

# The efficiency of immunotherapy to the subjects with allergy to bee venom and its influence in pollen allergy

## Abstract

Hymenoptera venom allergy is an immunoglobulin E (IgE)- mediated hypersensitivity to the venom of insects in the insect order Hymenoptera. This allergic reaction may be caused by stings from a number of species in this insect order, occurring only in persons who have previously been sensitized to Hymenoptera venom. Insect sting allergy can develop at any age and usually manifests after several uneventful stings. The incidence of systemic reactions to Hymenoptera venom is approximately 3% in adults. Although children are stung more often than adults, Systemic reactions occur in only about 1% of children younger than 17years, and many of these reactions are relatively mild.

Large local reactions to Hymenoptera stings are more common in children, with an estimated incidence of 20% and 10%, respectively, for children and adults. The prevalence of insect sting allergy is twice as high in male as in female patients and may be a result of increased exposure rather than inherent susceptibility. Normally there is no clear association with other allergies, and only 30% of patients with venom allergy are atopic. In addition, insect sting allergy is statistically not more likely to occur in persons with a family history of sting reactions.

**Keywords:** allergy, influence, symptoms, venom, immunotherapy, allergic reactions, vaccine, bee

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**Abbreviations:** IgE, immunoglobulin E; VIT, venom immunotherapy; SCIT, subcutaneous immunotherapy

## Introduction

### History

The first reports of stinging insect allergy came from the Middle East thousands of years ago. Even at that time, people understood that a small insect, such as a bee or a wasp, had the potential to cause serious illness or even death. Hymenoptera Stinging insects: All the stinging insects belong to the insect order Hymenoptera, of which there are 16,000 species in North America. Less than 1% is responsible for human stings. All the species that are medically important belong to three families: Apidae, Vespidae, and Formicidae. Only the females of each species have stingers, which are ovipositors that have lost their egg-laying function and have been modified for stinging and envenomization. Most species sting in defense of themselves and their nests, although some species also sting as a means of capturing their prey.

### Signs and symptoms

Most Hymenoptera stings cause small local reactions of no significant medical consequence. These normal sting reactions are characterized by pain, itching, redness, and swelling at the sting site that resolve within several hours and are caused by the pharmacologic properties of the venom. Some large local reactions are caused by a late-phase IgE-dependent reaction that is mild initially but progresses after 12 to 24hours to a diameter of more than 5cm; these usually peak in intensity at 48 to 72hours. These reactions are contiguous with the sting site and occasionally involve an entire extremity. In rare cases, massive swelling causes local anatomic compression. Large local sting reactions typically resolve gradually over 5 to 10days. Virtually

all patients with large local reactions continue to have similar reactions with subsequent stings.

This tendency is not modified with venom immunotherapy; therefore, patients with large local reactions are candidates for further diagnostic evaluation. Systemic reactions cause signs and symptoms in one or more organ systems and are almost always IgE-mediated. Systemic reactions cause a spectrum of manifestations, ranging from cutaneous signs (pruritus, flushing, urticaria, angioedema) to respiratory involvement (cough, throat and/or chest tightness, dyspnea, wheezing) and cardiovascular compromise (dizziness, hypotension, unconsciousness), depending on the severity of the reaction. Gastrointestinal manifestations (nausea, vomiting, diarrhea) and uterine cramping also occur occasionally. Cardiac anaphylaxis with manifestations of coronary vasospasm, arrhythmias, or bradycardia can also occur following stings, even in persons with no underlying cardiac disease. Systemic reactions usually cause signs and symptoms starting within minutes following a sting. In general, the sooner the symptoms occur, the more severe the reaction.

### Pathophysiology

Both systemic and large local reactions to stinging insects are usually caused by IgE-mediated reactions to Hymenoptera venom. At least one prior sting is required to sensitize a person to venom, and sensitization is more likely to occur following multiple simultaneous stings or subsequent stings occurring over a relatively short period of time. Once sensitization has occurred, a sting can cause mast cell and basophil degranulation, resulting in release of the histamine and other inflammatory mediators responsible for the signs and symptoms of anaphylactic and some large local reactions.

Family Apidae; Scientific name: *Apis mellifera*; Common name: Bee; *Apis mellifera*, commonly known as the bee, is a very common

insect. Believed to have originated in Africa, most likely this primitive species spread from France throughout Central Europe, north of the Alps, the British Isles, southern Scandinavia, down to the Ural Mountains:

1. Worker bees can have a length between 1.1 and 1.5 cm with a light orange and dark brown coloring.
2. You can often see bees on flowering plants, on sources of sugar (honeydew, etc.) or on pools of water during hot days. Bees build nests in beehives or sometimes in hollow trees or cracks in the walls of buildings.

Bees can attack en mass if not too far from their hives.

A peculiar characteristic of the *Apis mellifera* is the serrated stinger. The stinger is barbed so that it lodges in the victim's skin, tearing loose from the bee's abdomen and leading to its death in minutes. Distribution: Throughout Italy. Period of exposure to allergens: All year round. Allergy testing: Allergic reactions to bee venom can be severe enough to cause anaphylactic shock, which can be fatal.

### Allergy efficacy of VIT

(Venom Immunotherapy)

Venom immunotherapy is extremely efficacious in preventing subsequent systemic reactions in patients with stinging insect allergy:

1. Efficacy is highest with mixed vespid venom; it is 98% effective in preventing subsequent systemic reactions with a maintenance dose of 300 µg (100 µg per venom).
2. For therapy with individual venoms (i.e., honeybee, yellow jacket, or wasp) at a dose of 100µg per venom, immunotherapy is 75% to 95% effective in preventing systemic reactions to future stings.
3. Those few patients who continue to have systemic reactions usually have milder reactions than before beginning treatment. Increasing the maintenance dose of immunotherapy to 200 µg provides full protection for most patients who have had systemic reactions while receiving treatment with single venoms at a dose of 100 µg. IN KOSOVO as in the other parts of the globe, allergy diseases are very often presented in medical institutions. Also the percentage is almost same as in Europe, or in the other parts of the world. In general, approximately 1/4 or 1/5 of inhabitants is representing different kinds of allergy, starting from mild symptoms to severe life threatening allergy reactions. As a certified specialized allergologist-immunologist, while living and working in the small city of Gjakova in Kosovo, in my everyday experience, I meet patients with different kinds of allergies like pollen allergies, food allergies, medication allergic reactions, contact allergies and insect sting allergies such as bites from bee, wasp etc.
4. In one of my patients, I verified that 12years old female was allergic to pollens and bee venom with anaphylactic reaction. Specific Ig-E detected with POLYCHECK (Bio-Check) first analysis are shown below. This patient has started initial treatment in "Mother Theresa" University Hospital Center of Tirana in Albania, 2years ago with rush method. After this process, the treatment was

continued by me in "Isa Grezda" Regional Hospital of Gjakova. Until now I am performing by schematic regimen SCIT and every time the patient is under my observation for 30minutes. During the period of two years of immunotherapy, the treatment has been shown to be effective, with moderate local reaction initially and without any possible clinical adverse reactions. Every application of vaccine was performed deep subcutaneously in the upper external side of the arm. After one year of venom immunotherapy with Anallergo vaccine, the patient has been tested for Ig-E specific for pollens and hymenoptera venoms. The following results were observed; the levels of Bee venom has decreased from 5-4; Alder pollen from 1-0; Birch pollen from 2-0; Hazelnut pollen from 2-1; Beech pollen from 2-0; Oak pollen from 2-1; Pine from 2-0; Rhizopus nigrans from 2-0; Grass mix from 3-1 and house dust from 2-0. Concomitantly IgE specific to bee venom and pollens began to decline without treatment, it means without S.I.T on certain pollens.

### Material and methods

The patient was receiving L-Tyrosine-adsorbed subcutaneous immunotherapy (SCIT) for hymenoptera venom ANALLERGO vaccine (*Apis mellifera*) L-tyrosine delayed subcutaneous immunotherapy for hymenoptera venom consists of two initial vials of L-tyrosine delayed extract of purified venom, respectively one 5ml vial containing 1mcg/ml and one 5ml vial containing 10mcg/ml.

### Starting treatment plan

1. N.1-5.0ml green label vial containing 1mcg / ml of hymenoptera venom.
2. No.1-5.0ml yellow label vial containing 10 mcg / ml of hymenoptera venom.
3. No. 1-5.0ml red label vial containing 100 mcg / ml of hymenoptera venom.

### Maintenance therapy

No.1-5.0ml red label vial containing 100mcg / ml of hymenoptera venom. Vials are packed in a protective rigid plastic container.

### Conclusion

The patients which are allergic to bee venom which are most of the time allergic to pollens too, by obtaining VIT can present a decrease of parameters in pollen allergy too. So, I need to follow one year more, the patient analysis, in order to make a definitive conclusion about the efficiency of VIT and its correlation of positive influence to pollen allergy?

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### Conflicts of interest

Author declares there are no conflicts of interest.

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