

## Tick Allergy

Allergic reactions to ticks range from mild, with swelling and inflammation (at the site of a tick bite), to severe (anaphylaxis). To prevent allergic reactions to ticks it is important that ticks are not forcibly removed or touched. Disturbing a tick may cause more allergen-containing saliva to be injected by the tick.

Published studies show that the safest way to remove a tick is to:

- Freeze the tick, using a product that rapidly freezes and kills the tick, and allow it to drop off; OR
- Leave the tick in place and seek medical assistance to remove the tick.

### Ticks and health problems

Health problems linked with tick bites include:

- Allergic reactions.
- Allergic reactions to red meat and gelatin (mammalian meat allergy).
- Transmission of infections (these are less common than allergic reactions).
- Tick paralysis (this is rare in humans as a tick must be attached for several days to inject enough toxin).

### The life of ticks

Ticks are arachnids (related to spiders) and have eight legs. Tick larvae are very small, around 1mm in size and can be hard to see. Nymphs are slightly larger at around 2mm diameter, and adult ticks (before a blood feed), are around 4mm in size.



Adult ticks attach to the tips of grass blades and vegetation, and from there transfer themselves to a host, which is usually a passing animal or human. The tick then attaches to their host by biting the skin.

Ticks generally lodge in the skin of the head, scalp or neck of their host. The most common reaction is local irritation, itching and swelling at the site of a tick bite, which is usually not due to allergy.

Ticks are present mainly on the east coast of Australia, however, there are also populations of ticks in several non-coastal areas.

The tick season is often considered to range from July to December when adult ticks are more prevalent, but the risk of exposure to ticks exists throughout the year.

Distribution map of the Australian Paralysis Tick (*Ixodes holocyclus*) adapted from Roberts FHS (1970) *Australian Ticks*. Yeerongpilly, QLD, Australia by TAGS Inc., Bill Conroy and Norbert Fischer.

### Allergic reactions to ticks

Mild allergic reactions to ticks appear as large local swelling and inflammation at the site of a tick bite, that can last for several days.

Severe allergic reactions (anaphylaxis) to the Australian paralysis tick, *Ixodes holocyclus* have been reported. Anaphylaxis occurs when the tick is disturbed, as this may causes the tick to inject more allergen-containing saliva.

It is important to avoid disturbing the tick by scratching something that can't be seen, trying to remove the tick, or applying chemicals such as methylated spirits or kerosene to the tick.

### First aid for tick bites

- Freeze the tick, using a product that rapidly freezes and kills the tick, and allow it to drop off. In most cases ether-containing sprays will kill the tick within five minutes, and it will drop off the skin. Published studies show that safe and fast removal of the tick may reduce the possibility of becoming allergic to ticks. It may also reduce the risk of getting a tick-borne infectious disease, or developing tick paralysis.
- If the tick does not drop off, or you can't freeze the tick, leave the tick in place and seek urgent medical assistance to remove the tick.
- Do not scratch anything you can't see if you live or work in a tick-endemic area.
- Know how to manage allergic reactions (including anaphylaxis) to tick bites.

It is unsafe to insert fine tweezers between the skin and the tick mouthpiece and lever the tick out. This does not prevent tick allergy or anaphylaxis, and therefore ASCIA advises against this method.

### What to do if you find a tick lodged in your skin and you are ALLERGIC to tick bites

If a person is allergic to ticks, they should carry an adrenaline (epinephrine) autoinjector (such as EpiPen) and a mobile telephone. Symptoms of a severe allergic reaction (anaphylaxis) include any acute onset illness with skin reactions such as swellings, and difficulty breathing.

- If a person is having symptoms of anaphylaxis as a reaction to a tick bite, use an adrenaline autoinjector, and follow the ASCIA Action Plan.
- Do not forcibly remove the tick.
- In a tick allergic person, the tick should be killed and removed in a hospital emergency department. After consultation with a medical specialist a person with tick allergy may be able to kill and remove the tick safely without going to hospital. Some people with tick allergy are so highly allergic that medical support should always be sought. A medical specialist will advise as to which approach will be safest.
- If available, liquid nitrogen applied by a doctor is effective in killing a tick.
- If killing the tick and removing it can be safely performed by the person with tick allergy, kill the tick first by using a product to rapidly freeze the tick, to prevent it from injecting more allergen containing saliva. If the tick does not drop off, or you can't freeze the tick, leave the tick in place and seek urgent medical assistance to remove the tick.

It is important to note that:

- This advice is based on the clinical experience and published studies of medical specialists who treat patients with tick allergy.
- Tick allergy should be confirmed by a clinical immunology/allergy specialist.
- There is a link between tick allergy and the development of allergic reactions to mammalian meats and/or mammalian meat-derived gelatin.

### Confirming a diagnosis of tick allergy

At this time, there is no reliable skin test or blood test for allergen specific Immunoglobulin E (IgE) antibodies to confirm a diagnosis of tick allergy. Australian researchers have identified that the allergens that cause problems are proteins in tick saliva. Diagnosis is currently based on the history of the reaction.

Researchers have identified that the following blood allergy tests are positive in the majority of people with serious allergic reactions to tick bites. The following blood tests for allergen specific IgE may assist in confirming a diagnosis:

- Mammalian meats Immunocap.
- Alpha-galactose Immunocap. Alpha-galactose is a sugar molecule present in meat from mammals other than humans, great apes and Old World monkeys. It is also found in the gut of ticks.

- Blood tests for mast cell Tryptase may also be useful. Tryptase is an enzyme that is increased in people with a condition called mastocytosis. It is associated with a higher risk of allergic reactions to many allergic triggers including insect stings and tick bites. People with higher tryptase levels may have more severe anaphylactic reactions to insect stings and bites.

### **Tick bites and mammalian meat allergy**

Australian allergic diseases physicians were the first to describe a link between tick bites and the development of mammalian meat allergy. These findings have since been confirmed by researchers in the USA and in Europe.

Some people will also be allergic to mammalian milks and animal-derived gelatin which is present in many food products, as a binding agent in some medications and in intravenous blood substitutes known as gelatin colloid (such as Haemaccel and Gelofusine). The target allergen associated with these allergic reactions is present in the gut of ticks, and all mammalian meats (such as beef, pork, lamb, kangaroo, and venison).

People with allergic reactions to mammalian meats are advised to avoid all mammalian meats (beef, lamb/mutton, pork, goat, horse, kangaroo, venison and other exotic mammals). Artificial blood (made from beef), and all forms of gelatin should also be avoided.

People with mammalian meat allergy should wear a medical bracelet warning of allergy to intravenous gelatin colloid. This is an intravenous preparation used as a blood substitute in emergency situations.

### **Measures to reduce the risk of tick bites**

The following measures may reduce the risk of tick bites:

- Wear long-sleeved shirts and long trousers when walking in areas where ticks live.
- Tuck shirt into trousers.
- Tuck trouser legs into long socks.
- Wear a wide-brimmed hat.
- Wear light-coloured clothes, which makes it easier to see ticks.
- Brush clothing before coming inside to remove ticks.
- Undress and check for ticks daily, checking carefully in the neck and scalp.
- Use insect repellent that contains DEET (such as RID, Tropical RID, Tropical Aerogard, or Bushmans).
- Consider using permethrin-treated clothing when exposed to tick habitat or gardening in tick endemic areas.
  - People with recurrent severe allergic reactions to tick bites may consider relocating to an area where ticks are not endemic.

Allergen immunotherapy (AIT) which is also known as desensitization, is currently not available to switch off tick bite allergy.

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