

The meat allergy: Researcher IDs biological changes triggered by tick bites

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The new discovery by UVA's Loren Erickson, PhD, is an important step toward understanding the strange meat allergy spread by ticks -- and developing a treatment for it. Credit: UVA Health

A University of Virginia School of Medicine scientist has identified key

immunological changes in people who abruptly develop an allergic reaction to mammalian meat, such as beef. His work also provides an important framework for other scientists to probe this strange, recently discovered allergy caused by tick bites.

The findings by UVA's Loren Erickson, Ph.D., and his team offer important insights into why otherwise healthy people can enjoy [meat](#) all their lives until a hot slab of ground beef or a festive Fourth of July hot dog suddenly become potentially life-threatening. Symptoms of the meat [allergy](#) can range from mild hives to nausea and vomiting to severe [anaphylaxis](#), which can result in death.

"We don't know what it is about the tick bite that causes the meat allergy. And, in particular, we haven't really understood the source of immune cells that produce the antibodies that cause the [allergic reactions](#)," Erickson explained. "There's no way to prevent or cure this [food allergy](#), so we need to first understand the underlying mechanism that triggers the allergy so we can devise a new therapy."

Understanding the Meat Allergy

People who develop the allergy in response to the bite of the Lone Star [tick](#) often have to give up eating mammalian meat, including beef and pork, entirely. Even food that does not appear to contain meat can contain meat-based ingredients that trigger the allergy. That means people living with the meat allergy must be hyper-vigilant. (For one person's experience with the meat allergy, visit UVA's Making of Medicine blog.)

The allergy was first discovered by UVA's Thomas Platts-Mills, MD, a renowned allergist who determined that people were suffering reactions to a sugar called alpha-gal found in mammalian meat. Exactly what is happening inside the body, though, has remained poorly understood.

Erickson's work, along with that of others at UVA, is changing that.

Erickson's team in UVA's Department of Microbiology, Immunology and Cancer Biology has found that people with the meat allergy have a distinctive form of immune cells known as B cells, and they have them in great numbers. These white blood cells produce antibodies that release chemicals that cause the allergic reaction to meat.

In addition, Erickson, a member of UVA's Carter Immunology Center, has developed a mouse model of the meat allergy so that scientists can study the mysterious allergy more effectively.

"This is the first clinically relevant model that I know of, so now we can go and ask a lot of these important questions," he said. "We can actually use this model to identify underlying causes of the meat allergy that may inform human studies. So it's sort of a back-and-forth of experiments that you can do in animal models that you can't do in humans. But you can identify potential mechanisms that could lead to new therapeutic strategies so that we can go back to human subjects and test some of those hypotheses."

More information: Jessica L. Chandrasekhar et al, Cutaneous Exposure to Clinically Relevant Lone Star Ticks Promotes IgE Production and Hypersensitivity through CD4+ T Cell- and MyD88-Dependent Pathways in Mice, *The Journal of Immunology* (2019). [DOI: 10.4049/jimmunol.1801156](https://doi.org/10.4049/jimmunol.1801156)

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