

Jack Jumper Ant Allergy

Allergic reactions to stinging ants are an important cause of anaphylaxis in Australia and the southern United States of America, and in some areas of the Korean Peninsula and the Middle East. Allergic reactions to the Jack Jumper ant (JJA; *Myrmecia pilosula*; also known as the Jumper Ant, Hopper Ant) are a uniquely Australian problem, although other species such as the Green Ant of Queensland, and the introduced South American Fire Ant can also cause allergic reactions.



What is a Jack Jumper Ant?

Most Australian native stinging ants are from the genus *Myrmecia*. The various *Myrmecia* are members of the hymenoptera order and therefore related to other stinging insects such as honey bees and wasps. They are perhaps the most primitive ants that survive. Although there is fossil evidence of a wider distribution in the past, the 89 species of *Myrmecia* are confined as natives to Australia and New Caledonia, with only one species introduced into New Zealand.

Myrmecia are broadly subdivided into "Jumper ants" and "Bull Dog ants". Bull Dog ants are large, around 15-25 mm long, whereas Jumper ants are generally 10 to 15mm long and often display jerky, jumping movements. The Jack Jumper Ant most frequently associated with allergic reactions is the *Myrmecia pilosula* species complex, commonly known as the "Jack Jumper Ant" (JJA), "Jack Jumper" or "Jumping Jack". JJA have a black body and orange/brown jaws/pincers and limbs. Jack Jumper Ants are also known as "Hopper Ants" or "Skipper Ants" in South Australia.

Jumper ants and bull dog ants sting rather than bite

Like bees and wasps, JJA do not bite, but rather grasp the victim in their jaws, then bend around and sting them. Their sting is in the tail. They are aggressive, typically move with a hopping motion, and can sometimes jump from surrounding vegetation.

Myrmecia have a widespread distribution

These ants are found in Tasmania, Victoria, ACT, New South Wales (Snowy Mountains, Blue Mountains and coastal regions), South Australia (Adelaide Hills), some parts of Western Australia and Queensland. It is likely that there are other habitats which are yet to be identified. Observations have shown interactions between ant colonies and human habitats.

It is important to appreciate that not only is the JJA one of many types of Jumper Ant, but that they are often found in areas where there are other species of Jumper ant(s), larger Bull Dog Ants as well as introduced honey bees and wasps. It can therefore sometimes be difficult to identify the cause of an allergic reaction to a stinging insect based on history alone, and even venom-specific IgE results can be sometimes be misleading.

Nests are often difficult to find

JJA live in underground nests. Although established nests can form massive mounds, they are often difficult to find, and may be present under rock, with the entrance surrounded by a pile of fine gravel. Typically, a couple of sentry ants are present at the entrance. The ants are aggressive, and often hunt alone. They will stray away from the nest, and at times find their way into people's houses and kitchens. It is very difficult to avoid being stung by jumper ant in endemic areas, when many nests are located close to human inhabitants.

Historical aspects

The late Dr Paul Clarke first drew medical attention to the problem of JJA stings in 1986 (Clarke, 1986). The Australasian Society of Clinical Immunology and Allergy (ASCIA) ran a register of reactions to JJA stings from 1989 to 1994 and recorded 454 sting episodes in 224 subjects.

Allergic reactions may occur to JJA stings

There are different types of allergic reactions to stinging insects. The stings of JJA ants, like those of bees and wasps, are very painful. Local swelling is very common. Large local swellings can also occur, lasting a few days at a time. The most serious reactions are known as generalised allergic reactions, of which the most severe is anaphylaxis.

Anaphylaxis is the most serious type of allergic reaction

Anaphylaxis occurs after exposure to an allergen (such as food, insect sting or medicine), to which a person is already extremely sensitive and can be potentially life-threatening. Signs and symptoms of a severe allergic reaction to insect stings or bites include:

- Difficulty/noisy breathing
- Swelling of tongue
- Swelling/tightness in throat
- Difficulty talking and/or hoarse voice
- Wheeze or persistent cough
- Abdominal pain and vomiting
- Loss of consciousness and/or collapse
- Pale and floppy (in young children)

In some cases, anaphylaxis is preceded by mild or moderate allergic reactions with signs and symptoms that include:

- Swelling of face, lips and eyes
- Hives or welts on the skin

Anaphylaxis to JJA stings is not rare

In areas where jumper ants are common, population surveys have shown that between 2 and 3 per cent of people have had generalised allergic reactions, and around half are potentially life-threatening:

- Six hundred residents of rural and semi-rural Victoria were studied with a random postal questionnaire (Douglas, Weiner et al. 1998). Of the two thirds of recipients who responded, 2.9% reported systemic reactions.

- Around 3% of the population of Tasmania have experienced immediate generalised allergic reactions to JJA stings and about half of these reactions involved features that were potentially life threatening (Brown, Franks et al, 2003).
- JJA stings were also the most common single cause of high grade anaphylaxis presenting to the Royal Hobart Hospital in a recently published study (Brown, 2004)

Anaphylactic deaths have also been described

Deaths from JJA sting anaphylaxis have occurred in Australia, with several recorded cases in recent years. Since anaphylactic deaths can be difficult to detect at post mortem, it is conceivable that JJA sting-related deaths are under-reported, listed instead as heart attacks or unexplained death.

Jack Jumper Ant allergy does not disappear quickly

Follow-up studies have shown that the majority of people with JJA allergy will have another allergic reaction if re-stung. In both a large epidemiological Tasmanian study (Brown, Franks et al, 2003) and in the placebo treatment arm of the recent double-blind, randomised study of JJA venom immunotherapy (Brown, Wiese et al, 2003), approximately 70% of subjects with a history of a previous systemic allergic reaction to the ant's sting, had a further such reaction on re-sting. About half of these reactions were life-threatening and occurred predominantly in those who had previously experienced severe reactions. This sensitivity to repeat stings appears to persist for many years. Comparative figures for honey bee and vespula ("European wasp") allergy are approximately 50% and 25% respectively (van der Linden, Hack et al, 1994; Blaauw, Smithuis, Elbers, 1996).

As 20 per cent of *M. pilosula* have an empty venom sac, however, (Brown, Wiese et al., 2003) a negative sting reaction following previous severe reaction, should not be interpreted as meaning loss of sensitivity. Indeed, the severity of reactions to insect stings typically fluctuate. It is therefore essential to always use the worst previous reaction to assess risk and be guarded in predicting what will happen after an initial mild systemic reaction.

Diagnosing Jumper Ant allergy

Diagnosis is challenging owing to the variety of stinging insects, including other *Myrmecia* and other stinging ants, and relative lack of epidemiological data and diagnostic tests. There is currently no skin allergy test available outside of ant allergy research programs in Tasmania. An in vitro test is available from SA Pathology, Frome Road site, South Australia 5042. Tests can be arranged via a local pathology laboratory. There may be a small out-of-pocket cost for this test, which detects around three quarters of cases of JJA allergy. The specificity of this test is high, but sensitivity is such that approximately 20% of JJA sensitive subjects give false negative results. Also, tests against other species that cohabit with JJA are not yet available. Given the potential for false negative and positive test results, correlation with clinical history and an intimate knowledge of local insect species is required to reach an accurate diagnosis. Members of ASCIA are involved in a national research project to develop a diagnostic strategy to deal with this problem, which is a necessary prelude to providing specific immunotherapy to patients.

Management options

Patients with allergic reactions to JJA, as with other allergies, need to avoid the trigger (where possible), carry emergency medication (adrenaline [epinephrine] autoinjector such as EpiPen) and know what to do if accidental exposure occurs. Wearing medical alert jewelry may provide additional information to attending doctors or ambulance officers.

Patients with allergic reactions to JJA should:

- Avoid JJA
- Have an ASCIA Action Plan and medication
- Know when and how to use an adrenaline autoinjector (if prescribed)

JJA venom immunotherapy may be an option for some patients. Further information is available from the ASCIA website: www.allergy.org.au/health-professionals/papers/jack-jumper-ant-venom-immunotherapy

Avoiding Jumper ants

JJA are difficult to avoid in endemic areas, as they often stray long distances from the nests. Destroying nearby nests has been proposed to reduce the risk of accidental stings, but may not prevent stings from nests located further away. Closed footwear (such as shoes or boots) and socks should be worn, rather than thongs or sandals. Wearing heavy clothing when in the bush (and gloves when gardening) seems sensible, but JJA can still sting through the holes in certain fabrics and can find their way through gaps in clothing. Whether moving from endemic areas to another area may help is uncertain, because of potential cross-reactivity with other native stinging ant species.

ASCIA Action Plan

Patients with life-threatening (anaphylactic) reactions should:

- Seek urgent medical assistance if stung.
- Carry (and know how to use) an adrenaline autoinjector (e.g. EpiPen). Adrenaline acts as a natural antidote to some of the chemicals released during severe allergic reactions. This is the only medicine able to counteract the dangerous symptoms of anaphylaxis. Medications taken orally, such as antihistamines or steroids, have **no** effect on the immediate and dangerous symptoms of anaphylaxis. Adrenaline should be considered as First Aid for the treatment of anaphylaxis.

Subjects who have a history of hypotensive anaphylaxis following a sting and those exposed in remote areas may need additional supplies of adrenaline beyond that available from the current Australian PBS Authority Scheme (Brown, Blackman et al, 2004).

Even if the adrenaline autoinjector has been highly effective at relieving symptoms, patients should seek emergency medical care without delay. Patients who have had an anaphylactic reaction should be medically observed for at least four (4) hours after the last dose of adrenaline.

Use of ancillary medication

If evidence of a systemic allergic reaction is present, adrenaline must be given. Medications such as antihistamines, H2 blockers and corticosteroids (and occasionally anti-leukotrienes), have no effect on the immediate and dangerous effects of anaphylaxis.

Other measures

- Those allergic to JJA should carry a means of summoning assistance if stung, such as a mobile phone.
- They should not travel alone in remote areas, and consider carrying an emergency satellite beacon and additional emergency medication if traveling in areas without easy access to medical assistance.
- There is some evidence that certain medications used in the management of blood pressure and heart problems (beta blockers and ACE-Inhibitors) may worsen anaphylaxis or interfere with the action of adrenaline administered in an emergency. This poorly defined risk, however, needs to be balanced against the benefits that these medications provide. For patients taking any form of blood pressure or heart

medication, the relative risk and benefits of their use should be considered in consultation with their allergy specialist and / or cardiologist.

- The complexity of the issues and input from ongoing studies merit review by a specialist in clinical immunology and allergy of subjects with a history of serious insect sting reaction.
- Wearing medical identification jewelry may provide additional information to attending doctors or ambulance officers.

Using an adrenaline autoinjector

Patients need to be taught how to use the adrenaline autoinjector and refresh their memory from time to time. You can get instructions for using them from:

- ASCIA Action Plans for Anaphylaxis - these contain clear pictures and instructions and should be kept with the adrenaline autoinjector and are available from the ASCIA website:
www.allergy.org.au/health-professionals/anaphylaxis-resources
- Videos are also available on the ASCIA website:
www.allergy.org.au/health-professionals/anaphylaxis-resources

Prospects for immunotherapy

Commercial venom extracts are available in Australia for the diagnosis and treatment of patients allergic to honey bees and Paper wasps and European wasps. At this time, there is no commercial venom extract available for skin testing to confirm JJA allergy or to use for immunotherapy (desensitisation, allergy injections).

In the last couple of years however, a study performed in Tasmania demonstrated that JJA venom extracts were very effective at switching off Jumper Ant allergy, and preventing allergic reactions when patients were re-stung. This study provided level 1 evidence for efficacy of immunotherapy with *M. pilosula* venom in preventing anaphylaxis (Brown, Wiese et al, 2003) but there is not yet a TGA registered product available for general clinical use. Members of ASCIA are attempting to make this treatment more widely available by lobbying for government and commercial support for further research.

Further information is available from the ASCIA website:

www.allergy.org.au/health-professionals/papers/jack-jumper-ant-venom-immunotherapy

Check for updates

If your patients are allergic to JJA, you and they should check this page from time to time. ASCIA members are actively involved in researching this uniquely Australian problem, and important updates on treatment options and research program will be posted here when available.

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Website: www.allergy.org.au

Email: projects@allergy.org.au

Postal address: PO Box 450 Balgowlah, NSW Australia 2093

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