

# Increased Seroprevalence Signals the Reemergence of Typhus Group Rickettsiosis in Galveston County, Texas, USA

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

[Sarah Gregory] Hello, I'm Sarah Gregory, and today I'm talking with Dr. Lucas Blanton, an infectious disease physician and associate professor of medicine at the University of Texas Medical Branch in Galveston, Texas. We'll be discussing increases in typhus group rickettsiosis in Galveston County, Texas.

Welcome, Dr. Blanton.

[Lucas Blanton] Oh, thank you for having me.

[Sarah Gregory] Your article is about murine typhus. What is that? Is it the same as what used to be known as typhoid fever?

[Lucas Blanton] Well, murine typhus is an acute, flu-like illness. And like typhoid fever, it's characterized by high fevers. In fact, the words typhus and typhoid are both derived from a Greek word that means smoky or hazy. And in context to these diseases, this refers to the altered sensorium that patients experience when they have these really high fevers. And although fever is the main feature of both diseases (murine typhus and typhoid fever), they're clinically a little different and certainly caused by different organisms.

[Sarah Gregory] Okay. So what is it caused by?

[Lucas Blanton] So murine typhus is a bacterial illness, and it's caused by a bacteria named *Rickettsia typhi* that's spread to people by infected fleas. And this bacteria is related to diseases that cause tick-borne diseases such as Rocky Mountain spotted fever.

[Sarah Gregory] So these fleas that carry it...how do the fleas get it in the first place?

[Lucas Blanton] So the fleas feed on infected animals. They feed, they acquire a blood meal from these infected animals, and the fleas become infected. They remain infected for life. The infection doesn't really seem to affect its lifespan or the way the fleas behave, and they can actually spread the infection to their offspring.

[Sarah Gregory] Oh, terrible.

How do the animals that they feed on get it in the first place?

[Lucas Blanton] So animals are infected by infected fleas, and there are some animals that can remain infected for long periods of time and not really experience any clinical illness. So these animals act as an amplifying reservoir. So fleas that feed on these animals...uninfected fleas will acquire the infection and carry out this cycle to uninfected animals which could therefore infect uninfected fleas.

[Sarah Gregory] So it's a complete circle. The animals get it from the fleas and the fleas get it from the animals.

[Lucas Blanton] Correct.

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[Sarah Gregory] How do rats, possums, and cats fit into this picture?

[Lucas Blanton] So rats spread the infection to fleas in most of the world, and at one time they were responsible for murine typhus in the United States. Now we believe that the increase in murine typhus, at least in Texas and parts of Southern California, is actually related to possums. So possums become infected with *Rickettsia typhi* (just as rats may) in this infected animal-to-flea-to-animal cycle and can spread the infection to uninfected fleas.

Cats, on the other hand, it's not real sure if they can efficiently spread the bacteria to uninfected fleas. But rather, we believe cats act as a vehicle to bring infected fleas closer to humans.

[Sarah Gregory] Oh okay, that's very interesting.

How do people get it then?

[Lucas Blanton] So it's not necessarily spread by the actual flea bite, which is what a lot of people think. And this is kind of gross, it's actually spread by the flea's feces. The...as the fleas feed, they defecate infected flea feces onto a person, and if that person scratches this infected feces material into, say, a flea bite wound or rubs it onto mucous membranes such as the conjunctiva of the eye, they can get infected.

[Sarah Gregory] I'm thinking that is it a good recommendation for people not to scratch their flea bites and to wash them immediately to get the poop away? Or should we just stay away from all that?

[Lucas Blanton] So you know, there's so few people that recognize flea bites because they're so small that, unlike ticks where you see it attached and can remove it in a controlled manner, people don't really notice when fleas are feeding on them. So it would be a really hard thing to do.

Anecdotally, I have walked in areas where there have been flea infestations and have seen fleas on my skin and on my clothing, and I have gone out of my way to make sure I didn't do any scratching. But kind of anecdotal.

[Sarah Gregory] And flea poop must be so very, very tiny.

[Lucas Blanton] Yes, it's nothing anyone would really notice.

[Sarah Gregory] It apparently was prevalent in the past and then was gotten under control. How was this achieved?

[Lucas Blanton] So first there were rat control programs to aggressively get rid of rats around homes and businesses. But this didn't really work too well for curbing murine typhus in the United States. What really worked was the use of DDT. So after World War II, DDT was used specifically in campaigns to control murine typhus by spreading it around rat runs and areas where rats were prevalent. And it's really a great example of how vector control was able to curb an infectious disease. The number of reported cases in the United States dramatically fell after that campaign.

[Sarah Gregory] And how long ago was that? How long has it been absent?

[Lucas Blanton] So the peak in reporting was in the mid-1940s—we're looking at about 5,000 cases per year. And that's about when they started using DDT in these campaigns to control

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murine typhus. So ten years later, by the mid-1950s, there were less than 200 cases per year. And those cases were really located in the very southern counties of Texas (along the Rio Grande border) and in parts of Southern California. And this very low level of endemic disease, looking at 100–200 cases a year, persisted for decades until about the mid-2000s, where in Texas it started to reemerge in more northern areas.

[Sarah Gregory] So what changed? Why the apparent increase?

[Lucas Blanton] So that's a great question, and I really don't know if anyone really knows the answer. I believe there's a certain threshold of infected fleas that are required to make the cycle go round and round. And over the years, this infected flea threshold has crept up into communities to begin making a noticeable spillover in the people. Now, what has caused this creeping up of the threshold of infected fleas, no one is really sure. Some have wondered if it has anything to do with climate change. Some have wondered if it's the actual number of fleas, and perhaps related to the lingering effects of DDT within the environment that have acted on fleas for long periods of time and then decades later, it's just starting to wane. In reality, no one really knows.

[Sarah Gregory] You did a serosurvey to track this apparent reemergence. How was this done?

[Lucas Blanton] So we took serum from the lab (the clinical lab at our hospital)—it was serum that would have otherwise been discarded; it was collected for routine clinical purposes, for example, maybe someone coming in to get their cholesterol checked. So we were able to capture these samples that would otherwise be discarded. We ensured that the samples were from citizens of Galveston County, and basically, we tested the samples to see if they had antibodies against *Rickettsia typhi*, which would indicate a prior immune response or exposure to the bacteria.

[Sarah Gregory] What time periods were you looking at?

[Lucas Blanton] So we collected the specimens in the winter of 2021, and we compared these specimens to those collected in a very similar manner previously reported from another study that we conducted in 2013.

[Sarah Gregory] As you said, you specifically looked at the Galveston, Texas area. Do you think the geographic ranges of this reemergence are greater than that?

[Lucas Blanton] Definitely. There is evidence—and this has been demonstrated by others looking at data reported to the Texas Department of State Health Services—that cases are increasing. And the cases that are being reported seem to be marching northward as the years pass. I have no doubt that if I were to conduct a similar study using serum from two different points of time in a different region of Texas, that we would probably find similar results.

[Sarah Gregory] And why did you do this study in the first place? What were you looking for?

[Lucas Blanton] So I was asked several times if this disease has really reemerged. In other words, is this something that is occurring because there's more of this bacteria and infected fleas around? Or is this just something that physicians are starting to recognize, because you have a physician or two physicians in an area that are very interested in this disease and are spreading the word? So that's why I decided to conduct this study. And antibodies, we know, persist for some time, sometimes years. So if the number of people with antibodies remained relatively the

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same over time, we can assume the number of people getting infected has remained relatively constant over time. If the number of people with antibodies has increased over time, we can assume that there are truly more infections occurring, which is what we found.

[Sarah Gregory] And what was the most interesting thing you did find? And also, was there anything surprising?

[Lucas Blanton] So the most interesting thing (or surprising thing) that I found was the increase in seroprevalence from 2013 to 2021 was a lot more than I thought it would be. It went from 1.2% in 2013 to 7.8% in 2021. I figured there would be an increase, but not to that degree.

[Sarah Gregory] And even though those numbers sound low, that's actually a pretty huge increase, right?

[Lucas Blanton] Yes, definitely.

[Sarah Gregory] And what are the public health implications of all of this?

[Lucas Blanton] So over time, more people in more places will be at risk. Infection can really take its toll on people. Someone can have fever for up to three weeks when infected. It's a difficult to diagnose infection, and it requires a very specific antibiotic therapy. So people can make repeated trips to doctors, urgent cares, emergency departments, before someone even thinks about murine typhus. And of course, all of this costs money. And for a person who is infected, it costs them some misery and time away from school and from work.

[Sarah Gregory] So you do think this will continue to spread and increase, yes?

[Lucas Blanton] Yes. I think it's going to spread northward. I think in places where it's just reemerging, it's going to increase until it reaches an endemic steady state.

[Sarah Gregory] Can anything be done? What should or could be done to stop this?

[Lucas Blanton] Well, I think one thing that's important is the control of fleas in and around homes. The fleas that we believe that are responsible for murine typhus in the United States now are cat fleas, which not only infest possums but, as the name would suggest, they infest dogs and cats. To control the fleas on domestic animals who can bring fleas into the homes is important. And lastly, I advise people to avoid feeding stray cats or leaving food outdoors to keep possums and other rodents from feeding in the proximity to homes.

[Sarah Gregory] I had a possum in my yard, and he was very, very, very cute. But I had a humane trapper come and get him. And he took two weeks, but he finally trapped him and then took him out into the woods and actually sent me a picture of him up in a tree. So...

[Lucas Blanton] Oh, that's nice.

[Sarah Gregory] Yeah, I felt good about it.

[Lucas Blanton] They are, especially the juveniles, the juveniles are quite cute. The older ones, not so much.

[Sarah Gregory] I think this was an older one, but he was so not intimidated by anything. I have a little dog, and my dog wasn't any bigger than he was, and I kept trying to...I picked up the dog and was having the dog bark at him. I mean, I was doing the barking, and I was getting very

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close, and the possum was looking at me like, "Okay, lady. You're crazy". I finally had to get a broom and make him go. He was eating the food I put out for the birds.

Anyway, is there a vaccine?

[Lucas Blanton] Unfortunately, there's no available vaccine.

[Sarah Gregory] That is unfortunate.

What's your job and how did you become interested in this topic?

[Lucas Blanton] Well, I'm an infectious disease physician. And as a faculty member at the University of Texas Medical Branch, I'm involved in patient care, education, and research. Early in my training and career, I took an interest in vectorborne diseases, and that's when I joined a lab that was working with bacteria and the genus *Rickettsia*. As I was learning about rickettsial diseases in the lab with a great mentor, I used my clinical training and I happened to stumble upon some cases of murine typhus in Galveston. And that's when we started to recognize that it was reemerging as an illness here.

[Sarah Gregory] Well, thank you so much for taking the time to talk with me today, Dr. Blanton. That was very interesting.

[Lucas Blanton] I enjoy your podcast, so this was great to be invited to talk about some of my work.

[Sarah Gregory] Well, thank you.

And thanks for joining me out there. You can read the January 2023 article, Increased Seroprevalence of Typhus Group Rickettsiosis, Galveston County, Texas, USA, online at [cdc.gov/eid](https://www.cdc.gov/eid).

I'm Sarah Gregory for *Emerging Infectious Diseases*.

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