

Allergic contact urticaria caused by raw prawns and shrimps: Three cases

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Contact urticaria from raw prawns and shrimps was suspected in three housewives with hand eczema who visited our clinic. A practice skin test in which patients stripped the shells from raw prawns and shrimps was positive, but an intradermal skin test with an allergen extracted from a mixture of prawns and shrimps was negative. Results of skin tests with fresh extracts of raw prawns and shrimps were positive. The RAST with a paper disc method with use of a raw prawn and shrimp as antigens was also positive in these three patients. It is evident from the results obtained that some common substances causing a local urticaria exist in raw prawns and shrimps. (J ALLERGY CLIN IMMUNOL 74:489-93, 1984.)

It is well-known that alimentary urticaria occurs systemically after eating either prawns or shrimps, but there are only a few reports on contact urticaria appearing locally after touching them. Among the housewives with hand eczema who visited our clinic, contact urticaria from raw prawns or shrimps was confirmed in three.¹ We have experienced subsequently two other patients with contact urticaria from raw prawns or shrimps. In three of these five patients, the presence of reagin was confirmed by RAST with a paper disc method with the use of raw prawns and shrimps as the antigen.² This article refers to the three RAST-confirmed cases of contact urticaria from raw prawns and shrimps.

CASE REPORTS

Patient 1 is a 27-year-old female nurse with a past history of recurrent urticaria since childhood. The patient's elder sister has allergic rhinitis. At the age of 13 yr, she had her first episode of itchiness and swelling on her lips soon after ingestion of raw prawn or shrimp. Since that time, she has had repeated episodes of itchiness on her hands on contact with raw prawn or shrimp. Laboratory tests were within normal limits except for serum IgE, which was 500 U/ml.

An intradermal test with an allergen extracted from a

TABLE I. Results of the intradermal test with an allergen extracted from raw prawns

Extract from raw prawns	Control subjects				Patient
	A	B	C	D	
Undiluted	+	+	+	+	
1:10	—	—	—	—	+++†
1:100	—	—	—	—	++*
Saline	—	—	—	—	—

*Erythema alone.

†Erythema, wheals, and itching (triple reaction).

mixture of prawns and shrimps (Torii & Co., Ltd., Tokyo, Japan) was negative.

A practice skin test in which the patient stripped the shells from raw prawns was positive. One minute after stripping the shell from a raw prawn with her hands, she experienced itchiness. Redness and swelling occurred on her hands 15 min later (Fig. 1).

An open skin test with a raw prawn was positive. The shell at the body of a raw prawn was stripped, and the prawn was applied to the flexor aspect of the left forearm for 1 min (Fig. 2). She experienced itchiness at the application site of the head 30 sec after removal. Three minutes after removal, erythema and wheals occurred at the site (Fig. 3). No eruptions were observed at the site where the body without shell was on contact.

Intradermal tests with the use of extracts from raw prawns were positive. Five raw prawns with shells were immersed in 200 ml of distilled water for 20 min. By use of the sterile filtrate collected through a micropore filter as an antigen, an intradermal test was performed 1 day later.

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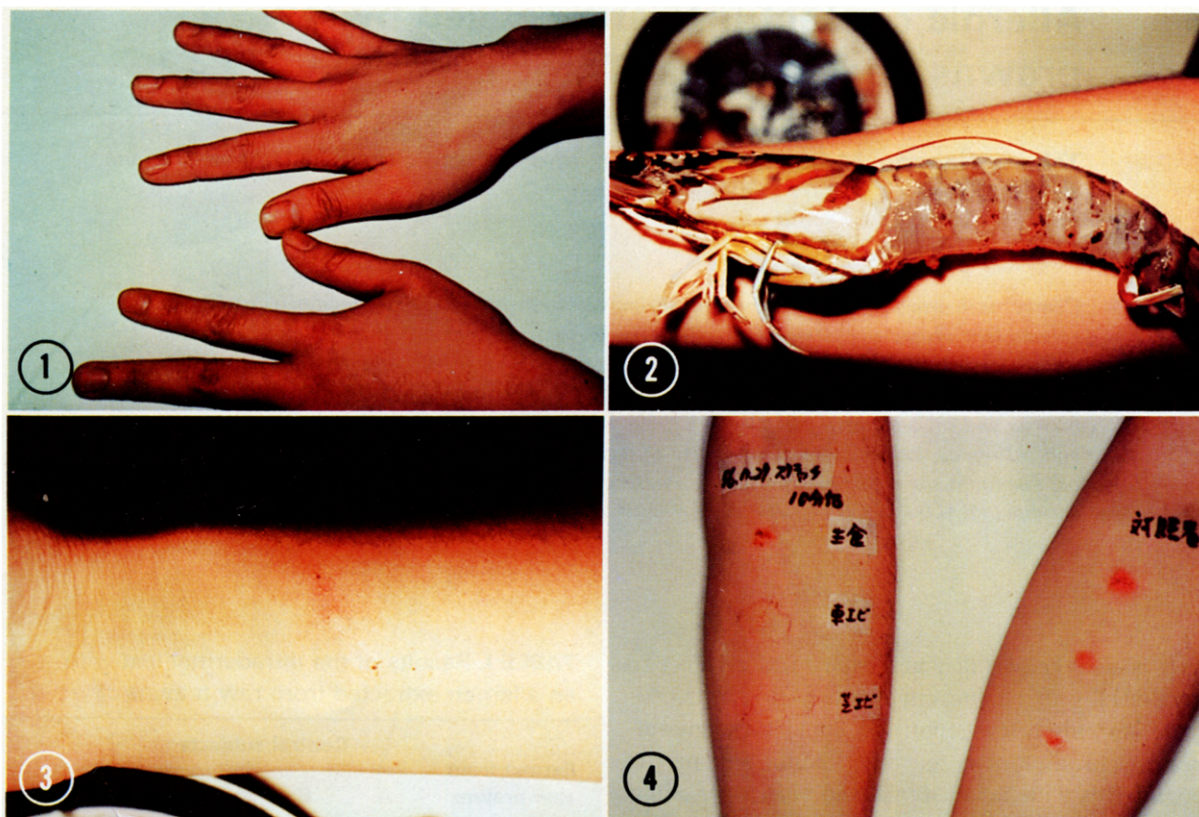


FIG. 1. Patient 1. Erythema and swelling induced by the practice skin test.

FIG. 2. Patient 1. Open skin test with a raw prawn. Notice that the shell remains on the head, stripped from the body.

FIG. 3. Patient 1. Erythema and wheal soon after the 3-minute open skin test with a raw prawn. Notice that urticaria occurred at a contact site with shell not with prawn meat.

FIG. 4. Patient 2. Urticarial reactions 2 min after scratch skin test with fresh extracts of raw prawn and shrimp.

Three concentrations of antigen in a tenfold serial dilution of saline solution, i.e., from an undiluted to a 1:100 solution, were prepared. The intradermal tests were performed in four apparently healthy volunteers as control subjects. As demonstrated in Table I, when the undiluted solution was used, all control subjects demonstrated erythema. Therefore, the tenfold and 100-fold dilutions were used in the patient. When the tenfold dilution was intradermally injected, an obvious urticarial response was demonstrated. When the intradermal test was repeated 3 days later, the reaction was markedly diminished. Thus the available period of antigenicity is short.

Patient 2 is a 51-year-old housewife. She has had fixed drug eruptions caused by aminopyrine. Her eldest daughter has Japanese cedar pollinosis. At the age of 10 yr, she had urticaria after ingestion of hand-rolled "sushi." She has never eaten raw seafoods since that incident. When she removed the shells of raw prawns or shrimps about 14 yr ago, the tissue fluid of prawn or shrimp accidentally

splashed and entered her eye, which became swollen immediately. Since that occurrence, she has felt itching on the hands when she handled prawns or shrimps. The data revealed no abnormalities. Serum IgE was 320 U/ml.

An intradermal test with an allergen extracted from a mixture of prawns and shrimps (Torii & Co., Ltd.) was negative.

A practice skin test in which the patient stripped the shells from raw prawns and shrimps was positive.

Open skin testing with a raw prawn and shrimp was negative. The shells were stripped from raw prawn and shrimp, and the internal organs were removed. The prawn and shrimp were divided into three parts: shell, meat, and internal organs. Each was applied to the flexor surface of the forearm of the patient.

Scratch skin tests with fresh extracts of raw prawn and shrimp meat were positive. The shells were stripped from raw prawn and shrimp, and the meat was removed. The meat was put in a porcelain mortar together with 3 ml of

TABLE II. Results of the allergy test in three patients

Method	Patients			Control subjects	
	1	2	3	1	2
Intradermal test with an allergen extracted from a mixture of prawns and shrimps*	—	—	—	—	—
Practice skin test†	+	+	+	—	—
Open skin test with a raw prawn	+	—	—	—	—
Intradermal test with a self-prepared prawn antigen	+	nd	nd	—	—
Scratch skin tests with fresh extracts of raw prawn and shrimp	nd	+	+	—	—
RAST (see Table III)	+	+	+	—	—

nd = Not done.

*Made by the Torii & Co., Ltd., Tokyo, Japan (commercially available antigen).

†The patient strips the shells from raw prawns and shrimps.

saline solution and was ground well. The solution was used as an antigen for the test. None of the two control subjects demonstrated any reactions, whereas the patient demonstrated urticarial reactions 2 min later at sites where the fresh extracts were applied (Fig. 4).

Patient 3 is a 40-year-old housewife with a past history of recurrent urticaria since childhood. Her mother has chronic rheumatoid arthritis. During the previous 10 yr, she noted itching on the hands when she handled raw prawns or shrimps. Her eyes always became swollen when their tissue fluid entered her eyes. The data revealed no abnormalities except for the 2+ Rheumatoid arthritis factor test. Serum IgE was 187 U/ml.

An intradermal test with an allergen extracted from a mixture of prawns and shrimps (Torii & Co., Ltd.) was negative.

A practice skin test in which the patient stripped the shells from raw prawns was positive.

Open skin testing with a raw prawn and shrimp was negative.

Scratch skin tests with fresh extracts of raw prawn and shrimp meat were positive.

The results of the skin tests on these patients are illustrated in Table II.

RAST

It is evident from the results obtained that some substances causing a local urticaria exist in raw prawns and shrimps. To investigate whether the localization of antigenicity differs from kinds and parts of prawns and shrimps, the RAST was carried out. Care was taken with regard to the preparation of antigens for the RAST from fresh prawns and shrimps. The RAST was performed immediately after preparation of antigens because of the lack of antigen stability.

The raw prawns and shrimps were divided into

shell, meat, and internal organs. Antigens were fixed in a manner similar to that used in the preparation of antigen solution for the intradermal test. On the same day that the antigen solution was prepared, the RAST was performed with a paper disc method as previously reported.³ Table III illustrates the results. The five subjects tested demonstrated negative reactions to commercially available shrimps (Pharmacia, Uppsala, Sweden). Three patients, however, demonstrated positive reactions to a self-prepared raw prawn and shrimp antigen. On the basis of the positive reactions demonstrated by these three patients to the antigen of the meat from prawns and shrimp, it is believed that there is an antigen or antigens common to prawn (*Penaeus japonicus bate*) and shrimp (*Metapenaeus joyneri miers*) genera. However, two patients demonstrated a positive response even to the shell antigen, and there were some differences in the grade of reactions between the antigens of prawn and shrimp. On the other hand, positive reactions to the antigen of meat and internal organs of shrimp were found even in one control subject. Thus the specificity of the reactions remains to be clarified.

DISCUSSION

Contact urticaria was classified in 1975 by Maibach and Johnson⁴ into three types: A, nonallergic; B, allergic; and C, undetermined. Contact urticaria in the three patients described in the present article is believed to be rare and to belong to the B type at stage 1,⁵ since the reagent was confirmed by RAST. In 1976 on the other hand, Hjorth and Roed-Petersen⁶ reported on occupational protein contact dermatitis on the hands. They indicated the dermatitis to be contact

TABLE III. Score of RAST with use of prawn and shrimp antigens

Subjects		Antigens					
		Raw prawn*					
		Shell		Meat		Internal organs	
		Counts	Score	Counts	Score	Counts	Score
Control subjects	A	388	—	509	—	393	—
	B	350	—	371	—	341	—
Patients	1	890	+1	2520	+2	605	—
	2	866	+1	2634	+2	475	—
	3	395	—	2606	+2	448	—
Identity		Counts	Class				
			More than 3832				
References	A	3832	A to B				
	B	2514	B to C				
	C	862	C to D				
	D	644	Less than 644				

*Prawn: *Penaeus japonicus* bate.†Shrimp: *Metapenaeus joyneri* miers.

‡Commercially available antigen (Pharmacia, Uppsala, Sweden).

urticaria mainly caused by fish and shellfish and to be related to an immediate-type hypersensitivity as compared with delayed-type contact dermatitis caused by metals, onion, and garlic. They also discussed contact urticaria in atopic persons. Among 25 patients, six had a personal and/or family history of atopy of whom only two had previously had atopic dermatitis. Many of their patients are said to be difficult to classify as suffering from atopic dermatitis. They were described as having "atopic contact dermatitis." In Japan, Watanabe et al.⁷ in 1980 reported four patients

with contact urticaria from raw egg white and not from cooked eggs. The fact that the four patients had atopic dermatitis was regarded as of major importance. It is interesting to say that the three patients presented also have an atopic disposition. It appears widely accepted that hand dermatitis is often observed in atopic persons and generally ascribed not to allergy but to irritants such as seafoods and vegetables. Now it is clear that some of these cases involve protein contact dermatitis incriminated by the type I allergens as described by Hjorth and Roed-Petersen.⁶

Antigens							
Raw shrimp†						Shrimp‡	
Shell		Meat		Internal organs			
Counts	Score	Counts	Score	Counts	Score	Counts	Score
408	—	693	+1	699	+1	123	—
377	—	368	—	432	—	101	—
700	+1	1830	+2	1880	+2	123	—
367	—	1873	+2	702	+1	122	—
356	—	1886	+2	697	+1	118	—
Counts	Class					Counts	Class
	More than 3046			+3		More than 3046	+3
3046	A to B			+2		3046	A to B
1815	B to C			+1		1815	B to C
693	C to D			±		693	C to D
473	Less than 473			—		473	Less than 473

Cases of protein contact dermatitis reported up to the present time appear to be induced by raw foods and not by processed foods,^{3, 7} which suggest that the antigens are unstable. This was also confirmed by RAST.³ Thus it will be quite difficult to identify the antigen or antigens.

REFERENCES

1. Nagano T, Watanabe K, Sugai T: Three cases of contact urticaria due to raw prawns. *Skin Res (Hifu)* 23:544, 1981
2. Wide L, Bennich H, Johansson SGO: Diagnosis of allergy by an in vitro test for allergen antibodies. *Lancet* 2:1105, 1967
3. Nagano T, Kanao K: A case of contact urticaria with reagin of raw prawn crust. *Allergy* 31:46, 1982
4. Maibach HI, Johnson HL: Contact urticaria syndrome. *Arch Dermatol* 111:726, 1975
5. von Krogh G, Maibach HI: The contact urticaria syndrome—1982. *Semin Dermatol* 1:59, 1982
6. Hjorth N, Roed-Petersen J: Occupational protein contact dermatitis in food handlers. *Contact Dermatitis* 2:28, 1976
7. Watanabe K, Sugai T, Yamamoto Y: Atopic dermatitis and contact urticaria. *Skin Res (Hifu)* 22:293, 1980