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Skin Reactions to Foods in Patients with Atopic Dermatitis

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Thirty-seven patients with moderate or severe persistent atopic dermatitis gave a history of skin reactions following the ingestion of certain foods. These reactions fell into three groups: [a]immediate reactions (within one hour) which included angio-oedema, contact urticaria, generalised itching and erythema, or urticaria; [b]late reactions, where patients experienced late urticaria, late angio-oedema, itching, or exacerbation of the dermatitis; [c]dual reactions where immediate reactions were followed by exacerbation of the atopic dermatitis. The foods implicated were either potential allergens or recognised non-immunological histamine-release agents. Foods which caused an IgE-mediated reaction tended to produce early or dual reactions whereas histamine releasing foods tended to result in late reactions. *Key words: Food allergy; Atopic dermatitis; Angio-oedema; Urticaria.*

The role of food allergy and food intolerance in the precipitation and exacerbation of atopic dermatitis is a continuing source of controversy. It is known that in atopic infants, food allergy is relatively common but many of these allergies are outgrown during early childhood. Symptoms include angio-oedema, contact urticaria, generalised erythema and itching, as well as asthma, rhinitis and gastrointestinal symptoms. In adults also, especially those with severe atopic dermatitis, IgE-mediated food allergy occurs not infrequently: this does not, however, imply an inevitable causal relationship between the two.

We set out to define, from questioning a group of adults and adolescents with moderate or severe atopic dermatitis, which foods, if any, caused skin manifestations, and in particular whether exacerbation of atopic dermatitis ensued.

PATIENTS AND METHODS

Fifty patients aged 9–57 years (mean 29 years) with moderate or severe persistent atopic dermatitis, were asked whether ingestion of any foods or drinks precipitated symptoms related to the skin. If they gave a positive response more details were ascertained about the nature and timing of these reactions for each food implicated, including possible aggravation of the dermatitis.

Skin prick tests using Bencard allergens (Bencard, Brentford, U.K.) were performed to hen's egg, cow's milk, codfish, crab, wheat, cheese, chocolate, pork/bacon, strawberry and mixed nuts. A weal of greater than 5 mm in diameter was regarded as positive.

RESULTS

Thirty-seven of the 50 patients reported skin symptoms following ingestion of one or more foods (range of 1 to 12 foods). In addition 5 patients reported the onset of asthma within 1 hour following ingestion of fish, eggs, nuts or cheese. The most commonly implicated foods are listed in Table I, with corresponding positive prick test results where appropriate. They include potential allergens, e.g. hen's egg, fish, cow's milk, and a group of foods containing histamine releasing agents, e.g. alcohol and colourings. Some foods, e.g. chocolate, strawberry and cheese are both potential allergens and histamine releasing agents.

Reactions included angio-oedema, facial or widespread erythema, urticaria, itchiness and exacerbation of eczema. The timing of the reactions fell into three groups, although

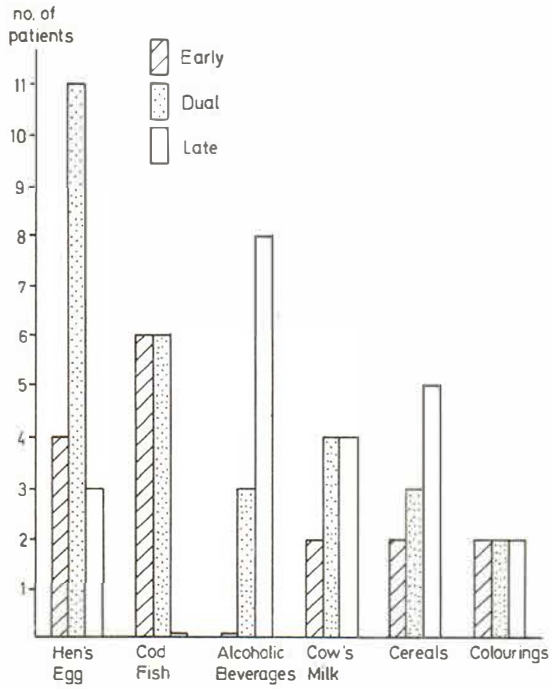

Fig. 1. Temporal distribution of reactions to 6 foods.

there was overlap of the type of symptoms experienced between the groups especially for itching and erythematous rashes. The groups were defined as follows: (*a*) immediate onset of symptoms within 1 hour (and often immediately after ingestion of food): angio-oedema, contact urticaria, generalised itching and erythema, and urticaria; (*b*) a late reaction where there were no symptoms for at least 1 hour after ingestion of food: either aggravation of

Table 1. *Foods precipitating skin manifestations in 37 patients with atopic dermatitis*
ND = not done

Food	Total	Early	Dual	Late	Positive prick tests (>5 mm)
Hen's egg	18	4	11	3	13
Fish	12	6	6	0	10
Alcoholic beverages	11	0	3	8	ND
Cow's milk	10	2	4	4	3
Cereals	10	2	3	5	2
Cheese	9	2	5	2	2
Chocolate	9	3	4	2	2
Peanuts	8	1	3	4	ND
Pork/bacon	7	2	5	0	4
Strawberry	7	3	2	2	0
Colourings	6	2	2	2	ND
Nuts	5	2	3	0	1

Adapted from immediate, dual and late reactions in atopic eczema. R. StC. Barnetson & E. C. Benton. In: The Urticarias. Eds. R. H. Champion. M. W. Greaves. A. Kobza Black and R. J. Pye. Churchill Livingstone. Edinburgh, 1985.

eczema, or urticaria which usually occurred between 12 and 24 hours; (*c*) dual reactions where angio-oedema or erythema occurred within 1 hour, being followed several hours later (usually less than 12 hours) by aggravation of the eczema, itching or a diffuse erythematous eruption.

Fig. 1 shows the reactions to six foods, four well documented allergen-containing foods—hen's egg, codfish, cow's milk and wheat, and two substances containing potent histamine release agents, i.e. alcoholic beverages and colourings. The reactions to egg and codfish were nearly always early or dual reactions, whereas those to alcoholic beverages and colourings were usually late. Interestingly, almost half the reactions to milk and wheat, both potential allergens, were late, and very few patients had positive prick tests to these foods.

DISCUSSION

Reactions to foods whether due to allergy or intolerance are subject to a number of variables.

When food, either in solid or liquid form is ingested, it first comes into contact with the oral mucosa where it may cause mast cell degranulation in sensitised individuals, resulting in angio-oedema. At this stage the food is unmodified by gastric acid.

The first few mouthfuls of a meal usually flow into the jejunum almost immediately. Thereafter the stomach acts as a reservoir, where secretion of hydrochloric acid and pepsin may alter the antigenicity of the food. On entry to the small intestine the food is subjected to enzymes in the intestinal fluid which may again modify food antigenicity.

Degranulation of mucosal mast cells in the jejunal mucosa as a result of antigen exposure may lead to intestinal symptoms such as vomiting, diarrhoea or abdominal pain. However, it is interesting to note that even when patients have been challenged scientifically, such symptoms only occur in a minority of patients (1); in the vast majority skin symptoms predominated and studies of plasma histamine levels suggested that histamine release resulted from skin mast cell degranulation, presumably due to absorbed antigen.

In those patients with IgE-mediated food allergy it would be expected that comparatively small amounts of allergen are required to be absorbed before mast cell degranulation in the skin occurs, as this is an immunological phenomenon. Thus urticaria or late angio-oedema as a result of absorbed food antigens may occur soon after ingestion of the food: in contrast, with pharmacological agents such as histamine release agents, much more food would have to be absorbed before skin symptoms occurred, and urticaria in this case may well occur later.

The results of our questioning of patients support this concept with many more early and dual reactions being seen with potential allergens and more late reactions with ingestants such as alcoholic beverages or colourings. In the case of milk and wheat, both potential allergens, a considerable proportion of the reactions to these were late and only 20–30% of patients had positive prick tests to these foods. This is in keeping with observations made by both Atherton (2) and Lessof (3). It is possible that with these foods other mechanisms, either immunological or non-immunological, are involved.

Histamine release by immunological or non-immunological means can account for the appearance of angio-oedema, urticaria and erythema of the skin. However, exacerbation of dermatitis would not appear to occur as a direct result of this, especially since it does not always inevitably follow these early reactions. Possible mechanisms for exacerbation of the atopic dermatitis include second phase leukotriene release from neutrophils and eosinophils, basophil recruitment, or immune complex deposition in the skin: such mechanisms clearly require further investigation.

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