

A comparison of two RAST methods and skin prick testing in the diagnosis of wasp venom allergy

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With the aim of evaluating the correlation between skin prick test and two radioallergosorbent tests (RAST) using paper (P-RAST) and Al (OH)₃ (Al-RAST) as sorbent materials, 45 consecutive patients known to have been stung by wasp within 6 months were examined. Four patients had a normal reaction, four a large local reaction and 37 a systemic reaction. We found a good correlation between a systemic reaction and a positive P-RAST. Fifty-one per cent of patients with a systemic reaction had a negative Al-RAST, whereas only 8% had a negative P-RAST. Eight per cent of patients with a systemic reaction had a negative SPT. In the eight patients without a systemic reaction, the same patient reacted positively in Al-RAST and P-RAST.

Key words: RAST; skin prick test; systemic allergic reaction; wasp.

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Allergy to insect venom is generally characterized by a short infrequent, but clearly identified exposure. The reactions may be dramatic such as anaphylactic shock and cardiac arrest, when the reacting organ is the cardiovascular system. When the diagnosis of insect venom allergy has been established, effective prophylactic treatment is possible, as immunotherapy offers good protection in more than 90% of patients (6, 10). Since immunotherapy is time-consuming, expensive and not without risks, and since at least 40% of the patients with systemic allergic reactions to insect sting will react normally to stings from the same insect in future, even without treatment, it is highly important to identify the patients in need of therapy.

The correlation between the clinical reactions and the subsequent allergy tests is not impressive (2, 8). The explanation of this could be that some of the adverse reactions to insect stings are in fact of non-allergic origin. Further allergy tests detect antibody responses to the latest sting rather than antibodies causing the severe reaction seen – parameters may very well have changed subsequently to the latest sting.

The primary aim of this prospective study was to evaluate the correlation between results from two radioallergosorbent tests (RAST) using paper P-RAST and Al (OH)₃ Al-RAST as sorbents and skin prick test in patients referred after wasp stings.

MATERIAL AND METHODS

Forty-five consecutive patients known to have been stung by wasp within 6 months were included. Mean age was 42 years (range 16–75). None had been treated with insect venom or whole-body extracts, and none had experienced systemic reactions when stung by unidentified insects.

Four patients had had a normal reaction after the sting, i.e. a local swelling (mean diameter < 10 cm), and four a large local reaction with a local swelling > 10 cm in diameter. Thirty-seven patients had a systemic reaction characterized by one or more of the following symptoms: urticaria or angio-oedema apart from sting region, shortness of breath, hoarseness, nausea, diarrhoea, abdominal pain, confusion, or anaphylactic shock.

Venom from a mixture of *Vespula* species (primarily *Vespula vulgaris* and *Vespula germanica*) was obtained from Vespa Laboratories Inc., Spring Mills, PA, U.S.A. The extracts were purified to remove all low molecular substances <1000 Dalton, standardized by quantitative immune electrophoresis (QIE) and RAST-inhibition.

Skin prick test (SPT) was performed in duplicate on the volar side of a forearm with wasp venom in glycerol (50 % w/v) in the concentrations 10, 30, 100, 300, and 1,000 µg/ml. Histamine dihydrochloride 1 mg/ml and isotonic saline in glycerol (50 % w/v) were used to check reactivity and as negative controls (Soluprick®, Allergologisk Laboratorium A/S, Copenhagen, Denmark).

A lancet with a point length of 1.0 mm (Dome/Hollister-Stier) (7, 14) was jabbed through the drops at an angle of 90° to the skin. The weal reactions were recorded at maximum size, i.e. 10–12 min after the prick. If the weal diameter on venom extract was ≥ 3 mm, the skin prick test was classified as positive (9).

For the aluminium hydroxide adsorbed allergen RAST (Al-RAST) the allergens were

coupled to Alhydrogel® (Superfos, Vedbæk, Denmark), and the analyses performed in duplicate according to Poulsen & Weeke (12). Results were expressed in sorbent units (SU). Values > 3 SU (RAST Class 2) were considered positive.

The classical RAST (Phadebas RAST (P-RAST)), using paper discs as sorbent for the allergen, was carried out according to the manufacturer's instructions (Pharmacia AB, Uppsala, Sweden) (3). Results were expressed in PRU (Phadebas RAST units). All tests were made in duplicate. Values > 0.70 PRU (RAST-Class ≥ 2) were considered positive.

Statistics. Relations in two-way tables were evaluated by means of χ^2 -test. *P*-values under 0.05 were considered statistically significant.

RESULTS

Thirty-four of 37 patients with a systemic reaction had a positive SPT (Table 1), and there was a significant correlation between a positive P-RAST and a systemic reaction (*P* < 0.001) (Table 2). The same clear picture was not seen

Table 1

Skin prick test versus case history in 45 persons stung by wasp

	SPT	
	-	+
Normal reaction	2	2
Large local reaction	2	2
Systemic reaction	3	34
	7	38

Table 2

Results of P-RAST and Al-RAST compared with the clinical reaction in 45 persons stung by wasp

	P-RAST		Al-RAST	
	-	+	-	+
Normal	4	0	4	0
Large local reaction	3	1	3	1
Systemic reaction	3	34	19	18

Table 3

Results of P-RAST and Al-RAST compared with SPT in 37 patients with systemic reaction to wasp

		P-RAST		Al-RAST	
		-	+	-	+
SPT	-	0	3	1	2
	+	3	31	18	16

Table 4

Comparison between Al-RAST and P-RAST in 37 patients with systemic reaction to wasp

		Al-RAST	
		-	+
P-RAST	-	3	0
	+	16	18
		19	18

in the comparison between Al-RAST and a systemic reaction ($P > 0.05$). Fifty-one per cent of patients with a systemic reaction had a negative Al-RAST in contrast to 8% in the P-RAST group.

In patients with a systemic reaction, accordance was found between a positive P-RAST and positive SPT (Table 3). There was no significant correlation between Al-RAST and SPT. In patients with a systemic reaction to wasp no significant correlation was found between the results of Al-RAST and P-RAST (Table 4).

In skin prick testing in the group of systemic reactions three patients reacted at 1,000 µg/ml, 13 patients at 300 µg/ml, 10 patients at 100 µg/ml, 7 patients at 30 µg/ml, and 1 patient at 10 µg/ml. Three patients had a negative skin prick test.

DISCUSSION

The diagnosis of allergy to venom is based on a suggestive history of anaphylaxis, positive skin test to venom and/or the presence of venom-specific IgE in serum. Both tests can be useful in establishing the identity of the insect by which the patient was stung in the past.

This is the first study with wasp venom allergy in which a comparison between the P-RAST and the Al-RAST was carried out. We have looked at the correlation between case history, SPT, P-RAST, and Al-RAST in a group of patients referred to our clinic suspected of a wasp venom allergy, and the majority of whom had experienced systemic reactions to stings.

A good correlation was found between case history and positive SPT, and it seemed that most allergic patients having experienced a systemic reaction to wasp showed a positive SPT at a concentration of 300 µg/ml, whereas 100 µg/ml was not enough when using a 1 mm prick lancet. Nearly all patients (Table 2) with a systemic reaction to wasp had a positive P-RAST, but Al-RAST was positive only in a minority. If the limit for positive reaction was lowered to RAST-Class 1 in this method, only four additional patients would become

positive in Al-RAST. We conclude that the sensitivity of the Al-RAST is less than that of the P-RAST, and that the results cannot be compensated by lowering the limit for positivity.

However, since this study deals with diagnostic tests after the sting and not before, it cannot give a definite answer as to which of the two RAST tests has the best predictive value concerning future sting reactions.

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