



VECTOR-BORNE DISEASE NEWS

A SYNOPSIS OF PEER-REVIEWED AND OTHER PUBLICATIONS ON VBDS.

SUMMER, 2020



Tick-borne Diseases: Diagnosis and Management *American Family Physician* May 1, 2020; 101(9); 530-540

(<https://www.aafp.org/afp/2020/0501/>) Includes key recommendations best practices; incidence, causative agents, vectors, and geographic distribution of tick-borne diseases in the U.S.. Outlines clinical characteristics of tick-borne diseases, treatment protocols, emerging conditions, tick analysis and prevention. Fully referenced with recommendations and guidance from CDC, IDSA and peer-reviewed literature.

Seminars in Neurology Five Emerging Neuroinvasive Arboviral Diseases: Cache Valley, Eastern Equine Encephalitis, Jamestown Canyon, Powassan, and Usutu 2019 ... Cache Valley and Jamestown Canyon viruses likely circulate throughout most of North America, while eastern equine encephalitis and Powassan viruses typically circulate in the eastern half. Usutu ...has the potential to be introduced in the futureTo prevent neuroinvasive arboviral diseases, use of insect repellent and other mosquito and tick bite prevention strategies are key. <https://www.thieme-connect.com/products/ejournals/html/10.1055/s-0039-1687839>

MMWR Vital Signs Trends in Reported Vector borne Disease Cases - U.S. and Territories, 2004–2016 May 4, 2018 <https://www.cdc.gov/mmwr/volumes/67/wr/pdfs/mm6717e1-H.pdf>

- Nearly 650,000 cases of vector borne disease reported. Most instances of vector-borne diseases go *unreported*
- TICK-BORNE
 - **Reported tick-borne disease cases doubled**
 - Lyme disease accounted for 82% of all reported tick-borne disease.
 - The combined incidence of reported anaplasmosis and ehrlichiosis rose annually, as did spotted fever.
 - Babesiosis, a tick-borne parasitic infection notifiable since 2011, also contributed to the rise.
 - Tularemia and ehrlichiosis are geographically widespread but more prevalent in the central U.S.
- MOSQUITO-BORNE
 - WNV was the most commonly transmitted mosquito borne disease in the continental U.S. Its most notable epidemic occurred in 2012, especially in Texas.
 - Epidemics of dengue, chikungunya, and Zika viruses were mostly confined to U.S. territories.
 - Limited transmission of dengue occurred in Florida, Hawaii, and Texas
 - Human cases of Chikungunya and Zika occurred in Texas and Florida.

TICK-BORNE DISEASES

News Wise Ticks aren't social distancing: Here's how to protect yourself Apr 23, 2020 You should wear repellent, light-colored clothing and tuck your pantlegs into your socks. https://www.newswise.com/coronavirus/ticks-aren-t-social-distancing-here-s-how-to-protect-yourself/?article_id=730450&sc=mwhp

Clinical Chemistry Tick-Borne Diseases in the United States Apr 1, 2020 This review covers the clinical manifestations and preferred diagnostic approaches for important bacterial, viral, and parasitic tick-borne diseases in the United States, including Lyme disease, tick-borne relapsing fever, anaplasmosis, ehrlichiosis, spotted fever rickettsioses, and babesiosis. Infection with emerging pathogens such as *Borrelia miyamotoi*, Powassan virus, Heartland virus, Colorado tick fever virus, and Bourbon virus are also covered. <https://academic.oup.com/clinchem/article-abstract/66/4/537/5814095?redirectedFrom=fulltext>

Journal of Medical Entomology Artificial Accumulation of Leaf Litter in Forest Edges on Residential Properties via Leaf Blowing Is Associated with Increased Numbers of Host-Seeking *Ixodes scapularis* (Acari: Ixodidae) Nymphs Mar 18, 2020 ...Our data suggest that the acarological risk of human encounters with *I. scapularis* nymphs may be significantly greater in areas receiving an accumulation of leaves from leaf blowing or raking compared to adjacent unmanaged forest edges. This artificially elevated acarological risk can be mitigated if homeowners avail themselves of curbside leaf pickup or composting services offered by many municipalities or request that lawn/landscaping contractors remove

collected leaves offsite, or at least to areas of less frequent use, rather than concentrating them along the lawn-forest edge. <https://academic.oup.com/jme/advance-article/doi/10.1093/jme/tjaa033/5804234>

The Journal of Parasitology Prevalence of Infection and Co-Infection and Presence of Rickettsial Endosymbionts in Ixodes Scapularis (Acari: Ixodidae) in Connecticut, USA Feb, 2020 *Ixodes scapularis* is currently known to transmit 7 pathogens responsible for Lyme disease, anaplasmosis, babesiosis, tick-borne relapsing fever, ehrlichiosis, and Powassan encephalitis. *Ixodes scapularis* can also be colonized by endosymbiotic bacteria including those in the genus of Rickettsia. ...Infection prevalence of *Bo. burgdorferi* is not independent of other co-circulating pathogens and ... there is a substantially higher infection of *Bo. miyamotoi* in *I. scapularis* females compared with nymphs in this study. High prevalence of infection and co-infection with multiple pathogens in *I. scapularis* highlights the public health consequences in Connecticut, a state endemic for Lyme and other tick-borne diseases. <https://pubmed.ncbi.nlm.nih.gov/31971489-prevalence-of-infection-and-co-infection-and-presence-of-rickettsial-endosymbionts-in-ixodes-scapularis-acari-ixodidae-in-connecticut-usa/>

New England Journal of Medicine Bracing for the Worst — Range Expansion of the Lone Star Tick in the Northeastern U.S. Dec 5, 2019 More than 90% of the nearly 60,000 cases of nationally notifiable vector borne diseases reported in 2017 were linked to ticks... Abundant reproductive hosts, an increasingly hospitable climate, and genetic plasticity of the lone star tick support the continued invasion and establishment of this tick in the Northeast. Increasing population densities and subsequent range expansion, in conjunction with nondiscriminating biting habits and the capacity to transmit diverse pathogens, position the lone star tick as an important emerging health threat to humans, domesticated animals, and wildlife. <https://www.nejm.org/doi/full/10.1056/NEJMp1911661>

British Medical Journal Case Reports Powassan virus encephalitis, severe babesiosis and Lyme carditis in a single patient. Nov 10, 2019 ...A case of an 87-year-old man who presented with fever and altered mental status [and] tested positive for *B. burgdorferi* and *Babesia microti*....Results were positive for Powassan virus.... Patient developed permanent neurological deficits even after recovery from the acute illness. <https://casereports.bmj.com/content/12/11/e231645.long>

Ticks and Tick-borne Diseases First report of *Candidatus Rickettsia mendelii* in *Ixodes brunneus* from the U.S. Sep 27, 2019 *Candidatus Rickettsia mendelii* is a novel rickettsial species recently identified in *Ixodes ricinus*. <https://www.sciencedirect.com/science/article/abs/pii/S1877959X18300918>

People's Pharmacy Are Tick-Borne Illnesses More of a Problem? Sep 26, 2019 A single tick can carry many pathogens. As a result, a person who is bitten might develop two or more tick-borne illnesses... Many species of ticks have been extending their range into new territory. Because they carry disease-causing pathogens with them, clinicians may not recognize the resulting illnesses at first. <https://www.peoplespharmacy.com/articles/are-tick-borne-illnesses-more-of-a-problem/>

Zoonoses and Public Health Knowledge and prevention of tick-borne diseases among Hispanic and non-Hispanic residents of Maryland and Virginia. Sep 3, 2019 ...Hispanic populations may be at greater risk for occupational exposure to ticks and disseminated Lyme Disease.... Primary language (English vs. Spanish) was a significant predictor of whether an individual had knowledge of symptoms, correctly identified ticks as vectors and performed daily tick checks. <https://onlinelibrary.wiley.com/doi/abs/10.1111/zph.12627>

Contagion Live Tick, Tick, Tick: Vector-Borne Diseases Ramp Up Jun 4, 2019 Pathogens transmitted by ticks cause the vast majority of vector-borne diseases in temperate North America, Europe, and Asia. In the continental U.S., more than 95% of reported human cases of vector-borne diseases are caused by tick bites. Lyme disease may exceed 300,000 cases annually, about 10-fold higher than the number of reported cases, ranking it ...second only to sexually transmitted diseases. <https://www.contagionlive.com/publications/contagion/2019/june/tick-tick-tick-vectorborne-diseases-ramp-up>

Consumer Reports The Great American Tick Invasion May 30, 2019. An exploding tick population is spreading a host of diseases. Disease-carrying ticks, found in all 50 states, have significantly increased their geographical range in the past 15 years, ... and multiplying quickly. <https://www.consumerreports.org/outdoor-safety/the-great-american-tick-invasion/>

International Journal of Environmental Research and Public Health Range expansion of tick disease vectors in North America: implications for spread of tick-borne disease. Mar 9, 2019 Ticks are the major vectors of most disease-causing agents to humans, companion animals and wildlife. ...[They] transmit a greater variety of pathogenic agents than

any other blood-feeding arthropod. ...Tick populations in many areas ... have increased in abundance. ...Four representative tick species are ... the American dog tick, the lone star tick, the Gulf Coast Tick, and the black-legged tick. <https://www.mdpi.com/1660-4601/15/3/478>

Journal of Medical Entomology Prevalence and Diversity of Tick-Borne Pathogens in Nymphal *Ixodes scapularis* (Acari: Ixodidae) in Eastern National Parks (2014-2015) May 2017 [Acadia National Park, Catoctin Mountain Park, Fire Island National Seashore, Gettysburg National Military Park, Manassas National Battlefield Park, Monocacy National Battlefield, Prince William Forest Park, Rock Creek Park, Shenandoah National Park]

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5657145/>

- Deer ticks (*I. scapularis*) were found at all sites
- The Lyme disease spirochete *Borrelia burgdorferi* was the most widespread pathogen.
- *Borrelia miyamotoi*, an emerging pathogen, is a relapsing fever spirochete vectored by deer ticks. Infected nymphs were found at 66.7% of sites sampled
- Anaplasmosis (*Anaplasma phagocytophilum*)-infected nymphs were found at 77.8% of sites. Babesiosis (*Babesia microti*) was the least commonly detected pathogen. 28% of nymphs in a specific area were infected
- Multiple pathogens in deer ticks were found at all sites except Monocacy National Battlefield.
- Coinfections with *B. burgdorferi* and *Ba. microti* were the most common (41% of coinfecting nymphs), followed by coinfections with *B. burgdorferi* and *A. phagocytophilum* 35.9% from Virginia to Maine. Lone star ticks occurred in high numbers at Fire Island National Seashore and Manassas. They were also found at Prince William Forest Park.

INVASIVE TICK

Center for Infectious Disease Research and Policy First US human bite from worrying longhorned tick noted June 3, 2019 the first human in the U.S. known to be bitten by an Asian longhorned tick, a rapidly spreading invasive species. Tick sampling found Asian longhorned ticks on the patient's manicured lawn, some of them in direct sun.

<http://www.cidrap.umn.edu/news-perspective/2019/06/first-us-human-bite-worrying-longhorned-tick-noted>

<https://academic.oup.com/cid/advance-article-abstract/doi/10.1093/cid/ciz449/5509416?redirectedFrom=fulltext>

Centers for Disease Control and Prevention (CDC) CDC investigating disease threat posed by fast-multiplying exotic tick

Nov 29, 2018 Pathogens found in the Asian longhorned tick in other parts of the world include *Borrelia*, *Anaplasma*, *Ehrlichia*, *Rickettsia*, and *Babesia*. The females can lay eggs and reproduce without mating...Up to thousands of ticks may be found at a time, or on an animal...As of May 22, 2019, Asian longhorned ticks have been found in AK, CT, DE, KY, MD, NC, NJ, NY, PA, TN, VA., and WV. <https://www.cdc.gov/ticks/pdfs/AsianLonghornedTick-P.pdf>

The Mount Airy News Mount Airy NC: Tick swarms kill five cows Jul 9, 2019 ...67 counties in the U.S. have confirmed local Asian Longhorned tick populations. Virginia has the most counties, with 24 confirmed. "It is an aggressive biter and frequently builds intense infestations on animals, causing great stress, reduced growth and production, and blood loss. The tick can reproduce parthenogenetically (without a male), and a single fed female tick can create a localized population." The tick has not been linked to any infections in humans in the U.S. at this point. As of 24 Jun 2019, no harmful germs that can infect people have been found in the ticks collected in the U.S..

Journal of Medical Entomology The Ability of the Invasive Asian Longhorned Tick *Haemaphysalis longicornis* (Acari: Ixodidae) to Acquire and Transmit *Rickettsia rickettsii* (Rickettsiales: Rickettsiaceae), the Agent of Rocky Mountain Spotted Fever, Under Laboratory Conditions Apr 27, 2020 ... Of the tick-borne diseases endemic to the United States, Rocky Mountain spotted fever (RMSF), a rapidly progressive and potentially fatal disease caused by *Rickettsia rickettsii*, is the most severe. There is considerable geographical overlap between spotted fever rickettsioses cases, which include RMSF, and the currently known distribution of *H. longicornis*, providing the potential for this tick to encounter this pathogen. We have evaluated the ability of *H. longicornis* to acquire and transmit *R. rickettsii* under laboratory conditions. *Haemaphysalis longicornis* as larvae and nymphs acquired the pathogen while feeding on infected guinea pigs. The infection persisted through every life stage, all of which were able to transmit *R. rickettsii* to naïve hosts. The pathogen was also transmitted at a low frequency between generations of *H. longicornis* through the ova. While *H. longicornis* was demonstrated to be a competent vector for *R. rickettsii* under laboratory conditions, the probability of its involvement in the maintenance and transmission of this pathogen in nature, as well as its potential impact on human health, requires further study. <https://pubmed.ncbi.nlm.nih.gov/32338290/>

Ticks and Tick-Borne Diseases Failure of the Asian longhorned tick, *Haemaphysalis longicornis*, to serve as an experimental vector of the Lyme disease spirochete, *Borrelia burgdorferi sensu stricto* Jan, 2020 We conclude that *H. longicornis* is unlikely to contribute more than minimally, if at all, to transmission of Lyme disease spirochetes in the U.S. https://www.sciencedirect.com/science/article/pii/S1877959X19303498?dgcid=raven_sd_recommender_email

[Syracuse.com 'Aggressive' lone star tick invades CNY, raising fears of new diseases](https://www.syracuse.com/news/2020/05/aggressive-lone-star-tick-invades-cny-raising-fears-of-new-diseases.html) May 14, 2020 The lone star tick, more common to the Southwest, is slowly pushing its way north and into New York state. They are already abundant on Long Island. Of the 84 ticks sent to his lab from Suffolk County, more than half were lone star ticks... Lone star ticks can also carry several viruses that cause disease, including Southern tick-associated rash illness, which looks and feels like Lyme...the ticks can carry heartland virus... The tick can also transmit a sugar molecule called alpha-gal that can cause an allergic reaction if the infected person eats mammal flesh. <https://www.syracuse.com/news/2020/05/aggressive-lone-star-tick-invades-cny-raising-fears-of-new-diseases.html>

LYME DISEASE

CDC Emerging Infectious Diseases Relative Risk for Ehrlichiosis and Lyme Disease in an Area Where Vectors for Both Are Sympatric, New Jersey Jun, 2017

- Lyme disease is the most frequently reported vector-borne illness in the Northeast. The much more aggressive Lone Star tick, *Amblyomma americanum*, transmits the agent of human monocytic ehrlichiosis and may serve as the vector for several other emerging tick-borne pathogens.
- The lower-than-expected number of reported ehrlichiosis cases is attributed to a lack of awareness about ehrlichial disease by the public and by physicians, leading to misdiagnosis and underreporting. Another explanation could be the existence of asymptomatic infections. https://wwwnc.cdc.gov/eid/article/23/6/16-0528_article

Clinical Infectious Diseases Assessment of Duration of Tick Feeding... Reduces Need for Antibiotic Prophylaxis

After *Ixodes scapularis* Tick Bites Aug 1, 2018 Doxycycline is recommended for persons with *Ixodes scapularis* tick bites in certain geographic areas, if the tick had fed for at least 36 hours. ...Over 40% of *I. scapularis* tick bites from patients seen at the Lyme Disease Diagnostic Center did not warrant antibiotic prophylaxis.

<https://academic.oup.com/cid/article-abstract/67/4/614/4944894?redirectedFrom=fulltext>

Travel Medicine and Infectious Disease Travel and tick-borne diseases: Lyme disease and beyond.

Nov/Dec. 2019 On a global scale, ticks are second only to mosquitoes as the most important of vectors of infectious disease agents of humans. Ticks transmit a greater diversity of viral, bacterial and protozoan infections than any other arthropod on earth, and in many temperate regions of the world, including Europe and the U.S., tick-borne diseases (TBD) are the most widespread and medically important of all vector-borne infections. Lyme borreliosis... afflicts tens and possibly hundreds of thousands of persons in the Northern Hemisphere each year.... The scope and magnitude of other TBD have expanded worldwide both in the U.S. and Europe, 14 newly recognized TBDs have been identified in only the last 25 years.Minimizing the risk of tick bites remains the most important measure to reduce the risk of TBD. This can be accomplished by wearing long pants that are tucked into boots and by applying tick repellents and acaricides. Inspecting for and removing attached ticks with tweezers or forceps as soon as possible following exposures to tick-infested areas is another important consideration. ...Because most bacterial infections transmitted by ticks are susceptible to doxycycline, malaria prophylaxis with doxycycline might also provide protection against many TBD.

<https://hal.archives-ouvertes.fr/hal-01970230/document>

Seminars in Neurology A Neurologist's View of Lyme Disease and Other Tick-Borne Infections 2019 Tick-borne infections—including tick-borne encephalitis viruses, represented in the U.S. by rare infections with Powassan and deer tick viruses, and more often Lyme disease—are of increasing importance to neurologists. Lyme neuroborreliosis (LNB) causes all or part of a triad including meningitis, radiculoneuritis, and cranial neuritis. Increasing evidence suggests that LNB not involving the CNS parenchyma can be treated successfully with oral doxycycline. <https://www.thieme-connect.com/products/ejournals/html/10.1055/s-0039-1692143#N68226>

Annals of Internal Medicine Fatal Lyme Carditis in New England: Two Case Reports Oct 22, 2019 Lyme disease is the most common vector-borne disease in the U.S., and it is hyperendemic in the Northeast .Carditis is a rare manifestation that can usually be treated successfully with a short course of antibiotics .However, it can present with many symptoms,

and its severity can change rapidly and unpredictably Death can occur when Lyme carditis is untreated. Before this report, only 9 fatal cases were reported. <https://annals.org/aim/article-abstract/2753436/fatal-lyme-carditis-new-england-two-case-reports>

Center for Infectious Disease Research and Policy Health insurance claims show increasing Lyme prevalence in US Dec 10, 2019 A survey of health insurance claims made in the U.S. from 2007 through 2018 shows that claim lines with a diagnosis of Lyme disease increased 117%. ... Lyme disease was the predominate tick-borne disease on health insurance claims, representing 94% of tick-borne claims, and, in 2018, 0.058% of all medical claims.

<http://www.cidrap.umn.edu/news-perspective/2019/12/news-scan-dec-10-2019>

Center for Infectious Disease Research and Policy Inexpensive paper-based test detects Lyme bacteria in early stages Dec 18, 2019 A new inexpensive paper-based test can detect antibodies against the *Borrelia burgdorferi* bacterium in serum samples, which means it could quickly and accurately identify Lyme disease, a tick-borne illness that affects up to 300,000 American each year. The test is meant for use in the first 30 days after a tick bite, when the telltale "bull's eye" rash may or may not appear.... Current two-tier tests for Lyme disease catch only 50% of Lyme cases in early stages...and cost more than \$400 per test, with results typically read in more than 1 day. The new paper-based test costs \$0.42 per test. <http://www.cidrap.umn.edu/news-perspective/2019/12/news-scan-dec-18-2019>

POWASSAN VIRUS

DrDanielCameronMD.com No Neurologic Damage in Three Children with Lyme Disease and Powassan Virus Over the past ten years, there have been 75 cases of Powassan virus reported in the United States. Most cases have been confined to the Northeast and Great Lakes region. That, however, may change. As Lyme disease continues to spread throughout the country, so too may this potentially deadly virus... About 15% of patients who are infected and have symptoms are not going to survive," Dr. Jennifer Lyons, chief of the Division of Neurological Infections and Inflammatory Diseases at Brigham and Women's Hospital in Boston... "Of the survivors, at least 50% will have long-term neurological damage that is not going to resolve." <https://danielcameronmd.com/no-neurologic-damage-three-children-lyme-disease-powassan-virus/>

Zoonosis and Public Health Powassan virus, a scoping review of the global evidence Jun 17, 2019

Powassan virus -POWV... causes sporadic but severe cases of encephalitis in humans. ...To date, POWV has been reported in 147 humans in North America. The virus has also been isolated from five tick species....

<https://onlinelibrary.wiley.com/doi/full/10.1111/zph.12485>

JAMA Neurology Fatal Powassan encephalitis (deer tick virus, lineage ii) in a patient with fever and orchitis receiving rituximab. JAMA Neurol. 2018 Powassan virus is a rare ... cause of severe neurological disease. ...POWV is the causative agent of severe neuroinvasive illness with 50 percent of survivors displaying long-term neurological sequelae. diagnosis. <https://jamanetwork.com/journals/jamaneurology/article-abstract/2675289>

The News & Observer Raleigh, NC A tick bite led to US Sen. Kay Hagan's death. Here's what is known about the virus

Oct 28, 2019 Former U.S. Sen. Kay Hagan died Monday at age 66 — nearly three years after she was first hospitalized with what doctors later said was encephalitis. The cause? Powassan virus, a relatively rare tick-borne disease.

<https://www.newsobserver.com/latest-news/article236739528.html?>

Clinical Microbiology Reviews Tick-Borne Flaviviruses, with a Focus on Powassan Virus. Dec, 2018 Despite the low disease incidence, the approximately 10% to 15% case fatality rate of neuroinvasive Powassan virus infection and temporary or prolonged sequelae in >50% of survivors make Powassan virus a medical concern.

<https://cmr.asm.org/content/32/1/e00106-17.long>

SPOTTED FEVER RICKETTSIOSIS

The Brazilian Journal of Infectious Diseases Long term neurologic sequelae in a Mexican rocky mountain spotted fever case. May 16, 2019. A Mexican pediatric patient with neurologic sequelae 10 years after an acute infection by *R. rickettsii*. <https://www.sciencedirect.com/science/article/pii/S1413867019301473?via%3Dihub>

Rheumatology International HLA-B27 spondyloarthritis and spotted fever rickettsiosis: case-based review. May 27, 2019 Rocky Mountain Spotted Fever (RMSF) can progress to fulminant multiorgan failure and death. Rickettsial infections in general can rapidly become fatal in both healthy and immunosuppressed patients. Prompt diagnosis and therapy are required. <https://link.springer.com/article/10.1007%2Fs00296-019-04330-8>

Today Rocky mountain spotted fever: Tick bite lands 2-year-old boy in ICU Jun 11, 2019 After a tick bite caused Rocky Mountain spotted fever ... his mom wants to prevent it from happening to others. Range of symptoms misdiagnosed. <https://www.today.com/health/rocky-mountain-spotted-fever-tick-bite-lands-2-year-old-t155846>

Clinical Infectious Diseases Meningoencephalitis due to Spotted Fever Rickettsioses, Including Rocky Mountain Spotted Fever Aug 15, 2019 Results: Nineteen cases (11 children, 8 adults) met criteria for SFR meningoencephalitis. Rash was significantly more common in children than adults (100% vs. 50%, respectively), but other clinical features were similar between the 2 groups. ...SFR meningoencephalitis is a life-threatening infection. The clinical presentation varies between adults and children based on the presence of rash and brain MRI findings. The starry sky sign was ubiquitous in children and should prompt consideration of empiric treatment for SFR when present. <https://academic.oup.com/cid/advance-article/doi/10.1093/cid/ciz776/5550194?guestAccessKey=8f2bcb54-9b15-4fc1-903e-cfd7dabcf9c4>

Journal of Medical Entomology Minimal Duration of Tick Attachment Sufficient for Transmission of Infectious *Rickettsia rickettsii* ...by Its Primary Vector *Dermacentor variabilis* ...: Duration of Rickettsial Reactivation in the Vector Revisited Mar, 2020 ... *R. rickettsii* residing in salivary glands of unfed questing ticks does not necessarily require a period of reactivation to precede the salivary transmission and ticks can transmit infectious *Rickettsia* virtually as soon as they attach to the host. <https://academic.oup.com/jme/article/57/2/585/5607361>

Experimental & Applied Acarology Molecular Detection of Rickettsia Species in Ticks Collected in the Mexico-USA Transboundary Region Apr, 2020 Zoonotic tick-borne diseases, including those caused by *Rickettsia* species, continue to have serious consequences for public health worldwide. One such disease that has emerged as a major problem in several countries of the American continent is the Rocky Mountain Spotted Fever (RMSF) caused by the bacterium *Rickettsia rickettsii*. Several tick species are capable of transmitting *R. rickettsii*, including *Amblyomma cajennense*, *A. aureolatum*, *A. imitator*, *Rhipicephalus sanguineus*, *Dermacentor andersoni*, *D. variabilis* and possibly *A. americanum*. ... Our analysis revealed the presence of *R. rickettsii* in six samples and these findings contribute to a spatial distribution map that is intended to minimize the risk of transmission to humans. <https://link.springer.com/article/10.1007/s10493-020-00483-5>

BABESIOSIS

CDC Morbidity and Mortality Weekly Report Babesiosis Surveillance — U.S., 2011–2015 May 31, 2019 As of 2015, babesiosis has been a reportable condition in 33 states Reported cases occurred most frequently during June–August in the Northeast and upper Midwest. ...[The] foci of transmission might be expanding. Hospitalizations were common, particularly among patients who were asplenic or elderly. Doxycycline, which is *not* recommended for treatment of babesiosis, was specified for 1,320 (48.4%) of the 2,728 patients. https://www.cdc.gov/mmwr/volumes/68/ss/ss6806a1.htm?s_cid=ss6806a1_e

PLoS One Zoonotic Babesia: A scoping review of the global evidence. Dec 30, 2019 A review of 1394 articles relevant to human babesiosis and/or zoonotic Babesia species. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0226781>

TICK-BORNE ENCEPHALITIS

BBC UK Brain illness spread by ticks has reached UK Oct 29, 2019 <https://www.bbc.com/news/health-50206382>; <https://www.dailymail.co.uk/health/article-7624395/Ticks-spread-brain-illness-reached-UK.html>

BORRELIA MIYAMOTOI

Ticks and Tick-borne Diseases Identification of immunoreactive linear epitopes of Borrelia miyamotoi. Jan, 2020 *Borrelia miyamotoi* is an emerging tick-borne spirochete transmitted by Ixodes ticks. <https://www.sciencedirect.com/science/article/pii/S1877959X1930353X?via%3Dihub>

HEARTLAND VIRUS

Open Forum Infectious Diseases Investigation of Heartland virus disease throughout the United States, 2013–2017 Apr 11, 2020 ... Healthcare providers should consider HRTV disease testing in patients with an acute febrile illness with either leukopenia or thrombocytopenia not explained by another condition or were suspected to have a tickborne disease but did not improve following appropriate treatment. <https://academic.oup.com/ofid/article/doi/10.1093/ofid/ofaa125/5819209>

ALPHA-GAL ALLERGY

People's Pharmacy Show 1167: Will a Tick Bite Make You Allergic to Meat? Jun 6, 2019 A tick bite can set a person up for an unusual hours-delayed allergic reaction to eating beef, pork, lamb or any other type of mammalian meat.

https://www.peoplespharmacy.com/2019/05/29/show-1167-will-a-tick-bite-make-you-allergic-to-meat/?utm_source=The+People%27s+Pharmacy+Newsletter&utm_campaign=707c912925-MC_D_2019-06-03%26subscriber%3D1&utm_medium=email&utm_term=0_7300006d3c-707c912925-220815025&goal=0_7300006d3c-707c912925-220815025&mc_cid=707c912925&mc_eid=002411ae2b

MOSQUITO-BORNE DISEASES

Review of Integrative Business and Economics Research Current Issue in Tourism: Disease Transmission as a Potential Risk for Travelers, 2019 Chikungunya, Dengue and Zika to be of concern for travelers.

http://buscompress.com/uploads/3/4/9/8/34980536/riber_8-s4_07_k19-121_103-114.pdf

Jornal de Pediatria Arboviral diseases in pediatrics Oct 9, 2019 Children are especially vulnerable to this group of diseases due to characteristics that facilitate the development of the most severe forms.

<https://www.sciencedirect.com/science/article/pii/S0021755719303791?via%3Dihub>

Journal of Travel Medicine Dengue, Zika and Chikungunya during pregnancy: pre- and post-travel advice and clinical management. Oct 16, 2019 Dengue virus may be associated with severe maternal complications, particularly post-partum hemorrhage...Prematurity, growth retardation and stillbirths may occur, particularly in cases of severe maternal infection. Zika virus is a teratogenic infectious agent associated with severe brain lesions, with similar risks to other well-known TORCH pathogens. Implications of Chikungunya virus in pregnancy are mostly related to intrapartum transmission that may be associated with severe neonatal infections and long-term morbidity.

<https://academic.oup.com/jtm/advance-article/doi/10.1093/jtm/taz077/5588082>

International Journal of Infectious Diseases Seroprevalence of Yellow Fever, Dengue, West Nile and Chikungunya Viruses in Children in Teso South Sub County, Western Kenya Nov 8, 2019

- Arboviruses affected over 27% of children younger than 12 years in Teso County, Western Kenya
- Chikungunya, yellow fever, dengue and West Nile antibodies were confirmed in children

[https://www.ijidonline.com/article/S1201-9712\(19\)30443-6/fulltext?dgcid=raven_jbs_aip_email](https://www.ijidonline.com/article/S1201-9712(19)30443-6/fulltext?dgcid=raven_jbs_aip_email)

WEST NILE VIRUS

Pediatrics Infectious and Autoimmune Causes of Encephalitis in Children May 1, 2020 ...WNV was the most common infectious cause of encephalitis in our pediatric population despite lower testing frequency for WNV than herpes simplex virus or enterovirus. Increased testing for anti-NMDAR encephalitis resulted in frequent identification of cases. Increased awareness and testing for WNV and Bartonella would likely result in more identified causes of pediatric encephalitis.

<https://pediatrics.aappublications.org/content/early/2020/04/29/peds.2019-2543.long>

Vector-Borne Zoonotic Disease Comparison of Characteristics of Patients With West Nile Virus or St. Louis Encephalitis Virus Neuroinvasive Disease During Concurrent Outbreaks, Maricopa County, Arizona, 2015 Apr 6, 2020 ...During the first known concurrent WNV and SLEV disease outbreaks, no specific clinical features were identified that could differentiate between WNV and SLEV neuroinvasive cases. Health care providers should consider both infections in patients with aseptic meningitis or encephalitis. <https://www.liebertpub.com/doi/10.1089/vbz.2019.2572>

The Neurohospitalist Clinical Spectrum of West Nile Virus Neuroinvasive Disease Jan, 2020 West Nile virus (WNV) is the most common arbovirus infection in the U.S.. ...Epidemiology of WNV, risk factors for infection, the neurologic sequelae and long-term outcomes, and the importance of recognizing ocular involvement to prevent ophthalmologic complications. <https://journals.sagepub.com/doi/abs/10.1177/1941874419868636?journalCode=nhoa>

Precision Vaccination West Nile Relocated From Nebraska to the US Southwest During 2019 Dec 26, 2019 As of December 17, 2019, California (213), Arizona (173) and Colorado (120), Nevada (44) and New Mexico have reported a total of 590 West Nile virus (WNV) cases during 2019. These states represent about 64 percent of all West Nile virus (WNV) cases (910) reported by CDC during 2019. <https://www.precisionvaccinations.com/preventive-vaccines-west-nile-virus-remain-early-stage-clinical-study>

Orvosi Hetilap [The occurrence of neuroinvasive symptoms caused by the West Nile virus at an emergency center] Dec, 2019 ...Prevalence of neuroinvasive symptoms caused by West Nile virus (WNV) has significantly increased in the

past years throughout Europe, including Hungary. The appearance of more severe, neuroinvasive symptoms following WNV infections is also characteristic of Hungary. <https://akademai.com/doi/abs/10.1556/650.2019.31575>

Vector Borne and Zoonotic Diseases Entomological Data and Detection of West Nile Virus in Mosquitoes in Greece (2014-2016), Before Disease Re-Emergence in 2017 Nov 11, 2019

https://www.liebertpub.com/doi/abs/10.1089/vbz.2018.2422?rfr_dat=cr_pub%3Dpubmed&url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org&journalCode=vbz

Pathogens West Nile Virus Induced Cell Death in the Central Nervous System. Nov 1, 2019. Neuronal death in the central nervous system (CNS) is a hallmark of WNV-induced meningitis and encephalitis. <https://www.mdpi.com/2076-0817/8/4/215>

PLoS Pathogens Twenty years of West Nile virus spread and evolution in the Americas visualized by Nextstrain Oct 31, 2019 It has been 20 years since West Nile virus first emerged in the Americas.... Now the virus has become endemic to the U.S., where an estimated 7 million human infections have occurred, making it the leading mosquito-borne virus infection and the most common cause of viral encephalitis in the country.

<https://journals.plos.org/plospathogens/article?id=10.1371/journal.ppat.1008042>

Journal of Medical Entomology Epidemiology of West Nile Virus in the U.S.: Implications for Arbovirology and Public Health Oct 24, 2019 Since West Nile virus (WNV) emerged in the U.S. in 1999, 22,999 neuroinvasive disease cases in humans were reported through 2017. These cases have arisen from an estimated seven million human infections. Population incidence is highest in the West and Midwest. <https://academic.oup.com/jme/article/56/6/1456/5572378?searchresult=1>

Journal of Medical Entomology Introduction, Spread, and Establishment of West Nile Virus in the Americas Oct 24, 2019 The introduction of West Nile virus (WNV) to North America in 1999 and its subsequent rapid spread across the Americas demonstrated the potential impact of arboviral introductions to new regions, and this was reinforced by the subsequent introductions of chikungunya and Zika viruses. <https://academic.oup.com/jme/article-abstract/56/6/1448/5572102?redirectedFrom=fulltext>

Journal of Medical Entomology West Nile Virus Mosquito Vectors in North America Oct 24, 2019 East of the Mississippi River, mostly *Culex pipiens* L. complex mosquitoes drive intense enzootic transmission with relatively small numbers of human cases. Westward, the presence of highly competent *Culex tarsalis* (Coquillett) under arid climate and hot summers defines the regions with the highest human risk. West Nile virus human risk distribution is not uniform geographically or temporally within all regions. Notable geographic 'hotspots' persist with occasional severe outbreaks. <https://academic.oup.com/jme/article-abstract/56/6/1475/5572131?redirectedFrom=fulltext>

Pathogens Current Understanding of West Nile Virus Clinical Manifestations, Immune Responses, Neuroinvasion, and Immunotherapeutic Implications. Oct 16, 2019 <https://www.mdpi.com/2076-0817/8/4/193>

Journal of Medical Entomology Overwintering of West Nile Virus in the U.S. Sep 24, 2019 ... Multiple overwintering pathways are possible and collectively may be necessary to allow this virus to overwinter consistently within the U.S.. <https://academic.oup.com/jme/article-abstract/56/6/1498/5572361?redirectedFrom=fulltext>

Journal of Medical Entomology Twenty Years of West Nile Virus in the U.S.: Introduction Sept 24, 2019 A 20-year compendium <https://academic.oup.com/jme/advance-article/doi/10.1093/jme/tjz130/5572116>

Annals of Neurology West Nile virus neuroinvasive disease Sep 18, 2019 Since 1999, there have been nearly 20,000 cases of confirmed symptomatic West Nile virus (WNV) infection in the U.S., and it is likely that more than 1 million people have been infected by the virus. WNV is now the most common cause of epidemic viral encephalitis in the U.S.... Recovery from neurological sequelae of WNV infection including cognitive deficits and weakness may be prolonged and incomplete. <https://onlinelibrary.wiley.com/doi/abs/10.1002/ana.20959>

Pediatric Neurology Pediatric West Nile Virus-Associated Neuroinvasive Disease: A Review of the Literature Mar, 2019—A summary of the most recent literature regarding West Nile virus-associated neuroinvasive disease, especially in pediatric populations. [https://www.pedneur.com/article/S0887-8994\(18\)30062-6/fulltext](https://www.pedneur.com/article/S0887-8994(18)30062-6/fulltext)

Centers for Disease Control and Prevention (CDC) Jan 8, 2019 WNV is now well established in the lower 48 states of the

U.S. ...Avoidance of mosquito bites is the only practical preventive measure available.

<https://www.cdc.gov/westnile/statsmaps/preliminarymapsdata2018/disease-cases-state-2018.html>

ZIKA VIRUS

CDC Emerging Infectious Diseases Women's Awareness and Healthcare Provider Discussions about Zika Virus during Pregnancy, United States, 2016–2017

May, 2020 We surveyed women with a recent live birth who resided in 16 US states and 1 city during the 2016 Zika outbreak. We found high awareness about the risk of Zika virus infection during pregnancy and about advisories to avoid travel to affected areas but moderate levels of discussions with healthcare providers. https://wwwnc.cdc.gov/eid/article/26/5/19-0727_article?deliveryName=USCDC_331-DM26146

BMJ Global Health The Frequency and Clinical Presentation of Zika Virus Coinfections: A Systematic Review

May, 2020 ...Of the 213 coinfections described, ZIKV infections co-occurred with chikungunya in 115 cases, with dengue in 68 cases and with both viruses in 19 cases. Other coinfecting agents included human immunodeficiency, Epstein-Barr, human herpes and Mayaro viruses, *Leptospira spp*, *Toxoplasma gondii* and *Schistosoma mansoni*. ZIKV-coinfected cases primarily presented with mild clinical features, typical of ZIKV monoinfection; however, 9% of cases in cohort and cross-sectional studies were reported to experience complications. ...Coinfections do not appear to strongly influence the clinical manifestations of uncomplicated ZIKV infections. Further research is needed to confirm whether risk of severe complications is altered when ZIKV infection co-occurs with other infections.

<https://pubmed.ncbi.nlm.nih.gov/32381652/>

Viral Immunology New Challenge for Zika Virus Infection: Human Reservoirs? Apr 20, 2020 We have detected viremia in healthy carriers up to 3 years after symptom onset. Humans acting as potential viral reservoirs have major implication for the current understanding of ZIKV infection. <https://www.liebertpub.com/doi/10.1089/vim.2019.0187>

News Wise Scientists Uncover How Zika Virus Can Spread through Sexual Contact Apr 27, 2020 Zika virus is capable of replicating and spreading infectious particles within the outermost cells lining the vaginal tract, according to new research. The findings provide the first molecular-level insights into how the virus can move from person to person through sexual contact. <https://www.newswise.com/articles/scientists-uncover-how-zika-virus-can-spread-through-sexual-contact?sc=sphp>

<https://www.dropbox.com/s/i29us697rnh3zui/Mungin%20Abstract.pdf?dl=0>

CDC Emerging Infectious Diseases Comprehensive Profiling of Zika Virus Risk with Natural and Artificial Mitigating Strategies, United States Apr, 2020 Zika virus is transitioning to become a long-term public health challenge.... We found that, although sporadic single transmission events could occur in most US counties, outbreaks will likely be restricted to the Gulf Coast region and to late spring through autumn. ... Overall, outbreak control will be more effective and efficient than prevention, and vaccination will be most effective at >70% coverage. ...

https://wwwnc.cdc.gov/eid/article/26/4/18-1739_article?deliveryName=USCDC_351-DM23375

Journal of Neurological Sciences Association between Zika virus and future neurological diseases Feb 15, 2020 Viruses such as human cytomegalovirus, rubella, varicella-zoster and West Nile have been reported to cause birth defects similar to Zika virus (ZIKV), and some of them have also been associated with long-term neurological impacts. Other clinically relevant neurotropic arboviruses include Flaviviruses (e.g., St. Louis encephalitis virus, and Japanese encephalitis virus), Bunyaviruses (e.g., La Crosse virus and California encephalitis virus) and New World Alphaviruses (e.g., Eastern, Western, and Venezuelan equine encephalitis viruses). [https://www.jns-journal.com/article/S0022-510X\(19\)32382-2/fulltext](https://www.jns-journal.com/article/S0022-510X(19)32382-2/fulltext)

CDC Morbidity and Mortality Weekly Report Population-Based Surveillance for Birth Defects Potentially Related to Zika Virus Infection — 22 States and Territories, January 2016–June 2017

Jan 24, 2020 In states and territories with documented local Zika virus transmission, the prevalence of birth defects potentially related to Zika virus infection during pregnancy increased 21% during the second half of 2016 compared with that in the first half. In U.S. territories with widespread local Zika virus transmission, the prevalence of birth defects potentially related to Zika virus infection increased fourfold during January–March 2017 compared with January–March 2016. During the Zika virus outbreak, birth defects surveillance programs adapted to rapidly identify Zika-related birth defects regardless of laboratory evidence. These data provide more complete information on all infants affected and allow planning for care.

<https://www.cdc.gov/mmwr/volumes/69/wr/mm6903a3.htm>

International Journal of Infectious Diseases Clinical, laboratory and immune aspects of Zika virus-associated encephalitis in children Jan, 2020 Zika virus (ZIKV) infection was detected in an important fraction of pediatric encephalitis cases. ZIKV encephalitis patients displayed a higher frequency of exanthema and shorter duration of hospitalization compared to patients with encephalitis caused by children with ZIKV other etiological agents. [https://www.ijidonline.com/article/S1201-9712\(19\)30424-2/fulltext](https://www.ijidonline.com/article/S1201-9712(19)30424-2/fulltext)

Journal of Infectious Diseases Prevalence and Incidence of Zika Virus Infection Among Household Contacts of Patients With Zika Virus Disease, Puerto Rico, 2016–2017 Dec 13, 2019 Sexual contact as a risk factor for ZIKV infection. <https://academic.oup.com/jid/advance-article/doi/10.1093/infdis/jiy689/5244593>

Journal of the Peripheral Nervous System Diagnosis and Treatment of Guillain-Barré Syndrome During The Zika Virus Epidemic In Brazil: A National Survey Study. Nov 20, 2019 ... Sixty-one percent of neurologists noticed an increase in patients with GBS during the ZIKV epidemic; 30% experienced an increase in problems in managing GBS during this time. <https://onlinelibrary.wiley.com/doi/abs/10.1111/jns.12358>

Impact of weather seasonality and sexual transmission on the spread of Zika fever. Nov 19, 2019Spread through sexual contacts... highly contributes to the transmission of Zika virus.... <https://www.nature.com/articles/s41598-019-53062-z>

The Lancet The first local cases of Zika virus in Europe Nov 18, 2019 The arrival... confirms the mosquito species *Aedes albopictus* as capable of supporting Zika virus transmission. This expands ... the number of countries and territories where this unpredictable disease can occur ..., putting 4.6 billion people potentially at risk. [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(19\)32790-4/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(19)32790-4/fulltext)

The Lancet The first local cases of Zika virus in Europe Nov 18, 2019 In October, 2019, The arrival also confirms the mosquito species *Aedes albopictus* as capable of supporting Zika virus transmission. This expands considerably the number of countries and territories where this unpredictable disease can occur ..., putting 4.6 billion people potentially at risk. [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(19\)32790-4/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(19)32790-4/fulltext)

PeerJ Vector distribution and transmission risk of the Zika virus in South and Central America. Nov 7, 2019 The following countries were... particularly affected: Brazil, Colombia, Cuba, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Puerto Rico and Venezuela. ... <https://peerj.com/articles/7920/>

International Journal of Infectious Diseases Fatal Zika virus infection in the Americas: A systematic review Nov, 2019 51 reported deaths ... in nine countries were identified;...56.9% were not related to Guillain–Barré syndrome. Cases from three countries accounted for 67.6% of the deaths. [https://www.ijidonline.com/article/S1201-9712\(19\)30361-3/fulltext](https://www.ijidonline.com/article/S1201-9712(19)30361-3/fulltext)

International Journal of Infectious Diseases Fatal Zika virus infection in the Americas: A systematic review Nov, 2019 Highlights:

- Severe manifestations of Zika virus (ZIKV) infection have recently been noted during epidemics.
- A systematic review of the literature ...[showed] 51 reported deaths associated with ZIKV infection in nine countries, the majority (56.9%) not related to Guillain–Barré syndrome.
- Cases from the Dominican Republic, Brazil, and Puerto Rico accounted for 67.6% of the deaths (33.3%, 18.6%, and 15.7%, respectively). [https://www.ijidonline.com/article/S1201-9712\(19\)30361-3/fulltext](https://www.ijidonline.com/article/S1201-9712(19)30361-3/fulltext)

Wisconsin Medical Journal Travel During Pregnancy: A Study of Postpartum Women in Madison, Wisconsin Oct, 2019 Women traveling domestically were less likely to discuss their travel plans with their obstetrician when compared to women traveling internationally (67.4% v 85.7%, respectively). Out of 19 canceled trips, both domestic and international, 4 women opted to cancel their trips due to concerns about Zika virus (21.1%). When travel plans were discussed, in most instances (94.6%), the obstetrician initiated the conversation. <http://www.wisconsinmedicalsociety.org/WMS/publications/wmj/pdf/118/3/114.pdf>

Nature Reviews. Neurology. Diagnosis and management of Guillain-Barré syndrome in ten steps. Sept 20, 2019 Guillain-Barré syndrome (GBS) is a rare, but potentially fatal, immune-mediated disease of the peripheral nerves and nerve roots that is usually triggered by infections. The incidence of GBS can... increase during outbreaks of infectious diseases.... Diagnosis and management of GBS can be complicated as its clinical presentation and disease course are

heterogeneous, and no international clinical guidelines are currently available. ...We have developed a globally applicable guideline for the diagnosis and management of GBS. <https://www.nature.com/articles/s41582-019-0250-9>

International Journal of Infectious Diseases Guillain–Barré syndrome associated with Zika virus infection in Honduras, 2016–2017 Jul, 2019 In addition to GBS, the neurological consequences of ZIKV include not only CZS and GBS, but also encephalitis, meningoencephalitis, myelitis, sensory neuropathies, optic neuropathy, seizures, and epilepsy, among other reported complications. [https://www.ijidonline.com/article/S1201-9712\(19\)30214-0/fulltext](https://www.ijidonline.com/article/S1201-9712(19)30214-0/fulltext)

Maternal and Child Health Journal Zika Testing Behaviors and Risk Perceptions Among Pregnant Women in Miami-Dade County, One Year After Local Transmission. Jun 17, 2019 Participants with some high school education were significantly more likely than those with higher education levels to see ZIKV as a “big problem” in the community. <https://link.springer.com/article/10.1007%2Fs10995-019-02756-x>

Journal of Assisted Reproduction and Genetics ...Aspects of Zika virus infection on the male reproductive system May 30, 2019Data on ZIKV persistence in semen and associated risks to the male reproductive system described in human and animal model studies. <https://link.springer.com/article/10.1007%2Fs10815-019-01493-y>

Journal of Clinical Virology Neurological manifestations of pediatric arboviral infections in the Americas May 8, 2019 Neurological manifestations of acquired Zika includes hemiparesis, myelitis, Guillain-Barré, cortical infarction and behavioral changes. Neurological manifestations in children with Chikungunya were seizures, encephalitis, meningism and behavioral changes. Among the children with neurological manifestations due to CHIKV, 5.6% died and 8.5% developed neuronal sequelae. <https://www.sciencedirect.com/science/article/pii/S1386653219300940?via%3Dihub>

Emerging Microbes & Infections Increased temperatures reduce the Vectorial capacity of Aedes mosquitoes for Zika virus Jan 2, 2019 Future increases in temperature in the Americas could significantly impact vector competence, blood-feeding and longevity, and potentially decrease the overall vectorial capacity of Aedes mosquitoes in the Americas. <https://www.tandfonline.com/doi/full/10.1080/22221751.2019.1707125?scroll=top&needAccess=true>

BCM Public Health A survey of the knowledge, attitudes and practices on Zika virus in New York City Jan 2, 2018 -- Knowledge of Zika transmission is *not* significantly associated with travel history but is significantly associated with pregnancy. Participants reported more actions related to the reduction of potential mosquito breeding sites (94%) and protection against mosquito-borne transmission (63%) than of protection against sexual transmission (23%). ...40% of persons do not think that the risk of Zika applies to them. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5748954/>

CHIKUNGUNYA

Clinical Medicine Chikungunya arthritis Sep 1, 2019 The chikungunya virus (CHIKV)... has emerged as a significant public health concern in the last 10–15 years, especially in Asian and South American countries. ... Cases have now been reported in North America and Europe. CHIKV infection predominantly causes musculoskeletal symptoms with a chronic polyarthritis which may resemble autoimmune inflammatory arthritis. CHIKV infection should always be suspected in a returning traveler presenting with fever, skin rash and arthralgia. <http://www.clinmed.rcpjournal.org/content/19/5/381.short>

CDC Emerging Infectious Diseases Secondary Autochthonous Outbreak of Chikungunya, Southern Italy, 2017 Nov, 2019 Officials have taken action to raise awareness ..., increase timely case detection, reduce mosquito breeding sites, and promote mosquito bite prevention. https://wwwnc.cdc.gov/eid/article/25/11/18-0949_article?deliveryName=USCDC_331-DM11209

DENGUE

CDC Dengue – 2020 USA cases (as of May 3 2020)

State	Imported	Locally Acquired	State	Imported	Locally Acquired
Alabama	0	0	Nebraska	0	0
Arizona	2	0	Nevada	1	0
Arkansas	1	0	New Jersey	0	0
California	21	0	New Mexico	1	0
Colorado	0	0	New York	4	0

Connecticut	0	0	North Carolina	3	1
Delaware	1	0	Ohio	0	0
District of Columbia	2	0	Oklahoma	0	0
Florida	20	0	Oregon	4	0
Georgia	0	0	Pennsylvania	3	0
Hawaii	3	0	Rhode Island	0	0
Idaho	2	0	South Carolina	0	0
Illinois	5	0	South Dakota	1	0
Indiana	14	0	Tennessee	1	0
Iowa	0	0	Texas	7	0
Kansas	0	0	Utah	0	0
Louisiana	3	0	Vermont	0	0
Maine	0	0	Virginia	4	0
Maryland	2	0	Washington	4	0
Massachusetts	1	0	West Virginia	0	0
Michigan	0	0	Wisconsin	3	0
Missouri	2	0	Wyoming	0	0
Montana	0	0	TOTAL	99	0

Public Health Reports Investigation and Response to an Outbreak of Dengue: Island of Hawaii, 2015-2016 Mar/Apr, 2020 From September 2015 through March 2016, Hawaii had the largest outbreak of locally transmitted dengue since 1944. ... 238 (90.2%) were Hawaii residents. 37 (14.0%) persons required hospitalization... Established risk factors for dengue exposure included ... not using insect repellent or wearing protective clothing. ...Public health response should focus on behavioral and cultural attitudes, emphasizing personal mosquito protection and mosquito control at the community level. <https://journals.sagepub.com/doi/full/10.1177/0033354920904068>

Center for Infectious Disease Research and Policy Dengue case recorded in Florida Keys, more cases in French Caribbean Mar 10, 2020 Florida Health officials confirmed a case of locally acquired dengue in the Florida Keys, according to the Associated Press (AP), and said the patient is doing well. The Keys saw outbreaks of the mosquito-borne disease in 2009 and 2010. Also today, the World Health Organization (WHO) reported a sharp uptick of dengue cases in French Caribbean regions, including French Guiana, Guadeloupe, Martinique, and Saint-Martin.

Morbidity and Mortality Weekly Report Travel-Associated and Locally Acquired Dengue Cases - United States, 2010-2017 Feb 14, 2020 Dengue is a potentially fatal acute febrile illness Competent mosquito vectors of DENV are present in approximately one half of all U.S. counties. During 2010-2017, totals of 5,009 (93%) travel-associated and 378 (7%) locally acquired confirmed or probable dengue cases were reported to ArboNET. Cases were equally distributed between males and females, and median age was 41 years. Eighteen (three per 1,000) fatal cases were reported, all among travelers. Travelers should review country-specific recommendations (<https://wwwnc.cdc.gov/travel/notices/watch/dengue-asia>) for reducing their risk for DENV infection, including using insect repellent and staying in residences with air conditioning or screens on windows and doors. <https://pubmed.ncbi.nlm.nih.gov/32053577-travel-associated-and-locally-acquired-dengue-cases-united-states-2010-2017/>

CVT News Canada 26-year-old Canadian woman dies after catching dengue fever in Jamaica Feb 13, 2020 Jodie Dicks from Toronto, Ont., contracted a severe case of dengue fever while attending her friend's destination wedding in Jamaica. After spending a few days in a Jamaican hospital, she was flown to a Florida medical centre, where

she suffered two heart attacks and died in her mother's arms on Jan. 26. <https://www.ctvnews.ca/health/26-year-old-canadian-woman-dies-after-catching-dengue-fever-in-jamaica-1.4810795>

International Journal of Infectious Diseases Prevalence of dengue antibodies in healthy children and adults in different Colombian endemic areas Feb, 2020 Dengue seroprevalence is over 90% in Colombian volunteers from 4 to 95 years old. There is a wide and persistent DENV circulation and a large number of asymptomatic infections in the population. [https://www.ijidonline.com/article/S1201-9712\(19\)30439-4/fulltext](https://www.ijidonline.com/article/S1201-9712(19)30439-4/fulltext)

Vax Before Travel Travel Alert Issued for The Americas' Dengue Outbreaks Dec 30, 2019 ... The CDC said 'because dengue is spread by mosquito bites, all travelers to risk areas should prevent mosquito bites by using an EPA-registered insect repellent <https://www.vaxbeforetravel.com/dengue-cases-americas-set-new-records-2019>

Outbreak News Today CDC: Travel notice issued for the Americas due to dengue risk Dec 25, 2019 CDC issued a travel notice for travelers to parts of Central and South America, Mexico, and the Caribbean due to the ongoing dengue fever risk. The Pan American Health Organization (PAHO) has reported 2,981,769 cases year to date, including 1,372 deaths—the highest number of cases ever recorded. <http://outbreaknewstoday.com/cdc-travel-notice-issued-for-the-americas-due-to-dengue-risk-57831/>

Center for Infectious Disease Research and Policy Dengue cases in Americas region hit record high Nov 13, 2019 ...WHO Americas region has experienced the most dengue cases in its history, topping the number reported in the 2015 epidemic year by 13%.<http://www.cidrap.umn.edu/news-perspective/2019/11/news-scan-nov-13-2019>

Prevalence of dengue antibodies in healthy children and adults in different Colombian endemic areas Nov 13, 2019 Results: The seroprevalence of IgG for dengue were 85% in children and over 90% for adults. [https://www.ijidonline.com/article/S1201-9712\(19\)30439-4/fulltext?dgcid=raven_jbs_aip_email](https://www.ijidonline.com/article/S1201-9712(19)30439-4/fulltext?dgcid=raven_jbs_aip_email)

Male-to-male sexual transmission suspected in Spanish dengue cases Nov 8, 2019 Spanish health officials have reported sexual transmission of dengue virus between a man and his male partner, an unusual mode of transmission, the European Center for Disease Prevention and Control ... noted that ... semen was found to be positive for dengue 37 days after symptom onset. <http://www.cidrap.umn.edu/news-perspective/2019/11/news-scan-nov-08-2019>

ProMED-mail Dengue/DHF update (05): Americas Apr 29, 2020

County	YTD2020 Cases by Country	Week updated	Serotype	Total	Confirmed	Severe	Deaths	County	YTD2020 Cases by Country	Week updated	Serotype	Total	Confirmed	Severe	Deaths
North America USA	16	4/18/2020	D?	133	133	0	0	Haiti	7	2/15/2020	D?	9	0	0	0
Belize	7	2/15/2020	D1,D3	473	156	0	0	Jamaica	11	2/22/2020	D?	530	1	-	1
Costa Rica	12	3/21/2020	D1,2	1,574	101	0	0	Martinique	5	2/1/2020	D2,3	802	234	0	0
El Salvador	15	4/11/2020	D2	2,440	20	4	0	Montserrat		11/1/2019	D?	1	0	0	0
Guatemala	11	3/14/2020	D1,2,3	2,808	1,130	1	1	St. Barthelemy	5	2/1/2020	D?	52	11	0	0
Honduras	13	3/28/2020	D1,2	11,460	982	21	1	St. Kitts & Nevis	8	2/22/2020	D3	18	2	0	0
Nicaragua	17	4/25/2020	D2	22,176	509	25	0	St Martin	5	2/1/2020	D1,2,3	355	88	0	0
Panama	15	4/11/2020	D1	2,925	1,326	11	2	St Vincent & the Grenadines	8	2/22/2020	D?	52	11	0	0
Dominican Republic	11	3/4/2020	D1	2,875	368	92	0	Trinidad & Tobago	12	3/21/2020	D?	19	0	0	0
Puerto Rico	16	4/18/2020	D?	106	106	5	0	Turks & Caicos	12	3/21/2020	D1	135	22	0	0
Anguilla	12	3/21/2020	D1,3	6	1	0	0	Virgin Islands	8	2/22/2020	D?	15	15	0	0
Antigua & Barbuda	8	2/22/2020	D?	125	0	0	0	Bolivia	16	4/11/2020	D1,2	78,162	12,870	2093	19
Aruba	8	2/22/2020	D?	3	1	0	0	Columbia	19	4/18/2020	D1,2,3,4	46,266	12,481	506	18
Bahamas	7	2/15/2020	D?	3	0	0	0	Ecuador	15	4/11/2020	D1,2	7,388		31	6
Cayman Islands	9	2/29/2020	D2	35	1	0	0	Venezuela	16	4/18/2020	D1,2	2,737	120	11	6
Dominica	12	3/21/2020	D?	37	7	1	0	Brazil	16	4/18/2020	D1,2,3,4	794,565	362,969	443	221
French Guiana	15	4/11/2020	D1,2,3	719	719	1	0	Chile	16	4/18/2020	D1,2	7	7	0	0
Guadeloupe	5	2/1/2020	D2	1,740	170	0	0	Uruguay	16	4/18/2020	D1	2	2	0	0
Guyana	9	2/29/2020	D?	10	0	0	0	TOTALS FOR THE AMERICAS				1,174,636	400,708	2,816	355

MALARIA

VaxBeforeTravel.com 7.2 Million Malaria Cases Confirmed in the Republic of Burundi Oct 28, 2019 January to October 20, 2019, the WHO has confirmed 7,233,138 malaria cases with 2,691 fatalities across Burundi. <https://www.vaxbeforetravel.com/burundi-medical-services-2019-fall-well-below-us-standards>

EASTERN EQUINE ENCEPHALITIS

CDC As of December 17, 2019, CDC has received reports of 38 confirmed cases of Eastern equine encephalitis virus

disease for this year, including 15 deaths. Cases have been reported from ten states: Alabama (1), Connecticut (4), Georgia (1), Indiana (1), Massachusetts (12), Michigan (10), New Jersey (4), North Carolina (1), Rhode Island (3), and Tennessee (1). <https://www.cdc.gov/easternequineencephalitis/index.html>

New England Journal of Medicine Eastern Equine Encephalitis Virus — Another Emergent Arbovirus in the U.S. Nov 21, 2019 <https://www.nejm.org/doi/full/10.1056/NEJMp1914328>

ST LOUIS ENCEPHALITIS

CDC As of December 17, 2019, CDC has received reports of 38 confirmed cases of Eastern equine encephalitis virus disease for this year, including 15 deaths. <https://www.cdc.gov/easternequineencephalitis/index.html>

Journal Inquirer Manchester, CT EEE called 'emergent threat' Dec 9, 2019 As of Dec. 3, according to the Centers for Disease Control and Prevention, there were 37 confirmed human cases of EEE this year in nine U.S. states, resulting in 15 deaths. Four of those cases were in Connecticut, three of which were fatal.

https://www.journalinquirer.com/connecticut-and-region/eee-called-emergent-threat/article_bf7d1e1a-1aa7-11ea-b197-bbaef328641e.html

NIH/National Institute of Allergy and Infectious Diseases (press release) Eastern equine encephalitis virus poses emergent threat Nov 21, 2019 As of November 12, 36 confirmed cases of EEE had been reported by eight states; 13 of these cases were fatal. https://www.eurekalert.org/pub_releases/2019-11/nioa-eee112019.php

American Journal of Tropical Medicine and Hygiene St. Louis Encephalitis Virus Disease in the U.S., 2003-2017. Oct. 2018. 198 counties in 33 states and the District of Columbia reported SLEV activity. A total of 193 human cases of SLEV disease were reported, including 148 cases of neuroinvasive disease. AK, AZ, and MS had the highest average annual incidence of neuroinvasive disease cases. <http://www.ajtmh.org/content/journals/10.4269/ajtmh.18-0420>

LA CROSSE ENCEPHALITIS

The News-Herald Willoughby, OH Human case of La Crosse encephalitis confirmed in Lake County Dec 9, 2019 Lake County has a confirmed human case of [La Crosse encephalitis](#), a viral disease spread to people by the bite of an infected [Aedes triseriatus](#) (Eastern tree hole) mosquito. It's the third case of La Crosse encephalitis in the county in the past 10 years and the first since 2014, according to the [Lake County General Health District](#). https://www.news-herald.com/news/human-case-of-la-crosse-encephalitis-confirmed-in-lake-county/article_e13cfc68-1a99-11ea-8c67-979f8510d181.html

IndeOnline.com Massillon OH Stark family warns of dangerous mosquito virus after rare diagnosis Oct 7, 2018 <https://www.indeonline.com/news/20181007/stark-family-warns-of-dangerous-mosquito-virus-after-rare-diagnosis> La Crosse encephalitis, a rare and dangerous virus, is on the increase. [See link for story of one family's experience, symptoms, more.] Transmitted by infected eastern treehole mosquitoes, it has a 5-15-day incubation period, with most severe cases often found in children under 16. It can cause seizures and, in some cases, coma and paralysis. It strikes boys 5-9 in particular. Though most patients recover, it can cause cognitive and neuro-behavioral problems that require occupational therapy. There is no cure, however, symptoms are treatable. Severe neurological cases occur, mainly in pre-school age children. They are seldom fatal, but prolonged hospitalization and sequelae including personality changes, may occur. The virus can be transovarially transmitted by the infected female to her eggs, so that emerging adults may already be infected and ready to transmit the virus. See a summary of LACV, its epidemiology, geographic distribution, and clinical characteristics at <https://www.cdc.gov/lac/tech/epi.html>.

YELLOW FEVER

International Journal of Infectious Diseases A yellow flag on the horizon: The looming threat of yellow fever to North America Oct, 2019 Highlights:...Unless preventive measures are implemented, yellow fever might soon reach North America and Europe. [https://www.ijidonline.com/article/S1201-9712\(19\)30319-4/fulltext](https://www.ijidonline.com/article/S1201-9712(19)30319-4/fulltext)

USUTU VIRUS

Journal of Neurovirology Usutu virus disease: a potential problem for North America? Dec 19, 2019 Usutu virus is an emerging mosquito-borne flavivirus ...that is now circulating throughout parts of Africa, Europe, and the Middle East.The potential for introduction to North America is possible. <https://link.springer.com/article/10.1007%2Fs13365-019-00818-y>

KEYSTONE VIRUS

USA Today Brain-swelling sickness carried by mosquitoes can infect humans June 25, 2018--Another mosquito-borne virus, the Keystone virus, might pose a risk to people, specifically those in Florida. A confirmed human case was recently reported in *Clinical Infectious Diseases*. Cases could be "fairly common in North Florida," but patients are rarely tested for the virus. <https://www.usatoday.com/story/news/nation-now/2018/06/25/what-keystone-virus-mosquito-carrying-sickness-found-florida/730055002/>

JAMESTOWN CANYON VIRUS

Concord Monitor (NH) A NH man said to be infected with a rare mosquito-borne disease called Jamestown Canyon virus may be its first recorded fatality. <http://www.concordmonitor.com/jamestown-canyon-virus-death-18342165>

MAYARO

International Journal of Infectious Diseases Mayaro as a Caribbean traveler: Evidence for multiple introductions and transmission of the virus into Haiti Oct , 2019 Mayaro virus is a mosquito-transmitted alphavirus that is being recognized with increasing frequency in South America. As part of on-going surveillance of a school cohort in Haiti, we identified MAYV infections in 5 children across a 7-month time span, at two different school campuses... Our data highlight the clear potential for spread of the virus in the northern Caribbean and North America. [https://www.ijidonline.com/article/S1201-9712\(19\)30317-0/fulltext](https://www.ijidonline.com/article/S1201-9712(19)30317-0/fulltext)

RIFT VALLEY FEVER

ProMedMail Sudan, Egypt, Alertness, Preventive Measures Nov 7, 2019 ... The total number of human RVF cases, since the onset of the disease on 28 Sep 2019 until 4 Nov 2019, is 279, including 9 deaths.

Kenya News Agency Foot And Mouth Disease Reported In Laikipia County Nov 11, 2019 The CLPO cautioned that the heavy long rains might result in flooding with subsequent incidences of Zoonotic diseases, like Anthrax, Brucellosis and Rift Valley Fever (RVF). <http://www.kenyanews.go.ke/foot-and-mouth-disease-reported-in-laikipia-county/>

ROSS RIVER VIRUS

CDC Emerging Infectious Diseases Epidemiologic, Entomologic, and Virologic Factors of the 2014–15 Ross River Virus Outbreak, Queensland, Australia Dec, 2019 Australia experienced its largest recorded outbreak of Ross River virus (RRV) during the 2014–15 reporting year, comprising >10,000 reported cases. Longitudinal mosquito collections demonstrated unusually high relative abundance of *Culex annulirostris* and *Aedes procax* mosquitoes.... Increased prevalence of these mosquitoes probably contributed to the scale of this outbreak. https://wwwnc.cdc.gov/eid/article/25/12/18-1810_article?deliveryName=DM13541

SPONDWENI VIRUS

BioRxiv Spondweni virus causes fetal harm in a mouse model of vertical transmission and is transmitted by *Aedes aegypti* mosquitoes Oct 30, 2019 Spondweni virus (SPONV) is the most closely related known flavivirus to Zika virus (ZIKV). Its pathogenic potential and vector specificity have not been well defined. SPONV has been found predominantly in Africa, but was recently detected in a pool of *Culex quinquefasciatus* mosquitoes in Haiti. SPONV can cause significant fetal harm, including demise, comparable to ZIKV, in a mouse model of vertical transmission. *Aedes aegypti* could efficiently transmit SPONV, whereas *Culex quinquefasciatus* could not. Our results suggest that SPONV has the same features that made ZIKV a public health risk. <https://www.biorxiv.org/content/10.1101/824466v1>

PROTECTION

Insider DEET is relatively harmless, contrary to popular belief May 8, 2020 DEET is not toxic to humans when used properly... DEET is an effective bug repellent that has been used safely for many years, and there is currently no evidence that it causes cancer. Though it is generally safe, you need to take precautions when using DEET to make sure it doesn't irritate your skin or get swallowed. <https://www.insider.com/is-deet-bad-for-you>

Prevention How to Identify Chigger Bites, and Get Rid of the Annoying Berry Bugs for Good May 4, 2020 ...They suggest applying a DEET-based repellent on your boots and clothing if you're heading out to areas with thick greenery (avoid spraying directly onto your skin). If you're going to be out for a long amount of time, be sure to reapply your repellent ever two to three hours. <https://www.prevention.com/health/a32363091/how-to-get-rid-of-chiggers-berry-bugs/>

Good Housekeeping 13 Bug Sprays for Kids and Babies to Help Protect During Your Next Family Outing Apr 29, 2020 EPA registration of skin-applied repellent products, including DEET, indicates that they have been evaluated and approved for human safety and effectiveness when applied according to instructions on the label. Their evaluation includes ensuring that the registered product does not harm vulnerable populations, including children and pregnant women...DEET... is considered safe for anyone older than 2 months—the American Academy of Pediatrics recommends products that contain between 10% and 30% DEET. <https://www.goodhousekeeping.com/childrens-products/g32269687/best-bug-sprays-for-babies-kids/>

Who's Afraid of DEET? Fearmongering in Papers on Botanical Repellents Apr 8, 2020 DEET (N,N-Diethyl-met-toluamide) is considered the gold standard in mosquito repellents, not only for its effectiveness, but also for its safety. DEET has been more extensively studied for safety than any other repellent, and is accepted as completely safe when used correctly (i.e. not consumed or bathed in). Researchers studying botanical repellents, however, often paint DEET as far more toxic than it really is, falsely claiming it is a menace to the public health or even the environment. These claims are unfounded, and often the only evidence given by such publications are references to other publications also studying botanical repellents. Such publications are biased, and may be attacking DEET's excellent safety record to justify their existence and the need for their research. The inconvenient yet undisputable fact is that no botanical repellent has been proven to be as safe as DEET, and the majority never had any safety testing whatsoever. The automatic assumption that botanical repellents are safer than DEET is the 'appeal to nature fallacy,' which also drives most of the market for "natural" repellents, yet natural repellents have side effects and even a body count. Finding a botanical repellent that works as well as DEET and is equally safe is a legitimate research goal on its own, and need not be justified by fear-mongering and irrational chemophobia. Researchers studying these alternatives should strive for integrity, raising the real issue of the lack of safety testing for botanical repellents rather than denying the proven safety of DEET. <https://malariajournal.biomedcentral.com/articles/10.1186/s12936-020-03217-5>

SYN TV National Dec 31, 2019 [8:47:35 AM] [1:47:34 PM] That's safe for all. Pregnant and breast-feeding women. You want to make sure it contains the active ingredient, DEET... And people should know, look for 30% DEET, oil of lemon, eucalyptus. These are safe.

AllOutdoor.com Do Not Forget Bug Spray During Hunting Season Dec 6, 2019 If the reader does not like DEET then maybe consider Permethrin. Permethrin does not just repel ticks, it kills them. Unlike DEET which should be reapplied every few hours, Permethrin can be sprayed on clothing every few days. <https://www.alloutdoor.com/2019/12/06/not-forget-bug-spray-hunting-season/>

Nature World News Preventing Black Death 2.0: Here's What to Do Against the Plague Nov 16, 2019 You might also apply lotions that contain DEET, an insect-repellent ingredient. <https://www.natureworldnews.com/articles/42597/20191116/preventing-black-death-2-0-here-s-what-against-plague.htm>

Time DEET Is the Most Effective Bug Spray. But Is It Safe? Jul 25, 2019 ...A *New England Journal of Medicine* study concluded that ... DEET is among the most effective ways to prevent bites. "I use DEET all the time when I'm working in the field," says Jonathan Day, a professor of medical entomology at the University of Florida....Existing research suggests that applying DEET is a safe, effective way to protect yourself and your family from potentially disease-carrying bugs. <https://time.com/5347546/is-deet-safe/>

EWG's Top Three Bug Repellent Recommendations For Kids Jul 10, 2019 Our top picks are DEET, Picaridin and IR3535..... If you're using DEET to protect kids in an area known for ticks' carrying Lyme disease bacteria or for Zika outbreaks, a concentration of 20 percent to 30 percent may be appropriate...contrary to popular belief, bug repellents with higher concentrations – such as old-school 100 percent DEET – are not necessarily more effectiveYes, DEET is a reasonable choice when used as directed, even for children. ... EWG researchers concluded that it is best to use the lowest effective concentration of DEET, even though it's effective and generally safer than is commonly assumed. Picaridin is a great alternative to DEET. <https://www.ewg.org/childrenshealth/22764/ewg-s-top-three-bug-repellent-recommendations-kids>

CBS News Tick-borne diseases are on the rise. Here's what you need to know June 10, 2019 Some ways you can avoid tick-borne disease when spending time outdoors is to wear DEET, tuck your pants into your socks, avoid tall grass, shower immediately after being outside and have someone check your body. ...Time is of the essence, Dr. David Agus warned. "Take a straight tweezers, pull straight out and put the tick into alcohol. The quicker you remove it the better,

because it takes time before it can inject its saliva into you. The saliva is what contains the bacteria and the virus." While most diseases like Lyme are treatable, there have been two cases of the Powassan virus reported in New Jersey. It is not treatable. "It's got a 10 percent mortality rate and 50 percent of people who get this virus have permanent neurologic injury. So have someone search you for ticks and pull them off right afterward. Avoid it. Wear

Deet." <https://www.cbsnews.com/news/tickborne-diseases-are-one-the-rise-heres-what-you-need-to-know/>

Scouting Magazine The colorful history of fighting off pesky pests May/June, 2019 The CDC and EPA agree that repellents DEET and picaridin are effective at fending off insects... The promise of a bug repellent that really works finally began to be realized with the development of the chemical DEET... While there are pros and cons to all repellents, concerns about the side effects of DEET have been largely put to rest, especially in light of DEET's value in protecting against insect-borne diseases. <https://scoutingmagazine.org/2019/04/the-colorful-history-of-fighting-off-pesky-pests/>

Romper.com the 3 Best Bug Sprays for Kids May 3, 2019 The most popular bug sprays will have one of two ingredients that help ward off mosquitoes: DEET or Picaridin. DEET is a far and away the most common active ingredient in insect repellents... Despite any reports you hear, DEET-based formulas are considered safe for kids to use as a bug repellent so long as the concentration of DEET used is lower than 30 percent... For young children, you're better off with a DEET- or Picaridin-based formula. <https://www.romper.com/p/the-3-best-bug-spray-for-kids-17016907>

New York Times How to Protect Yourself From Mosquitoes and Ticks May 1, 2018 There's no magic pill or vaccine to prevent disease infections. "This is one concern in life that's preventable by following some simple guidelines, ...," said Dr. David Weber, professor of medicine and medical director of UNC Hospitals' departments of epidemiology and occupational health service. Only DEET, picaridin and IR3535 are effective agents against ticks, and will require higher concentrations than when used against mosquitoes. <https://www.nytimes.com/2018/05/01/well/mosquitoes-ticks-lyme-disease-protection.html>

Prevention Why Essential Oils Probably Won't Protect You From Ticks This Summer May 1, 2019 The most preventative insect repellents are ones with active ingredients like DEET, picaridin, IR3535, oil of lemon eucalyptus (OLE), para-menthane-diol (PMD), or 2-undecanone. <https://www.prevention.com/health/a27333432/essential-oils-for-ticks/>

Consumer Reports: Which bug sprays are worth your bucks? Apr 23, 2019 Concentrations of DEET at 25% to 30% are really the best to keep you protected...Off Deep Woods, Sportsmen Insect Repellent IV Dry with 25% DEET performed excellently against mosquitoes. Or a CR Best Buy, Ben's with 30% DEET. If you prefer wipes, CR recommends Repel Insect Repellent Mosquito Wipes with 30% DEET. So a lot of folks are worried that DEET might not be safe, but there's a lot of evidence to show that when you follow the directions on the label and you use it properly, DEET is very effective and safe. <https://www.news4jax.com/consumer/consumer-reports/consumer-reports-which-bug-sprays-are-worth-your-bucks>

Organic Authority How to Avoid Mosquito-Borne Diseases When You're Traveling Apr 16, 2019 DEET is the most effective barrier protection(CDC). <https://www.organicauthority.com/energetic-health/how-to-avoid-mosquito-borne-diseases-deet>

Przegląd Epidemiologiczny Susceptibility of *Dermacentor reticulatus* tick to repellents containing different active ingredients 2019 DEET is considered by many to be the 'gold standard' of insect repellents, and we have also confirmed this in our studies. DEET expressed the higher repellency after 7 hours of application (90%) comparing to other formulations. Other repellents Picaridin 20% and IR3535 12% were effective only up to four hours after application (the efficacy was 85% and 40%, respectively). <https://www.ncbi.nlm.nih.gov/pubmed/31134780>

The New England Journal of Medicine Tick-borne Diseases — Confronting a Growing Threat July 25, 2018 The public health burden of tick-borne pathogens is considerably underestimated. ...The CDC reports approximately 30,000 cases of Lyme disease per year but estimates the true incidence is 10 times higher. ...Clinicians should advise patients to use insect repellent and wear long pants when walking in the woods or tending their gardens — and check themselves for ticks when they are done. <https://www.nejm.org/doi/full/10.1056/NEJMp1807870>

Environmental Working Group EWG's 2018 Guide to Bug Repellents Can Help Fend off Disease- Carrying Ticks, Mosquitoes July 17, 2018 EWG's top choices for repellents include those that contain the active ingredients picaridin, DEET and IR3535 for protection from a variety of biting insects and ticks. And all three have good safety profiles. Many people are concerned about the possible drawbacks of common active ingredients like DEET. EWG researchers have analyzed the science in depth and found that, with proper application and precaution, our

recommended active ingredients effectively reduce risk from life-altering diseases and have very low toxicity concerns. <https://www.ewg.org/release/ewg-s-2018-guide-bug-repellents-can-help-fend-disease-carrying-ticks-mosquitoes#.W094INVKiUk>

STATE REPORTS

ALABAMA

Fox10tv.com Mobile AL What is Eastern Equine Encephalitis Nov 6, 2019 Use Environmental Protection Agency (EPA)-registered insect repellents with one of the active ingredients below... DEET, Picaridin (known as KBR 3023 and icaridin outside the US), IR3535, Oil of lemon eucalyptus (OLE), Para-menthane-diol (PMD), 2-undecanone https://www.fox10tv.com/news/alabama/what-is-eastern-equine-encephalitis/article_2c93df50-00d8-11ea-b483-47458acc48a0.html

ARIZONA

Arizona Daily Sun Flagstaff, AZ Preventing summer diseases in northern Arizona Apr 28, 2020 Wear covering clothing—shoes, socks, long pants and a long-sleeved shirt—and insect repellent with active ingredients such as DEET when outdoors. https://azdailysun.com/news/local/preventing-summer-diseases-in-northern-arizona/article_c43780a5-24f9-54f1-bbe4-fc8ff4541c04.html

ARKANSAS

KNWA-NBC TV Ft. Smith-Fayetteville-Springdale-Rogers, AR (101) Mar 26, 2020 [5:13:23 PM] Something lingering out in nature that can have a big impact on your health, ticks. Some ways to keep yourself, and your furry friends safe include, avoid areas with high grass and leaf litter, and use EPA registered insect repellents containing DEET.

KNWA-NBC TV Ft. Smith-Fayetteville-Springdale-Rogers, AR (101) May 8, 2020 [5:26:34 AM] [6:28:27 AM] . Avoid areas with high grass and leaf litter, use EPA registered insect repellents containing DEET.

CALIFORNIA

Valley Voice Ivanhoe, CA During focus on COVID-19, prepare for mosquito season Apr 16, 2020 Apply insect repellent containing EPA-registered active ingredients, including DEET, picaridin, oil of lemon eucalyptus, or IR3535, according to label instructions. Repellents keep mosquitoes from biting. DEET can be used safely on infants and children 2 months of age and older. <https://www.ourvalleyvoice.com/2020/04/16/during-focus-on-covid-19-prepare-for-mosquito-season/>

COLORADO

TheDenverChannel.com Denver, CO Two new human cases of West Nile virus found in Colorado, this time in Weld County Aug 30, 2019 Use DEET-enhanced insect repellent or alternative: Repellents containing DEET, picaridin, IR3535, and some oil of lemon eucalyptus and para-menthane-diol products provide the best protection. <https://www.thedenverchannel.com/news/front-range/weld-county/two-new-human-cases-of-west-nile-virus-found-in-colorado-this-time-in-weld-county>

CONNECTICUT

Ticks and Tick-borne Diseases Microbiome analysis of Ixodes scapularis ticks from New York and Connecticut Apr 15, 2020 The black legged tick transmits the greatest diversity of pathogens of any tick within the U.S. Combined, these pathogens account for >90% of all reported tick-borne diseases. Lyme disease was detected in 56.3% of ticks. Other pathogens were also found. Powassan was present in 3.6%. 19% of ticks were co-infected with two to three pathogens. <https://doi.org/10.1016/j.ttbdis.2019.04.011>

New Haven Register West Nile, not coronavirus, something to worry about as mosquito season nears May 6, 2020 Defend against mosquito bites by using a mosquito repellent that has been registered by the Environmental Protection Agency, such as DEET, Picaridin or oil of lemon eucalyptus. <https://www.nhregister.com/metro/article/West-Nile-not-coronavirus-something-to-worry-15251093.php>

DISTRICT OF COLUMBIA

WRC-NBC TV Washington, DC-Hagerstown, MD (7) Mar 27, 2020 [5:16:03 AM] ...You can use an insect repellent with up to 30% DEET. That's the magic ingredient. DEET is safe for kids as young as 2 months old.

FLORIDA

Miami.cbslocal.com Health Officials Announce First Case Of West Nile Virus Of 2020 In Miami-Dade May 9, 2020 The Florida Department of Health in Miami-Dade County confirmed the first case of West Nile virus infection of 2020...

Always use repellents according to the label. Repellents with DEET, picaridin, oil of lemon eucalyptus, para-menthane-diol, and IR3535 are effective. <https://miami.cbslocal.com/2020/05/09/health-officials-announce-first-case-of-west-nile-virus-of-2020-in-miami-dade/>

The Independent Florida Alligator Yellow fever mosquito found in downtown Gainesville May 9, 2020 Gainesville's Public Works Department wrote that a yellow fever mosquito was found downtown this week. Yellow fever mosquitoes can spread yellow fever, dengue, chikungunya and Zika viruses, according to the post. https://www.alligator.org/news/local/yellow-fever-mosquito-found-in-downtown-gainesville/article_51273a9e-9221-11ea-93da-231b185e49f5.html

The Horse Two Florida Horses Test Positive for EEE Apr 16, 2020 Look for EPA-labeled products containing active ingredients such as DEET, picaridin (KBR3023), or oil of lemon eucalyptus (p-menthane 3,8-diol). <https://thehorse.com/187362/two-florida-horses-test-positive-for-eee/>

Miami Herald Miami, FL Two more cases of dengue fever have hit Miami-Dade, bringing total to 14 for the year Dec 23, 2019 ... Miami-Dade County announced two more locally transmitted cases of dengue fever on Monday, bringing the total number of local cases to 14 so far this year. <https://www.miamiherald.com/news/health-care/article238674158.html>

GEORGIA

WLTV-NBC TV Columbus, GA (130) Mar 29, 2020 [6:07:05 PM] Don't be ticked. Use repellents with 20 percent DEET on skin.

WALB-NBC TV Albany, GA (154) Mar 31, 2020 [5:18:02 AM] [6:20:12 AM] [12:20:21 PM] That has DEET in it before you spend time outside. "Empty those containers, wear an insect repellent with DEET and try to avoid having any kind of standing water on your property.

<https://www.walb.com/2020/03/31/how-get-rid-those-pesky-mosquitoes/>

ILLINOIS

Register-Mail Galesburg, IL Outdoors: Ticks active right now May 9, 2020 Apply a good insect repellent to your clothing and around your ankle areas to help keep them from climbing onto your clothing.

<https://www.galesburg.com/sports/20200509/outdoors-ticks-active-right-now>

INDIANA

Journal of Community Health Predictors of Tick Exposure Risk-Reduction Behavior in Indiana Mar 9, 2020 The most adopted tick exposure risk reduction behavior (TERRB) (was 'Walking on established trails and avoiding contact with adjacent vegetation' (83%, n = 2418). This was followed by 'Conducting a thorough check of clothing and the body soon after returning from the outdoors' (81%, n = 2373). The two least adopted TERRBs were, 'Treating outdoor clothing with special insect repellent (e.g. Permethrin)' (48%, n = 1409) and 'Wearing appropriate clothing' ('Tucking shirt into pants, and the pants into socks when outdoors') respectively (52%, n = 1524). ...Increased risk perception, among Indiana residents is significantly associated with adoption of multiple TERRBs. Identifying the predictors of the adoption of more than one TERRB is vital for the prevention of tick-borne diseases. <https://link.springer.com/article/10.1007%2Fs10900-020-00803-1>

WSBT-CBS TV South Bend-Elkhart, IN (98) Apr 30, 2020 [4:36:26 PM] [6:12:43 PM] [11:07:49 PM] Black flies are not known to carry any human pathogens in our area of the United States. The scientist recommends using DEET on your clothes to prevent black flies from biting you as well as making sure your skin isn't exposed while you're outside.

May 1, 2020 [5:08:00 AM] [6:18:52 AM] [12:07:10 PM] He says to make sure to spray clothes and exposed skin with a repellent containing DEET.

WSBT-CBS TV South Bend-Elkhart, IN (98) May 1, 2020 [5:08:00 AM] [6:18:52 AM] [12:07:10 PM] They're most active in feeding during the daytime hours and so that's when you'd be most likely to get bitten if you're out and about during the daytime. Make sure to spray clothes and exposed skin with a repellent containing DEET.

KENTUCKY

WDRB.com Louisville KY 5 Ways to Protect Your Family Against Mosquitos Apr 1, 2020 N,N-Diethyl-meta-toluamide, or DEET, has been demonstrated to be the most effective repellent, even for babies as young as two months. https://www.wdrb.com/community/marketplace/4/5-ways-to-protect-your-family-against-mosquitos/article_2be6f74e-72df-11ea-92c3-af3a08db139f.html

LOUISIANA

Nola.gov City Of New Orleans Mosquito, Termite And Rodent Control Board To Conduct Adult Mosquito Abatement Tonight Apr 30, 2020 The CDC recommends using repellents containing EPA-registered active ingredients including DEET, picaridin, IR3535, or oil of lemon eucalyptus. <https://nola.gov/mayor/news/april-2020/city-of-new-orleans-mosquito,-termite-and-rodent-control-board-to-conduct-adult-mosquito-abatement-t-en/>

MAINE

CDC Emerging Infectious Diseases Surge in Anaplasmosis Cases in Maine, USA, 2013–2017 Feb, 2020 Incidence of human granulocytic anaplasmosis is rising in Maine. This increase may be explained in part by adoption of tick panels as a frequent diagnostic test in persons with febrile illness and in part by range expansion of *Ixodes scapularis* ticks and zoonotic amplification of *Anaplasma phagocytophilum*. <https://wwwnc.cdc.gov/eid/article/26/2/pdfs/19-0529.pdf>

WGME.com Portland, ME Lyme disease found in nearly 40 percent of Maine deer ticks in 2019 Feb 11, 2020 Nearly 40 percent of Maine deer ticks submitted to the University of Maine Tick Lab in 2019 tested positive for Lyme disease, according to the lab's first tick surveillance annual report. A smaller percentage tested positive for anaplasma and babesia, two other common tick-borne diseases. <https://wgme.com/news/local/lyme-disease-found-in-nearly-40-percent-of-maine-deer-ticks-in-2019>

Journal of Medical Entomology Decoupling of Blacklegged Tick Abundance and Lyme Disease Incidence in Southern Maine, USA May, 2020 ...Maine, USA, is a high Lyme disease incidence state, with rising incidence of Lyme disease and other tick-borne illnesses associated with increasing *I. scapularis* abundance and northward range expansion. ...In the northern tier, the *I. scapularis* submission rate increased throughout the duration of the time series, suggesting *I. scapularis* was emergent but not established. By contrast, in the southern tier, submission rate increased initially but leveled off after 10–14 yr, suggesting *I. scapularis* was established by the mid-2000s. Active (field) surveillance data from a site in the southern tier—bird tick burdens and questing adult tick collections—corroborated this leveling pattern. Lyme disease incidence and *I. scapularis* submission rate were temporally correlated in the northern but not southern tier. This suggested a decoupling of reported disease incidence and entomological risk. <https://academic.oup.com/jme/article-abstract/57/3/755/5663535?redirectedFrom=fulltext>

MASSACHUSETTS

Gloucester Times Gloucester, MA Tick season is coming, and it's likely to be bad Mar 22, 2020 Consider using an insect repellent containing DEET and applying it to shoes and clothing. https://www.gloucestertimes.com/news/local_news/tick-season-is-coming-and-it-s-likely-to-be/article_e3ab3ce0-f6cf-501b-aeaf-023be495f243.html

WMUR-ABC TV Boston-Manchester, MA (9) Apr 23, 2020 [12:20:50 PM] We recommend insect repellent effective against ticks be applied to exposed skin. Formulations with DEET are effective but there are other formulations, like oil of eucalyptus insect oil.

CapeCod.com Entomologist Reminding Residents to be Mindful of Ticks Amid COVID-19 Pandemic Apr 13, 2020 To protect against ticks, Dapsis recommends using insect repellent such as DEET on your skin and Permethrin on your clothing. <https://www.capecod.com/newscenter/barnstable-county-entomologist-reminding-residents-to-be-mindful-of-ticks-amid-covid-19-pandemic/>

WWLP-NBC TV Springfield-Holyoke, MA (111) May 5, 2020 [5:14:59 PM] Use a skin repellent with 30-percent DEET, or a repellent called permethrin for only your clothes.

MICHIGAN

Iron Mountain Daily News Iron Mountain, MI Spring brings back the threat of ticks Mar 30, 2020 Use an insect repellent with at least 20% DEET or another EPA-registered repellent according to the label instructions. <https://www.ironmountaindailynews.com/opinion/editorials/2020/03/spring-brings-back-the-threat-of-ticks/>

MISSISSIPPI

WAPT.com Jackson MS 2 new West Nile virus cases reported in Mississippi Dec 5, 2019 State's total for 2019 rises to 15 cases... Health officials urge people to reduce risk by using insect repellent. <https://www.wapt.com/article/a-blessing-to-us-police-officer-opens-up-home-changes-lives-on-and-off-the-clock/30206479>

MISSOURI

KSPR-ABC TV & KYTV-NBC TV Springfield, MO (73) Mar 31, 2020 [5:32:09 AM] If you plan to work outside over the weekend find a repellent with 20 DEET in it. Some people think more DEET means better protection. But 25-30 percent can provide protection that last through the day.

MONTANA

KTVH-NBC TV Helena, MT (205) Apr 17, 2020 [6:14:04 PM] [10:09:48 PM] He also suggests wearing a DEET based repellent that discourages ticks from attaching to your skin.

KTVQ-CBS TV Billings, MT (168) MA May 8, 2020 [10:07:09 PM] May 10, 2020 [10:07:09 PM] It's time to start thinking about how to avoid tick bites. First, use repellents that has up to 30% DEET, wear long pants, shirts and try to avoid long grass.

NEBRASKA

Journal of Medical Entomology Molecular Detection of Spotted Fever Group Rickettsiae (Rickettsiales: Rickettsiaceae) in *Dermacentor variabilis* (Acari: Ixodidae) Collected Along the Platte River in South Central Nebraska Mar, 2020 ...RMSF cases in Nebraska have increased on a year-to-year basis ...These data indicate that *R. rickettsii* is likely at a low prevalence in south central Nebraska and spillover of *R. amblyommatis* into *D. variabilis* is likely occurring due to the invasive lone star tick (*Amblyomma americanum*). ...*R. montanensis* and *R. amblyommatis* could be associated with the increase in SFG *rickettsiae* infections in Nebraska. This information will be of value to clinicians and the general public for evaluating diagnosis of disease- and risk-associated environmental exposure...<https://academic.oup.com/jme/article/57/2/519/5580100>

Journal of Medical Entomology First Records of Established Populations of *Ixodes scapularis* (Acari: Ixodidae) Collected From Three Nebraska Counties May, 2020 Reported cases of Lyme disease in Nebraska have been assumed to be imported from other endemic areas. Previous surveillance efforts provided no evidence of established populations as only individual specimens of *Ixodes scapularis* (Say) had been collected. In the winter of 2018, adult *I. scapularis* were found on a dog at Two Rivers State Recreation Area, Douglas County, prompting tick collection at the site and nearby natural areas. ...This is the first documentation of established populations of *I. scapularis* in Nebraska.
<https://academic.oup.com/jme/article-abstract/57/3/939/5644602?redirectedFrom=fulltext>

NEW HAMPSHIRE

NECN.com Newton, MA NH Adult Has Mosquito-Borne Jamestown Canyon Virus, Test Shows Oct 16, 2019 An adult from Laconia has tested positive for a mosquito-borne virus, New Hampshire's Department of Health and Human Services says. The adult tested positive for the Jamestown Canyon virus, which is transmitted by infected mosquitoes... It's the second time a case has been identified in the state this year; it was identified in a Kingston resident in August.
<https://www.necn.com/news/new-england/NH-Adult-Has-Mosquito-Borne-Jamestown-Canyon-Virus-Test-Shows-563246832.html>

NEW JERSEY

Journal of Medical Entomology *Rickettsia Spp.* Infecting Lone Star Ticks (*Amblyomma Americanum*) (Acari: Ixodidae) in Monmouth County, New Jersey Jan 8, 2020 Of the 1,858 tested, 465 (25.0%) were infected with *Rickettsia amblyommatis* Karpthy, a species of undetermined pathogenicity found frequently in *A. americanum*, while 1/1,858 (0.05%) contained *Rickettsia rickettsii* Brumpt, the agent of Rocky Mountain spotted fever. No ticks tested positive for mildly pathogenic *Rickettsia parkeri* Lackman, and no ticks were co-infected with multiple *Rickettsia spp.* ... *A. americanum* could be involved in transmission of *R. rickettsii* to humans in New Jersey, albeit rarely. The much higher rates of *R. amblyommatis* infection are consistent with hypotheses that human sera reacting to this species could contribute to reports of mild SFGR cases. <https://academic.oup.com/jme/advance-article-abstract/doi/10.1093/jme/tjz251/5698250>

NEW YORK

Microbiome analysis of *Ixodes scapularis* ticks from New York and Connecticut
<https://doi.org/10.1016/j.ttbdis.2019.04.011> **Ticks and Tick-borne Diseases 15 April 2019 894-900.** The black legged tick transmits the greatest diversity of pathogens of any tick within the U.S. Combined, these pathogens account for >90% of all reported tick-borne diseases. Lyme disease was detected in 56.3% of ticks. Other pathogens were also found. Powassan was present in 3.6%. 19% of ticks were co-infected with two to three pathogens.

Daily Freeman Kingston, NY Dutchess warns that tick-borne diseases still a threat Apr 28, 2020 Use an EPA registered insect repellent on exposed skin. https://www.dailyfreeman.com/news/local-news/dutchess-warns-that-tick-borne-diseases-still-a-threat/article_e77f0f18-832f-11ea-9b38-5fadac71d49c.html

NORTH CAROLINA

Watauga Democrat Boone, NC Watauga an 'emerging' area for Lyme disease cases Mar 6, 2020 According to data from the N.C. Electronic Disease Surveillance System, in Watauga County in 2018, there were seven reported cases in humans in 2018, compared to 23 reported cases in 2019.

OHIO

WBNS-CBS TV Columbus, OH (34) Apr 28, 2020 [5:14:14 PM] The Centers for Disease Control... recommends using insect repellents with ingredients like DEET.

OKLAHOMA

Tulsa World Tulsa, OK Warm, damp March has ticks, mosquitoes on a roll, including new tick species Mar 14, 2020 Use an insect repellent containing 20% or more DEET, picaridin or IR3535 on exposed skin and reapply as directed through the day to maintain effectiveness. https://www.tulsaworld.com/news/local/warm-damp-march-has-ticks-mosquitoes-on-a-roll-including/article_f4be5fe8-48c9-5d00-9491-97c3c99aa18d.html

Tulsa World Tulsa, OK Tulsa Health Department launches mosquito surveillance season, reports COVID-19 not carried by insects May 2, 2020 Wearing an insect repellent containing DEET also is advised. https://www.tulsaworld.com/news/local/tulsa-health-launches-mosquito-surveillance-season-reports-covid-19-not-carried-by-insects/article_e0924298-e83d-54c8-86de-cf495a0decbc.html

OREGON

KGW-NBC TV Portland, OR (22) May 9, 2020 [4:43:04 PM] ...The repellents that work best in our tests use 25 to 30 percent DEET, 20 percent picaridin, or 30 percent oil of lemon eucalyptus.

PENNSYLVANIA

The Tribune Democrat Johnstown, PA Editorial | Take steps to prevent tick bites Apr 21, 2020 Other preventative measures include wearing long pants tucked into tall socks and a long-sleeved shirt tucked into the pants; and the use of insect repellent with DEET (N,N-Diethyl-meta-toluamide). https://www.tribdem.com/news/editorials/editorial-take-steps-to-prevent-tick-bites/article_5eade30e-83f6-11ea-9548-bb70e31a821c.html

The Bradford Era Bradford, PA Burchfield: Social distancing — from bugs Apr 30, 2020 Insect repellent is an outdoor essential to protect exposed skin. Some repellents contain DEET....The chemical was invented in 1944 and by 1946 the repellent was being used by the U.S. Army... The repellent works and is the most widely used product of its kind. It can be applied to clothing or the skin. Products containing DEET that are most effective contain at least 15 to 25 percent of the chemical. When venturing into areas where there is a higher concentration of insects, products that contain a higher percentage of DEET can be used. http://www.bradfordera.com/sports/burchfield-social-distancing-from-bugs/article_e542ad44-8b3c-11ea-b4cd-2f9388773ac5.html

CBSN Philadelphia TV Philadelphia, PA (4) May 7, 2020 [2:05:16 PM] The best way to protect yourself from a tick bite is to cover exposed skin with lightweight clothing, use insect repellent containing twenty percent or more of the DEET in it and to do a tick check immediately when you come in.

CBSN Pittsburgh TV Pittsburgh, PA (24) May 7, 2020 [2:08:19 PM]

RHODE ISLAND

Brown Daily Herald Providence IR Three people contract rare EEE disease in R.I. Sept 18, 2019 ...Two more Rhode Island residents have been diagnosed with Eastern Equine Encephalitis, a rare but potentially fatal mosquito-borne disease. These diagnoses bring the state's total number of human cases this year to three... Students can also wear long-sleeved shirts and pants, ensure window screens are intact and use insect repellent when outdoors to limit exposure.

SOUTH DAKOTA

Journal of Medical Entomology Epidemic West Nile Virus Infection Rates and Endemic Population Dynamics Among South Dakota Mosquitoes: A 15-yr Study from the United States Northern Great Plains May, 2020 Mosquito surveillance has been conducted across South Dakota (SD) to record and track potential West Nile virus (WNV) vectors since 2004. During this time, communities from 29 counties collected nearly 5.5 million mosquitoes, providing data from over 60,000 unique trapping nights. The nuisance mosquito, *Aedes vexans* (Meigen) was the most abundant species in the state (39.9%), and most abundant in most regions. The WNV vector, *Culex tarsalis* Coquillett (Diptera: Culicidae), was the second most abundant species (20.5%), and 26 times more abundant than the other *Culex* species that also transmit WNV. However, geographic variation did exist between WNV vector species, as well as relative abundance of vector and nuisance mosquitoes. The abundance of *Ae. vexans* decreased from east to west in South Dakota, resulting in an increase in the relative abundance of *Cx. tarsalis*. WNV infection rates of mosquitoes showed that *Cx. tarsalis* had the most positive sampling pools and the highest vector index of all the species tested.

<https://academic.oup.com/jme/article-abstract/57/3/862/5651347?redirectedFrom=fulltext>

TENNESSEE

Times Free Press Chattanooga TN Soddy-Daisy man recovering from rare mosquito-borne virus that nearly killed him

Oct 13, 2019 Twenty-four hours after Kenny Fleshman thought he had food poisoning in August, he was unconscious and fighting for his life in the medical intensive care unit at Erlanger Health System... There, he was diagnosed with eastern equine encephalitis virus — commonly called EEE or triple E... Wear enough insect repellent to cover skin and clothes that contain one of the following EPA-registered ingredients: DEET, Picaridin, Oil of Lemon Eucalyptus/PMD or IR3535. <https://www.timesfreepress.com/news/local/story/2019/oct/13/soddy-daisy-mrecovering-rare-mosquito-borne-v/505726/>

Times Free Press Chattanooga TN State veterinarian confirms case of eastern equine encephalitis in Tennessee Oct 18, 2019 Use repellents that contain DEET, picaridin, oil of lemon eucalyptus, or IR3535, following all label recommendations for use.

<https://www.timesfreepress.com/news/local/story/2019/oct/18/state-veterinarian-confirms-case-eastern-equine-encephalitis-tennessee/506183/>

TEXAS

KBTX-CBS TV Waco-Temple-Bryan, TX (82) Apr 8, 2020 [6:10:19 PM] Wear long sleeves and pants. Apply insect repellent with DEET.

KFOXTV.com El Paso, TX El Paso Health: COVID-19 not transmitted by mosquitoes Apr 8, 2020 Use insect repellents that contain DEET when outdoors <https://kfoxtv.com/news/local/el-paso-health-covid-19-not-transmitted-by-mosquitoes>

NBCDFW.com West Nile Virus Confirmed in Cedar Hill; Dallas County to Spray for Mosquitoes Apr 15, 2020 When outdoors, no matter what time of day, adjust your dress accordingly and wear insect repellent containing DEET, picaridin or oil of lemon eucalyptus as your first line of defense against insect bites. <https://www.nbcdfw.com/news/health/west-nile-virus-confirmed-in-cedar-hill-dallas-county-to-spray-for-mosquitoes/2351976/>

KDBC-CBS TV El Paso, TX (93) Apr 30, 2020 [5:12:01 AM] [6:40:42 AM] ...Make sure to wear DEET when outdoors, dress appropriately and also remember dusk and dawn are the peak hours for the mosquitoes to really be out and about.

Daily Register Gainesville, TX Mosquito collection, testing delayed May 6, 2020 Apply insect repellent that contains DEET. Read and follow label instructions. https://www.gainesvilleregister.com/news/coronavirus/mosquito-collection-testing-delayed/article_a8bc4c4c-8fe5-11ea-bacd-0f67d04f6c1a.html

CDC Emerging Infectious Diseases Rise in Murine Typhus in Galveston County, Texas, USA, 2018 May, 2020 Murine typhus, an undifferentiated febrile illness caused by *Rickettsia typhi*, is increasing in prevalence and distribution throughout Texas. In 2018, a total of 40 cases of murine typhus were reported in Galveston County. This increase, unprecedented since the 1940s, highlights the importance of awareness by physicians and public health officials. https://wwwnc.cdc.gov/eid/article/26/5/19-1505_article?deliveryName=USCDC_331-DM26146

UTAH

Desert News Salt Lake City, UT Yellow fever mosquito invades southeast Utah Sept 13, 2019 Detection of the invasive

Aedes aegypti mosquitoes in the Moab area provoked a rapid, extensive and aggressive attack ...the mosquito has not been seen in the Moab Valley area before. <https://www.deseret.com/utah/2019/9/13/20864489/yellow-fever-mosquito-invades-southeast-utah>

VERMONT

Rutland Herald Rutland, VT RRCM Health Talk: Be smart about ticks May 2, 2020 Protect yourself. Use insect repellent containing 20-30% DEET. https://www.rutlandherald.com/features/weekend_magazine/rrmc-health-talk-be-smart-about-ticks/article_15e3f2f0-3f0b-5f00-94b5-1cff7d7fe380.html

CDC Emerging Infectious Diseases Diplorickettsia Bacteria in an Ixodes scapularis Tick, Vermont, USA May, 2020 An unexpected *Diplorickettsia* species closely related to the tickborne pathogen *D. massiliensis* was found in the microbiome of an *Ixodes scapularis* tick in Vermont, USA. This evidence of *Diplorickettsia* in North American ticks suggests a need for disease surveillance using molecular screening of ticks and serologic studies of humans. https://wwwnc.cdc.gov/eid/article/26/5/19-1135_article?deliveryName=USCDC_331-DM26146

VIRGINIA

Fort Lee Traveller Command Spotlight: Combatting Disease-Carrying Critters Mar 19, 2020 Use insect repellent containing DEET on your exposed skin and an insect repellent containing permethrin on your clothing. https://www.fortleetraveller.com/commentary/commanders_corner/command-spotlight-combatting-disease-carrying-critters/article_1da5d32a-69fd-11ea-84be-f790bd06ea29.html

Parasites and Vectors Vector Competence of Virginia Mosquitoes for Zika and Cache Valley Viruses Apr 10, 2020 ...This laboratory transmission study provided further understanding of potential ZIKV and CVV transmission cycles with *Aedes* mosquitoes from Virginia. The ability for these mosquitoes to transmit ZIKV and CVV make them a public health concern and suggest targeted control programs by mosquito and vector abatement districts. <https://parasitesandvectors.biomedcentral.com/articles/10.1186/s13071-020-04042-0>

WASHINGTON

CDC Emerging Infectious Diseases Ecology and Epidemiology of Tickborne Pathogens, Washington, USA, 2011-2016 Apr, 2020 Tickborne diseases are rare in Washington, USA, and the ecology of these pathogens is poorly understood. We integrated surveillance data from humans and ticks to better describe their epidemiology and ecology. During 2011-2016, a total of 202 tickborne disease cases were reported in Washington residents. Of these, 68 (34%) were autochthonous, including cases of Lyme disease, Rocky Mountain spotted fever, tickborne relapsing fever, and tularemia. During May 2011-December 2016, we collected 977 host-seeking ticks, including *Ixodes pacificus*, *I. angustus*, *I. spinipalpis*, *I. auritulus*, *Dermacentor andersoni*, and *D. variabilis* ticks. The prevalence of *Borrelia burgdorferi* sensu stricto in *I. pacificus* ticks was 4.0%; of *B. burgdorferi* sensu lato, 3.8%; of *B. miyamotoi*, 4.4%; and of *Anaplasma phagocytophilum*, 1.9%. We did not detect *Rickettsia rickettsii* in either *Dermacentor* species. Case-patient histories and detection of pathogens in field-collected ticks indicate that several tickborne pathogens are endemic to Washington. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7101130/>

WISCONSIN

International Journal of Environmental Research and Public Health A 15 Year Evaluation of West Nile Virus in Wisconsin: Effects on Wildlife and Human Health Mar 9, 2020 ... During a 15 year period, WNV was detected in 71 of 72 counties, resulting in 239 human and 1397 wildlife cases. ...Rates of WNV are highest in the western and northwestern rural regions of the state. WNV incidence rates were highest in counties with low human population densities, predominantly wetland, and at elevations greater than 1000 feet. ...Overall, increasing mean temperature and decreasing precipitation showed positive influence on WNV transmission in Wisconsin. This study incorporates the first statewide assessment of WNV in Wisconsin. <https://www.mdpi.com/1660-4601/17/5/1767>

WFRV-CBS TV Green Bay-Appleton, WI (67) Apr 28, 2020 [6:15:07 AM] [6:55:13 PM] We all know ticks suck blood but even a tiny tick can make you super sick! When you're outdoors, wear protective clothing and an EPA registered insect repellent. And remember to check for ticks! Everywhere.

WYOMING

Oil City News Casper, WY West Nile Virus Case Confirmed in Natrona County Resident Sep 20, 2019 Use an insect repellent containing DEET (N, N-diethyl-m-toluamide). When using DEET, be sure to read and follow label instructions.

Prepared by the Vector-borne Disease Alliance

Contact: info@vbdalliance.org

1-800-789-3300

www.repellentinfo.org

51520