Could 'new' antibiotic treatment prevent chronic Lyme disease?

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Every year, tens of thousands of new Lyme disease patients find that their symptoms persist even after the standard course of antibiotic

treatment.

Instead of being cured, they find their lives upturned by chronic Lyme, also called persistent or post-treatment Lyme. Symptoms include bone-deep fatigue, cognitive difficulties, arthritis, muscle and joint pain and intermittent fevers, chills and sweats that can go on for months or years.

While medical solutions have proved elusive, a researcher at Northeastern University says he has developed a treatment for Lyme disease that could prevent chronic Lyme from developing in the first place.

Kim Lewis, distinguished professor of biology and director of Northeastern's Antimicrobial Discovery Center, says human trials of his discovery may begin as early as next year.

Final toxicity trials will continue this summer, but so far the treatment—an antibiotic known as hygromycin A—has not been toxic in animals and has effectively cleared Lyme disease in mice, Lewis says.

He says the real promise of hygromycin A in preventing chronic Lyme is that it is a targeted antibiotic that selectively kills Lyme disease-causing bacteria without damaging the beneficial bacteria in the patient's microbiome.

According to Lewis' theory, the broad spectrum antibiotics traditionally prescribed for Lyme disease, doxycycline and amoxicillin, cause havoc in the gut by wiping out the healthy balance of bacteria.

"The microbiome has now been linked to almost every aspect of our health, especially the development of the immune system," Lewis says.

A healthy gut serves many roles, according to the National Institutes of

Health, including preventing disease, modulating the immune system, supporting metabolism and aiding brain function.

It's not surprising to Lewis that a depleted microbiome could lead to many of the frustrating and seemingly endless symptoms associated with chronic Lyme disease.

He found in previous research that patients with long-term Lyme disease symptoms tend to have a gut microbiome that is distinct from healthy patients.

"I think the contributing factor is that broad spectrum antibiotics really damage the microbiome, and that in turn changes the immune system and you get an immunological disorder with symptoms like fatigue, foggy mind, etc.," Lewis says.

"I hope that this compound hygromycin A will decrease" cases of chronic Lyme in patients treated for acute Lyme, he says.

The need is dire.

The Centers for Disease Prevention and Control now estimates that each year up to 476,000 people in the United States get Lyme disease from the bite of a deer tick, a substantial increase in cases from years before.

Lewis estimates that 10% of people treated for acute cases of Lyme go on to develop post-treatment or chronic Lyme. Some advocacy groups for people with tick-borne diseases, such as the Bay Area Lyme Foundation, say persistent Lyme could account for as many as 34% of Lyme cases.

Made by a bacterium found in the soil, hygromycin A has been a known antimicrobial since 1953, Lewis says.

"Nobody really cared about that compound because it's very weak against regular bacteria," he says. "What we discovered is that it is indeed very weak against regular pathogens, but exceptionally potent against spirochetes."

Spirochetes are spiral-shaped bacteria found in the pathogens causing Lyme disease, syphilis and yaws.

Lewis' team has licensed the compound to Flightpath, a biotech company focused on Lyme disease, to perform development studies and pursue production of the treatment.

"Clearly, this needs to move to industrial production," says Lewis, scientific co-founder of Flightpath.

So far hygromycin A cleared Lyme disease in a mouse model and awaits the final stage of animal toxicity studies, which will take place this summer.

Lewis hopes that the antibiotic proves to be a silver bullet in preventing chronic Lyme. Human trials, he says, may start as soon as next year.

Provided by Northeastern University