

Occupational protein contact dermatitis in food handlers

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The preparation of food in restaurant kitchens carries a high risk of occupational dermatoses. Analysis of 33 cases revealed four different etiological types. Simple irritant dermatitis was rare (2 cases), plain contact dermatitis was more common (6 cases). Fifteen patients had relevant patch tests and scratch tests; ten had positive scratch tests only to explain the cause of their dermatitis. The last type was termed protein contact dermatitis.

The major type IV allergens incriminated were metals, onion and garlic. The major proteinaceous allergens indicated by history and test results were fish and shell-fish. Open patch tests with the incriminated foods may cause erythema or oedema on normal skin after 20 minutes. Previously eczematous, now normal looking, skin often responds with a crop of dyshidrotic vesicles preceded by erythema and itching 30 minutes after the application of an open test. Examination for specific IgE is not always positive in such cases. Inhalant allergy was rare. The results indicate that food handlers are sensitized by the protein they touch, and then react to later contact with the proteins. Protein contact dermatitis is similarly common among veterinary surgeons, while the importance in other occupational groups remains to be studied.

Key words: garlic - protein contact dermatitis - occupational dermatitis - restaurant worker.

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Questionnaires on a multitude of health problems were recently distributed to a large number of Danish Trade Union members. According to the forms returned, the highest risk group where skin disease was concerned was the tannery workers. Next came the Union of hotel and restaurant kitchen staff (Arbejdsmiljøundersøgelsen 1974).

Traditionally, occupational dermatitis comprises allergic and irritant contact dermatitis. The patch test results supply the criteria for this distinction.

In the present paper we suggest the addition of a third category, namely, occupational protein contact dermatitis.

Contact dermatitis in food handlers is usually ascribed to their work with irritants

such as vinegar, fish and meat, or with sensitizers such as garlic, onion and spices. Occupational dermatitis in this trade may therefore be of mixed irritant and allergic origin.

Analysis of 33 cases seen by us indicate that combined type I and type IV contact sensitivities are involved in the causing of occupational dermatitis in chefs and in sandwich-makers (i.e. females, skilled in the trade of preparing Danish open sandwiches). Some have only a type I sensitivity to explain the cause of their illness.

This type can be called protein contact dermatitis. This is distinctive from allergic contact dermatitis, which is a reaction to a simple chemical. Here proteins or proteinaceous materials are the cause, and intra-

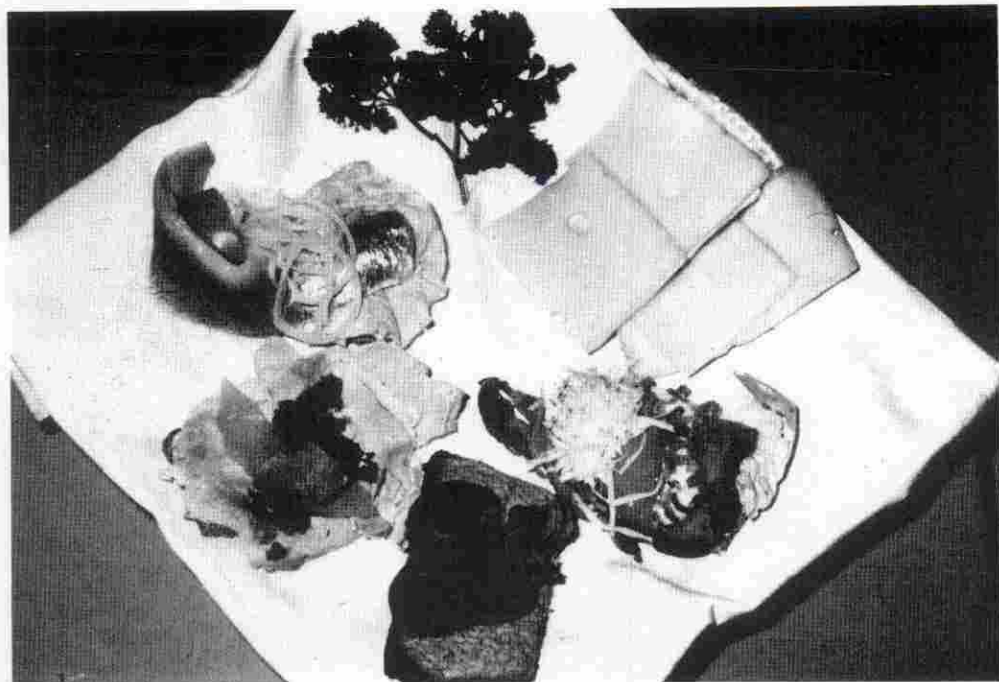


Fig. 1. Danish open sandwiches composed of a multitude of different irritants and allergens.

cutaneous or scratch tests may be required to prove the cause of dermatitis.

The patients in these trades usually have a finger-tip eczema starting on the left hand, because the right hand holds the knife and is thus protected. A danish chef uses his first, third and fourth left fingers to hold the vegetables or meat while cutting it with the right hand. Sandwich-makers employ first, second, fourth and sometimes third left fingers to hold the food. These kitchen workers nearly all complain that their dermatitis is aggravated by contact with fish and certain vegetables.

According to the history, itching starts within 10–30 minutes after contact with the incriminating foods, which may cause an erythema and sometimes vesicles.

Among the contact sensitivities, garlic, onion and metals dominate. Sensitivity to

metals in this selected group of patients is more frequent than in the population in general.

The results of scratch tests are more remarkable. These patients have an immediate reaction to fish and many other food allergens they touch. But few have inhalation allergies. Thus the type of protein touched during work seems to determine the type of sensitivity developed.

Only seven had a personal and/or family history of atopic disease. Two of them had previous atopic dermatitis and one dry skin.

Material and Methods

Between 1968 and 1975, nine male chefs and 24 female sandwich-makers or kitchen workers were referred because of occupational dermatitis of the hands. Among these,

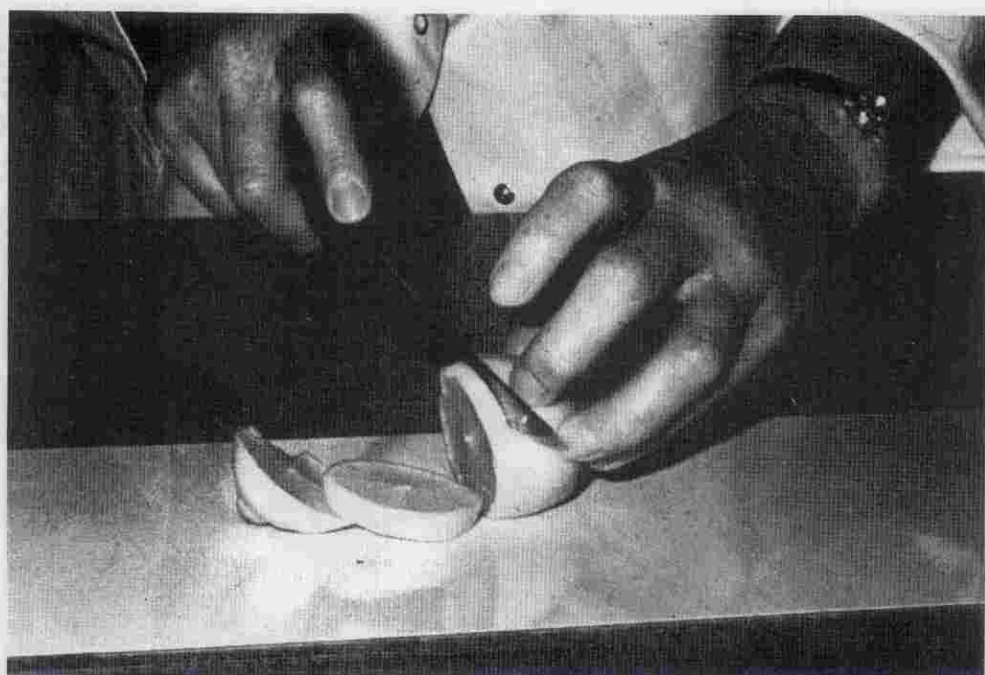


Fig. 2. A chef holds meats, bread or onions with the left 1st, 3rd, 4th (and 5th) fingers. A female sandwich-maker will use the 1st, 2nd, 4th and sometimes 3rd fingers.

Table 1.

Age	No. of patients	Duration of employment years	Duration of employment average	Duration of dermatitis years	Duration of dermatitis average	Subsequent change of occupation
<i>Females</i>						
15-25	14	9/12- 6	2 6/12	1/12-5	1 1/12	5
26-35	5	8-14	8 10/12	9/12-8	5	1
36-45	4	1-23	9 6/12	6/12-3	1 6/12	2
46-55	1	23	-	11	-	1
Total	24					9
<i>Males</i>						
15-25	7	1- 9	3 2/12	9/12-6	2 4/12	3
46-55	2	?	?	4/12-8	3 8/12	0
Total	9					3

three were referred because of compensation claims and nine had initially been referred to one dermatological office and from there to Gentofte Hospital.

A further 18 patients were not included in the material because their skin disease proved to be non-occupational. Two had a mycotic infection, one psoriasis, one pustulosis of the palms, one urticaria due to drugs, six had contact dermatitis from different chemicals (formalin, rubber, balsams, nickel, hair colourant) not related to their work, and one had a photo-allergic dermatitis assumed to be due to an antimicrobial compound in soap. One worked as a gut-cleaner and four had a dermatitis whose clinical and anamnestic information excluded occupational dermatitis.

One patient had a widespread urticarial eruption after a patch test with vanilla besides a nickel and cobalt sensitivity. This patient made a vanilla custard at home about three times a week, and also had an

Table 2. Test results

	Patch tests	Scratch tests	No. of patients
	+	+	15
	+	—	6
	—	+	10
	—	—	2
Total	21	25	33

urticarial eruption in connection with this preparation.

All the patients were examined by our standard series of patch tests (supplied by K. Trolle-Lassen, A. N. Hansensalle 6B, 2900 Hellerup, Denmark) and scratch tests (supplied by Allergologisk Laboratorium, Copenhagen S, Denmark). Further, the patients were examined by patch and scratch tests with various meats, fish, vegetables and spices (as is).

Table 3. Test results in patients with contact sensitivity to metals

Patient no.	Nickel	Cobalt	Chromate	Remaining Patch tests	positive Scratch tests	Atopic disease Personal/familial
5	++	—	—	garlic ++	codfish plaice herring eel cheese cat's hair	— / —
7	—	++	—	—	herring eel	— / —
10	—	+	+	carrot ++ formalin +	mackerel cheese	— / —
15	++	—	—	colophony ++ plaice ++	—	— / —
24	++	—	—	—	lobster pork mackerel	— / —

Table 4. Patients with personal and/or familial history of atopic disease.

Patient no.	Atopic disease		Patch tests	Positive		Anamnestic cause of dermatitis
	Personal	Familial		Scratch tests		
3	hay-fever	?	cress ++	pollen of grasses cheese mackerel	?	
4	dry skin	?	garlic ++	0	lobster cheese	
8	asthma hay fever flexural eczema as a young child	0	lanolin ++ colophony ++ neomycin ++ garlic ++	mackerel pollen of grasses wheat flour chrysanthemum barley codfish	?	
12	as a young child mild flexural eczema	asthma (mother)	0	mackerel pollen of grasses birch and hazel nut	eel beef	
18	asthma urticaria	0	citronella oil ++	mackerel shellfish wheat flour cow's hair house dust horse flesh cucumber	?	
23	0	asthma (father)	neomycin ++	pollen of grasses and hazel nut	cheese lemon onion	
30	hay-fever	0	curry ++	pollen of grasses cat's hair	fish shrimp onion	

Some patients had closed patch tests on normal skin in parallel rows, one of which was removed after 20 minutes, one on day 2. The study also included open patch tests on previously affected skin for some patients with foods which, according to the history, had caused dermatitis.

Radio-allergosorbent tests were kindly performed on nine patients either by Dr.

S. G. O. Johansson, Uppsala, Sweden, or by Pharmacia A/S Hillerød, Denmark, in order to determine the serum level of IgE, total and specific to certain allergens.

Leucocyte migration inhibition tests as described by Soeborg and Bendixen (1967) were kindly performed in five patients by Dr. E. Andersen, Gentofte Hospital, Denmark.

Table 5. Results of patch and scratch tests with pertinent foods.

Patient no.	Antigen	20 minutes open patch test on affected skin	20 minutes closed patch test on normal skin	2 day closed patch test on normal skin	Scratch test on fresh food	Scratch test on normal skin extract	Anamnestic cause of dermatitis
13	chicory						
	salad	no reactions	NT	++	NT	NT	shellfish
	tomato	vesicles	NT	neg	pos	NT	salmon
	lettuce	no reactions	NT	neg	neg	NT	onion
16							tomato
							lettuce
							chicory
							salad
20	cheese	no reactions	NT	NT	pos	NT	cheese
							onion
							herring
							shrimp
21	lobster	erythema, itching	neg	neg	NT	neg	fish
	codfish	erythema, itching	pos	++	NT	pos	shrimp
	herring	erythema, itching	neg	neg	NT	pos	
	plaice	erythema, itching	pos	++	NT	neg	
25	shrimp	erythema, pain	neg	neg	NT	neg	
29	herring	erythema and wheal	neg	neg	neg	neg	herring
	cheese	erythema and wheal	NT	neg	neg	NT	cheese
29	codfish	erythema, pain	neg	neg	neg	pos	herring
	plaice	erythema, pain	neg	neg	neg	neg	
	herring	erythema, pain	neg	neg	neg	neg	
	cheese	erythema, pain	NT	NT	neg	pos (i.c. test 1:10000)	
29							
29	herring	no reactions	neg	neg	pos	pos	herring
	plaice	no reactions	neg	neg	pos	pos	eel

Table 6. Results of 20 minutes and 2 day closed patch tests and scratch tests on normal skin with pertinent fresh foods. Scratch tests also with extracts (Allergologisk lab.)

Allergen	Patch tests pos/neg		Scratch tests pos/neg	
	20 min.	2 days	fresh food	extract
Codfish	1/19	2/18	3/14	5/15
Plaice	2/18	2/18	4/13	4/16
Herring	1/19	1/18	4/14	4/16
Lobster	1/15	1/15	0/13	2/18
Chicken	1/18	2/17	4/16	NT
Onion	0/16	6/14	0/19	NT
Garlic	0/16	7/13	1/10	NT

Results

The age and sex of the patients, the duration of employment in a kitchen and of dermatitis are summarized in table 1, which also includes information about an eventual change of occupation because of dermatitis.

Among 33 patients, 21 had one or more contact sensitivities and 25 had positive scratch tests. Two patients had negative patch and scratch tests. Table 2 illustrates the combination of such sensitivities.

Five had positive patch tests to metals. Table 3 lists these cases together with the remaining positive patch and scratch tests. Four of these patients also had positive scratch tests with materials relevant to their work.

Seven had a personal and/or family history of atopic disease. Three of these had hay-fever and positive scratch tests to pollen of grasses; two previously had atopic dermatitis and one had a dry skin. All except one had positive scratch tests; four were positive to fish. All except one had positive patch tests to haptens, none to proteinaceous materials. Two patients in this group had a contact sensitivity to garlic (table 4).



Fig. 3. Open patch tests on previously affected but presently non-eczematous skin can bring out a crop of dyshidrotic vesicles within 20 mins, accompanied by erythema and itching.

The results of 20 minute open patch tests on previously affected skin with incriminated foods are listed in table 5. The positive reactions observed were either urticarial or an eruption of vesicles with all the features of dermatitis. Four out of six patients tested had positive reactions to this provocation test.

Twenty patients had 20 minute and 2 day closed patch tests on normal skin with fresh fish, lobster, chicken, onion and garlic. Scratch tests were performed with these foods also, using fresh food and extracts. Three patients had positive scratch tests, 20 minutes and 2 day closed patch tests to proteins, while seven had positive scratch

Table 7. Total IgE in serum and Radio-allergosorbent test (RAST)

Norms: IgE total: 10-506 units/ml

RAST: arbitrary units: 0-7

Fish: mixed extract of codfish, herring, perch, pike dr. S. G. O. Johansson. Pt. no.: 5, 13, 15, 20

IgE total: 30-500 units/ml

RAST: arbitrary units: 0-4

Pharmacia AS. Pt. no.: 16, 25, 26, 29, 30

Patient no.	IgE total	IgE specific	Patch/scratch test with antigen	Anamnestic cause of dermatitis	Atopic disease personal/familial
5	690	fish: 4	neg/pos	herring, salmon, onion, cress	- / -
13	200	milk: 0 egg: 0 fish: 0 shellfish: 0	NT/neg NT/neg pos/pos pos/neg	shellfish salmon, onion lettuce, tomato chicory salad	- / -
15	180	fish: 5 egg: 1 milk: 0 tomato: 0 pea: 0 hen's feather: 0	neg/pos NT/neg NT/NT neg/neg NT/NT NT/NT	fish	- / -
16	60	codfish: 0	neg/neg	shrimp, herring cheese, onion	- / -
20	450	codfish: 6	pos/pos	fish shrimp	- / -
25	56	codfish: 0 milk: 0 egg: 0	neg/pos NT/pos NT/neg	fish	- / -
26	NT	milk: 1 egg: 1 codfish: 2	NT/NT NT/neg neg/pos	?	- / -
29	4000	codfish: 3	neg/pos	herring, eel salmon	- / -
30	170	milk: 0 egg: 0 codfish: 0 pollen of grasses: 3	NT/neg NT/neg neg/neg NT/pos	fish, shrimp onion, potato	hay-fever / -

tests only. Three had positive 2 day patch tests to garlic and onion only and seven had negative reactions throughout (table 6).

Radio-allergosorbent tests (RAST) were performed in nine patients who ascribed their eczema to contact with fish. Seven had

Table 8. Leucocyte migration inhibition test. Antigen concentration: 100 microgram protein/ml. Five patients tested against different antigens (dr. E. Andersen)

Patient no.	Antigen	Anamnestic cause of dermatitis	Scratch test/ patch test with antigen	MI < control	IgE total/specific against antigen
3	beef pork codfish	?	neg/NT neg/neg neg/NT	no no no	NT NT NT
5	codfish	herring, salmon onion, cress	pos/neg	no	690/4*)
12	lobster beef	beef, eel	neg/neg neg/neg	no no	NT NT
13	shrimp lobster	shellfish salmon, onion lettuce, tomato chicory salad	neg/+ neg/+ +	no no	200/0 200/0
15	shrimp lobster codfish chicken herring	fish	neg/neg neg/NT pos/neg pos/+ + pos/+	no no no no no	180/NT 180/NT 180/5*) 180/NT 180/5*)
No. of controls					
6	shrimp	*) tested against a mixed fish-extract of codfish, herring, perch and pike. Norms: IgE total: 10-506 units/ml fish, arbitrary units: 0-7 (RAST-test) Dr. S. G. O. Johansson MI = migration index.			
6	lobster				
3	beef				
6	pork				
4	codfish				
1	chicken				
0	herring				

positive scratch tests to fish and five of these had strongly positive RAST with fish. Two had a serum level of IgE higher than normal, both had positive RAST and scratch tests with fish but negative patch tests. Only one of these nine patients had a history of atopic disease (hay-fever). She had a positive scratch test and RAST to pollen of grasses, but was negative to fish (table 7).

Leucocyte migration inhibition tests (LMT) were negative in five patients whose

dermatitis was obviously clinically related to the allergens tested. Two had positive patch tests to these allergens (table 8).

Ten onion and/or garlic sensitive patients were patch-tested with onion and garlic extracted in different solvents. The results are listed in table 9. Some of these patients were further tested with allyldisulfide, allylisothiocyanate, chives, leek and chicory salad. Four patients sensitive to onion and garlic also had a positive reaction to allyldisulfide. Only one out of five tested with

Table 9. Garlic and/or onion sensitive patients

Patient no.	Garlic extract 1:10 ethanol	Garlic extract 1:10 water	as is	acc- tone	as is	Onion extract 1:10 water	Onion extract 1:10 ethanol	ether	acc- tone	allyl- disulphide 5% pet.	allyl- isothio- cyanate 0.1% pet.	chives as is	leek as is	chicory salad as is
4	NT	NT	NT	++	NT	NT	NT	NT	+	NT	NT	NT	NT	NT
5	NT	NT	NT	++	NT	NT	NT	NT	+	NT	NT	NT	NT	NT
6	NT	NT	NT	++	NT	NT	NT	NT	+	NT	NT	NT	NT	NT
8	NT	NT	NT	++	NT	NT	NT	NT	+	NT	NT	NT	NT	NT
13	NT	NT	NT	++	NT	NT	NT	NT	+	NT	NT	NT	NT	NT
17	NT	NT	NT	++	NT	NT	NT	NT	+	NT	NT	NT	NT	NT
20	NT	NT	NT	++	NT	NT	NT	NT	+	NT	NT	NT	NT	NT
27	NT	NT	NT	++	NT	NT	NT	NT	+	NT	NT	NT	NT	NT
28	NT	NT	NT	++	NT	NT	NT	NT	+	NT	NT	NT	NT	NT
32	NT	NT	NT	++	NT	NT	NT	NT	+	NT	NT	NT	NT	NT

allylisothiocyanate had a positive reaction. This patient also had a positive reaction to chicory salad. Six out of nine had positive reactions to chives and five out of six were sensitive to leek.

Six patients with a positive immediate type I reaction to codfish were scratch-tested with a dialyzed extract of codfish, kindly prepared by Dr. I. Gjerløff, Gentofte Hospital, Denmark. The positive reactions were ascribed to the protein fraction throughout except in one case, and not to the low molecular weight fraction. Four of these patients had a positive RAST to codfish (table 10).

In fifteen patients who ascribed their dermatitis to contact with fish or shellfish, eight had positive scratch tests to one or more of these allergens and four had positive 2 day closed patch tests. Three had positive 20 minute open patch tests on previously affected skin. Four had negative reactions throughout but in these, patch tests on previously affected skin were not performed and three of them were not tested by the RAST. Five out of eight tested had positive RAST with fish (table 11).

The patch and scratch test battery, including controls, are summarized in tables 12 and 13.

Comments

The very number of cases available for analysis proves that the work of preparing food carries a high occupational risk. We have previously assumed that allergic contact dermatitis was caused exclusively by haptens. In this particular group of patients, contact with proteins can also bring out acute dermatitis. We have also previously assumed that the late developing dermatitis of the hands in atopic persons was due to their dry skin and low resistance to irritants. This does not hold true. A total of 25 had one or more positive immediate type I reactions; among these, six had a personal

Table 10. Scratch tests with dialysed extract of codfish, commercial extract of codfish (Allergologisk Lab.) and fresh codfish

Patient no.	Dialysed extract		Commercial extract	Codfish as is	IgE total Units/ml	RAST with codfish
	Protein fraction	Low molecular fraction				
13	pos	neg	neg	pos	4000	3
15	pos	neg	pos	pos	180	5
20	pos	neg	pos	NT	450	6
25	pos	neg	neg	neg	56	0
26	neg	pos	pos	pos	NT	2
29	pos	neg	neg	pos	4000	3

Table 11. Results of tests with fish and/or shellfish in 15 patients who ascribed their dermatitis to contact with these allergens.

	Positive	Negative
2 day closed patch tests on normal skin	4	11
20 min. open patch tests on affected skin	3	1
Scratch tests	8	7
RAST with fish	5	3

and/or family history of atopy, of whom only two had previously had atopic dermatitis. Many of the patients in this series can be classified only with difficulty as suffering from atopic dermatitis, and if so it must be atopic contact dermatitis.

Juhlin et al. (1969) found the serum level of IgE to be significantly greater than normal in patients with atopic dermatitis. In this material seven out of nine had a serum level of IgE within normal ranges.

In 1967, Malten coined the term of "eczema hybrids", i.e. contact dermatitis caused by concurrent atopic and contact sensitivity. He suggested that contact dermatitis in atopic persons might be aggravated by contact with proteins whose penetration through the epidermis was facilitated by the eczematous state of the skin.

The present series of cases suggests that a contact dermatitis may develop from contact with proteins on apparently normal skin. In some cases irritants may have started the dermatitis and thus facilitated the later penetration of the proteins. In other cases, however, contact with proteins may have caused a primary vascular reaction, and this may have facilitated the development of the irritant or allergic contact dermatitis.

Sensitization must have occurred from skin contact. Remarkably few of those who had positive scratch tests reacted to common inhalants, which are otherwise the common allergens in the age group between 10 and 30 years. The patients in this series have atopic sensitivities to the foods they touch.

Eight out of 15 patients who ascribed their eczema to contact with fish or shellfish had their suspicion confirmed by the results of scratch tests, while 2 day closed patch tests on normal skin were positive in only four cases. Many foods, especially fish and shellfish, tend to decay under a 2 day closed patch test. Biopsy of positive patch tests have not been done. We cannot with certainty state that these positive reactions are allergic rather than irritant. However, control patch tests in consecutive patients

with different kinds of dermatitis point to the view that the clinically relevant positive patch tests with different kinds of foods including proteinaceous materials are to be considered as allergic.

Protein allergens must thus be able to penetrate the skin. Patch tests on the normal skin of the back with fish and meat caused an erythema and/or wheal after 20 minutes' contact in three out of 20 patients who ascribed their eczema to contact with proteins. The rapidity of reaction is remarkable if it indicates a passage of protein from the skin surface to the dermis within 20 minutes. Possibly contact with the allergen releases some mediator which penetrates more rapidly. In six cases open patch tests were performed on previously affected skin on the fingers. Four of these developed visible dyshidrotic vesicles, wheals or erythema and itching at the site of contact within 30 minutes; the relevance of this exposure is supported by the history of our patients, among whom those who stated that handling of food caused irritation also stated that the itching and erythema developed within half an hour.

Recently Maibach (1975) has described a case very similar to the patients in this series. A female aged 51 had a hand eczema of 25 years' duration. Her past history in-

Proteinaceous materials: 2 day closed patch tests with fresh foods.

	patients		controls	
	pos	neg	pos	neg
chicken	2	16	0	54
herring	2	20	0	54
codfish	3	20	0	54
plaice	4	18	0	54
lobster	1	19	0	54

Vegetables: 2 day closed patch tests with fresh foods.

cucumber	1	19	0	67
leek	5	17	2	57
chives	6	23	1	58
carrot	1	19	0	62
cress	1	23	0	55
horseradish	1	19	0	55
chicory salad	1	18	1	57
onion	7	28	2	50
(extract or fresh)				
garlic	10	28	2	61
(extract or fresh)				
allylisothiocyanate				
0.1 % pet.	1	12	2	41
allylsulphide				
5 % pet.	3	10	0	41

Spices: as is or extracts

			no controls
cardamon	1	16	—
ginger	1	2	—
citronelle	1	16	—
oil 2 % pet.			
korriander	1	1	—

The following were negative throughout:

pork, beef, veal, pig's liver, salmon, eel, celery, artichoke, potato, lettuce, wondersalad, green pepper, red pepper, tomato, radish, dill, parsley, thyme, chervil, apple, capers, lemon peel and flesh, orange peel and flesh, beetroot, asparagus, mushroom.

All spices 5 % alc., laurel leaf 1 % pet., pepper (black) 1 %, vanilla, monosodiumglutamate 10 % pet., paprika, cinnamic aldehyde 5 % pet., eugenol 2 % pet., cayenne pepper, nutmeg, marjoram oil 5 % alc.

Table 12. Special patch test battery for food handlers

Standard series: total tested: 33

Positive:

nickel:	3
cobalt:	2
chromate:	1
neomycin:	2
lanolin:	1
colophony:	2
formalin:	1
turpentine:	1
primula:	1

Antioxidants: total tested: 15, all negative

NDGA 2 % pet., BHA 2 % pet., BHT 2 % pet.

Table 13. Special scratch test battery for food handlers

Standard series: total tested: 33

Positive:

hazel nut:	2
brazil nut:	1
grasses:	8
cat's hair:	3
codfish:	8
plaice:	5
shrimp:	1
wheat:	2
lobster:	2
herring:	6
barley:	1
maize:	1
rye:	1
cow's hair:	1
birch:	3
chrysanthemum:	2
horse dander:	2
crab:	2
house dust: :	3

Proteinaceous materials (fresh foods)

	patients		controls	
	pos	neg	pos	neg
pork	1	27	1	78
veal	1	28	1	78
lamb	1	26	0	79
horse flesh	2	25	3	75
duck	1	26	0	79
chicken	3	27	0	79
cheese	5	19	8	71
crayfish	2	26	7	72
oyster	1	26	0	79
mussel	1	26	0	79
salmon	2	25	0	79
eel	7	21	2	77
mackerel	14	11	17	62
codfish	4	19	0	54
plaice	4	15	1	53
herring	4	15	0	54

Vegetables (fresh foods)

cucumber	1	25	0	79
tomato	2	27	1	78
rapeseed	1	24	2	77
parsley root	1	13	1	77
garlic	1	10	0	54

cluded flexural eczema as a young child, intermittent hay-fever and asthma and a family history of atopic diseases. Application of pertinent foods caused a wheal and flare response on chronically inflamed skin, but not on normal skin. Scratch tests on normal skin were positive with the same foods (i.e. turkey skin, ground lamb and wheat flour). Standard patch tests were negative. Avoiding contact with these foods almost cleared the eczema.

Among patients with atopic eczema and sensitivity to house dust mites, three out of 13 dramatically improved after treatment of the skin with lindane and DDT (Alani & Hjorth 1970). Thus, some protein allergens may cause itching in atopic eczema. Contact with animal hair would seem to be a major cause of dermatitis in veterinary surgeons (Hjorth & Roed-Petersen 1975) and in milkers (Epstein 1948). Irritant dermatitis is common in both occupations and may be a prerequisite.

Coincidental occurrence of atopic and contact sensitivity was found in 233 out of 4,000 persons with eczema tested by the International Contact Dermatitis Research Group (Cronin et al. 1970), but in this study relevant atopic sensitivities were not discussed. The incidence of positive reactions for those with atopic dermatitis, seborrhoeic dermatitis and nummular eczema was similar.

Garlic predominated among the contact allergies, although garlic is used very sparingly in Danish cooking. Seven out of ten garlic sensitive patients also had a positive reaction to onion, but six of them only to fresh onion and not to extracts in different solvents. Four of the ten garlic sensitive

The following were negative throughout: beef, garfish, borecole, lettuce, onion, chives, parsley, pea, apple, walnut, coconut, peanut, celery, carrot, horseradish, potato, spinach, orange, lemon, grape.



Fig. 4. In some patients open patch tests on normal skin bring out an immediate type urticarial reaction.

patients were tested with allyldisulphide and all were positive. They also had positive reactions to chives and leek. Allyldisulphide thus seems to be a common allergen in these vegetables.

In three patients sensitive to garlic and onion attempts have been made to desensitize the patients giving extracts of garlic or onion perorally, following the same procedure as Kligman (1958) in his experiments with peroral desensitization against poison ivy. After two, four and nine months' treatment respectively with increasing doses of the extract the experiment was abandoned because there was no effect. The patients complained of a constant feeling of unpleasant flavour from their skin and breath, but were all very co-operative.

Garlic dermatitis has previously been described by Edelstein (1950), Burks (1954) and Bleumink & Nater (1973). The latter

found that the allergen is soluble in water rather than in lipid.

As might be expected, several patients were sensitive to nickel. For unknown reasons two were sensitive to cobalt and not to nickel. Metal sensitive patients had the same incidence of type I reactions compared with the rest of the material, but none of them had a personal or family history of atopic disease.

Lobitz et al. (1972) found that lymphocyte mediated sensitivity was depressed in severe chronic atopic dermatitis, thus their patients could not be sensitized to DNCB, and the lymphocytes had a diminished responsiveness to phytohemagglutinin. Direct immunofluorescence tests showed the medium and small lymphocytes in the peripheral blood to be coated by IgE. IgE, however, could not be demonstrated in the skin. None of our patients presented a

severe and widespread dermatitis, and their immediate type hypersensitivities did not prevent them from developing contact sensitivities.

Conclusion

Chefs and sandwich-makers have a high incidence of contact dermatitis. Many complain that their dermatitis is caused by contact with proteinaceous materials such as fish and shellfish. Scratch tests, RAST and application of the incriminated substances on previously affected skin show that the apparent protein contact dermatitis here is related to an immediate type hypersensitivity. Patch tests and LMT are usually negative.

Common haptenic allergens in these trades are garlic, onion and chives; sometimes other vegetables such as cucumber, horseradish, leek, parsley and tomato. Sensitivity to nickel and cobalt was frequent, but not the major cause of dermatitis.

Two day patch tests are inadequate in the examination of occupational dermatitis in food-handlers. We suggest that an examination by scratch tests and a 20 minute exposure first on normal and next on previously affected skin with suspected foods must be included in such patients if suspected of occupational dermatitis. RAST should be performed when possible to pertinent foods.

We suggest that protein can 1) cause a primary allergic dermatitis, here termed protein contact dermatitis, 2) aggravate allergic and irritant dermatitis and 3) cause a pre-existing atopic dermatitis to flare.

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