UGA animal vaccine may slow deadly spread of Chagas disease

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Chagas disease is the single most common cause of congestive heart failure and sudden death in the world. The devastating parasitic infection affects millions of people throughout Central and South America. But as global travel increases, it's becoming a greater threat in the United States and Europe as well.

Chagas, which is caused by the parasite *Trypanosoma cruzi*, or *T. cruzi*, is the leading cause of death among young-to-middle-age adults in endemic areas of South America, and many people live years without symptoms while their hearts and digestive systems suffer irreparable damage.

Now, thanks in part to a five-year, $1.8 million grant from the National Institutes of Health, University of Georgia researcher Rick Tarleton is close to developing the first vaccine for pets that will ultimately prevent the spread of disease to humans.

"One of the problems with *T. cruzi* is that it infects not just humans but many different animals," said Tarleton, Distinguished Research Professor in the department of cellular biology and member of the UGA Center for Tropical and Emerging Global Diseases. "What that means is that it will never be eradicated; you can't kill or vaccinate all the animals that carry this parasite," he said.

T. cruzi is most often spread via a subspecies of blood-feeding insects called triatomines. These insects, commonly known as "kissing bugs"

because they tend to bite people on the face and lips, feed and defecate on human skin. Triatomine feces containing the parasite are then rubbed into the bite when humans scratch the wound or when humans rub their eyes or mouth.

While kissing bugs are ultimately responsible for passing the disease on to humans, the bugs that live in people's homes don't normally carry the disease. The bugs become infected when they bite the family pet.

"Humans end up being incidental hosts for this parasite," Tarleton said. "It really circulates much better and at much higher levels in a lot of other animal species."

Dogs, cats, goats or any other animal living in or around homes are likely to become infected from kissing bugs living in shrubs, woods, kennels or barns. These animals then expose kissing bugs already nesting in homes to the *T. cruzi* parasite. Once the insects in a home carry the parasite, the chances of human infection increase significantly.

It is estimated there are 300,000 people in the U.S. infected with *T. cruzi*, and studies show a sizeable number of dogs, particularly in the southern U.S., are infected as well, according to Tarleton.

While most Americans do not live in houses where kissing bugs thrive, the bugs are commonplace in the southern U.S., and they are capable of spreading the disease to humans. Transmission of the disease to humans may also occur through blood transfusions and organ transplants.

Tarleton's vaccine uses a live parasite that has been genetically modified so that it is incapable of replicating inside the host.

"We have a parasite that can grow in the insect and can infect an animal, but when it goes inside a cell, it cannot replicate," Tarleton said. "As a

result, the immune system controls that infection, but you also get induction of a nice, strong immune response, which is what you need a vaccine to do."

Successful implementation of this vaccine could improve the lives of millions of people in Central and South America, but it would also help prevent the spread of the disease here in the U.S.

Immunology has given us vaccines for humans that have effectively rid the U.S. of diseases like polio and small pox, but because *T. cruzi* affects so many animals, Tarleton is certain that it will always be with us.

While Tarleton is frustrated that the science does not exist to create a human vaccine, he is confident that using immunological techniques on animals will significantly reduce the number of human infections.

Provided by University of Georgia

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