



Tick-Borne Infections Council  
of North Carolina, Inc.

## NEWSLETTER 2019, Volume 4



**Quote:** - “For reasons that are not clear, mosquito control is usually done by county or state health departments, where tick control is not,” he notes. “The result of that is it’s beholden upon you and I, as the lay public, to do our own control of ticks.” – Marm Kilpatrick in Scientific American, *Vaccinating Mice May Finally Slow Lyme Disease*. [www.scientificamerican.com/article/vaccinating-mice-may-finally-slow-lyme-disease/](http://www.scientificamerican.com/article/vaccinating-mice-may-finally-slow-lyme-disease/)

### Highlights...

- **5 cattle died from anemia due to infestation by the invasive longhorn tick**
- **Red meat allergy may develop independent of tick blood meal status**
- **Rocky Mountain Spotted Fever in an adult horse in the SE**
- **Lyme disease is present in Mexico**
- **US spends more on health care, has lower life expectancy, higher infant mortality**
- **Prevalence and Severity of Food Allergies Among US Adults (does not include alpha gal)**
- **NIH boosting Lyme and other tick disease research**
- **Test that distinguishes severe alpha-gal allergy from being sensitive without symptoms**
- **Lone star ticks in a NJ Lyme disease endemic county**
- **Single Dose Antibiotic for Lyme Disease Prevention Challenged**
- **Asian longhorn tick found in 34% of inspected Staten Island properties adjacent to parks**
- **American dog ticks and tularemia (rabbit fever) in Minnesota**
- ***Borrelia miyamotoi* can be transmitted at high rates through eggs**
- **Tick-Borne Relapsing Fever in the White Mountains, Arizona**

- **17 Human-biting tick species in Australia, makes us lucky in NC to ‘only’ have 6**
- **Even Mongolia Has Lyme Disease**

**Extra: Public Comment Period for IDSA/AAN/ACR Draft Lyme Disease Guidelines Open Through Aug. 10** 26-Jun-2019 9:00 AM EDT [Infectious Diseases Society of America](#)

The Infectious Diseases Society of America (IDSA), the American Academy of Neurology (AAN), and the American College of Rheumatology (ACR) have opened a public comment period for the draft of their joint guidelines for the prevention, diagnosis, and treatment of Lyme disease. The draft guidelines are based on a systematic review of current evidence surrounding the prevention, diagnosis, and treatment of Lyme disease and are written with the goals of improving patient outcomes and ensuring patient safety.

The public comment period is open for 45 days, during which IDSA, AAN, and ACR are seeking input from the public, including professionals and patients. [Those wishing to provide feedback can view the draft guidelines and submit their comments on the IDSA website.](#) The deadline to submit comments is Aug. 10, 2019.

[Feedback gathered during the public comment period will be taken into consideration by the guidelines panel,](#) comprised of experts from 16 medical specialties, as well as patients, before the document is approved by IDSA, AAN and ACR and finalized for publication. For more information, visit the [IDSA website.](#)

**State Vector-Borne Disease Working Group 2019 Meeting Schedule**

- **Date:** Friday, **July 19, 2019;** **Location:** Webinar format, due to height of tick and beginning of mosquito seasons. **Time:** 10 am. All VBDW members on the listserv will receive a link to attend via email.
- **Date:** Friday, **November 15, 2019;** **Location:** TBD, but likely The State Laboratory of Public Health. **Time:** 10 am.

(Check with us before going to confirm date as they occasionally change.)

**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:

**Where To Find CDC Case Definitions and their Statement that the Surveillance Case Definitions Are “not to be used as the sole criteria for establishing critical diagnosis”**

Go to: [www.cdc.gov/lyme/healthcare/index.html](http://www.cdc.gov/lyme/healthcare/index.html). (The links below in a clip of the website are not active.) Scroll down and find “Case Definition and Report Forms”. See the grey box with “Note” containing the disclaimer.

## Case Definition and Report Forms

- [Lyme Disease Surveillance Case Definition](#) (revised Jan 2017)
- [Lyme Disease Surveillance Case Report Form](#) [PDF - 2 pages] (for public health officials' use)

▲ **Note:** Surveillance case definitions establish uniform criteria for disease reporting and should not be used as the sole criteria for establishing clinical diagnoses, determining the standard of care necessary for a particular patient, setting guidelines for quality assurance, or providing standards for reimbursement.

Accessed and copied 15 August 2017.

### TIC-NC Talks and Materials Distributed

#### Brochures/booklets:

Siler City agriculture group  
More sites in Asheville  
Veterinary practices across the state  
Black Mountain, NC, Police Department  
Asheville chiropractor  
Ranger station in Brevard

Festival on the Eno: bilingual folletos and booklets at 5 different booths <http://tic-nc.org/wp-content/uploads/2016/12/FoietoEnglishSpanish.pdf>

Bilingual Student Cards sent home with final reports to all Orange County students!!! <http://tic-nc.org/wp-content/uploads/2019/05/Student-Card-web.pdf>

#### Booth:

Talks: News & Observer Forum: Are We Safe?"  
Raleigh, June 26

### TIC-NC in the news

Ticks – and the infections they carry – are reaching record numbers in North Carolina by

[kenwyn.carrana@greensboro.com](mailto:kenwyn.carrana@greensboro.com)

“... In 2012, he [Joe Andrews] was listening to Marcia Herman-Giddens, cofounder of the Tick-borne Infections Council of North Carolina, speak at a conference about the symptoms of tick bites.”

[https://www.greensboro.com/news/local\\_news/scratch-that-itch-ticks-and-the-infections-they-carry-are/article\\_27b11138-451c-5506-8dde-a0374ebc8770.html](https://www.greensboro.com/news/local_news/scratch-that-itch-ticks-and-the-infections-they-carry-are/article_27b11138-451c-5506-8dde-a0374ebc8770.html)

## State tick happenings

5 cattle died from anemia due to infestation by the invasive longhorn tick: Surry County, NC, July 2019



Taylor Neuman  
@TaylorNeumanTV



The NC state veterinarian is warning livestock/pet owners to watch out for ticks after 5 cows died in Surry County due to “tick infestations.” Coming up on @SpecNewsTriad how farmers are responding to this tragic accident and how they plan on protecting their own livestock.

♡ 2 1:38 PM - Jul 10, 2019

### Volunteer Corner

Janet Dooley in Asheville presented in May to the city council and mayor emphasizing “Undiagnosed or Misdiagnosed.” She also promoted our work (TIC-NC).

## NC TBIs 2017 final, 2018 probable/confirmed

Disease	Total Cases/Confirmed cases by year of report 2017†	Total preliminary confirmed and probable Events in NCEDSS created between 1/1/2018 - 8/9/2018*	Total Events Reviewed and closed by NC DPH 1/1/17 - 8/9/2018	Total Events Still Under Investigation by LHD 1/1/18 - 8/9/2018	Total Events created in NCEDSS 1/1/18 - 8/9/2018
Lyme Disease	298/71C	81/35C	530	102	632
RMSF	521/6C	418/6C	2039	282	2321
Ehrlichiosis	72/18C	51/8C	192	18	210
Anaplasmosis	10/4C	9/4C	29	4	33

\* Note 2018 data are preliminary

**Note:** By the *former* CDC definition, six counties had 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 were endemic for Lyme disease by the**

**former CDC definition: Wake, Guilford, Haywood, Alleghany, Buncombe, and Wilkes.** Counties with one case of locally acquired Lyme disease were: 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 Activities §§

As part of the year-long series “Are We Safe?” The News & Observer held a community forum on summer safety on Wednesday, June 26, at the North Carolina Museum of Natural Sciences in Raleigh. A panel of experts spoke on events and creatures that can be harmful including:

- Marcia E. Herman-Giddens, adjunct professor at UNC-Chapel Hill’s Department of Maternal and Child Health, talked about the risks of tick encounters in North Carolina, including tick-borne infections. She is with TIC-NC.
- Jeff Mette, curator of the Living Collections at the Museum of Natural Sciences and president of the North Carolina Herpetological Society, focused on safety around snakes.
- John Merial, a retired business executive, joined the panel to warn participants about potential dangers of rip currents. Merial’s daughter, Paige, [died after being caught in a rip current](#) off of Emerald Isle in April.
- Kelly Ransdell, a regional public education specialist for the National Fire Protection Association, talked about fireworks and fire safety.
- Jeff Plumlee, a Ph.D. student at the UNC Institute of Marine Sciences, discussed [shark](#) ecology and how to avoid shark attacks.

**Raleigh’s News & Observer conducted a poll about what makes people feel unsafe**

FROM PAGE 1A

**POLL**

dents between the ages of 18 and 29 said they felt very unsafe about shootings in public places.

**NATURE**

When it comes to nature, four things make more than half of the North Carolinian respondents fear for their personal safety: tornadoes, hurricanes, snakes and ticks.

TOPIC	UNSAFE
Tornadoes	51%
Hurricanes	53%
Snakes	56%
Ticks	57%

They are less concerned about sharks, with 39% feeling unsafe and nearly half (47%) feeling personally safe. When it comes to spiders, 40% feel unsafe, 35% reported feeling safe, with 25% neutral. Dogs only make 16% of respondents feel unsafe. Sixty-two percent said they felt safe around dogs.

Less than half of those polled (42%) feel unsafe because of climate change.

**INFRASTRUCTURE**

Two-thirds of respon-

<http://digital.olivesoftware.com/Olive/ODN/NewsAndObserver/default.aspx>

**Red Meat Allergy May Develop Independent of Tick Blood Meal Status**

**RATIONALE:** Alpha-gal syndrome (AGS) is a paradigm-shifting food allergy characterized by delayed reactions to non-primate mammalian meat and derived products. Evidence continues to suggest that AGS develops following tick bites and multiple species have been implicated globally. Tick saliva may contain alpha-gal from prior blood meal or may act as an adjuvant to induce IgE. This study assessed whether tick salivary gland extract (TSGE) could activate alpha-gal-sensitized basophils directly and if IgE reactivity was present in tick saliva.

**METHODS:** PBMCs containing basophils from a non-alpha-gal allergic control subject were stripped of IgE; primed with plasma from subjects with and without alpha-gal allergy; stimulated for 30 minutes with TSGE from 4 species of ticks; and assessed for basophil activation by FACS. IgE reactivity was assessed by immunoassay using TSGE, tick larvae extract and tick saliva.

**RESULTS:** The frequency of CD63+ basophils was 40-fold higher when alpha-gal IgE-sensitized basophils were stimulated with TSGE from Lone Star ticks compared to baseline. Extract from *Ixodes scapularis* but not the Gulf Coast tick, *Amblyomma maculatum*, also increased basophil activation. IgE reactivity was found in tick saliva (mean 23.4 IU/mL±1.9) among subjects with AGS but not larval tick or partially fed TSGE.



**CONCLUSIONS:** IgE from subjects with AGS recognizes an antigen present in ticks from some species but not all and this observation can lead to identification of the sensitizing allergen. Interestingly, IgE reactivity appears to be specifically retained in tick saliva, an important distinction that may suggest alpha-gal antigen is present in ticks independent of blood meal status. Commins et al. Presented at the American Academy of Allergy, Asthma and Immunology annual conference, San Francisco, February 27, 2019.

## **Link to 2018 radio interview on alpha gal aka as meat allergy**

Guest: Dr. Scott Commins, Associate Professor of Medicine, UNC Allergy and Immunology Clinic

Topics: Red meat allergy caused by Lone Star tick bite, allergic sensitization to Alpha-Gal.

<https://radioinvo.org/2018/09/05/tick-borne-red-meat-allergy/>

## **A suspected case of Rocky Mountain Spotted Fever in an adult horse in the southeastern United States**

A 20-year-old Paint gelding was evaluated for fever of unknown origin. History and clinical signs were consistent with potential tick-borne disease.

The clinical and serological findings in this case strongly suggest infection of an adult horse with a *Rickettsia spp.* bacterium. It may be advisable for practitioners in certain geographic locations to consider testing for *Rickettsia rickettsii* when suspicion of any tick-borne pathogen is present. Freese and Sheats. Journal of Equine Veterinary Science, <https://doi.org/10.1016/j.jevs.2019.05.003>

## **Bartonella henselae Bloodstream Infection in a Boy with Pediatric Acute-Onset Neuropsychiatric Syndrome**

With the advent of more sensitive culture and molecular diagnostic testing modalities, *Bartonella spp.* infections have been documented in blood and/or cerebrospinal fluid specimens from patients with diverse neurological symptoms. Pediatric acute-onset neuropsychiatric syndrome (PANS) is characterized by an unusually abrupt onset of cognitive, behavioral, or neurological symptoms.

Between October 2015 and January 2017, a 14-year-old boy underwent evaluation by multiple specialists for sudden-onset psychotic behavior (hallucinations, delusions, suicidal and homicidal ideation)... . For 18 months, the boy remained psychotic despite 4 hospitalizations, therapeutic trials involving multiple psychiatric medication combinations, and immunosuppressive treatment for autoimmune encephalitis.

Neurobartonellosis was diagnosed after cutaneous lesions developed. Subsequently, despite nearly 2 consecutive months of doxycycline administration, *Bartonella henselae* DNA was PCR amplified and sequenced from the patient's blood, and from *Bartonella* alphaproteobacteria growth medium enrichment blood cultures. B *henselae* serology was negative.

During treatment with combination antimicrobial chemotherapy, he experienced a gradual progressive decrease in neuropsychiatric symptoms, cessation of psychiatric drugs, resolution of Bartonella-associated cutaneous lesions, and a return to all preillness activities.

This case report suggests that *B. henselae* bloodstream infection may contribute to progressive, recalcitrant neuropsychiatric symptoms consistent with PANS in a subset of patients. Breitschwerdt et al. *Journal of Central Nervous System Disease*, Volume 11: 1– <https://www.ncbi.nlm.nih.gov/pubmed/30911227>

## ▣▣ National Section ▣▣

### **Lyme disease research gets a needed boost- NIH and some money**

Months after a U.S. Congress–mandated advisory group sounded the alarm about tickborne illnesses and urged more federal action and money, the National Institutes of Health (NIH) is readying its first strategic plan for these diseases. Last week it also, serendipitously, issued a rare solicitation for prevention proposals in tickborne diseases.

The new pot of money for those efforts, \$6 million in 2020, represents a significant boost to the field; NIH spent \$23 million on Lyme in 2018, by far the most common tickborne illness, with \$56 million devoted to tickborne diseases overall. Cases of Lyme disease have roughly tripled since the 1990s, to more than 300,000, as ticks carrying the bacterium *Borrelia burgdorferi* have spread. Scientists still hope for more money for diagnostics and treatment research. Couzin-Frankel et al. *Science*:Vol. 364, Issue 6437, pp. 221, [DOI: 10.1126/science.364.6437.221](https://doi.org/10.1126/science.364.6437.221).

### **Asian longhorn tick found in 34% of inspected Staten Island properties adjacent to parks**

#### **Distribution, host-seeking phenology, and host and habitat associations of *Haemaphysalis longicornis* ticks, Staten Island, New York, USA.**

...During June 6–July 13, 2018, tick sampling was conducted on residential properties, which were selected by using a random cluster sampling strategy within areas previously identified as high risk given their proximity to parks (within 100 m). Houses were visited once, and questing ticks were collected along property edges by using the same method as in public parks.

We found questing *H. longicornis* ticks at 7 of 13 parks surveyed in 2017 and 16 of 32 parks surveyed in 2018. Adult ticks were most active in late July and nymphs were active from mid-June to mid-July, similar to findings in South Korea. Larvae showed highest proportional activity in late August. We identified ticks primarily by morphology; a representative sample of specimens from deer and drag collections (n = 63) were confirmed as *H. longicornis* ticks by DNA barcoding using the cytochrome c oxidase I locus...

We surveyed 135 residential properties (average size 1,455 m<sup>2</sup>) (total visited = 505), of which 80% were located adjacent to parks in south and central Staten Island. Ticks were present at 34.1% of inspected properties. *H. longicornis* nymphs (n = 16) were found at 5 properties (in tall grass and shaded lawns), all located in the southern section of the island; no other life stages were found. Tufts DM, et al. Emerg Infect Dis. 2019 <https://doi.org/10.3201/eid2504.181541>. Entire article free of charge.

## The growing importance of lone star ticks in a Lyme disease endemic county: Passive tick surveillance in Monmouth County, NJ, 2006 – 2016

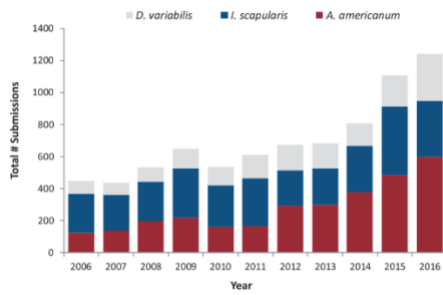


Fig 2. Total annual submissions comprising 3 medically important tick species, 2006–2016.

As human cases of tick-borne disease continue to increase, there is a heightened imperative to collect data on human-tick encounters to inform disease prevention. Passive tick surveillance programs that encourage members of the public to submit ticks they have encountered can provide a relatively low-cost means of collecting such data.

We report the results of 11 years of tick submissions (2006–2016) collected in Monmouth County, New Jersey, an Atlantic coastal county long endemic for Lyme disease. A total of 8,608 ticks acquired in 22 U.S. states were submitted, 89.7% of which were acquired in Monmouth County, from 52 of the County’s 53 municipalities. Seasonal submission rates reflected known phenology of common human-biting ticks, but annual submissions of both *Amblyomma americanum* and *Dermacentor variabilis* increased significantly over time while numbers of *Ixodes scapularis* remained static. By 2016, *A. americanum* had expanded northward in the county and now accounted for nearly half (48.1%) of submissions, far outpacing encounters with *I. scapularis* (28.2% of submissions).

Across all tick species and stages the greatest number of ticks were removed from children (ages 0–9, 40.8%) and older adults (ages 50+, 23.8%) and these age groups were also more likely to submit partially or fully engorged ticks, suggesting increased risk of tick-borne disease transmission to these vulnerable age groups.

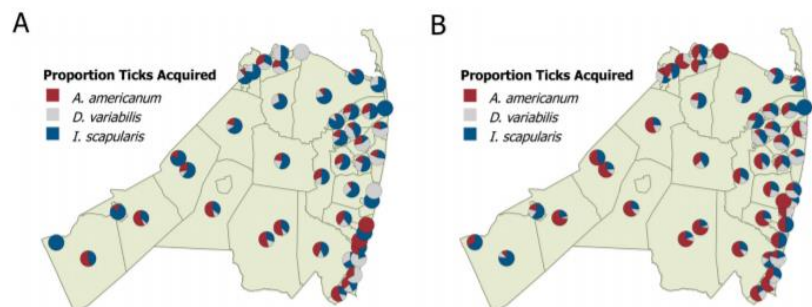


Fig 1. Species composition of ticks submitted in Monmouth County, by acquired municipality. A) 2006–2011, B) 2012–2016.

<https://doi.org/10.1371/journal.pone.0211778.g001>

Significantly more people (43.2%) reported acquiring ticks at their place of residence than in a park or natural area (17.9%). This pattern was more pronounced for residents over 60 years of age (72.7% acquired at home). Education that stresses frequent tick checks should target older age groups engaged in activity around the home. Our results strongly suggest that encounter rates with ticks other than *I. scapularis* are substantial and increasing and that their role in causing human illness should be carefully investigated. Jordan R & Egizi A (2019) PLoS ONE 14(2): e0211778. <https://doi.org/10.1371/journal.pone.0211778>. Entire paper free of charge.



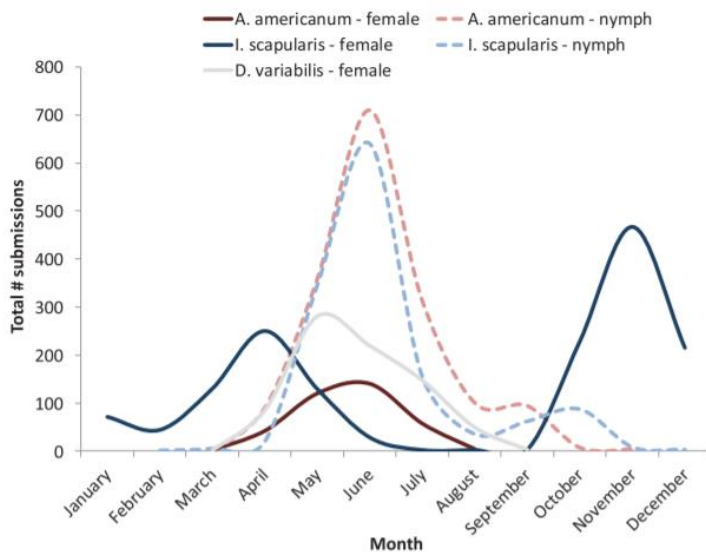


Fig 3. Seasonal phenology of 3 medically-important tick species reflected in passive surveillance submissions. Monmouth County, New Jersey, 2006–2016. Only 2 *D. variabilis* nymphs were submitted, both during the month of June.

<https://doi.org/10.1371/journal.pone.0211778.g003>

## CDC Endorsement of Single Dose Antibiotic for Lyme Disease Prevention Challenged

### Advocates claim policy harms patients and violates HHS standards for information quality

...According to Bruce Fries, president of the Patient Centered Care Advocacy Group and lead author of the complaint: “CDC’s endorsement of the IDSA recommendation for a single dose of doxycycline to prevent Lyme Disease has potential to cause serious harm to patients for whom the prophylaxis fails to prevent infection. CDC’s dissemination of this information also violates *HHS Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated to the Public.*”

Fries says “It should be noted that the IDSA guidelines represent one of two standards of care for Lyme disease. More recent and comprehensive evidence-based guidelines for Lyme disease were published by the International Lyme and Associated Diseases Society (ILADS) in 2014. The ILADS guidelines, which are fully compliant with current standards, specifically recommend against a single dose of doxycycline for prevention of Lyme disease.”

To read the full complaint

visit: <http://www.lymepatientadvocacy.org/Documents/CDCInfoRequestforCorrection-02-14-2019.pdf>

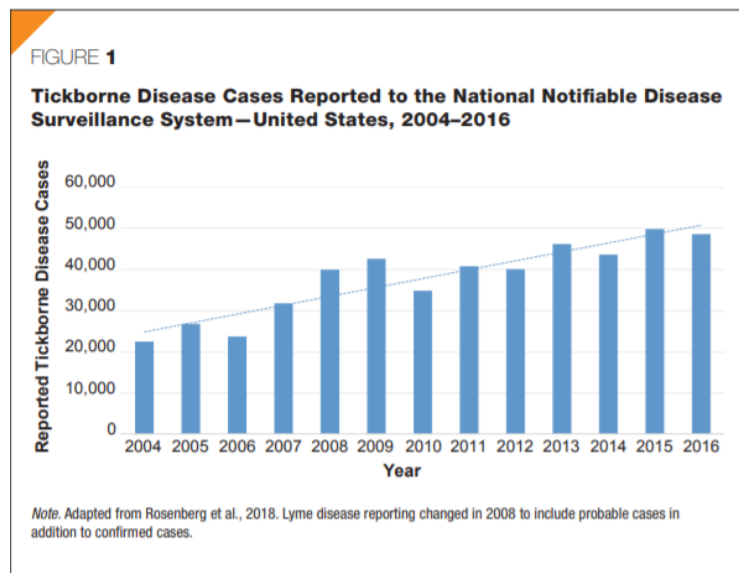
## Trouble with heparin derived from pork (porcine-derived) in a patient with previously unknown alpha-gal allergy

### Red Meat Allergy Associated with NSTEMI (non-ST-segment elevation myocardial infarction)

Alpha-gal syndrome, also known as mammalian meat allergy, is characterized by a hypersensitivity reaction to galactose-alpha-1,3-galactose. Reactions typically manifest hours after consumption of red meat products such as beef, pork, and lamb. We describe the case of a 64-year-old male resident of rural Oklahoma who presented with anaphylaxis and myocardial infarction. The patient suffered complications that were attributed to porcine-derived heparin in the setting of undiagnosed alpha-gal syndrome. We describe the clinical course of this patient that lead to the diagnosis of alpha-gal syndrome to raise awareness of this disease. Crowe et al. American Journal of Medical Case Reports, vol. 7, no. 1 (2019): 13-15 <http://pubs.sciepub.com/ajmcr/7/1/4/index.html> Entire paper is free of charge. Note there are now several terms for this condition: alpha-gal, red meat allergy, mammalian allergy, & mammalian meat allergy.

## Tick Talk: Keeping Environmental Health Up with Current Trends

This paper discusses CDC activities in the area of vector-borne diseases and vector control. An excerpt: Environmental health professionals should be aware of two federal initiatives that could enhance vector control services in the U.S.: The Tick-Borne Disease Working Group and the establishment of Regional Centers of Excellence in Vector-Borne Diseases. The U.S. Congress enacted the 21st Century Cures Act in 2016 that authorized the U.S. Department of Health and Human Services secretary to form the Tick-Borne Disease Working Group.



The conclusions in these columns are those of the author(s) and do not necessarily represent the official position of CDC. Vanover and Ruiz, Journal of Environmental Health, 81:7. Entire paper at <https://www.neha.org/sites/default/files/jeh/JEH3.19-Column-Direct-From-CDC-EHS.pdf>

## American dog ticks play an important role in the natural history of tularemia (rabbit fever) in Minnesota.

### Prevalence of *Francisella tularensis* in *Dermacentor variabilis* Ticks, Minnesota, 2017

The prevalence of *Francisella tularensis* in Minnesota ticks is unknown. Ticks collected at seven sites were tested to determine the infection prevalence of *F. tularensis* in *Dermacentor variabilis* in Minnesota... .

A total of 3527 ticks were tested for *F. tularensis* including 1601 male *D. variabilis* and 1926 female *D. variabilis*. Across all sites, 128 (34%) of 378 pools were RT-PCR positive for *F. tularensis*. Of 128 positive pools, *F. tularensis* from 96 (75%) was identified as type A; *F. tularensis* from 32 pools was unable to be subtyped. The overall MIR was 3.6%... .

Conclusions: *F. tularensis* was found in ticks at a majority of sites tested. The MIR of *F. tularensis* in *D. variabilis* ticks in Minnesota varied geographically. Our findings support the hypothesis that *D.*

variabilis plays an important role in the natural history of tularemia in Minnesota. Further ecologic studies are needed to fully understand the importance of tick species in the maintenance and transmission of *F. tularensis* in Minnesota. Whitten T, et al. VECTOR-BORNE AND ZONOTIC DISEASES. <https://www.liebertpub.com/doi/abs/10.1089/vbz.2018.2388>

## **Boston emergency department study found only 18.5% of children evaluated for Lyme disease recalled a tick bite**

### **A minority of children diagnosed with Lyme disease recall a preceding tick bite**

Of 1,770 children undergoing emergency department evaluation for Lyme disease, 362 (20.5%) children had Lyme disease. Of those with an available tick bite history, only a minority of those with Lyme disease had a recognized tick bite (60/325; 18.5%, 95% confidence interval 14.6 – 23.0%). Lack of a tick bite history does not reliably exclude Lyme disease. Nigrovic et al. Ticks and Tickborne Diseases, <https://www.sciencedirect.com/science/article/abs/pii/S1877959X18304965?via=ihub>

## ***Borrelia miyamotoi* can be transmitted at high rates through eggs, largely maintaining infection in larvae**

### **Vertical transmission rates of *Borrelia miyamotoi* in *Ixodes scapularis* collected from white-tailed deer**

*Borrelia miyamotoi* is a relapsing fever spirochete transmitted by ticks in the *Ixodes ricinus* complex. In the eastern United States, *B. miyamotoi* is transmitted by *I. scapularis*, which also vectors several other pathogens including *B. burgdorferi* sensu stricto. In contrast to Lyme borreliae, *B. miyamotoi* can be transmitted vertically from infected female ticks to their progeny. Therefore, in addition to nymphs and adults, larvae can vector *B. miyamotoi* to wildlife and human hosts... .

The transovarial transmission rate of the 11 infected females was 90.9% (95% CI; 57.1-99.5%) and the mean [infection rate] of the resulting larval clutches was 84.4% (95% CI; 68.1-100%)... . Further investigation of TOT and FIP variability and the underlying mechanisms, both in nature and the laboratory, will be needed to resolve this question. Meanwhile, studies quantifying the acarological risk of *Borrelia miyamotoi* disease need to consider not only nymphs and adults, but larval *I. scapularis* as well. Han et al. Ticks and Tickborne Diseases, [doi.org/10.1016/j.ttbdis.2019.02.014](https://doi.org/10.1016/j.ttbdis.2019.02.014).

## **Latent Lyme Disease Resulting in Chronic Arthritis and Early Career Termination in a United States Army Officer**

Lyme disease is a continuing threat to military personnel operating in arboriferous and mountainous environments. Here we present the case of a 24-year-old Second Lieutenant, a recent graduate from the United States Military Academy, with a history of Lyme disease who developed recurrent knee effusions following surgery to correct a hip impingement. Although gonococcal arthritis was initially suspected from preliminary laboratory results, a comprehensive evaluation contradicted this diagnosis. Despite antibiotic therapy, aspiration of the effusions, and steroid treatment to control inflammation,

the condition of the patient deteriorated to the point where he was found to be unfit for duty and subsequently discharged from active military service.

This case illustrates the profound effect that latent Lyme disease can have on the quality of life and the career of an active duty military member. It highlights the need for increased surveillance for *Borrelia burgdorferi* (*B. burgdorferi*) in military training areas and for the early and aggressive diagnosis and treatment of military personnel who present with the symptoms of acute Lyme disease. Weiss et al. *Military Medicine*, usz026, <https://doi.org/10.1093/milmed/usz026>. Entire article is free of charge.

## **Diagnosis of Rocky Mountain Spotted Fever Now Grouped with Spotted Fever Rickettsioses**

### **Diagnostic Methods Used to Classify Confirmed and Probable Cases of Spotted Fever Rickettsioses — United States, 2010–2015**

Spotted fever rickettsioses (SFR) are nationally notifiable diseases caused by spotted fever group *Rickettsia*. SFR incidence has steadily increased since 2000; however, the majority of cases fail to meet criteria for confirmation.

A total of 16,807 SFR supplemental case report forms were provided to CDC with illness onset during 2010–2015; 1.0% met criteria for confirmation. Reasons for nonconfirmation included failure to submit a second serum specimen and low use of molecular diagnostic techniques.

Increased use of molecular assays, collecting appropriately timed serum specimens, and elimination of unreliable laboratory criteria could be important for understanding trends in SFR epidemiology in the United States. Binder et al. *MMWR Morb Mortal Wkly Rep* 2019;68:243–246.  
DOI: <http://dx.doi.org/10.15585/mmwr.mm6810a3>. Entire paper free of charge at doi link.

## **Tick-Borne Relapsing Fever in the White Mountains, Arizona, USA, 2013–2018**

Tick-borne relapsing fever (TBRF) is a bacterial infection transmitted by tick bites that occurs in several different parts of the world, including the western United States. We describe 6 cases of TBRF acquired in the White Mountains of Arizona, USA, and diagnosed during 2013–2018. All but 1 case-patient had recurrent fever, and some had marked laboratory abnormalities, including leukopenia, thrombocytopenia, hyperbilirubinemia, and elevated aminotransaminases. One patient had uveitis.

Diagnosis was delayed in 5 of the cases; all case-patients responded to therapy with doxycycline. Two patients had Jarisch-Herxheimer reactions. The White Mountains of Arizona have not been previously considered a region of high incidence for TBRF. These 6 cases likely represent a larger number of cases that might have been undiagnosed. Clinicians should be aware of TBRF in patients who reside, recreate, or travel to this area and especially for those who sleep overnight in cabins there. Mafi, et al. (2019). *Emerging Infectious Diseases*, 25(4), 649-653. [https://wwwnc.cdc.gov/eid/article/25/4/18-1369\\_article](https://wwwnc.cdc.gov/eid/article/25/4/18-1369_article)

## **Lyme disease: Insight from social sciences**

This article is a selective literature review of social science works published on Lyme disease that draws on other articles published on similar health hazards. These works present Lyme borreliosis as an “archetypal” example of modern infectious risks. It is an “invisible” risk resulting from interactions between human activities, ecosystems, and pathogens. To tackle this risk, health authorities promote individual-based prevention measures.

Perceptions of the general population should thus be better understood: different from the perceptions of experts, the general population’s perceptions are socially differentiated, inclined to an “optimism bias”, and influenced by personal stories. One should also not forget the dilemmas faced by the general population when contemplating preventive behavior. The “chronic Lyme disease” controversy illustrates the modern disappointment in science, the leveling of the general population’s and experts’ relative opinions, and the progressive interference of the former with expert matters. *Med Mal Infect.* 2019, 10.1016/j.medmal.2018.12.005., Peretti-Watel <https://www.ncbi.nlm.nih.gov/pubmed/30651195>

## **17 Human-biting tick species in Australia, we are lucky in NC to ‘only’ have 6**

### **Human Tick-Borne Diseases in Australia**

There are 17 human-biting ticks known in Australia. The bites of *Ixodes holocyclus*, *Ornithodoros capensis*, and *Ornithodoros gurneyi* can cause paralysis, inflammation, and severe local and systemic reactions in humans, respectively. Six ticks, including *Amblyomma triguttatum*, *Bothriocroton hydrosauri*, *Haemaphysalis novaeguineae*, *Ixodes cornuatus*, *Ixodes holocyclus*, and *Ixodes tasmani* may transmit *Coxiella burnetii*, *Rickettsia australis*, *Rickettsia honei*, or *Rickettsia honei* subsp. *marmionii*. These bacterial pathogens cause Q fever, Queensland tick typhus (QTT), Flinders Island spotted fever (FISF), and Australian spotted fever (ASF).

It is also believed that babesiosis can be transmitted by ticks to humans in Australia. In addition, *Argas robertsi*, *Haemaphysalis bancrofti*, *Haemaphysalis longicornis*, *Ixodes hirsti*, *Rhipicephalus australis*, and *Rhipicephalus sanguineus* ticks may play active roles in transmission of other pathogens that already exist or could potentially be introduced into Australia.

These pathogens include *Anaplasma* spp., *Bartonella* spp., *Burkholderia* spp., *Francisella* spp., Dera Ghazi Khan virus (DGKV), tick-borne encephalitis virus (TBEV), Lake Clarendon virus (LCV), Saumarez Reef virus (SREV), Upolu virus (UPOV), or Vinegar Hill virus (VINHV).

It is important to regularly update clinicians' knowledge about tick-borne infections because these bacteria and arboviruses are pathogens of humans that may cause fatal illness. An increase in the incidence of tick-borne infections of human may be observed in the future... There are some human pathogens, such as *Rickettsia conorii* and *Rickettsia rickettsii* that are not currently present in Australia, but can be transmitted by some human-biting ticks found in Australia, such as *Rhipicephalus sanguineus*, if they enter and establish in this country. Despite these threats, our knowledge of



## **Consumption of raw sheep and goat's milk and cheese can transmit tick-borne encephalitis: Study from the Slovak Republic**

### **Milk outbreaks of tick-borne encephalitis in Slovakia, 2012-2016.**

Tick-borne encephalitis virus (TBEV) is most commonly transmitted to humans via the bite of an infected tick. Alimentary infection through the consumption of TBEV-contaminated dairy products is also well-documented and is responsible for some diseases in endemic areas. The aim of the study was to emphasize the risk of contracting tick-borne encephalitis (TBE) by consuming raw milk and dairy products and to describe TBE epidemics in Slovakia for the period 2012-2016.

The data on epidemics were obtained from the Annual Reports for the period 2012-2016 available on the website of the Public Health Authority of the Slovak Republic. Medical records of patients hospitalized during epidemics were provided by the Department of Infectology and Travel Medicine, Faculty of Medicine, Pavol Jozef Šafárik University in Košice, and the Louis Pasteur University Hospital in Košice.

During the period 2012-2016, 13 smaller or larger TBE epidemic outbreaks were recorded in the Slovak Republic. The two outbreaks of TBE reported in 2012 were associated with the consumption of raw goat's milk and dairy products. The first case was an outbreak involving 12 infected people in the Lučenec District. The second case was a family outbreak in the Žilina District, where 3 persons out of 4 family members were infected. In 2013, one epidemic was reported involving 5 persons following the consumption of sheep's cheese from a farm in the Prešov District. One outbreak with 11 cases was reported in 2014. The investigation confirmed its association with the consumption of sheep's cheese in a restaurant located in the Ružomberok District. In 2015, 4 epidemics were described related to the consumption of goat's/sheep's milk and cheese (Žilina District, Krupina District, Kysucké Nové Mesto District, Trenčín District). In 2016, there were 5 TBE epidemics related to the consumption of milk and dairy products. The largest TBE epidemic outbreak in the last 5 years occurred in the Košice District. In this outbreak approximately 500 people were exposed, and 44 contracted the disease. Infected persons confirmed consumption of sheep's cheese from a farm.

Consumption of milk and dairy products made only from pasteurized milk, as well as the immunization of humans and animals are the most effective preventive measures against TBE. Dorko et al. Cent Eur J Public Health. 2018 Dec;26 Suppl:S47-S50. <https://www.ncbi.nlm.nih.gov/pubmed/30817873>

## **Even Mongolia Has Lyme Disease**

### **Geographic Range of Lyme Borreliosis in Mongolia**

**Introduction:** In Asia, *Borrelia garinii*, *B. afzelii*, and *B. bavariensis* are transmitted by *Ixodes persulcatus* ticks and clinically present with a wide range of neurological and arthritic symptoms. This report aims to provide details on the geographic distribution of suspected cases of Lyme borreliosis (LB), reported to local Mongolian hospitals between 2007 and 2017.

**Methods:** This report examines 150 reported cases of suspected LB from 13 aimags (provinces) in Mongolia from April 2007 to August 2017, including date and location of infection, method of

diagnosis (indirect immunofluorescent assay and/or enzyme-linked immunosorbent assay test), frequency of specific symptoms, and case demographics. Information was gathered through collaboration with the National Center of Communicable Disease and the National Center for Zoonotic Diseases.

**Results:** Zavkhan and Selenge, located in northern Mongolia, had the highest percentage of reported suspected cases, with 25% and 20%, respectively. Ages ranged from 1 to 78 years, with a mean age of 26 years, however, 37% of individuals were younger than 10. More than twice as many women sought treatment as men, and the distribution of men who sought treatment was skewed toward children and the elderly. Most frequently reported symptoms include fever, rash, headache, and enlarged lymph glands. Furthermore, peak months of tick bite and treatment seeking occurred between April and June.

**Conclusions:** Based on these preliminary findings, syndromic surveillance should be expanded across northern Mongolia, with LB considered in differential diagnosis for patients reporting a recent tick bite. <https://www.liebertpub.com/doi/10.1089/vbz.2018.2421>

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