

# Leishmaniasis in US-Born Dog

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

[Sarah Gregory] Hi, I'm Sarah Gregory, and today I'm talking with Dr. Marcos de Almeida. He's a scientist at CDC. We'll be discussing a case of leishmaniasis in a dog born in the United States.

Welcome, Dr. de Almeida.

[Marcos de Almeida] Hello, Sarah. Thank you.

[Sarah Gregory] What is leishmaniasis? Are there different subtypes?

[Marcos de Almeida] Leishmaniasis is a disease which affects millions of people, causing hundreds of deaths every year. The disease is caused by more than 20 species of *Leishmania* parasite, which are transmitted to humans and other animals by sand fly vectors. Usually, patients develop symptoms within three weeks to one year after the infection. The disease has three main clinical forms, including cutaneous leishmaniasis, which is the most common form of the disease, which is caused by any species of *Leishmania* parasite. This form of the disease is often self-limited to skin lesions, which may become skin ulcers around the area of the sand fly bite and usually heals very slow. The other form is mucocutaneous leishmaniasis. It's an invasive form of the disease caused by *Leishmania* species found in the South and Central Americas, and it is characterized by destruction of the pharyngeal mucosa tissue. And the other form is visceral leishmaniasis, which is the most aggressive form of the disease, which is caused specifically by *Leishmania donovani* and *Leishmania infantum*. This form of the disease affects internal organs, such as the liver, spleen, and also lymph nodes and bone marrow. Respectively, these three forms of the disease may lead for permanent scars, facial disfiguration, and death.

[Sarah Gregory] So, you mentioned South America. Where is it geographically mostly found?

[Marcos de Almeida] Basically, they arise from Brazil, Costa Rica, Panama, those areas such as South America—Bolivia, Peru, Venezuela. These countries are the most frequent areas that we can find the species that causes mucocutaneous leishmaniasis.

[Sarah Gregory] So it's not so much in Europe?

[Marcos de Almeida] Not to discount Europe, but with Europe it would be more visceral—visceral leishmaniasis.

[Sarah Gregory] Ah. How prevalent is it in the United States?

[Marcos de Almeida] In the United States, the disease is usually associated with travel to endemic areas. Those endemic areas...I mean...I mean, the disease is defined as a tropical and subtropical disease, and the most prevalent in countries...you know, in Americas, Europe, Africa, Asia, India, India subcontinents. So in the U.S., as I mentioned, the disease is associated with travel to endemic areas. However, the incidence of the autochthonous cases in the U.S. is increasing. Mainly, in the southern border of the country. Additionally, we have several reports of sporadic and outbreak cases of leishmaniasis in several states of the U.S.

[Sarah Gregory] So, you already sort of talked about the signs and symptoms of the various subtypes. How would someone know they had it initially? And are there challenges with diagnosing it?

[Marcos de Almeida] Well, theoretically all people traveling to endemic areas are under risk of the infection. So therefore, travelers should use bug spray to keep the...the sand flies away and avoid infection. That's the, the way that people can get leishmaniasis. This is, I mean..., basically, all the traveling people to endemic areas are under risk of the infection.

[Sarah Gregory] Right, but when somebody gets it, how would they know they had it? And are there challenges with diagnosing it?

[Marcos de Almeida] Okay...so, there are several cases that remain asymptomatic. However, rash and skin sores are the most common symptoms for cutaneous and mucocutaneous leishmaniasis. Other symptoms, mainly for visceral leishmaniasis, include weight loss, low blood cells count, high levels of immunoglobulin, enlargement of liver and spleen, and fever, which usually are intermittent. The main problem with the diagnosis of leishmaniasis is usually the...the disease is unknown or misdiagnosed by clinicians who are not well familiar with tropical diseases. Therefore, symptomatic cases are very difficult to be diagnosed. However, some of these cases can be detected using serology tests. As the different forms of the disease depend on the infecting parasites and require specific clinical management, preferably the diagnostic test must be performed to allow the identification of the...specific identification of the infecting parasite.

[Sarah Gregory] So someone would need to go to a tropical disease specialist? Or an internal medicine?

[Marcos de Almeida] Usually yes, usually yes. Usually, that's the most recommended clinician that people must to go. Because usually the dermatologist...is very common that they misdiagnose the infection as a fungi or bacterial infection, you know, because usually they are not well familiarized with the disease.

[Sarah Gregory] I see, ok. And you said sand flies is the main vector. Are there other ways people can get it?

[Marcos de Almeida] No. There is no other way.

[Sarah Gregory] Just sand flies. And is there a particular population that gets it more than others? Or can mammals...who can get it? Anybody? Any animal? Who gets it?

[Marcos de Almeida] Well, the life cycle of the parasite is facilitated...I mean depends...actually depends on the presence of competent vector and reservoirs in the same area. And although dogs are in the urban areas, the dogs are the main reservoirs. But people cannot be infected directly by dogs. But if a sand fly bites one infected dog, it can transmit the parasite to humans. Therefore, the...the infected dogs are one important risk for public health because it may contribute to increase the parasite transmission to humans and other animals.

[Sarah Gregory] I'm not clear here. So, a dog gets bit...bitten by a sand fly. And then, how do people get it from the dog?

[Marcos de Almeida] No, they don't get it from directly from the dog. The sand fly bites the dog, and later the sand fly bites the...the human.

[Sarah Gregory] Oh, I see.

[Marcos de Almeida] Or other animals. So, the transmission must have the vector. So, this is a vectorborne disease. So...and then we necessarily need the vector to transmit to...to animals to humans.

[Sarah Gregory] I see, I see. So the sand fly bites the dog, and then another sand fly...

[Marcos de Almeida] No, no. The same sand fly, the same sand fly.

[Sarah Gregory] The same sand fly...

[Marcos de Almeida] Yes.

[Sarah Gregory] They bite a person and then the person gets it. I see, ok.

[Marcos de Almeida] Right, yes.

[Sarah Gregory] Ok, so there's...there's no way for community spread then? Or is there?

[Marcos de Almeida] No. As I mentioned, in the U.S. leishmaniasis is usually considered an overseas travel-associated disease. And canine leishmaniasis is not well known...it is not a well-known disease among most of veterinarians and clinicians.

[Sarah Gregory] Are there any environmental factors causing it to spread more?

[Marcos de Almeida] Maybe...yeah, maybe. Because environmental change may be associated with the expand of the geographic range of the sand flies—mainly in North America—which would increase the exposure of human and other animals to...to the disease. It looks like the environmental change is facilitating the adaptation of the vectors in this...nonendemic areas in North America.

[Sarah Gregory] So, what environmental changes would those be?

[Marcos de Almeida] Of those, global warming probably is the main...is the main environmental factor that is helping on the sand fly adaptation.

[Sarah Gregory] I see. Okay, so this dog that got it, that you did your study on, where was this dog and how did you find out about it?

[Marcos de Almeida] The case was sent to CDC for a regular leishmaniasis diagnosis by Dr. Dennis Spann from Sacramento, California. And the specimen was analyzed using the current CDC leishmaniasis diagnostic protocols, which allowed the specific detection of *Leishmania infantum* in this specimen. Basically, this specimen was sent to us for...to, to rule out leishmaniasis and the test was...allowed us to identify the infecting species.

[Sarah Gregory] Is it treatable in humans and dogs, and...well, whoever else gets it? I mean, once they have it, what's the treatment?

[Marcos de Almeida] Yes. All leishmaniasis are treatable. And the treatment of cutaneous leishmaniasis, the most common form of the disease, may be always be considered to prevent the mucocutaneous and visceral complications. However, the most efficient therapeutic reagents can cause several adverse effects, since they are formulated using antimonial compounds, which is a heavy metal. Also, the efficiency of the treatment varies from case to case, which means that the treatment must be individualized and must be prescribed by an experienced clinician.

[Sarah Gregory] Heavy metals? They treat it with heavy metals?

[Marcos de Almeida] Yes. Yes, that's the antimonial compounds. This is the most efficient therapeutic reagent for the disease.

[Sarah Gregory] Ah.

[Marcos de Almeida] I mean, yeah, we have some other topical creams that can be used, you know, but the efficiency is not good as the...this antimonial compound. So that's why the treatment must be individualized, because of course the strategy for the treatment depends on several clinical factors from the patient—you know, if you have patients with other complications—so it is very difficult to treat.

[Sarah Gregory] Oh, goodness. And is there a treatment for the treatment of having heavy metals?

[Marcos de Almeida] Yes. Sometimes the treatment is more aggressive than the disease, you know, so that's why the case must be followed by an experienced clinician.

[Sarah Gregory] Oh, goodness. Ok, well tell us about your study now.

[Marcos de Almeida] So, this study was the first report of one boxer born in California, which was infected with *Leishmania infantum*. This is something that catch our attention, because the dog never traveled to endemic areas. So, we assumed that the infection was acquired by vertical transmission, what I mean is from the mom to the puppy, because the female was relocated from Spain, which is a high endemic area for *Leishmania infantum*. This find, along with other canine autochthonous cases in the U.S., suggests that the parasites are circulating the country, you know, and the prevalence of the disease is increasing because of this, because the parasites are circulating, mainly in the southern border of the country.

[Sarah Gregory] What's your takeaway from your study? Why is it important, and what do we need to know?

[Marcos de Almeida] Since plenty of leishmaniasis is likely unreported in North America and, given the lack of surveillance data regarding the incidence of infected dogs, routes of transmission, and the public health impact, this study is one alert to veterinary and public health communities about the incidence...about the autochthonous leishmaniasis cases. Also, these authorities must be alert to vectors and increasing the number of cases in humans, mainly in the southern border of the country.

[Sarah Gregory] So, that would be like southern California, Texas, Arizona...

[Marcos de Almeida] Texas, Arizona, Oklahoma are the hot spots now for the...mainly Texas, mainly Texas as the area.

[Sarah Gregory] I see.

[Marcos de Almeida] But we have reports more related to sand flies than reservoirs. But clinical case...mostly in Texas.

[Sarah Gregory] So, do you have suggested next steps for dealing with it in the U.S.?

[Marcos de Almeida] Yes. It's important to improve the epidemiological investigations to better understand the real incidence and distribution of the disease in the country. Also, it's important to consider testing animals, either relocated or returned from endemic areas, as a preventive

strategy, and because such information would be crucial to improve the surveillance and control of the disease in North America.

[Sarah Gregory] What do you do at CDC? Tell us about your job and a little bit about what you do for fun and relaxation in these very trying times.

[Marcos de Almeida] Ok. Well, I'm a Ph.D. molecular biologist from São Paulo, Brazil. And I'm working at CDC since 2004 developing diagnostic tests for specifically the identification of parasites using DNA-based methods. And until January 2020, I was in charge of leishmaniasis diagnostics in the molecular laboratory. But I moved to the serology laboratory, and now I'm working with the, the serological part instead of using DNA methods. And in my free time, I like to spend time with my family, traveling to mountains, to the beach. I also like to listen to the music, party, and I spend some time trying to learn how to play guitar.

[Sarah Gregory] Guitar, very nice. Do you play well now? Flamenco or jazz or...?

[Marcos de Almeida] Usually classical music.

[Sarah Gregory] Classical?

[Marcos de Almeida] Yes.

[Sarah Gregory] Well, good for you. I play a Russian folk instrument, so...

[Marcos de Almeida] Ah.

[Sarah Gregory] So kind of the same.

[Marcos de Almeida] Yeah.

[Sarah Gregory] Anyway...well thank you so much for taking time to talk to me today.

[Marcos de Almeida] Ok, thank you very much.

[Sarah Gregory] And thanks for joining me out there. You can read the August 2020 article, *Leishmania infantum* in US-Born Dog, online at [cdc.gov/eid](https://www.cdc.gov/eid).

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

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