described in Europe or North America. Based on phylogenetic analysis of eight chromosomally located housekeeping genes divergent strain clustered between *Borrelia bissettii* and *Borrelia carolinensis*, two species from the *B.burgdorferi* s.l. complex, widely distributed among the multiple hosts and vector ticks in the southeastern United States. The genetic distance analysis showed a close relationship of the diverged strain to *B. bissettii*.

Conclusions Here, we present the analysis of the first North American human originated live spirochete strain that revealed close relatedness to *B. bissettii*. The potential of *B. bissettii* to cause human disease, even if it is infrequent, is of importance for clinicians due to the extensive range of its geographic distribution. Golovchenko M, et al. Parasites & vectors. 2016 Feb 4;9(1):1. Entire paper free: http://parasitesandvectors.biomedcentral.com/articles/10.1186/s13071-016-1353-4p

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Wake County Materials in English and Spanish about Ticks, Staying Safe, and Diseases

http://www.wakegov.com/humanservices/publichealth/information/diseases/pages/ticks.aspx

Horses and Lyme Disease in Southwest Virginia

Seroprevalence of *Borrelia burgdorferi* in Horses Presented for Coggins Testing in Southwest Virginia and Change in Positive Test Results Approximately 1 Year Later

Hypothesis To determine the seroprevalence of *B. burgdorferi* in horses in southwest Virginia.

Animals Horses presented for routine Coggins testing from January 2013 to January 2014 had additional blood drawn for Lyme Multiplex Assay testing.

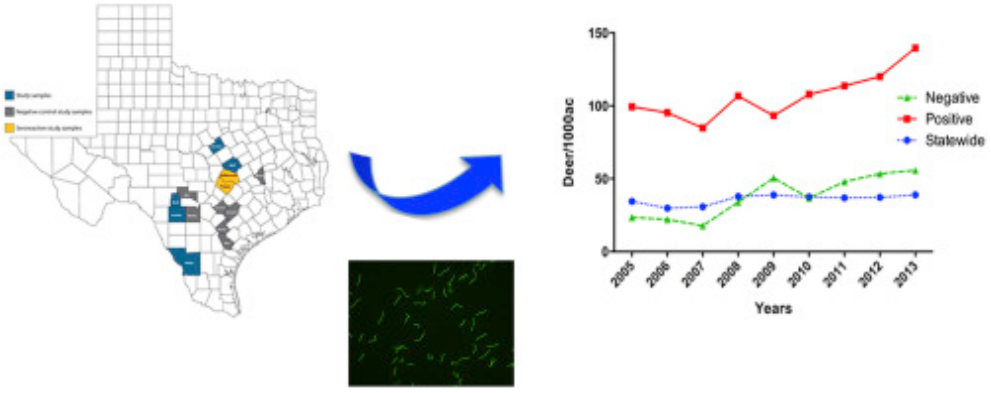
Methods Of 492 samples collected, 250 samples were analyzed using the Lyme Multiplex Assay. Of the 83 horses that had positive test results to at least 1 outer surface protein (Osp), 63 were available for follow-up testing 5–17 months later (June 2014).

Results Thirty-three percent of horses had positive results for antibodies to at least 1 Osp. Horses with a positive outer surface protein F (OspF) result were older (14.5 ± 0.79) than horses with a negative OspF result (11.6 ± 0.53). Of the horses available for follow-up testing, 63% had the same result as that of the initial test. There was no difference in test result between initial and follow-up testing.

Conclusions Horses seropositive to *B. burgdorferi* are common in Virginia, and older horses are more likely to have a positive test result for OspF than younger horses. Follow-up testing indicated that the majority of horses that were positive on initial testing did not have a different test result 5–17 months later. Journal of Veterinary Internal Medicine, Funk et al. DOI: 10.1111/jvim.13973

Seroprevalence of Borrelia burgdorferi Antibodies in White-tailed Deer from Texas: 4.7% Sero-reactive

Seroprevalence of Borrelia burgdorferi antibodies in white-tailed deer from Texas
Lyme Disease is caused by the bacterial pathogen Borrelia burgdorferi, and is transmitted by the tickvector Ixodes scapularis. It is the most prevalent arthropod-borne disease in the United States. To determine the seroprevalence of B. burgdorferi antibodies in white-tailed deer (Odocoileus virginianus) from Texas, we analyzed serum samples (n ¼ 1493) collected during the 2001e2015 hunting seasons, using indirect ELISA. Samples with higher sero-reactivity (0.803 above) than the



and negative control group (0.662) were further tested using a more specific standardized western immunoblot assay to rule out false positives. Using ELISA, 4.7% of the samples were sero-reactive against B. burgdorferi, and these originated in two eco-regions in Texas (Edwards Plateau and South Texas Plains). However, only 0.5% of the total samples were sero-reactive by standardized western immunoblot assay. Additionally, both ELISA and standardized western immunoblot assay results correlated with an increased incidence in human Lyme Disease cases reported in Texas. This is the first longitudinal study to demonstrate fluctuation in sero-reactivity of white-tailed deer to B. burgdorferi sensu stricto antigens in southern United States. Future ecological and geographical studies are needed to assess the environmental factors governing the prevalence of Lyme Disease in non-endemic areas of the southern United States. Adetunji et al.
http://www.sciencedirect.com/science/article/pii/S2213224416300207

Good Resource to Know About for Pest and Plant Disease Identification at NCSU

The **Plant Disease and Insect Clinic** diagnoses plant problems for farmers, growers, landscapers, homeowners, and gardeners. In consultation with expert faculty, we recommend ways to treat or prevent the problems we diagnose.

We work in partnership with your local County Agent or Master Gardener, who can diagnose many common plant disease and insect problems, or help you properly collect and submit a sample to the PDIC if necessary. Click these links to find a North Carolina **County Agent** and **Master Gardener** near you! https://projects.ncsu.edu/cals/plantpath/extension/clinic/

Discover Magazine's 2013 Article on Lyme Disease in the South Now Availble as a .pdf Download

From The December 2013 Issue: The Confounding Debate Over Lyme Disease in the South - The debilitating tick-borne disease is well-documented north of the Mason-Dixon line, but does it exist beyond that? By Wendy Orent | Friday, November 01, 2013
steveclarknd.com/wp-content/uploads/2013/11/The-Confounding-Debate-Over-Lyme-Disease-in-the-South-DiscoverMagazine.com_.pdf

⁂ North Carolina and Southeast Section ⁂

The CDC Began a Hard-to-Find-Out-About "Lyme Corp" Program Around 2014

TIC- NC has recently learned about this program:

See link – http://www.jhsph.edu/offices-and-services/practice-and-training/news-and-events/_documents/CDCLymeCorpsFlyer_09-29-2014_FINAL.pdf

another link- www.jhsph.edu/offices-and-services/practice-and-training/news-and-events/_documents/CDCLymeCorpsFlyer_09-29-2014_FINAL.pdf

- shows a poster beginning with this information: "Tick Tock, Tick Talk Learn about the CDC Division of Vector-Borne Diseases & How to Get Involved in the CDC Lyme Corps Program… Dr. Nelson will also talk about Lyme Corps, an exciting new CDC program for Johns Hopkins University students and residents."
It is dated September 2014. It appears that recruits are trained to disseminate Infectious Disease Society of America and CDC-based information about Lyme disease. Details of the program are lacking due to (at this writing) there being no further information online.

Most Tularemia is Now Tick Related

Ecology of Tularemia in Central US Endemic Region

Tularemia is a zoonotic disease that occurs in the Northern Hemisphere caused by the gammabacterium Francisella tularensis. The most severe form of human tularemia occurs in the central USA and involves a rabbit enzootic cycle, ixodid tick vectors, and F. tularensis subspecies tularensis genotype A1. Enzootic tularemia is thought to have a spring-summer seasonality corresponding to the questing activity of its primary tick vectors. Domestic cats, another common incidental host, acquire the infection by preying on infected rabbits. The seasonality of tularemia in cats, which demonstrate a bimodal seasonal incidence curve with peaks in the spring and late summer-fall, may serve as a surrogate for the seasonality of the disease in its enzootic host. Human tularemia shows a unimodal late spring, early summer peak, which correlates to the seasonal questing activity of tick vectors of human tularemia. This difference in seasonality suggests that different tick species or tick life stages

are involved in maintenance of the enzootic rabbit-tick cycle. Entire paper free at: Ecology of Tularemia in Central US Endemic Region, RJ Mani, RJ Morton, KD Clinkenbeard - Current Tropical Medicine Reports, 2016

70% of Black-legged Ticks Found to be Infected with More Than One Strain of the Lyme Disease Bacteria

Vectors as Epidemiological Sentinels: Patterns of Within-Tick Borrelia burgdorferi Diversity

Lyme disease, caused by a bacteria carried by deer ticks, is the most common vector-borne disease in North America and over 30,000 cases are reported each year in the United States. Ticks may be infected with multiple strains of the Lyme disease bacteria, which differ in transmissibility and the harm they pose to humans. In this study, we collected 98 infected deer ticks from across the United States and southern Canada. We used genetic techniques to investigate the diversity of the Lyme disease bacteria infecting each individual tick. We find that 70% of ticks are infected with multiple strains of the Lyme disease bacteria, indicating that *humans may be exposed to and infected with multiple bacterial strains from a single tick bite*. We also find evidence that the Lyme disease bacteria is evolving in response to the immune defenses of its natural hosts (including rodents and birds). Our study shows that individual ticks and other disease vectors can be studied as epidemiological sentinels, which reveal the extensive diversity of pathogens circulating in natural disease cycles and how they are evolving. Open access. Published: July 14, 2016, Walter et al.
http://dx.doi.org/10.1371/journal.ppat.1005759

0.3% of Black-legged Ticks Co-infected in Massachusetts, Mostly Children Bitten

Passive Surveillance of *Ixodes scapularis* (Say), Their Biting Activity, and Associated Pathogens in Massachusetts

A passive surveillance of tick-borne pathogens was conducted over a 7-year period (2006–2012), in which a total of 3551 ticks were submitted to the University of Massachusetts for PCR testing. The vast majority of these ticks were *Ixodes scapularis* from Massachusetts ($N = 2088$) and hence were the focus of further analysis. Two TaqMan duplex qPCR assays were developed to test *I. scapularis* ticks for the presence of three human pathogens:*Borrelia burgdorferi*, *Anaplasma phagocytophilum*, and *Babesia microti*. *I. scapularis* submissions were concentrated from Cape Cod, the eastern half of the state outside of the Boston metropolitan area, parts of Franklin and Hampshire counties along the Quabbin Reservoir watershed, and southwestern Berkshire county. Differences in seasonal activity pattern were observed for different developmental stages of *I. scapularis*. The largest proportion of tick bite victims were age 9 years and under. Nymphal ticks were found more often on lower extremities of their hosts, while more adult ticks were found on the head. Overall infection rate of *B. burgdorferi*,*A. phagocytophilum*, and *B. microti* in human-biting ticks was 29.6%, 4.6%, and 1.8%, respectively. *B. burgdorferi*-infected ticks were widely distributed, but *A. phagocytophilum*- and *B. microti*-infected *I. scapularis* were found mainly in the eastern half of the state. We found that 1.8%, 1.0%, and 0.4% of ticks were coinfected by *B. burgdorferi* and *A. phagocytophilum*, *B. burgdorferi* and *B. microti*, and *A. phagocytophilum* and *B. microti*, respectively, and 0.3% of ticks had triple coinfection. Guang et al. . Vector-Borne and Zoonotic Diseases doi:10.1089/vbz.2015.1912.

Underreporting of Lyme and Other Tick-Borne Diseases in Residents of a High-Incidence County, Minnesota, 2009

"The genome provides a foundation for a whole new era in tick research," said Catherine Hill, lead author of a paper that was published in Nature Communications. "Now that we've cracked the tick's code, we can begin to design strategies to control ticks, to understand how they transmit disease and to interfere with that process."
Tick-borne illnesses cause thousands of human and animal deaths annually, and ticks transmit a wider variety of pathogens and parasites than any other arthropod. They primarily spread disease by creating a feeding wound in the skin of their hosts, regurgitating infected saliva into the wound as they ingest blood.
Despite ticks' capacity to acquire and pass on an array of pathogens, research on ticks has lagged behind that of other arthropod vectors, such as mosquitoes, largely because of a lack of genetic and molecular tools and resources.
"Ticks are under-appreciated as vectors — until you get Lyme disease," Hill said.
About 30,000 cases of Lyme disease cases are reported in the U.S. annually, most concentrated in the Northeast and upper Midwest. But the Centers for Disease Control estimates the actual number of cases is 329,000 a year, many of which are unreported or misdiagnosed.
While not fatal, Lyme disease can be permanently debilitating if the infection is not treated before it reaches the chronic phase. The deer tick also vectors human granulocytic anaplasmosis, babesiosis and the potentially lethal Powassan virus. Schiffman et al. Zoonoses and Public Health. Entire paper is at: – Genomic insights into the Ixodes scapularis tick vector of Lyme disease. DOI: 10.1111/zph.12291

Article in Huffington Post

Arrogance and Ignorance: A Catastrophe for Lyme Sufferers

After writing about my horrendous road to getting a proper diagnosis and treatment for Lyme disease and Bartonella, a bacterial co-infection of Lyme, I was overwhelmed by hundreds of messages from others with similar stories. I believe that most who choose to dedicate themselves to helping professions, like medicine, take seriously their oath to Do No Harm.

Yet I am perplexed by the sheer magnitude of doctors from all over the world who are dismissive of their patient's symptoms and concerns, causing needless and profound suffering. Take the case of renowned Duke oncologist and researcher, Dr. Neil Spector, whose four-year Lyme misdiagnosis led to irreversible heart damage and, ultimately, a transplant. Yes, you read that right. "Top Doctor Failed by Other Top Doctors Resulted in Heart Transplant." Dana ParishSinger/ Songwriter/ NY'er/ Dog-rescuer/ Champion for those suffering with Lyme and associated diseases. Rest of article at: www.huffingtonpost.com/dana-parish/post_10991_b_9183900.html

Blood Meal Appears to be Required for Lyme Disease Spirochetes to Become Infective

Virulence of the Lyme disease spirochete before and after the tick bloodmeal: a quantitative assessment

Abstract Background: Borrelia burgdorferi, the tick-transmitted agent of Lyme disease, adapts to different environments as it cycles between an arthropod vector and vertebrate host. Signals encountered during nymphal tick feeding prior to transmission activate a regulon that is controlled by the alternative sigma factors RpoN and RpoS, which are required for mammalian infection. The ingested bloodmeal also provides nutrients that stimulate spirochete replication. Although the influence of tick feeding on spirochete growth and gene expression is well documented, a quantitative assessment of spirochete virulence before and after tick feeding has not been made.

Methods: Homogenates were prepared from unfed and fed infected Ixodes scapularis nymphs that had acquired B. burgdorferi as larvae. Serially diluted tick homogenates were needle-inoculated into mice to determine the infectious dose of tick-derived spirochetes before and after the bloodmeal. Mouse infection was assessed by sero-reactivity with B. burgdorferi whole cell lysates on immunoblots and attempted isolation of spirochetes from mouse tissues. Viable spirochetes in tick-derived inocula were quantified by colony formation in solid media.

Results: We found that an inoculum containing as many as 104 B. burgdorferi from unfed ticks is largely non-infectious, while the calculated ID50 for spirochetes from fed ticks is ~30 organisms. Engineered constitutive production of the essential virulence factor OspC by spirochetes within unfed ticks did not confer an infectious phenotype.

Conclusion: Conditional priming of B. burgdorferi during tick feeding induces changes in addition to OspC that are required for infection of the mammalian host. Kasumba et al. Parasites & Vectors (2016) 9:129 DOI 10.1186/s13071-016-1380-1

Interesting Paper about Using the α-Gal Immune Response in Vaccine Development

Control of vector-borne infectious diseases by human immunity against α-Gal

Excerpt from article: During evolution, hominid primates and humans lost the gene encoding the enzyme to synthesize the carbohydrate Galactose-alpha-1,3-galactose (α-Gal) that resulted in an almost unique capacity to produce high antibody titers against α-Gal [6]. This process may be viewed as a major evolutionary adaptation for protection against VBDs [5]. Other mammals do not produce anti-α-Gal antibodies because they express α-Gal, which is recognized as a self-antigen resulting in tolerogenic immune responses.

Carbohydrate-based vaccines have shown promising results against various infectious pathogens such as Neisseria meningitidis, Haemophilus influenzae type b, and Salmonella typhi [7]. Recently, Yilmaz et al. [6] found that bacteria expressing α-Gal in the gut microbiota of mice with knockout α-Gal pathway trigger a systemic antibody response that protects against transmission of malaria-causing Plasmodium parasites by Anopheles mosquitoes. The sterile protection against malaria transmission is achieved by α-Gal-specific IgM and IgG antibodies that neutralize Plasmodium sporozoites via a mechanism involving the binding of these immunoglobulins to the α-Gal moieties on the surface of the parasite that activates the classical complement pathway [6]. This was a groundbreaking finding that may greatly impact the control of human VBDs. Notably, when α-Gal is used for immunization, IgM and IgG responses are also induced and have a protective role [6]. In sharp contrast to these findings, anti-α-Gal IgE response induced by tick bites has been associated with anaphylactic reactions with still unknown implications for susceptibility to tick-borne pathogens [4,8]. These results suggest that the

immune response to α-Gal may be highly influenced by the context in which this antigen is presented to the immune system [4].

… In the context of the increasing burden of emerging VBDs worldwide, we propose the use of probiotics composed of bacteria producing the carbohydrate α-Gal as dietary supplements to control VBDs…
Cruz et al. EXPERT REVIEW OF VACCINES, 2016 http://dx.doi.org/10.1080/14760584.2016.1181547. Entire article free of charge.

Tick Saliva Dampens Immune Response in the Skin in Lyme Disease

Immunomodulatory effects of tick saliva on dermal cells exposed to *Borrelia burgdorferi,* the agent of Lyme disease

The prolonged feeding process of ixodid ticks, in combination with bacterial transmission, should lead to a robust inflammatory response at the blood-feeding site. Yet, factors present in tick saliva may down-regulate such responses, which may be beneficial to spirochete transmission. A cross-section of tick feeding on skin was examined histologically. Human THP-1 cells stimulated with *B. burgdorferi* and grown in the presence or absence of tick saliva were examined by human DNA microarray, cytokine bead array, sandwich ELISA, and qRT-PCR. Similar experiments were also conducted using dermal fibroblasts.

Tick feeding on skin showed dermal infiltration of histiocytes and granulocytes at the bite location. Changes in monocytic transcript levels during co-culture with *B. burgdorferi* and saliva indicated that tick saliva had a suppressive effect on the expression of certain pro-inflammatory mediators, such as IL-8 (CXCL8) and TLR2, but had a stimulatory effect on specific molecules such as the Interleukin 10 receptor, alpha subunit (IL-10RA), a known mediator of the immunosuppressive signal of IL-10.

The effects of ixodid tick saliva on resident skin cells is cell type-dependent. The response to both tick and pathogen at the site of feeding favors pathogen transmission, but may not be wholly suppressed by tick saliva. Scholl et al. *Parasites & Vectors*2016**9**:394. **DOI:** 10.1186/s13071-016-1638-7

International Section

Siberian Type of Black-Legged Tick Now Established in Northern Sweden- Ticks Seem to be Expanding in Many Places

First evidence of established populations of the taiga tick *Ixodes persulcatus* (Acari: Ixodidae) in Sweden

The tick species *Ixodes ricinus* and *I. persulcatus* are of exceptional medical importance in the western and eastern parts, respectively, of the Palaearctic region. In Russia and Finland the range of *I. persulcatus* has recently increased. In Finland the first records of *I. persulcatus* are from 2004. The apparent expansion of its range in Finland prompted us to investigate if *I. persulcatus* also occurs in

Sweden. Dog owners and hunters in the coastal areas of northern Sweden provided information about localities where ticks could be present. *Ixodes persulcatus* was detected in 9 of 36 field localities in the Bothnian Bay area. Dog owners asserted that their dogs became tick-infested on these islands for the first time 7–8 years ago. Moose (*Alces alces*), hares (*Lepus timidus*), domestic dogs (*Canis lupus familiaris*) and ground-feeding birds are the most likely carriers dispersing *I. persulcatus* in this area. All ticks ($n = 124$) from the more southern provinces of VB and UP were identified as *I. ricinus*.

The geographical range of the taiga tick has recently expanded into northern Sweden. Increased information about prophylactic, anti-tick measures should be directed to people living in or visiting the coastal areas and islands of the Baltic Bay. Jaenson et al. *Parasites & Vectors*2016**9**:377 **DOI:** 10.1186/s13071-016-1658-3

Lyme Disease in Norway

Incidence and antibiotic treatment of erythema migrans in Norway 2005–2009

The first stage of Lyme borreliosis (LB) is mainly the typical skin lesion, erythema migrans (EM), which is estimated to comprise 80–90% of all LB cases. However, the reporting of and actual incidence of LB varies throughout Europe. Studies from Sweden and Holland found EM incidences varied from 53–464 EM/100,000 inhabitants/year. Under-reporting of LB is common and a coefficient of three to reach a realistic estimate is suggested. In Norway, it is mandatory to report only the second and third LB stages to the National Institute of Public Health. To find the Norwegian incidence of EM, we extracted data from the electronic medical records of regular general practitioners and out-of-hours services in the four counties with the highest rates of registered LB in the 5 years from 2005 to 2009. We found an EM incidence of 448 EM/100,000 inhabitants/year in these counties, which yields a national incidence of 148 EM/100,000 inhabitants/year. Our findings show that solitary EMs comprised almost 96% of the total LB incidence in Norway. Older females have the highest rates of EM. Phenoxymethylpenicillin is the most commonly used drug to treat EM in Norway, which complies with the national guidelines for antibiotic use. Antibody tests are performed in 15% of cases. Less than 1% of patients are referred to secondary care. The study also shows a high number of patients seeking care for tick bites without signs of infection and there is an overuse of antibiotics in these patients. Eliassen et al. *Ticks and Tick-borne Diseases* doi:10.1016/j.ttbdis.2016.06.006

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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.

Disclaimer

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Any contact information is provided for you to learn about tick borne illnesses and related issues. Our organization is not responsible for the content of other material or for actions as a result of opinions or information expressed which may appear from time to time.

It is the responsibility of you as an individual to evaluate the usefulness, completeness or accuracy of any information you read and to seek the services of a competent medical professional of your choosing if you need medical care.

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