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Science AMA Series: I am Michaeleen Doucleff, a global health reporter for NPR, and Rick Ostfeld and Felicia Keesing – disease ecologists from the Cary Institute in New York and Bard College, we're looking at how to stop Lyme Disease, AMA!

LYME_DISEASE_AMA [R/SCIENCE](#)

Hi Reddit,

I am Michaeleen Doucleff, a global health reporter for NPR, and I am joined by Rick Ostfeld and Felicia Keesing – disease ecologists from the Cary Institute in New York and Bard College, respectively, who have worked on Lyme disease for more than 20 years.

In March, I reported [a story for NPR on Lyme disease and tick-borne diseases in the U.S.](#) The premise: Ostfeld and Keesing predict that 2017 will be a particularly bad year for Lyme. But they're testing a way to stop it. Lyme is already on the upswing. From 2001 to 2015, cases in the U.S. have more than doubled, and they've spread around the Northeast and northern Midwest. Ask us anything. We'll be here from 1PM to 3PM ET to answer your questions about how tick-borne diseases spread, why they're spreading and what scientists are doing to stop it. Looking forward to hearing from you!

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Has there been any progress in tests for lyme? Is there any hope of a home test you could buy over-the-counter?

[asbruckman](#)

Rick Ostfeld answering... Current tests are based on detecting antibodies against the Lyme disease bacterium, but antibody levels can take a few weeks after exposure to become detectable, so early tests can be negative even if the person was infected. There's a lot of activity by several labs to develop better diagnostic tests. Some of them are based on detecting metabolic byproducts of *Borrelia* infection -- metabolomics. These try to detect a molecular signature of Lyme infection based on a distinct set of peptides, sugars, and lipids that result from infection. This type of diagnostic will be useful if it ends up being sensitive enough and highly specific to Lyme disease. My personal view is that a home test might not be a good idea, since professional medical information will be critical in helping a patient know what to do with a positive or negative test result.

I've heard that the term "chronic Lyme disease" is a term avoided by doctors. Can you please explain the reason?

[subtech7](#)

Hi this is Michaeleen from NPR. Thank you for this question. The answer is long because the history is long. And for this reason, NPR is going to do a story on it in the next few months. But here's a brief synopsis:

Back in the 90s, some people diagnosed with Lyme disease started reporting lingering symptoms. Or their symptoms would come back after they had a course of antibiotics. These patients would return to

credited.



their doctors and sometimes the doctors would give them another course of antibiotics but in other cases, the doctors would stick to the recommended one dose. At that point, the medical community really didn't know what was wrong. Some doctors dismissed patients' complaints. Others chalked up the complaints to other problems (because in some cases the "chronic Lyme" symptoms looked like other diseases... MS, depression, [00:01:44] fibromyalgia). At the same time, studies couldn't find evidence that additional doses of antibiotics was helpful for patients with persisting Lyme symptoms (and antibiotics do come with risks and side effects, sometimes serious).

So this BIG CANYON got created between patients and the medical establishment. The former saying "I know something is wrong with me and it didn't start until after I had Lyme." And the latter saying, "Well it can't be Lyme because you've already had a curative duration of antibiotics. The guidelines say that typically one course of antibiotics is sufficient further treatment isn't indicated. So something else must be wrong. There is no such thing as chronic Lyme."

Many patients got frustrated. They felt alienated/disenfranchised from the medical community. And they started looking elsewhere for help.

For more information on the history/controversies, The New Yorker's Michael Spector does a nice job of explaining it : <http://www.newyorker.com/magazine/2013/07/01/the-lyme-wars>

But I think in the past few years, we're starting to see a bit more "middle ground." That doctors are realizing that indeed sometimes symptoms persists and can cause big problems for patients, including neurological ones.

As the CDC says: It is not uncommon for patients treated for Lyme disease with a recommended 2 to 4 week course of antibiotics to have lingering symptoms of fatigue, pain, or joint and muscle aches at the time they finish treatment. In a small percentage of cases, these symptoms can last for more than 6 months. Although sometimes called "chronic Lyme disease," this condition is properly known as "Post-treatment Lyme Disease Syndrome" (PTLDS).

<https://www.cdc.gov/lyme/postlds/index.html>

And then the agency goes on to say, no one really knows what causes these persistent symptoms. I think that's really where the controversy is: science/medicine doesn't know what's going when Lyme symptoms persist. And patients feel like they were being ignored.

Don't forget, there could be multiple reasons for the problem. In some cases, it could residual tissue damage. Remember, Lyme can affect the nervous system. And anytime, the nervous system gets involved in a disease, it can be very complicated .. and take a long time to heal.

In other cases, it may be something else. As the CDC says, more research is needed to answer many questions.

Even though your report states that mice are the main vector for ticks carrying Lyme disease, it also points out that the spread of Lyme disease is related to the surge of deer who have benefited from climate change. Do you believe that states that have reintroduced apex predators, such as wolves, will find that their cases of Lyme disease will decrease? Would you recommend a more aggressive management of deer populations, like the white-tailed deer?

[FeloniousCake](#)

Hi. This is Felicia. Managing Lyme disease by controlling deer populations is challenging because it only takes a few deer to maintain a large tick population. (That's because each deer can host thousands of adult ticks, and each of the adult female ticks can have thousands of babies.) Studies on deer control have had very variable results – the ones on islands, where deer can be completely eliminated, have tended to show effects on tick abundance while ones in mainland areas haven't. A more promising direction is to control mouse populations, since mice are the hosts most responsible for *infecting* ticks. There's some good evidence that having a lot of red foxes around reduces Lyme disease risk. Another strategy for reducing mouse populations is to maintain high levels of vertebrate diversity. Mice thrive even where other vertebrates can't, but in areas of high diversity, mouse

populations are kept in check by their predators and competitors. How to sustain diversity? Maintain large areas of natural habitat.

Is it possible to genetically modify ticks to stop the spread of Bartonella, Babesia, Erlichia, etc.? Is there a way to target the spirochetes in a similar fashion? There is a theory that spirochetes "hide out" from the immune system and this is the way that Lyme becomes dormant and chronic. Is this true? Is doxy still the most promising treatment for acute cases? If so, what will happen as tick-borne bacteria become resistant to doxy? Thank you for your research!

[aromick5](#)

Rick here. There are a couple of questions here. First about genetic modification. The tools to genetically modify animals like mosquitoes and ticks (and even mice) so that they can't be infected with tick-borne pathogens are developing at light-speed. Related genetic techniques that help these new genes spread rapidly in populations are also progressing quickly. There are some challenges with trying to do this with ticks, though. One is that they move around very little, maybe a few meters on their own or tens of meters on a host. This means that genetically modified ticks are likely not to range far and wide mating with other ticks and transferring their new genes to them. Also, blacklegged ticks have a generation time of two years, MUCH longer than the several weeks of many mosquitoes or the several months of mice. So, this means that proliferation of genetic modifications through breeding will be very slow. There is evidence that Lyme disease spirochetes can enter a dormant, resistant stage in animal hosts, and in this state they're less vulnerable to antibodies and antibiotics. They can then leave this resistant stage and cause symptoms in the host. Some researchers are testing the use of pulses of antibiotics, which might allow resistant bacteria to leave the resistant stage and become more vulnerable. Doxycycline is still frequently recommended by the CDC, but a number of other antibiotics, both singly and in combination, are being tested. We do need to be concerned with the potential for tick-borne bacteria to evolve resistance. But it's important to realize that humans are dead-end hosts for these bacteria, so those bacteria that resist antibiotic treatment won't get back out into the environment to perpetuate the resistant genotypes.

Please keep up your hard work. Lyme disease is killing my mother and I pray everyday that someone finds a cure or a treatment that will give her and millions others any relief.

My question is, how many people have you seen that are misdiagnosed that actually turnout to have Lyme disease?

Also, what treatments have you seen that are effective in relieving muscle pain and weakness associated with later stages of this disease?

Edit: spelling

[Squawkimus](#)

This is Rick answering. First the disclaimer that I'm not a physician (nor are the others addressing questions today). The question of how many actual or potential Lyme patients are misdiagnosed is one that's not possible to answer with current evidence. I think there is little doubt that some people who are infected by Lyme bacteria do not get properly diagnosed. Some others who are not infected with Lyme bacteria are incorrectly diagnosed with Lyme disease. But to accurately estimate how many are in each category would depend on having a gold standard to determine who is actually infected, and this is what we lack at present.

I'm afraid I don't have the expertise to recommend treatments against muscle pain and weakness.

Last week [there was a story](#) about Verily (formerly Google Life Sciences) planning on releasing 20 million sterile mosquitoes in California in an attempt to reduce the number of disease carrying insects. Could a similar strategy potentially work to fight Lyme disease, either by reducing the tick population or making the ticks incapable of carrying the bacteria?

[shiruken](#)

Hi, this is Rick. It's useful to think about adopting for ticks some of the technologies researchers are developing for mosquitoes. But, there are some challenges that make ticks a tough nut to crack. With mosquitoes, it's easier to envision a huge, mass release of sterile or otherwise genetically modified mosquitoes to inundate wild populations and wholesale replace wild-type genotypes. But for ticks, mass production in the lab is much harder. Ticks are much more widely dispersed in the environment and don't move much. So the physical dispersal of new genotypes would be slow. Ticks take two years to complete their life cycle, so this slows down opportunities to introduce new genes or genotypes. That said, I don't think that these technologies should be ignored.

Why is Lyme disease spreading?

[Phlox_carolina](#)

Hi, this is Rick. It looks like there are a lot of reasons why Lyme disease is spreading, but to be honest, scientists don't have strong answers to this question. It's clear that a warming climate is aiding the spread of Lyme disease into more northerly areas and up in elevation. The likely mechanism here is that some areas that were formerly too cold had warm seasons (when ticks can be active) that were just too short for the ticks to find successive hosts before they die. So, they couldn't live out their entire life cycles. But as climate change increases the length of the warm season, some of these areas are more hospitable for ticks. Some evidence even suggests that the southward expansion along the East Coast could be facilitated by climate warming, with some studies showing that warmer is better for tick populations, as long as it's wet and humid enough. But climate change doesn't seem like the only factor involved. The blacklegged tick is acting like other "invasive species" in rapidly advancing into new areas. One reason why I can't give a better answer is that we lack historical records of where this tick occurred, and at what abundance levels, before the discovery of Lyme disease in the 1970s and 80s. It is a native to North America and has been around for millions of years, but was it scarce and patchy or widespread and abundant 200 or 300 years ago? We don't know, unfortunately. But knowing where it was long ago would help us understand why it's spreading now.

I was told that if I get a tick bite in the south, I have a much lower chance of getting lyme than one in the northeast. Is that true? What should people in low-lyme areas do after getting a tick bite other than being alert for rashes or mysterious symptoms?

[asbruckman](#)

Rick Ostfeld answering... Blacklegged ticks are distributed across much of the eastern half of the United States, but tend to be more abundant in the northeastern and upper midwestern areas than in the south. The blacklegged ticks in the Northeast also have a higher prevalence of infection with the Lyme disease bacterium, compared with their southern counterparts. So, this means that, in general, you're less likely to get bitten by a blacklegged tick in the south than the northeast, and if you do get bitten, that tick is less likely to infect you. If you're bitten by a tick and start to feel symptoms (fever, muscle or joint pain, lethargy, etc), you should seek medical attention whether you're in the north or south. Remember that there are other ticks besides blacklegged ticks that transmit tick-borne diseases, and some of these are more common in the south.

How effective are anti-tick agents such as Frontline on dogs in preventing tick bites? Would putting these drops on long pant legs be effective in preventing tick bites in humans?

[jbsinger](#)

Hi, this is Rick. Frontline has a long track record as an effective and safe means of reducing ticks on dogs and cats. The active ingredient is fipronil. To my knowledge, there is no fipronil-based product for use on people. But, tick repellents containing DEET are reasonably effective in reducing tick bites. Also, there are permethrin-based products for spraying on clothing that are quite good at killing ticks

before they can bite you. Some companies sell pre-treated clothes, and the permethrin can last through dozens of washings. I recommend treating socks and shoes, or buying pre-treated socks (not sure if anyone sells treated shoes), because the nymph-stage ticks -- which are the most dangerous stage -- tend to hang around on the ground or on very low vegetation looking for a host. So your feet and ankles are likely to be the first point of "entry" for a tick.

I am a biology and environmental educator in the hudson valley. I've heard from a few alternative therapy practitioners that the "24 hour rule" should be disregarded and that each individual may react differently to tick bites depending on their immune system, as well as the possibility of Lyme + varying other viral/bacterials associated with ticks being transmitted through other vectors. What are your thoughts on this?

[twigs522](#)

Hi, this is Felicia. The notion that you have 24 hours to get a tick off of you before you're at risk comes from the evidence that it takes that long for the bacteria that cause Lyme to move from the tick into your blood. Of course there's variability from person to person, but the best reason to get the tick off quickly is that some of the other bacteria and viruses that can be transmitted by ticks can apparently be transmitted more quickly than the Lyme bacterium can. In short, you should get ticks off of you as soon as you can.

I've heard stories about research into distributing vaccinated mouse bait to try to interrupt some of the cycle of lyme disease. Is there still work being done on this? Do you know if it looks promising?

[kerovon](#)

Hi, this is Rick. I was involved in a study recently that asked whether providing wild white-footed mice with a bait vaccine might reduce their ability to transmit Lyme bacteria to feeding ticks. The short answer is, yes. It took a few consecutive years of treating mouse populations with this bait, and most members of the mouse population needed to be treated for the effect to be strong. Here's a link to the research paper: <https://academic.oup.com/jid/article-lookup/doi/10.1093/infdis/jiu005>. Based on this research, there is ongoing exploration of a commercial product that could be distributed in high-risk areas in order to reduce the percentage of ticks that get infected. If it's successful, I think this would be a valuable tool in our toolkit for reducing risk of Lyme.

do you think we might see (another) human vaccine on the market in the foreseeable future?

[shade404](#)

Hi. This is Felicia. Vaccine developers are well aware that there is a huge market for a vaccine, and there are a number of efforts underway to develop one. As I'm sure you know, vaccines have to go through a number of stages of trials before they can come to market and there have been some setbacks in the past few years for vaccines that had seemed promising. Here's [a link](#) from 2015 that provides a good overview of the state of things, as well as other insights about why ticks are so hard to combat.

I also read that ticks are attracted to carbon dioxide (your breath) and ammonia (urine). I read of an experiment using dry ice put out on a white sheet and they supposedly come running to it. Might be an interesting way to corral them and then spray them with permethrin.

[DCHSHFA](#)

Hi. This is Felicia. Ticks are attracted to carbon dioxide and this has been a common way to "corral" them for sampling. You might enjoy this recent paper that describes the use of a tick-collecting robot, or TickBot, that basically does what you describe using a machine that can't get sick: Gaff, Holly D., et al.

"TickBot: A novel robotic device for controlling tick populations in the natural environment." Ticks and Tick-borne Diseases 6.2 (2015): 146-151.

I have heard Lyme is the fastest growing vector borne infectious disease in the US with over 330,000 cases/year per CDC. Why do you think Lyme disease gets almost no funding and research compared to other more rare diseases? There have ONLY ever been a couple clinical trials and we have known about this disease for almost 40 years. What can we do to increase research and funding for Lyme?

[r3ditor](#)

Hi. This is Felicia. I agree that Lyme and other tick-borne diseases get less funding than they should, given the magnitude of the public health problem. I wish I had a better answer about why that is, but I'll speculate a bit. First, I think that, despite the havoc it wreaks on people's health, it is perceived as a bit of a less important disease because it doesn't kill people (except in some rare and very tragic cases). The controversies around chronic Lyme -- whether it's real or not -- haven't helped. Another important thing to recognize is that we're really playing catch-up now. Just a few years ago, it was thought that there were 10-20,000 cases each year, and that these were concentrated in just a handful of states. That made it less of a federal problem, I suppose, and more of a localized one. But now we know that the problem has gone nationwide, that there are new and more deadly tick-borne diseases, and that hundreds of thousands of people are getting sick. The good news, if I can try to end on a positive here, is that the recent flood of press attention around ticks and tick-borne diseases seems to be generating a response in Washington. There is new federal legislation for tick research, several new centers for the study of vectors, with a focus on ticks and mosquitoes, have just been funded, and some states are supporting tick research directly. So I think there's reason for some optimism, but calling YOUR representatives is always a great move. Let him or her know that you are concerned about federal funding and why. Organize those calls with a few friends and you'll really get their attention.

What are your thoughts on whole-body hyperthermia treatment for Lyme disease? Have any studies been conducted to test the efficacy of it?

[firststop_svalbard](#)

Hi, this is Michaelleen from NPR. From what we can tell, there haven't been any studies on using whole-body hyperthermia for treating Lyme. There are accounts in the media of families trying this. But no scientific evidence that it works. There can be serious risks and complications with this method. Here is some information about the technique from NCI: <https://www.cancer.gov/about-cancer/treatment/types/surgery/hyperthermia-fact-sheet#q4>

Hello and thanks for joining us!

1. I noticed the [Burtis et al.](#) paper wasn't mentioned in the [host community paper](#). When studying the ecology of the disease isn't it best to be as holistic as possible? Or is the next paper going to combine these two to try and find stronger correlates?
2. I love disease ecology and am hopefully moving into the field soon. Any wisdom for an ID Epi wanting to join your field?
3. What are your dinner conversations like?

[PHealthy](#)

Hi. This is Felicia. 1. The Burtis paper came out last year and adds to our ever-evolving understanding of this very complex system. I certainly agree that it's important to be holistic. My philosophy is to combine smaller-scale experiments (which can be designed to get at underlying mechanisms) with larger-scale studies (which tend to be more holistic). 2. Hmm. Try to identify the questions that you think will be important in the next 5-10 years, rather than picking up on a question that's been asked for years already. One way to do this is to read very current work to see what directions look like the

frontiers in the field. I'd be happy to talk with you by phone at some point if that's not too old-school -- I'm easy to find. You bring particular expertise to questions in disease ecology, so finding ways to build on your current skills would be a big plus. 3. Ha! The usual things, I think, like whose turn it is to do the dishes. That said, our two children might know more than the average kid about the ecology of tick-borne diseases.

Are certain demographics more at risk for contracting Lyme Disease than others? I had read somewhere that hunters generally have an elevated risk due to their interaction with deer populations.

[DopeRedPanda](#)

Hi, this is Michaelleen from NPR. The CDC tracks confirmed Lyme cases across states and the overall demographics. You can see from this chart, the highest number of cases are reported in young children, particular boys ages 5-14, and most cases are reported in June and July.

<https://www.cdc.gov/lyme/stats/graphs.html>

Really, the key determinant for risk is where you live. If you look at the CDC's data, 95 percent of cases in 2015 were reported in just 14 states: Connecticut, Delaware, Maine, Maryland, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, Wisconsin

In terms of hunters, I don't know of study in the U.S. But there have been studies in other countries. One in Poland, found that nearly 40 percent of hunters surveyed had antibodies against *B. burgdorferi* bacteria in their blood: <https://www.ncbi.nlm.nih.gov/pubmed/28035113>

As mountainsound89 said, spending time outdoors in the forest puts you at risk of getting ticks -- whether those ticks have Lyme depends a lot on where you live. This map of reported cases could help: <https://www.cdc.gov/lyme/stats/maps.html>

Has anyone considered what Lyme Disease could do to suburban property values in the Northeast? Because anecdotally at least people are getting Lyme just hanging out in their backyards. And no one wants to do tick checks every time they go outside their homes.

[snormie](#)

Hi, this is Felicia. I know anecdotally that people talk about this here in upstate NY where we live, but I don't have anything better than that for an answer. Rick and I are running the Tick Project (www.tickproject.org) to see if we can reduce incidence of tick-borne diseases in neighborhoods with high risk -- that's more to improve human health than property values, though. Our local politicians (from village mayors to state Senators) worry a lot about tick-borne diseases, esp. Lyme, because of how seriously voters take these concerns. All of that said, I don't personally know of anyone who has moved out of our high-risk area because of fear of ticks. It wouldn't surprise me if it happens occasionally, though.

Is there anything a citizen can do to contribute to the knowledge of what is happening in a given neighborhood? Citizen science reporting tool? Also, what is one of your greatest roadblocks in advancing the fight against tick-borne disease? Finally, could it be possible to invent a bodywash that assists in the purging of ticks after a visit to the outdoors or a medicine that can be ingested to kill ticks that bite a human?

[TheWriteBeat](#)

Hi. This is Felicia -- great question. I wish I had a better answer, actually. I don't know of a really good citizen science reporting tool. Right now, your best bet is to get to the doctor if you think you might have a tick-borne illness. That plugs you into the network of national reporting so that we can keep track of risk and incidence. The greatest roadblock? I suppose it's time. Answering questions well and thoroughly takes a lot of time, particularly for tick-borne diseases because ticks live for two years. So

we're always juggling how best to spend the time we have to answer research questions so that we're answering the right questions, and answering them well enough. Your ideas about preventing tick bites are good ones, and creative. Of course, one challenge of developing treatments like these is that you have to worry about side effects. Something powerful enough to kill ticks on you, either topically or through ingestion, would be pretty strong stuff. There is a lot of interest in finding repellents, etc. that target specific features of ticks, and these are promising. For example, could you block the tick sensory receptors in some way using a repellent so that they don't even know you're there?

The use of antitick and flea treatments for pets has been a monthly ritual for me and my pets. Is the frequent introduction of these preventative treatments posing any risk for development of resistance in the wild? Not gonna stop treating my pets anytime soon but should we be more conservative about this in the future?

[Alexgamebro](#)

Hi, this is Rick answering. The potential for ticks and other ectoparasites to evolve resistance to the insecticides/acaricides we use is definitely something to be concerned with. There is evidence of evolved resistance to fipronil (the active ingredient in Frontline) in insects in areas where this insecticide is sprayed on crops. The much more limited distribution of fipronil on dogs and cats would mean that a very small proportion of the tick population is exposed, which would reduce the probability that resistance will evolve. A few studies have shown resistance by some tick species to permethrin, perhaps aided by the broadcast spraying of this insecticide in agricultural fields. We will need to develop strategies of insecticide/acaricide delivery that reduce the probability of resistance evolving in the target species.

Does deet spray or Off and having pants/tall socks reduce chance of tick bite when hiking in the woods?

[shitlord-alpha](#)

Hi, shitlord-alpha, this is Rick. Several well-designed studies have shown that DEET sprayed on skin or clothing can reduce the probability that a tick will try to attach. But DEET isn't perfect. Tucking pant legs into socks is effective at keeping the ticks crawling on the outside of your clothes rather than underneath where you can't find them as easily. Treating shoes, socks, pants, etc with permethrin products is quite effective at killing the ticks that are trying to feed on you.

Could the tick population be addressed similarly to the way Zika-carrying mosquitos are being attacked in the south? Malaria has long been controlled by going after the carrying insects.

[pbhassall](#)

The mosquitoes that carry Zika (in the genus *Aedes*) are sometimes being treated by spraying insecticides aimed at killing the adults. My understanding is that broadcast spraying is considered only one part of what's called "integrated pest management" and needs to be combined with other methods to be effective. Similar broadcast spraying of tick-killing chemicals has not been effective in reducing cases of tick-borne diseases, although it can reduce abundance of tick populations in localized areas. Felicia and I are engaged in a study (www.tickproject.org) that is testing an "integrated" approach to reducing tick populations to the degree that fewer people get sick. We're conducting this study in residential neighborhoods where tick-borne diseases are quite common. It'll take a couple of years before we have results.

My wife got a tick a few months ago in a Lyme disease-heavy area. She went to the doctor soon after, and she was given a preventative treatment of one single doxycycline pill. I have read that some other doctors prescribe pills for longer periods than just one day. Should she have been given more than the

one pill? Should we push for a longer treatment if one of us gets a tick again?

[GreenFAQ](#)

There is evidence that one pill works well. A study in the NEJM in 2001 showed it to be highly effective at preventing Lyme infection after a bite.

<http://www.nejm.org/doi/full/10.1056/NEJM200107123450201#t=article> (around 87 percent)

Right now the Infectious Disease Society of America doesn't generally recommend any prophylactic treatment for Lyme after a bite. BUT ... the CDC does:

(<https://www.cdc.gov/ticks/tickbornediseases/tick-bites-prevention.html>)

1. What are the earliest symptoms Lyme disease?
2. How long after exposure would those symptoms be noticed?
3. What type of doctor can test for the disease?
4. How long should one wait until getting tested?

Personal Note:

I live in the Southeast and was bitten by ticks two weeks ago. I've had a low fever (~100F) and sore muscles for the past four days but am feeling better today. My symptoms are flu-like but with no congestion or coughing at all; I've never experienced that before and I also had the real flu in February. One of my bites is red, but no ring around it.

[nolij420](#)

Hi, This is Michaelleen. Flu-like symptoms are the first sign of Lyme after you've been bitten by a tick. The rash is another. And it doesn't need to be shaped like a bulls-eye. It can be just red and expanding. Other common symptoms are muscle and joint pain. These symptoms can occur 3 to 30 days after having a bite. Dr. Brian Fallon at Columbia University recently told NPR: "If you do develop an expanding rash, a fever or flu-like symptoms, don't wait. Go see a doctor." Why? The quicker a person gets tested and treated, the more likely they are to have a full recovery. As the Mayo Clinic points out, many people see a GP and then get referred to a infectious disease specialist.

Here are some useful links: <http://www.mayoclinic.org/diseases-conditions/lyme-disease/basics/symptoms/con-20019701> <http://www.npr.org/sections/health-shots/2017/03/06/518065660/if-you-get-bit-by-a-lyme-infested-tick-here-are-5-tips>

Is the lone star tick a problem in Dutchess Co.? How much? Are they more aggressive than black legged ticks?

[hud4riv6](#)

Hi, it's Rick. The lone star tick is spreading up into the Dutchess County area from the south, but so far is not very widespread or abundant. We occasionally do find it in our extensive tick sampling, but it remains uncommon (>99% of the ticks we collect in the environment are blacklegged ticks). Lone star ticks are much more "aggressive" than the rather wimpy blacklegged tick, in that they crawl much faster on much longer legs, and seem to orient towards people. They also can aggregate so you can feel like you're being hunted by a "pack" of ticks, which doesn't happen as often with blacklegged ticks.

How about more wide-spread use of tick tubes to control ticks. They work from the ground up - on the mice/chipmunks, etc. I made my own but if communities were subsidized with the tubes AND public outreach, I feel like that would go a long way in controlling the tick population. I have had lyme a few times and now have alpha gal from a lonestar tick bite that was on me for maybe 2 hours.

[DCHSHFA](#)

Hi. This is Felicia. Tick tubes have been tested a few times and the results have been mixed. We prefer

the "Tick Control System", which is a box that attracts rodents and then puts a bit of fipronil on them. The fipronil kills ticks on mice just like it does on your pets. Studies have shown these to be effective at reducing tick numbers. The downside: they are more expensive than tick tubes. We are using these as one of our treatments in the Tick Project (www.tickproject.org) to see if they, separately or in combination with Met52 fungal spray, reduce ticks. More importantly, we want to know if the use of these products actually reduces incidence of tick-borne diseases in people.

Can black-legged ticks get Lyme (and other tickborne diseases) when they attach to deer or is attachment to deer only for mating purposes?

[rxq09](#)

Hi. This is Felicia. Ticks that feed on deer are very unlikely to pick up the bacterium that causes Lyme. In fact, there's some evidence that deer can actually disinfect ticks a bit when the ticks are feeding on them, though I know of only one paper showing that. The effect is similar to that of western fence lizards on the west coast, though not at all as strong. The deer are primarily important as a preferred site for adult ticks so that the ticks can find a mate.

My sister contracted Lyme while she was pregnant 11 years ago. Her daughter has signs of also having the disease. She has been told that it's not possible to transfer it from mom to fetus so docs won't test my niece. What do you think/suggest?

[annaaragon](#)

The CDC says Lyme disease acquired during pregnancy can be passed onto the fetus. And it can be dangerous for the fetus. It can cause brain and heart damage. But if the mom gets treated, the risk is very low: "No life-threatening effects on the fetus have been found in cases where the mother receives appropriate antibiotic treatment for her Lyme disease," the CDC writes. Here's a guide from the agency:

https://www.cdc.gov/lyme/resources/toolkit/factsheets/10_508_Lyme%20disease_PregnantWoman_FACTSheet.pdf

Two questions for yea: What inspired you to become a tick researcher? Can other ticks besides deer tick Cary or transmit Lyme disease? Thanks!

[runningwithsloths](#)

Hi, this is Rick, although I encourage Felicia to respond as well, time permitting. I became a tick researcher when I was undertaking a study at the Cary Institute of whether white-footed mice might be able to regulate populations of gypsy moths, which are an introduced forest pest in the US. This was back in 1991. This study involved trapping lots and lots of mice in live-traps and inspecting them before releasing them. These mouse populations were absolutely infested with blacklegged ticks, with dozens on each ear of pretty much every mouse. So, in a way, the ticks were staring me in the face asking me to study them. And I obliged them. The blacklegged tick (sometimes called the "deer tick") is the only species of tick in the northeastern and upper midwestern United States that transmits Lyme disease bacteria. In the far western US, the pacific blacklegged tick is the culprit. In Europe and Asia, other species in the same genus (Ixodes) are the vectors of Lyme disease. Other types of ticks, prominently lone star ticks and dog ticks, can transmit other important diseases to people in the US.

There's a lot of misinformation and pseudoscience around Lyme disease, especially "chronic lyme." Do you feel that this hampers your research?

[mountainsound89](#)

Hi, this is Rick. The research that Felicia and I do is really on the "upstream" end of diagnosis and treatment (and the chronic Lyme issues). We try to understand the interactions between the ticks, their

hosts, and the pathogens that influence human risk of exposure. We also try to figure out how to actively reduce that risk in the real world. So, the controversies about diagnosis and treatment don't directly effect our research. We hope our research will reduce the need to argue over diagnosis and treatment -- and this would happen if we can help develop effective preventative measures that reduce actual cases.

Hi, I understand contact with long grass is the most common way to contract Lyme disease, what are some of the less well known ways of contracting Lyme disease and does covering your legs/feet protect you sufficiently?

[poon-is-food](#)

Hi. This is Felicia. Ticks are actually more abundant in forests than in grass, even long grass. Covering your legs/feet is a good start when you are in tick habitat. That means wearing long pants and long socks, and pulling the socks over your pantlegs. That prevents ticks from crawling up the inside of your pantleg. But you also need to do a thorough tick check as you walk, and particularly when you come inside. Using insecticide on your clothes will help. You should also familiarize yourself with the times of year when ticks are most likely to be dangerous. In the northeast, that's in April-June when the nymphal ticks are active -- they're small and hard to detect.

How severe do you think lyme disease symptoms and complications can become for a patient? Do you think it can be disabling?

[r3ditor](#)

Hi, this is Michaelleen from NPR. In the vast majority of cases, people make a full recovery from Lyme when they are treated with antibiotics quickly. But if the disease goes untreated, it can cause severe symptoms. In about 1 percent of cases, the bacteria can damage the heart and cause what's called Lyme carditis (https://www.cdc.gov/lyme/signs_symptoms/lymecarditis.html), which can cause chest pain, dizziness, shortness of breath and heart failure.

<https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6343a4.htm>

About 15 percent of patients not treated can get what's called neuroborreliosis -- where the bacteria affect the central or peripheral nervous system. This can cause inflammation in the brain, facial paralysis, numbness, tingling, fatigue, "brain fog."