

# Tick-bite-induced red meat allergy

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Tick-bite-induced red meat allergy — codes and concepts

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## What is tick-bite-induced red meat allergy?

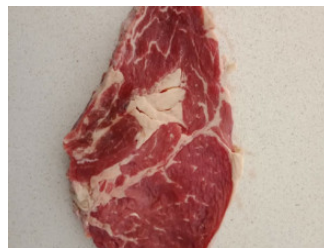
Tick-bite-induced red meat allergy is an [allergy](#) to the carbohydrate galactose-alpha-1,3-galactose (also known as alpha-gal), which is present in both tick bite saliva and red meat [1]. Tick-bite-induced red meat allergy is also called alpha-gal allergy.

Sensitisation to alpha-gal follows a [bite from particular species of tick](#). Subsequently, eating red meat may result in [itching](#), [urticaria](#), [angioedema](#), gastrointestinal upset, and rarely, [anaphylaxis](#) [2].

### Red meat



Lamb



Beef



Pork

## Who gets tick-bite-induced red meat allergy?

The incidence of tick-bite-induced red meat allergy is unknown [1]. It is associated with a history of [tick bites](#), atopy, and cat ownership [3]. Multiple tick bites increase the risk.

The allergy arises in people exposed to the ticks due to geographic location or occupation. For example, forestry service employees and hunters in certain countries are at higher risk of carrying alpha-gal-specific immunoglobulin E (IgE) and developing red meat allergy compared to the general population in the same region [4].

Systemic [mastocytosis](#) can increase the risk of acquiring tick-bite-induced red meat allergy [5].

## What causes tick-bite-induced red meat allergy?

The details of how a tick bite leads to allergic reactions to red meat and other substances are not completely understood.

The species of ticks that cause alpha-gal allergy include:

- The lone star tick (*Amblyomma americanum*) found in the United States

- The castor bean tick (*Ixodes ricinus*) found in Europe
- The paralysis tick (*Ixodes holocyclus*) found in Australia
- The hard tick species *Ixodes (Endopalpiger) australiensis*, found in Australia
- An unknown tick species found in South Africa and other regions [6].

The tick injects saliva containing alpha-gal into the skin of its victim. Sensitisation to alpha-gal is associated with the development of specific IgE antibodies to the carbohydrate. The component of alpha-gal that causes sensitisation is not known [7].

The symptoms of the subsequent reaction to red meat are typical of most [food allergies](#), except that the reaction is delayed by several hours and the antigen is a carbohydrate in the meat rather than a protein. More severe reactions can occur in people exposed to multiple tick bites.

Red meat is defined as all meats obtained from mammals and includes beef, pork, and lamb. The meat is red because of the high concentrations of myoglobin, a protein that transports oxygen to the muscles. Meat obtained from birds, such as chicken or turkey, is white meat and lacks alpha-gal so does not generate an allergic response.

Other substances can cause the same allergic response, including:

- Anticoagulants and bioprosthetic heart valves made from pig intestines contain alpha-gal
- Cetuximab (an anti-cancer drug), a chimeric mouse and human monoclonal antibody that contains alpha-gal
- Intravenous fluid replacements that contain gelatine may cause reactions in individuals sensitised to alpha-gal [8]
- Alpha-gal in gelatine, milk, whipped cream, and cheese can also elicit an allergic response [8].

## What are the clinical features of tick-bite-induced red meat allergy?

The delayed allergic reaction that follows is typical of [food allergy](#), except that symptoms begin 3–8 hours after ingestion of red meat, whereas other food allergies occur within minutes of exposure to the allergen [1].

Symptoms include:

- Nasal symptoms such as allergic rhinitis, sinusitis and sneezing
- Eye symptoms such as [allergic conjunctivitis](#)
- Gastrointestinal tract symptoms such as abdominal pain, bloating, vomiting, and diarrhoea
- Cutaneous symptoms such as [urticaria](#), [angioedema](#) [2,9].

On rare occasions, [anaphylaxis](#) can occur.

## What are the complications of tick-bite-induced red meat allergy?

The main complication of tick-bite-induced red meat allergy is [anaphylaxis](#), which can be life-threatening.

Anaphylaxis signs and symptoms include airway constriction, swelling of the throat, a severe drop in blood pressure, a high pulse rate, and dizziness.

## How is tick-bite-induced red meat allergy diagnosed?

Patients often self-diagnose alpha-gal allergy by using online sources of information, oral food challenges, and logical reasoning [10].

The most accurate method of diagnosing tick-bite-induced allergy is by [testing for IgE titres](#) against the alpha-gal molecule. However, the high cost and lack of availability of this test limit its use [11].

IgE-associated food allergies are usually tested for by [skin prick testing](#). The protocol and accuracy of the skin prick test for alpha-gal allergy are debated, as delayed reactions and false-negative results are reported [7].

## What is the differential diagnosis for tick bite induced red meat allergy?

The differential diagnosis for tick-bite-induced red meat allergy includes other forms of allergy, especially [food allergy](#).

The differential diagnosis for [anaphylaxis](#) includes:

- Septic shock
- Severe asthma attack
- An acute exacerbation of chronic obstructive pulmonary disease
- Hereditary angioedema [12].

## What is the treatment for tick-bite-induced red meat allergy?

The prevention of tick bites is paramount through both using [insect repellents](#) and avoiding forested areas.

People with tick-bite-induced red meat allergy should avoid red meat and other substances with alpha-gal.

The treatment of the allergic response includes [antihistamines](#), [oral steroids](#), and, in the case of [anaphylaxis](#), [adrenaline](#).

The use of desensitisation by exposing the patient to large amounts of alpha-gal is undergoing investigation [12].

## What is the outcome for tick-bite-induced red meat allergy?

Limited information indicates that alpha-gal allergy may recede over time, as long as the person is not bitten by another tick. The recovery period has been reported to take between 8 months and 5 years.

### Related information

### References

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## On DermNet NZ

- [Tick bite](#)
- [Food allergy](#)

## Other websites

- [Alpha-gal syndrome: symptoms and causes](#) — Mayo Clinic
- [Alpha-gal allergy](#) — US Centers for Disease Control and Prevention

## Books about skin diseases

- [Books about the skin](#)
- [Dermatology Made Easy book](#)



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