

A Tick on the Move?

[Announcer] This program is presented by the Centers for Disease Control and Prevention.

[Sarah Gregory] Today, I'm talking with Dr. Christopher Paddock about a possible tick migration into a new geographic area. Dr. Paddock is a rickettsial specialist at CDC. Welcome, Dr. Paddock.

[Christopher Paddock] Good morning.

[Sarah Gregory] So tell me what this study is all about?

[Christopher Paddock] This work describes the unexpected discovery of a newly recognized tickborne pathogen in an area of the United States far from the known distribution of the agent and its associated disease. This bacterial pathogen, called *Rickettsia parkeri*, causes an illness in humans that is similar to but generally less severe than Rocky Mountain spotted fever. The disease, known as *Rickettsia parkeri* rickettsiosis, was only first recognized in 2004. Since that time, CDC has become aware of approximately 40 cases in the United States, all of whom acquired their illnesses in a southeastern or mid-Atlantic state. In 2014, CDC, in collaboration with the Arizona Department of Health Services, confirmed this disease in a man bitten by ticks in a remote area of southern Arizona almost 1000 miles west of what was believed to be the range of this pathogen. What makes this discovery even more interesting is that this region is very dry and mountainous, and not one in which we would expect to find the recognized vectors of this pathogen, which are certain species of *Amblyomma* ticks, typically found in more humid, grassland environments.

[Sarah Gregory] What happened to the two patients and how was it determined that one had *Rickettsia parkeri* rickettsiosis and one may have had it?

[Christopher Paddock] The index patient who acquired the illness in 2014 developed signs and symptoms typical of *Rickettsia parkeri* rickettsiosis. The infection was confirmed by a PCR test that detected DNA of *Rickettsia parkeri* at the site where he was bitten by the *Amblyomma* tick. He was treated with the antibiotic used as primary therapy for this disease, known as doxycycline. He made a complete recovery. He returned to the same area one year later with some coworkers and again was bitten by ticks. This time he did not become ill but another coworker who was bitten developed a mild febrile illness and recovered when treated with doxycycline. We believe she also was infected because she developed antibodies that reacted with *Rickettsia parkeri*. However, because the antibody test is not as specific as a PCR test, we can only state that she probably was infected with *Rickettsia parkeri*.

[Sarah Gregory] Do we know what caused this geographic shift?

[Christopher Paddock] In all likelihood, this is not a geographical shift, but rather a situation where the tick vectors and the pathogen have existed unrecognized for many years. Only recently the association was made apparent after a person became an incidental host for both the tick and the *Rickettsia* and this event was brought to the attention of state and local health authorities and CDC.

[Sarah Gregory] What are the signs and symptoms of *Rickettsia parkeri*? Are they different from other tickborne illnesses, such as Lyme disease or babesiosis?

[Christopher Paddock] *Rickettsia parkeri* rickettsiosis is characterized by a distinctive lesion at the site where an infected tick bites the person and inoculates the rickettsiae. This lesion is known as an eschar and it is typically a painless, dark scab, about one centimeter in diameter. The surrounding skin is often red and slightly swollen. This occurs within few days after the initial tick bite. A few days after the formation of the eschar, patients develop a sparse generalized rash that appears as small red bumps or pustules, and a fever, generally between 100 and 103 degrees Fahrenheit. Other generalized symptoms include headache, muscle aches, and fatigue. The disease responds rapidly to oral therapy with doxycycline and most patients feel better within 24 hours after taking this antibiotic. The illness is distinguished from Lyme disease and babesiosis primarily by the appearance of the inoculation eschar, which does not occur in either of the latter illnesses. Instead, Lyme disease is well known for its bullseye rash at the site of tick bite, and its progression to serious manifestations involving the joints, heart, or central nervous system in some patients. Babesiosis is not typically associated with a rash, but in certain patients can be quite severe or even life threatening. By comparison, there are no known deaths or long-term health effects associated with *Rickettsia parkeri* rickettsiosis.

[Sarah Gregory] Have there been any more cases you are aware of since this study was done?

[Christopher Paddock] We know of no additional cases since 2015, but this is a very remote area of Arizona and not heavily visited. It is also possible that this tick and *Rickettsia parkeri* exist in other areas of the southwestern United States and remain to be discovered.

[Sarah Gregory] Are illnesses from tick bites really something that people need to be concerned about? Or are they pretty rare?

[Christopher Paddock] Tickborne illnesses in the United States range from mildly severe to life threatening. There are more than 20 different bacterial, viral, and protozoan tickborne agents that cause disease in humans in the United States. Some of these diseases, such as Lyme disease, are common in certain parts of the country. Other infections, such as Rocky Mountain spotted fever, ehrlichiosis, or Heartland virus infection are less common, but cause deaths in U.S. patients every year. So, yes, tickborne diseases are important in terms of public health and should be on everybody's radar, particularly during the spring and summer when ticks are very active.

[Sarah Gregory] Dr. Paddock, tell us a little about what you do at CDC.

[Christopher Paddock] My official title is Chief of the Reference Diagnostic and Microbiology Activity in the Rickettsial Zoonoses Branch at CDC. As with many other folks at CDC, I wear a lot of different hats and no two days are ever the same. Much of what I do involves interacting with state health departments and clinicians to guide them on the diagnosis of rickettsial diseases and coordinate collection of appropriate samples to establish a laboratory diagnosis.

[Sarah Gregory] So what are the best ways for people to protect themselves from tick bites?

[Christopher Paddock] Unfortunately, ticks are in many of the same habitats that people frequent for recreational activities during the spring and summer months, so it's not feasible to completely eliminate the risk of tick bites. Nonetheless, there are certain steps you can take to diminish this

risk, which include the application of tick repellents and wearing long-sleeved shirts and pants when frequenting tick infested habitats. The longer a tick remains attached to your skin, the more likely it can transmit a pathogen, so performing a careful tick check on yourself and your children as soon as you return from an area where ticks may be present is very important. Ticks are best removed by grasping the body with forceps, as close to the skin as possible, and gently pulling straight up. CDC has just published some very complete information on the diagnosis and prevention of tickborne rickettsial diseases that is available online at the CDC website. I encourage anyone who wishes to learn more on these topics to look at this information.

[Sarah Gregory] Thank you Dr. Paddock for speaking with me today. Listeners can read the entire May 2016 study, *Rickettsia parkeri* Rickettsiosis, Arizona, USA, online at cdc.gov/eid. I'm Sarah Gregory for Emerging Infectious Diseases.

[Announcer] For the most accurate health information, visit www.cdc.gov or call 1-800-CDC-INFO