

SPRING - SUMMER NEWSLETTER 2011

Tick-borne Infections Council of North Carolina, Inc.



www.tic-nc.org

Highlights:

Scroll down to see these features and more!

- The demise of NC's Pest Management Division by our state legislature: All tick research by state has now ceased, all state entomologists and other vector-borne disease workers lost their jobs.
- TIC-NC activities and North Carolina tick studies.
- Maps of Virginia's Lyme endemic counties and graph of their recent dramatic increase in tick-borne diseases.
- Link to NC's deer density maps.
- The Institute of Medicine's almost 500 page report on Lyme and other tick-borne diseases has been released. Links below.
- Link to CDC's Grand Rounds on Lyme disease, May 2011.
- Much more...

Quote of the season: "Politics" is made up of two words, "Poli", which is Greek for "many", and "tics", which are blood sucking insects." *Gore Vidal*

State Vector-Borne Disease Task Force Meeting Schedule

- Friday, November 4th, 2011 9:30a.m. – 12:30p.m. NOTE: **Actual meeting time is 10 – 12, but room is open longer for gathering.**

These meetings, open to the public, will be in room 1A224 at 2728 Capital Blvd. Folks are not to park in the front visitors spaces if they will be in the building longer than two hours...building management will have them towed.

The Loss of the State Pest Management Section of the NC Department of Natural Resources

The loss of the state Pest Management Section of NC DENR is a terrible tragedy for the people of North Carolina. Under the direction of Dr. Nolan Newton, the section had recently begun to make great advances in the understanding of the tick species as well as distribution and infection rates of various tick-borne pathogens in NC. In addition, an attachment project that would have provided invaluable information on the species and behavior of ticks biting people has also ended abruptly.

The educational outreach efforts, which included informative materials on the NC DENR website, updated maps of tick distributions, training classes, displays and public education, are gone as well. The resources to identify ticks and provide training on personal protection and prevention and control measures have ceased to exist.

The work done by this group which has led to ground breaking scientific publications such as the two mentioned below will occur no more.

□ [Borrelia species in Ixodes affinis and Ixodes scapularis ticks collected from the coastal plain of North Carolina. Ricardo G Maggi, Sara Reichelt, Marcée Toliver and Barry Engber. Ticks Tick Borne Dis 1\(4\):168-71 \(2010\) PMID 21771524.](#) Ixodes affinis and I. scapularis are tick species that are widely distributed in the coastal plain region of North Carolina. Both tick species are considered enzootic vectors for spirochetal bacteria of the genus Borrelia and specifically for B. burgdorferi s.s., the acknowledged pathogen responsible for Lyme disease.

□ [Recent discovery of widespread Ixodes affinis \(Acari: Ixodidae\) distribution in North Carolina with implications for Lyme disease studies. Bruce A Harrison, Walker H Rayburn, Marcee Toliver, Parker B Whitt. J Vector Ecol 35\(1\):174-9 \(2010\) PMID 20618664.](#) Ixodes affinis, which is similar morphologically to Ixodes scapularis, is widely distributed along the coastal plain of North Carolina. Collected in 32 of 41 coastal plain counties, the species is remarkably absent in the piedmont and mountain regions. This coastal plain distribution is similar to its distribution in Georgia and has been found in Virginia, as well.

We salute the state's entomologists and Marcee Toliver who often worked in miserable weather and in mosquito and tick infested areas to gather data for their research and to protect the public health. The people of North Carolina miss you.

Newspaper Article: State Tick Money Gone Along With Entire Pest Management Division

Ticks win in fight over budget. By Helen Chappell, The News And Observer, Raleigh, North Carolina June 29, 2011

<http://www.newsobserver.com/2011/06/29/1308380/ticks-win-in-fight-over-budget.html>
or <http://goo.gl/B7kGL>

The recent state budget cuts have discontinued funding for the only state effort to measure tick-borne disease risks by directly studying ticks.

The cuts of about \$500,000 will shut down the Public Health Pest Management section in the state Department of Environment and Natural Resources. Beyond studying tick populations, the five environmental health specialists who worked for the pest management program also educated residents about the risks of tick bites and the best ways to protect themselves. Full story and comments: <http://goo.gl/B7kGL>

Stats on TIC-NC's Website <http://www.tic-nc.org>

From January 2010 through June 2011, we have had about **106,000** visits!

New CDC Website For Lyme Disease

<http://www.cdc.gov/lyme/>

Booth on Tick Disease Prevention and Lyme Disease Held in Malls in Chapel Hill and Raleigh, May 2011

Designed and staffed as a personal project by Board Member, Carol Clark, RN.

The weekend was a huge success. About 30 people attended on Saturday and Sunday. The Lyme disease display was looked at by many people who left with a better understanding of the disease. Ms. Clark provided basic information to grateful parents on how to remove a tick, the animal connection, and what the tick looks like fed and unfed as well as where they hide. Kids were able to see real ticks. Lots of TIC-NC brochures were handed out.

North Carolina Deer Density Maps and Information About the Deer Population



It is estimated that only 10,000 deer inhabited the state in 1900. **The deer population has increased dramatically since that time.** Follow the link below to see the 2010 deer density map prepared by the Wildlife Resources Commission. There is a lot of information about deer in NC available at the WRC website: http://www.ncwildlife.org/wildlife_species_con/WSC_Deer.htm.

Coastal Black-Legged Ticks Found Positive for *Babesia Canis*, a Dog Parasite

In North Carolina this year, five *I. scapularis* (black-legged ticks) tested positive for *Babesia* and were initially listed as *microti*, but later the laboratory people changed that and listed it as *Babesia canis* because the parasite was more like a common dog parasite. A subspecies of *B. canis* has been found in dogs in NC, but the parasite is normally transmitted by another tick, the Brown dog tick, *Rhipicephalus sanguineus*, and not *I. scapularis*. *Babesia microti* can cause human illness but has not been found naturally in NC. One of the two specimens of *I. affinis* was found positive for *Borrelia burgdorferi s.s.* as well as another closely related *Borrelia* species that is in the *B. burgdorferi s.l.* group. In sum, that specimen of *I. affinis* had a dual infection, but it was not positive for a *Babesia* species.

The laboratory personnel that conducted the tests are interested in finding out more about the infections of *I. scapularis* with the *B. canis*-like parasites. The laboratory that did the identifications of the parasites is located at the U.S. Army Public Health Command Region North, Ft. Meade, MD. The field work that provided the ticks for this report was accomplished by personnel of the now disbanded vector portion of the Public Health Pest Management Section of NC DENR, as well as Navy and Marine public health personnel at Camp Lejeune, Onslow County, NC. Since there are no funds for researching this finding, it is hoped that a graduate student can use this as a graduate research project. The information about the subspecies of *B. canis* in NC was provided by a veterinarian at the NCSU College of Veterinary Medicine. There are no reports to date on *B. canis* or *B. gibsoni* infections in humans according to the same source.

Institute of Medicine Released Report of its Two Day Hearing on Lyme Disease and Other Tick-Borne Infections, April 20, 2011

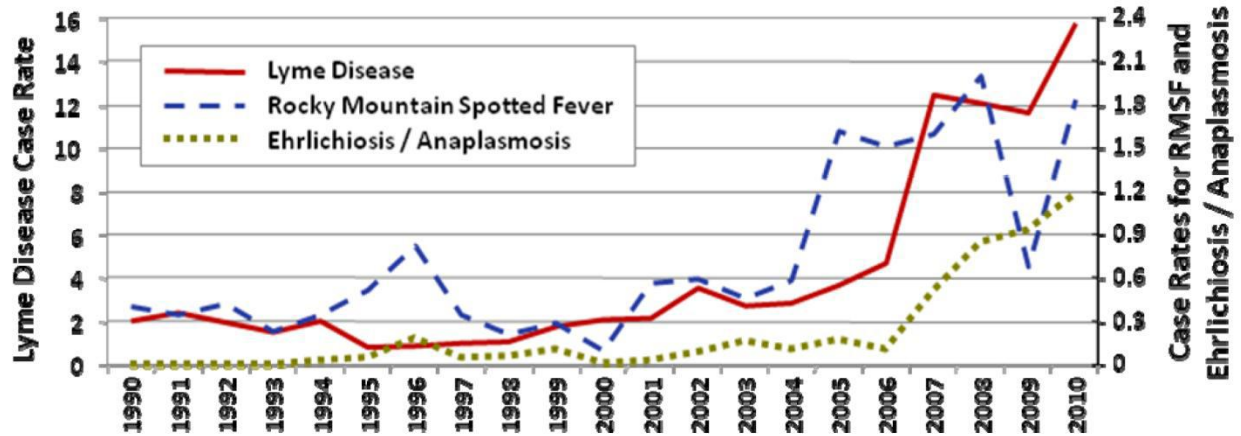
Critical Needs and Gaps in Understanding Prevention, Amelioration, and Resolution of Lyme and Other Tick-Borne Diseases: The Short-Term and Long-Term Outcomes - Workshop Report

Note: Workshop Summaries contain the opinion of the presenters, but do NOT reflect the conclusions of the Institute of Medicine (IOM).

A single tick bite can have debilitating consequences. Lyme disease is the most common disease carried by ticks in the United States, and the number of those afflicted is growing steadily—from 10,000 reported cases in 1992 to 30,000 in 2009. If caught early, Lyme and other diseases spread by ticks—known as tick-borne diseases—usually cause only mild symptoms and can be treated easily; however, if left untreated, these diseases can cause severe pain, fatigue, neurological problems, and other serious health problems.

At the request of the National Institutes of Health, the IOM held a workshop October 11-12, 2010, to examine the state of the science in Lyme disease and other tick-borne diseases. Speakers discussed current research and knowledge gaps; criteria for diagnosing tick-borne

Cases of Tick-borne Infection per 100,000 Population in Virginia, 1990-2010



CDC Grand Rounds on Lyme Disease Held May 19, 2011

"Lyme disease: Challenges and Innovations"

<http://www.cdc.gov/about/grand-rounds/archives/2011/May2011.htm>

Lyme disease is one of the most rapidly emerging infectious diseases in North America and Europe. In 2009, nearly 30,000 confirmed and more than 8,500 probable cases of Lyme disease were reported to the CDC in the United States alone. This hour long video will be controversial to some. Presenters included:

Paul Mead, MD, MPH

Chief, Epidemiology and Surveillance Activity, Bacterial Disease Branch,
Division of Vector-borne Infectious Diseases, NCEZID, CDC

Presentation: Ecology, Epidemiology and Prevention of Lyme Disease in the United States

Allen Steere, MD

Director of Clinical Research, Rheumatology Unit, Massachusetts General Hospital
Professor of Medicine, Harvard Medical School

Presentation: Clinical and Treatment Challenges

Adriana Marquez, MD

Chief, Clinical Studies Unit, Laboratory of Clinical Infectious Diseases
National Institute of Allergy and Infectious Diseases

National Institutes of Health

Presentation: Diagnostic Testing for Lyme Disease

Ruth Lynfield, MD

State Epidemiologist

Minnesota Department of Health

Presentation: A State Perspective

Studying Lyme Disease in the South

Lyme disease study lead by professor at Georgia Southern. Derrek Asberry 06 July 2010
George-Anne Daily, Georgia Southern University.

Georgia Southern University (GSU) professor, Lorenza Beati, of the department of arthropodology and parasitology, is currently leading a team of researchers to learn more about Lyme disease and the species of ticks that spread it.

For many years, the number of reported Lyme disease cases in the northern U.S. has been increasing at a steady pace, said Beati. However, the South's number of confirmed cases is much lower in comparison, despite the year-round abundance of ticks due to the warm climate.

She also said that there have been several debates over whether or not these lower rates are caused by the large number of unreported cases of Lyme disease in the south, which would result in inaccurate numbers. "We are trying to test alternative hypotheses to explain why this geographic difference is so marked," Beati said.

The group is comprised of Beati and several GSU biology and public health students. In addition, GSU has partnered with teams from four other universities across the country and in Canada—Michigan State University, the University of Tennessee, the University of Rhode Island, Hofstra University and the University of Montreal. This extensive partnership will allow the different universities to study the ticks in their respective region to find any differences among the species.

Beati specializes in GSU's Institute of Arthropodology and Parasitology. The IAP at GSU is home to the world's largest National Tick Collection. It houses over \$1 million specimens, which are sponsored by the Smithsonian Institution.

"You don't really appreciate the Tick Collection until you see it," said junior Jessica Dennis. "I really was impressed with how large our collection is and how much effort they are putting into the issue." Beati's research has already offered some possible solutions to the unbalanced number of cases of Lyme disease.

"One hypothesis circulating is that the south doesn't have much Lyme disease because ticks here often feed on lizards, which supposedly aren't good reservoirs for the disease," Beati said.

The groups' production has garnered a four-year, \$2.5 million dollar study allowance, funded by the National Science Foundation. Each university is heading a different aspect of the project. Beati is researching the genetic composition of the blacklegged tick.

"I'm in charge of studying the genetics of the ticks to see if they are a genetically different population...that make them more or less able to transmit diseases."

These studies began at the Department of Energy's Savannah River Site, near Aiken, S.C. As the research becomes more in depth, GSU's group is working on establishing two more field

research sites closer to campus. Their process begins with gathering ticks from lizards, rodents, mammals and vegetation.

All of the universities will compile a centralized database of their findings. They will be consistently updated and published throughout the duration of the project, which, according to Beati, will be funded through December of 2013.

“I think we got this grant because there is such a diversity of researchers collaborating on the same project,” Beati said “It is a large group effort where we put together a lot of strengths and expertise.”

http://www.stp.georgiasouthern.edu/index.php?option=com_content&view=article&id=2030:gsu-professor-leads-team-in-lyme-disease-study&catid=1:local-news&Itemid=53

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North Carolina Study on the Effectiveness of Permethrin Treated Clothing in Tick Avoidance

Pilot Study Assessing the Effectiveness of Long-Lasting Permethrin-Impregnated Clothing for the Prevention of Tick Bites.

Meagan F. Vaughn, Steven R. Meshnick. *Vector-Borne and Zoonotic Diseases*, online ahead of print, March 11, 2011. <http://dx.doi.org/10.1089/vbz.2010.0158>

Abstract

Introduction: Tick-borne diseases such as Lyme disease, Rocky Mountain spotted fever, and ehrlichiosis are a significant concern for many thousands of workers who have frequent and unavoidable exposure to tick-infested habitats. Many North Carolina state employees with outdoor occupations report multiple tick bites each year, indicating that existing tick preventive strategies may be underutilized or ineffective. Treatment of clothing with permethrin, a nontoxic chemical with insecticidal, knockdown, and repellent properties, is highly effective against ticks. However, most permethrin products must be reapplied after several washings to maintain insecticidal activity. Recently, a factory-based method for long-lasting permethrin impregnation of clothing has been developed by Insect Shield, Inc., that allows clothing to retain insecticidal activity for over 70 washes.

Methods: A nonrandomized open label pilot study was conducted to determine the effectiveness of Insect Shield-treated clothing for the prevention of tick bites among 16 outdoor workers from the North Carolina Division of Water Quality under actual field conditions. Participants completed questionnaires at the start of follow-up (March, 2008) and at the end of follow-up (September, 2008), and tick bites and outdoor work hours were reported on weekly tick bite logs for the entire follow-up period.

Results: Subjects wearing Insect Shield-treated clothing had a 93% reduction ($p < 0.0001$) in the total incidence of tick bites compared to subjects using standard tick bite prevention measures.

Conclusion: This study provides preliminary evidence that long-lasting permethrin-impregnated clothing may be highly effective against tick bites.

Massachusetts Finds Lyme Disease Control “Haphazard at Best”

State Targets Rising Lyme Disease by John J. Monahan, Worcester Telegram, April 30, 2011
<http://www.telegram.com/article/20110430/NEWS/104309978/-1/NEWS06>
or <http://tinyurl.com/3lw5m6h>

BOSTON - In the wake of a new legislative report that found state Lyme disease control and prevention efforts "haphazard at best," the House of Representatives has approved creation of a Lyme disease commission to investigate the need for new screening programs and other steps to combat the illness spread by bacteria from tick bites.

Included in the House budget approved Thursday, the amendment authorizing the commission charges it with studying the value of public health screening in high-risk areas, more prevention steps in schools, and the need for more medical research of the progression and treatment of Lyme disease.

Even Yosemite National Park is not Safe! 37% of Rodents Positive for the Lyme Disease Bacteria

Arthropod vectors and vector-borne bacterial pathogens in Yosemite National Park.
Fleer KA, Foley P, Calder L, Foley JE.
Journal of Medical Entomology 48(1):101-110. 2011
<http://dx.doi.org/10.1603/ME10040>

Abstract

Ticks, fleas, and vector-borne pathogens were surveyed in diverse small mammals in Yosemite National Park, California, from 2005 to 2007. A total of 450 unique captures of small mammals was collected during a 3-yr period and yielded 16 species of fleas and 10 species of ticks, including known vectors of *Anaplasma phagocytophilum* and *Borrelia burgdorferi* and plague.

Serology was performed for *A. phagocytophilum*, spotted fever group *Rickettsia* spp., *B. burgdorferi*, and *Yersinia pestis*. *A. phagocytophilum* exposure was identified in 12.1% of all wild small mammals tested, with seropositive animals in 10 species, notably Belding's ground squirrels (*Spermophilus beldingi*), jumping mice (*Zapus princeps*), and voles (*Microtus* sp.). Spotted fever group *Rickettsia* spp. exposure was detected in 13.9% of all small mammals tested, with seropositive animals in eight species. Additionally, 37.0% of rodents in five species tested were seropositive for *B. burgdorferi*. No individuals were seropositive for *Y. pestis*. No animals were polymerase chain reaction positive for any pathogen tested.

These results provide baseline data for future research and prediction of emerging vector-borne

disease in Yosemite National Park, as well as adding to the known ranges and host species for tick and fleas in California.

An Interesting Newsletter From the Environmental Protection Agency About Integrated Pest Management

Quarterly e-bulletin of EPA's Pesticide Environmental Stewardship Program

Inside This Issue:

- 1.) Community IPM to Prevent Ticks
- 2.) Featured Photo
- 3.) Department of Defense
- 4.) NAFTA BRIC Course
- 5.) Verifiable School IPM
- 6.) Benefits of PESP
- 7.) Biopesticide Active Ingredients
- 8.) Members Advance Tier
- 9.) Agricultural Grants
- 10.) OPP News Stories
- 11.) Upcoming Events
- 12.) Grant Opportunities

Link: http://www.epa.gov/pestwise/news/pesp/pestwire_spring2011.pdf#page=1

Series of Articles Targeting Lyme Disease Vaccine Issues

The Need for a New Lyme Disease Vaccine

Guest Editors: Stanley A. Plotkin, MD and Gary P. Wormser, MD

Clinical Infectious Diseases, Volume 52, Supplement 3.

Published by Oxford University Press on behalf of the Infectious Diseases Society of America, February 2011.

Angela K. Shen, Paul S. Mead, and Charles B. Beard

The Lyme Disease Vaccine – A Public Health Perspective

Clin Infect Dis. (2011) 52(suppl 3): s247-s252.

Abstract: <http://dx.doi.org/10.1093/cid/ciq115>

Full text .pdf file: http://cid.oxfordjournals.org/content/52/suppl_3/s247.full.pdf+html

Gregory A. Poland

Vaccines against Lyme Disease: What Happened and What Lessons Can We Learn?

Clin Infect Dis. (2011) 52(suppl 3): s253-s258.

Abstract: <http://dx.doi.org/10.1093/cid/ciq116>

Full text .pdf file: http://cid.oxfordjournals.org/content/52/suppl_3/s253.full.pdf+html

Allen C. Steere, Elise E. Drouin, and Lisa J. Glickstein

Relationship between Immunity to *Borrelia burgdorferi* Outer-surface Protein A (OspA) and Lyme Arthritis

Clin Infect Dis. (2011) 52(suppl 3): s259-s265.

Abstract: <http://dx.doi.org/10.1093/cid/ciq117>

Full text .pdf file: http://cid.oxfordjournals.org/content/52/suppl_3/s259.full.pdf+html

Ian Livey, Maria O'Rourke, Andreas Traweger, Helga Savidis-Dacho, Brian A. Crowe, P. Noel Barrett, Xiaohua Yang, John J. Dunn, and Benjamin J. Luft

A New Approach to a Lyme Disease Vaccine

Clin Infect Dis. (2011) 52(suppl 3): s266-s270.

Abstract: <http://dx.doi.org/10.1093/cid/ciq118>

Full text .pdf file: http://cid.oxfordjournals.org/content/52/suppl_3/s266.full.pdf+html

Stanley A. Plotkin

Correcting a Public Health Fiasco: The Need for a New Vaccine against Lyme Disease

Clin Infect Dis. (2011) 52(suppl 3): s271-s275.

Abstract: <http://dx.doi.org/10.1093/cid/ciq119>

Full text .pdf file: http://cid.oxfordjournals.org/content/52/suppl_3/s271.full.pdf+html

Plant-Derived Treatments to Kill Ticks in the Environment

Suppression of Host-Seeking *Ixodes Scapularis* and *Amblyomma Americanum* (Acari: Ixodidae) Nymphs After Dual Applications of Plant-Derived Acaricides in New Jersey

Jordan RA, Dolan MC, Piesman J, Schulze TL. *Journal of Economic Entomology*, Volume 104, Number 2, April 2011, pp. 659-664. <http://dx.doi.org/10.1603/EC10340>

The authors evaluated the ability of dual applications of natural, plant-derived acaricides to suppress nymphal *Ixodes scapularis* Say and *Amblyomma americanum* (L.) (Acari:Ixodidae) in a Lyme disease endemic area of New Jersey. An aqueous formulation of 2% nootkatone provided >90% control of *I. scapularis* through 7 days. Control declined to 80.9% at 14 days, and a second application was made that provided >95% control through the remaining 4 weeks of the nymphal season. See the link above for more information.

Removal of Lizards and Impact on Lyme Disease Risk

Impact of the experimental removal of lizards on Lyme disease risk. Andrea Sweil, Richard S. Ostfeld, Robert S. Lane and Cheryl J. Briggs, Published online before print February 16, 2011, *Proceedings of the Royal Society - Biological Sciences*.

Abstract. The distribution of vector meals in the host community is an important element of understanding and predicting vector-borne disease risk. Lizards (such as the western fence lizard;

Sceloporus occidentalis) play a unique role in Lyme disease ecology in the far-western United States.

Lizards rather than mammals serve as the blood meal hosts for a large fraction of larval and nymphal western black-legged ticks (*Ixodes pacificus*-the vector for Lyme disease in that region) but are not competent reservoirs for the pathogen, *Borrelia burgdorferi*. Prior studies have suggested that the net effect of lizards is to reduce risk of human exposure to Lyme disease, a hypothesis that we tested experimentally.

Following experimental removal of lizards, we documented incomplete host switching by larval ticks (5.19%) from lizards to other hosts. Larval tick burdens increased on woodrats, a competent reservoir, but not on deer mice, a less competent pathogen reservoir. However, most larvae failed to find an alternate host. This resulted in significantly lower densities of nymphal ticks the following year. Unexpectedly, the removal of reservoir-incompetent lizards did not cause an increase in nymphal tick infection prevalence. The net result of lizard removal was a decrease in the density of infected nymphal ticks, and therefore a decreased risk to humans of Lyme disease. Our results indicate that an incompetent reservoir for a pathogen may, in fact, increase disease risk through the maintenance of higher vector density and therefore, higher density of infected vectors. <http://dx.doi.org/10.1098/rspb.2010.2402>

Birds Introduce Lyme Infected Ticks to the Environment

Density of *Ixodes scapularis* ticks on Monhegan Island after complete deer removal: A question of avian importation?

Susan P. Elias, Robert P. Smith Jr, Sara R. Morris, Peter W. Rand, Charles Lubelczyk, Eleanor H. Lacombe. *Journal of Vector Ecology*, Volume 36, Issue 1, pages 11-23, June 2011.

Abstract

Questing adult blacklegged tick (*Ixodes scapularis* Say) abundance declined markedly three years after the 1999 removal of white-tailed deer (*Odocoileus virginianus* Zimmermann) from Monhegan Island, ME. Since 2000, subadult ticks have not been found on Norway rats (*Rattus norvegicus* Berkenhout); questing nymphs have not been found since 2002. This suggested *I. scapularis* was reintroduced annually via bird importation of subadult ticks, but unable to complete its two-year life cycle on the island due to lack of deer.

To investigate this, we used uncertainty analysis to estimate 1) questing adult ticks/ha that would result from avian importation of nymphs, and 2) questing adult ticks/ha on Monhegan Island, using bird capture and tick burden data from Appledore Island, ME, flagged tick data from Monhegan Island, and ten uncertain parameters. During the deer-fed period (1990-2001), estimated tick density on Monhegan Island was 18 times greater than that of imported ticks. During the post-deer-fed period (2002-2008), Monhegan Island tick density was equivalent to imported tick density. This supported the premise that all *I. scapularis* ticks on Monhegan Island have been bird-derived since 2002.

Free, full-text: <http://onlinelibrary.wiley.com/doi/10.1111/j.1948-7134.2011.00136.x/full>

Several Articles on Eliza/Western Blot Results in Lyme Disease

Anti-Borrelia burgdorferi antibody profile in post-Lyme disease syndrome. Chandra A, Wormser GP, Marques AR, Latov N, Alaedini A. Clin Vaccine Immunol. 2011 Mar 16.

Department of Neurology and Neuroscience, Weill Cornell Medical College, Cornell University, New York, NY, USA; Division of Infectious Diseases, Department of Medicine, New York Medical College, Valhalla, NY, USA; Laboratory of Clinical Infectious Diseases, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, MD, USA.

Abstract Patients with post-Lyme disease syndrome (PLDS) report persistent symptoms of pain, fatigue, and/or concentration and memory disturbances despite antibiotic treatment for Lyme borreliosis. The etiopathogenesis of these symptoms remains unknown and no effective therapies have been identified. We sought to examine the anti-borrelia antibody profile in affected patients with the aim of finding clues to the mechanism of the syndrome and its relationship to the original spirochetal infection. Serum specimens from 54 borrelial seropositive PLDS patients were examined for antibodies to B. burgdorferi proteins p18, p25, p28, p30, p31, p34, p39, p41, p45, p58, p66, p93, and VlsE by automated immunoblotting and software-assisted band analysis. Presence of serum antibodies to the 31 kDa band was further investigated by examination of reactivity against purified recombinant OspA protein. Control specimens included sera from 14 borrelial seropositive individuals with a history of early localized or disseminated Lyme disease who were symptom-free (post-Lyme healthy), as well as 20 healthy individuals without serologic evidence or history of Lyme disease. In comparison to the post-Lyme healthy group, higher frequencies of antibody to p28 ($p < 0.05$), p30 ($p < 0.05$), p31 ($p < 0.0001$), and p34 ($p < 0.05$) proteins were found in the PLDS group. Assessment of antibody reactivity to recombinant OspA confirmed the presence of elevated levels in PLDS patients ($p < 0.005$). The described anti-borrelia antibody profile in PLDS offers clues about the course of the antecedent infection in affected patients, which may be useful for understanding the pathogenic mechanism of the disease.

Serodiagnosis of Borreliosis: Indirect Immunofluorescence Assay, Enzyme-Linked Immunosorbent Assay and Immunoblotting Iwona Wojciechowska-Koszko, Iwona Maczynska, Zbigniew Szych and Stefania Giedrys-Kalemba

Archivum Immunologiae et Therapiae Experimentalis, published online 22 January 2011.

Abstract Lyme disease is an infectious, multi-system, tick-borne disease caused by genospecies of *Borrelia burgdorferi* bacteria sensu lato, characterized by remarkable heterogeneity. In this situation choosing an optimal antigen array for diagnostic tests seems problematic. The serological tests for borrelia routinely done in laboratories often produce ambiguous results, which makes a proper diagnosis rather complicated and thus delays the implementation of an appropriate treatment regimen.

Thirty-seven outpatients and eight inpatients with suspected borreliosis diagnosis hospitalized at the Clinics of the Pomeranian Medical University (Szczecin, Poland), participated in the study. In order to detect the antibodies against *Borrelia sensu lato* three kinds of serological tests were used: indirect immunofluorescence assay (IIFA), enzyme-linked immunosorbent assay

(ELISA), and immunoblot.

The IIFA and immunoblot tests conducted on 45 patients (100%) produced positive results for both the IgM and IgG antibody types. In the case of ELISA, positive or borderline results were observed in only 24 patients (53.3%). The immunoblot test for IgM most frequently detected antibodies against the outer surface protein C (OspC) antigen (p25), and, in the case of IgG, against the recombinant variable surface antigen (VlsE).

The IIFA screening test used for diagnosing Lyme borreliosis produced the highest percentage of positive results, which were then confirmed by immunoblot, but not by ELISA.

Therefore using only ELISA as a screening test or for diagnosing Lyme borreliosis seems debatable. <http://dx.doi.org/10.1007/s00005-010-0111-0>

Interpretation criteria in Western blot diagnosis of Lyme borreliosis. *Br J Biomed Sci* 2011; 68(1); 5-10 S. Mavin, S. McDonagh, R. Evans, R. M. Milner, J. M. W. Chatterton, D. O. Ho-Yen, National Lyme Borreliosis Testing Laboratory, Microbiology Department, Raigmore Hospital, Old Perth Road, Inverness IV2 3UJ, UK

Abstract. This study reviews the Lyme borreliosis Western blot interpretation process, including what bands are classed as specific, the number of bands needed for a positive result, the role of band intensity and the use of clinical information. In 2008, 3688 patients (4223 serum samples) were tested by enzyme immunoassay (EIA), with 832 patients tested by confirmatory in-house IgG Western blot: 272 patients were Western blot-positive, 170 were weak positive, 156 were equivocal and 234 were negative. These results were assessed, and a review of interpretation criteria from both the USA and Europe was carried out. New interpretation criteria and a testing algorithm were developed. The revised criteria changed the results in 109/3688 (3%) patients and produced significantly more Western blot-positive and weak-positive patients than with the current criteria (485 vs. 442, $P < 0.0001$). In total, 76 patients who were negative/equivocal became positive, which may have led to a change in their management. Conversely, 33 patients who were weak-positive became equivocal but their management may not have been affected. The authors believe that the revised criteria have simplified blot interpretation and improved the sensitivity and robustness of their Western blot method. Using a protocol tailored to patients that incorporates clinical characteristics means that the entire process will be easier and will aid the management of patients.

Tick-Borne Infections Council of North Carolina is a non-profit 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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This organization is not a representative, program, affiliate of any other organization, unless specifically stated. Contact us at info@tic-nc.org or 542-5573

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What is Insect Shield? - from their website www.insectshield.com

Insect Shield Repellent Apparel and Insect Shield Repellent Gear are revolutionary products designed to provide long-lasting, effective and convenient personal insect protection. Recently, EPA has granted Insect Shield extended durability claims for its apparel registration, through 70 washings. (The) proprietary formulation of the insect repellent permethrin results in effective, odorless insect protection that lasts the expected lifetime of a garment.

Which insects does Insect Shield repel?

Insect Shield Repellent Apparel has been proven and registered to repel mosquitoes, ticks, ants, flies, chiggers, and midges (no-see-ums).

TIC-NC is grateful for the financial contributions of Insta-Shield, Inc.