AGS in Illinois

Background

Alpha-gal syndrome (AGS), is an IgE-mediated allergy to the sugar galactose-α-1,3- galactose (alpha-gal), which is found in all mammals except some primates.[1] Its onset is associated with tick bites.[2] In the U.S., lone star ticks are responsible for the majority of cases.[3]

People with AGS react to products made from mammals. This includes foods such as beef, pork, lamb, venison, dairy products, and gelatin.[3-5] It also includes drugs and medical products, such as monoclonal antibodies, heparin, bioprosthetic heart valves, some vaccines, antivenom, medication in gelatin capsules, and many other medical products.[3-5] Over 75% of people with AGS report reacting to a medication, and about 50% report that they have experienced anaphylactic reactions to a health product.[6] Many people with AGS also react to personal care and household products with mammal-derived ingredients.[3]

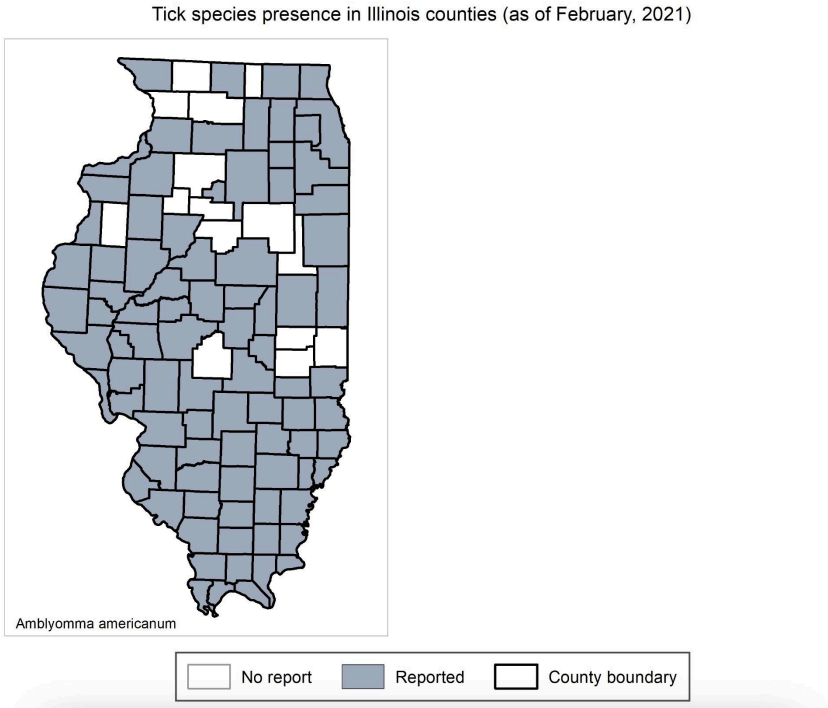
Alpha-gal reactions are often severe and can be fatal.[3,4,7] 60-75% of people with AGS experience anaphylactic reactions.[8,9] In areas of high prevalence, reactions to alpha-gal can be the number one cause of anaphylaxis in adults and adolescents, accounting for a third of all cases, more than all other food allergies combined.[10] Studies in Virginia suggest that AGS may be responsible for up to 25% of both IBS-like symptoms and rheumatological issues in high prevalence areas.[11,12] Concerningly, preliminary research in both the U.S. and Australia found that people who are sensitized to alpha-gal, even if they do not develop allergic reactions, may be at increased risk of cardiovascular disease.[13,14] The NIH is currently funding a follow-up study of this issue.[28]

Due to growing lone star tick populations, the number of cases of AGS is increasing at an alarming rate.[15,16] In a July 2023 report, the CDC recognized AGS as a growing clinical and public health concern.[16] They reported that between 2010 and 2022, more than 110,000 suspected cases of AGS were identified and estimated that up to 450,000 Americans may be affected, making AGS the 10th most common food allergy.[16,17] Yet alarmingly, 78% of physicians know little to nothing about AGS, and only 5% feel very confident in diagnosing and managing it.[18]

Illinois: an alpha-gal syndrome hotspot

Alpha-gal syndrome cases are not distributed evenly throughout the U.S. They are concentrated in high prevalence areas.[16] The CDC has identified Illinois as a state with one of the highest AGS prevalence rates in the nation.[16] Currently, residents in southern Illinois are most impacted.[16] However, lone star ticks are already the most commonly encountered tick in Illinois and have been found in almost every county in Illinois (see map below).[30] Moreover, growing white-tailed deer populations and climate change are driving an explosion in lone star tick populations and their expansion into north, including into northern IL.[29,31] As lone star tick populations grow, so will AGS cases.

There is a lack of AGS data from Illinois, but we do have data from other high prevalence states. In the most impacted areas, up to 47% of the population may be sensitized to alpha-gal.[19] Note that *not all* people who are sensitized to alpha-gal have full-blown allergy to alpha-gal syndrome, but 8-10% or more do.[9,25-27] A recent study found that more than 2% of an unselected cohort from central Virginia had AGS.[26] Other estimates suggest that up to 3% of people in the hardest hit areas may be affected.[3,25,27] We can safely assume that prevalence of AGS in areas of Illinois with similarly high numbers of lone star ticks is comparable.



Source: Information and Results. I-TICK. Accessed October 25, 2024. https://vetmed.illinois.edu/i-tick/info-and-results/

References:

1. Commins SP, Satinover SM, Hosen J, et al. Delayed anaphylaxis, angioedema, or urticaria after consumption of red meat in patients with IgE antibodies specific for galactose-alpha-1,3-galactose. *J Allergy Clin Immunol*. 2009;123(2):426-433.
2. Commins SP, James HR, Kelly LA, et al. The relevance of tick bites to the production of IgE antibodies to the mammalian oligosaccharide galactose-α-1,3- galactose. *J Allergy Clin Immunol*. 2011;127(5):1286-1293.e6.
3. Commins SP. Diagnosis & management of alpha-gal syndrome: lessons from 2,500 patients. *Expert Rev Clin Immunol*. 2020;16(7):667-677.
4. Platts-Mills TAE, Li RC, Keshavarz B, Smith AR, Wilson JM. Diagnosis and Management of Patients with the α-Gal Syndrome. *J Allergy Clin Immunol Pract*. 2020;8(1):15-23.e1.
5. Center for Disease Control and Prevention: Alpha-gal Syndrome; retrieved June 5, 2023.https://www.cdc.gov/ticks/alpha-gal/index.html

6. Alpha-gal in health products triggers anaphylaxis in half of alpha-gal syndrome patients. Richard Gawel. *Healio*. Published online June 27, 2023.
7. Steinke JW, Platts-Mills TAE, Commins SP. The alpha-gal story: lessons learned from connecting the dots. *J Allergy Clin Immunol*. 2015;135(3):589-596; quiz 597.
8. Wilson JM, Schuyler AJ, Workman L, et al. Investigation into the α-Gal Syndrome: Characteristics of 261 Children and Adults Reporting Red Meat Allergy. *J Allergy Clin Immunol Pract*. 2019;7(7):2348-2358.e4.
9. Fischer J, Yazdi AS, Biedermann T. Clinical spectrum of α-Gal syndrome: from immediate-type to delayed immediate-type reactions to mammalian innards and meat. *Allergo J*. 2016;25:55-62.
10. Pattanaik D, Lieberman P, Lieberman J, Pongdee T, Keene AT. The changing face of anaphylaxis in adults and adolescents. *Ann Allergy Asthma Immunol*. 2018;121(5):594-597.
11. Richards NE, Richards RD Jr. Alpha-Gal Allergy as a Cause of Intestinal Symptoms in a Gastroenterology Community Practice. *South Med J*. 2021;114(3):169-173.
12. Kimpel D, Wilson J, Lewis J. SAT0456 SERO-REACTIVITY TO GALACTOSE- ALPHA-1,3-GALACTOSE AND CLINICAL PRESENTATIONS OF PATIENTS SEEN IN A RHEUMATOLOGY OUTPATIENT PRACTICE. *Ann Rheum Dis*. 2019;78(Suppl 2):1317-1318.
13. Wilson JM, Nguyen AT, Schuyler AJ, Commins SP, Taylor AM, Platts-Mills TA, et al. IgE to the mammalian oligosaccharide galactose-α-1, 3-galactose is associated with increased atheroma volume and plaques with unstable characteristics—Brief Report. Arteriosclerosis, thrombosis, and vascular biology. 2018;38(7):1665-9.
14. Vernon ST, Kott KA, Hansen T, et al. Immunoglobulin E sensitization to mammalian oligosaccharide galactose-a-1,3 (α-Gal) is associated with noncalcified plaque, obstructive coronary artery disease, and ST-segment- elevated myocardial infarction. *Arterioscler Thromb Vasc Biol*. Published online January 20, 2022:ATVBAHA121316878.
15. Monzón JD, Atkinson EG, Henn BM, Benach JL. Population and Evolutionary Genomics of Amblyomma americanum, an Expanding Arthropod Disease Vector. *Genome Biol Evol*. 2016;8(5):1351-1360.
16. Thompson JM, Carpenter A, Kersh GJ, Wachs T, Commins SP, Salzer JS. Geographic distribution of suspected alpha-gal syndrome cases - United States, January 2017-December 2022. MMWR Morb Mortal Wkly Rep. 2023;72(30):815- 820.
17. Mysterious meat allergy passed by ticks may affect hundreds of thousands in US, CDC estimates. CNN. Updated 2:05 PM EDT, Sat July 29, 2023
18. Carpenter A, Drexler NA, McCormick DW, et al. Health care provider knowledge regarding alpha-gal syndrome - United States, march-may 2022. *MMWR Morb Mortal Wkly Rep*. 2023;72(30):809-814.
19. Ailsworth SM, Susi A, Workman LJ, et al. Alpha-gal IgE Prevalence Patterns in the United States: An Investigation of 3000 Military Recruits. *J Allergy Clin Immunol Pract*. Published online October 31, 2023. doi:10.1016/j.jaip.2023.10.046
20. Gaines DN, Operario DJ, Stroup S, et al. Ehrlichia and spotted fever group Rickettsiae surveillance in Amblyomma americanum in Virginia through use of a novel six-plex real-time PCR assay. *Vector Borne Zoonotic Dis*. 2014;14(5):307- 316.
21. Nadolny RM, Wright CL, Sonenshine DE, Hynes WL, Gaff HD. Ticks and spotted fever group rickettsiae of southeastern Virginia. *Ticks Tick Borne Dis*. 2014;5(1). doi:10.1016/j.ttbdis.2013.09.001
22. Ehrlichiosis Factsheet. Virginia Department of Health. Accessed Jan 7, 2023.https://www.vdh.virginia.gov/epidemiology/epidemiology-fact-sheets/ehrlichiosis/
23. Wilson JM, Keshavarz B, James HR, Retterer MK, Schuyler AJ, Knoedler A, et al. α-Gal specific-IgE prevalence and levels in Ecuador and Kenya: Relation to diet, parasites, and IgG4. Journal of Allergy and Clinical Immunology. 2021;147(4):1393-401. E7.
24. Commins S, Kelly L, Ronmark E, HR J, Pochan S, Peters E, et al. Galactose- alpha-1,3-galactosespecific IgE is associated with anaphylaxis but not asthma. Am J Respir Crit Care Med. 2012;185(7):723-30.
25. Fischer J, Lupberger E, Hebsaker J, et al. Prevalence of type I sensitization to alpha-gal in forest service employees and hunters. *Allergy*. 2017;72(10):1540- 1547.
26. Richards N, Keshavarz B, Workman L, Patel J, Platts-Mills T, Wilson J. Prevalence of α-Gal IgE and Mammalian Meat Allergy in a COVID-19 Vaccine Employee Cohort. *J Allergy Clin Immunol*. 2022;149(2):AB207.
27. Bianchi J, Walters A, Fitch ZW, Turek JW. Alpha-gal syndrome: Implications for cardiovascular disease. *Global Cardiology Science and Practice*. 2020;2019(3).
28. Loren Erickson, PhD and Coleen McNamara, MD, Awarded $4 Million NIH R01 Grant to Study IgE Sensitivity to Alpha-gal and Cardiovascular Disease. Medicine in Motion News. Published September 1, 2022. Accessed

October 24, 2024.
https://news.med.virginia.edu/research/loren-erickson-phd-and-coleen-mcnamara-md-awarded-4m-nih-r01-grant-to-study-ige-sensitivity-to-alpha-gal-and-cardiovascular-disease/
29. Centers for Disease Control. Lone Star Tick Surveillance Amblyomma americanum – Estimated and Established Distribution. Published online July 26, 2022. Accessed August 29, 2024.
30. Information and Results. I-TICK. Accessed October 25, 2024. https://vetmed.illinois.edu/i-tick/info-and-results/
31. climate-health-outlook-november-2023.pdf.
https://www.hhs.gov/sites/default/files/climate-health-outlook-november-2023.pdf