

## ALPHA-GAL SYNDROME

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### Abstract

Alpha-gal Syndrome (AGS) is a unique, recently identified type of anaphylaxis caused by a particular IgE antibody to the oligosaccharide galactose—1,3-galactose (alpha-gal), following a tick bite. The blood test for IgE to the oligosaccharide galactose-1,3-galactose (-Gal) and a history of delayed allergic reactions to red meat may usually be used to make the diagnosis. The diagnosis determines the primary treatment, which in most cases involves avoiding mammalian meat and, in some circumstances, dairy. The lone star tick is the main vector of this illness in the United States, while other nations are affected by other tick species. Patients who avoid recurring tick bites frequently see their blood levels of IgE to -Gal fall, albeit the rate of decline varies. This article focuses on the characteristics of the syndrome, diagnosis, treatment, and prevention, to provide more public awareness and acknowledgment of the condition.

**Keywords:** alpha-gal syndrome, red meat allergy, tick bite allergy, alpha-gal, lone star tick, mammalian meat allergy

### Introduction and background

Over the past ten years, there have been more and more reports of (alpha-gal syndrome) AGS in the scientific literature, although the actual number of cases is unknown. Furthermore, due to the increased geographic distribution of lone stars and other ticks, a significant portion of the nation may be at risk. To quantify disease burden, and to track trends in patient demographics and risk distribution across geographies, it is essential to standardize case definition and reporting criteria. The key strategy for AGS intervention is to prevent tick bites; as a result, health surveillance may guide efforts to increase occupational health protocols for suspected risk groups and public health messaging regarding tick bite prevention [1].

### Diagnosis

1. Description of exposure/large local reactions to tick or other arthropod bites, often including the report of an 'index' bite that behaved differently than prior bites.
2. Delayed development of symptoms compared to other anaphylaxis.
3. Improvement of symptoms when adhering to an appropriate avoidance diet.
4. Positive testing for alpha-gal IgE ( $>0.1$  IU/mL), is the key test for the diagnosis of alpha-gal syndrome.
5. Red meat tolerance Skin test; Doctors prick your skin and expose it to small amounts of substances extracted from commercial or fresh red meat or individual types of red meat because there are different kinds of allergies to meat [5].

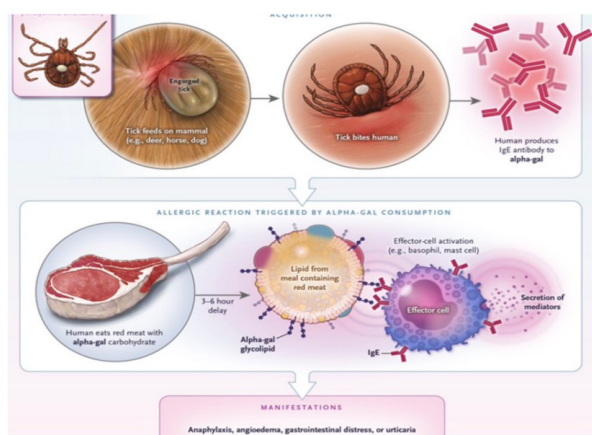
### Treatment

#### Limit exposure to meat and dairy products

The main recommendation for people who have just received an AGS diagnosis is to avoid eating any meat from mammals. to beef, hog, venison, and lamb as well as products derived from other mammals such as bison, buffalo, rabbit, horses, and goats. Although cooking does not appear to appreciably denature the alpha-gal epitope, it has been observed to lessen the severity of reactions. Management involves using masks for fume-sensitive patients, inhaled beta-agonists, prophylactic antihistamines, and even omalizumab. It also involves talking about labeling issues, prepackaged foods, hidden intake in social gatherings, and awareness of individuals eliciting threshold doses. An emergency injection of epinephrine and a visit to the emergency room may be required when a severe allergic reaction [5].

## What is AGS?

Alpha-gal syndrome (AGS) is a hypersensitivity reaction to mammalian meat and meat-derived products that develop after tick bite exposure and is associated with the development of IgE antibody to the oligosaccharide galactose- $\alpha$ -1,3-galactose (alpha-gal) [2]. Alpha-gal allergy, red meat allergy, or tick-bite meat allergy are other names for this condition. Alpha-gal (galactose- $\alpha$ -1,3-galactose) is a sugar molecule prevalent in most mammals, especially in red meat (for example, pork, beef, rabbit, lamb, and venison) and products made from mammals such as gelatin, candy, and dairy products cat-gut suture, porcine-derived heart valves, and bovine-derived vaccines [3].



## Symptoms

- Hives, itching, or itchy rash, sneezing, Headaches
- Edema of the lips, face, tongue, throat, or other body parts
- Cough, wheezing, or shortness of breath
- Stomach pain, diarrhea, nausea, or vomiting,
- Drop in blood pressure, Dizziness

Alpha-gal molecules take longer than other allergens to be digested and enter your circulatory system, which results in an alpha-gal allergic reaction being delayed by 3-6 hours compared to other food allergies and patients have frequently tolerated red meat for many years before the development of allergic reactions. The time before reactions also varies, and neither the time before reactions nor the titer of specific IgE can be used to forecast how severe an allergic reaction will be [1].

## Prevention is always the best

### Before going out and after coming home

Patients who avoid recurring tick bites frequently see their blood levels of IgE to -Gal fall, albeit the rate of decline varies. 1. Cover up by wearing shoes, long pants tucked into your socks, a long-sleeved shirt, a hat, and gloves when in wooded or grassy areas. Better to avoid walking through low bushes and long grass. Keep your dog on a leash. 2. Apply insect repellent with a 20% or higher concentration of DEET to your skin, will be helpful. Parents should apply repellent to their children, avoiding their hands, eyes, and mouths. 3. Clear brush and leaves where ticks live to tick-proof your yard. Keep woodpiles in sunny areas. 4. Check yourself, your children, and your pets for ticks: Be especially vigilant after spending time in wooded or grassy areas. 5. Ticks often remain on your skin for a long time before attaching themselves, so taking a shower when you return home would be helpful. 6. Remove a tick as soon as possible with tweezers: Gently grasp the tick near its head or mouth. Do not squeeze or crush the tick but pull carefully and steadily [1].

## Limitations of current knowledge

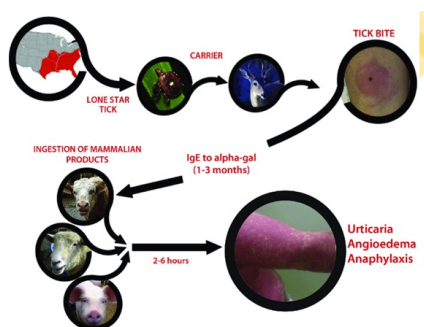
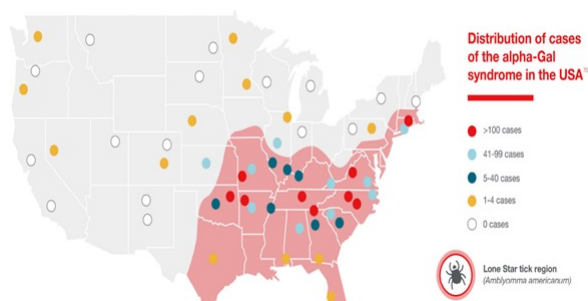
In areas where tick bites are prevalent, AGS is probably underrecognized due to the delayed occurrence of symptoms and lack of knowledge, even among public health personnel. Additionally, there is a lack of published information on the criteria of alpha-gal IgE testing, a lack of fundamental statistical data, and inadequate labeling of foods, medicines, and vaccines containing ingredients produced from mammals are the limitations of current research.

## Conclusion

The first reports of AGS date back to 2009 and various developments have been seen since then. There is, however, a lack of agreement and consistency about the proportions of Gal-specific IgE needed for the diagnosis of AGS, and it is important to look into the potential role of other tick species in the transmission of allergy. Further research into this unique allergen is expected to offer new perspectives on the epidemiology, incidence, distribution, and risk factors for AGS in the general population and high-risk tick-exposure groups.

## Alpha gal and Ticks

The suggested mechanism of transfer is, that ticks carry the alpha-gal molecule in their saliva after biting mammals and later transmit it to humans. Most prevalent in the United States are lone star ticks (*Amblyomma Americanum*), but other kinds of ticks (*Ixodes holocyclus*, *Ixodes Ricinus*, *Amblyomma cajenne*) carry alpha-gal molecules in Europe, Australia, and Asia. Lone star ticks are found throughout the southeastern and eastern United States [4]. You are at increased risk if you live or spend time in these specific regions and spend a lot of time outdoors, have received multiple Lone Star tick bites, and have a mast cell abnormality such as indolent systemic mastocytosis [1].



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