

Food allergy and intolerance

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DEFINITION

The definition of food allergy is based on the clinical reaction being produced by a recognised type of hypersensitivity mechanism. The reaction when IgE mediated is immediate, usually within 1 hour and consists of swelling of the tongue or other parts of the upper gastro-intestinal tract, and can also produce a systemic response with urticaria, vomiting and diarrhoea. There may well be a Type 4 mediated response in the gut which at the present time is not easily accessible for study(1).

Food intolerance implies reactions for which no immunological mechanism can be delineated. The clinical picture can be indistinguishable from an allergic reaction and it is not possible to make the distinction on the history alone. Under the umbrella of food intolerance there must be many different types of reaction from the pharmacological, enzyme deficiency, pseudo-allergic, psychological and toxic(2).

Prausnitz and Kustner

The original description of the reaginic antibody by Prausnitz and Kustner showed that the allergic "fraction" of the serum could be transferred to another individual and there mediate an allergic reaction(3). It is interesting that Kustner was allergic to cooked and not fresh fish. Some years later, Prausnitz mentioned that on occasions when he had injected some of Kustner's serum into his own skin and then eaten fish, the skin test site showed a classical wheal and flare reaction. This is evidence that the food was absorbed from the gut into the circulation and was able to reach the skin test site and trigger IgE sensitized mast cells in the dermis.

DIAGNOSIS

The diagnosis of IgE mediated food allergy should be straightforward involving a clinical history and both in vivo and in vitro tests for IgE mediated allergy. The reaction is immediate, the patient knows that they are allergic and the amounts of food needed to bring on the response are small. Usually only a small number of foods are involved.

With the delayed reactions associated with food intolerance the clinical picture is very different. The patient does not know that they are allergic and indeed they often crave the food to which they are sensitive. There are often withdrawal reactions when the food is avoided. In comparison with food allergy, large amounts of the food are needed to cause a reaction and a significant number of foods are involved. Needless to say, tests for IgE mediated reactions are negative.

ENZYME DEFICIENCY

Lactase

Of the many enzyme deficiencies known, the most common world-wide is alactasia, occurring in almost 75% of the population of the world(4).

Cytochrome P450 enzyme pathways

With regard to food intolerance, xenobiotic metabolism is crucial for the solubilisation and elimination of food chemicals. We have described an abnormality of the Cytochrome P450 enzyme pathway in food sensitive subjects where a high proportion of the patients are slow metabolisers of the probe substrate compared with normal subjects.

This enzyme is crucial for the degradation of a number of drugs including theophylline. Fevers alter the metabolic status of the individual from fast to slow thus accounting for the theophylline toxicity seen in some asthmatics following a virus infection.

Phenolsulphotransferase P

The sulphation of phenolic compounds in food is also important in xenobiotic pathways(5). Defects in this enzyme have been suggested as a cause of food

induced migraine. Further work needs to be done in this area as there are a large number of common foods which contain large amounts of phenolic compounds.

EXORPHINS

The name for these compounds is derived from exogenous morphine like compounds. These are produced as a result of digestion of wheat, milk and some other foods and the active molecule is said to be able to cross the blood-brain barrier. The opioid like activity is shown by the ability to block its pharmacological effects with a morphine antagonist such as naloxone(6). These compounds may be important in the addictive behaviour of some patients with food intolerance.

Bulimia

More interesting in some ways is the preliminary data in bulimia where the bingeing behaviour can be blocked with the oral morphine antagonist naltrexone (7,8). These data may allow us to re-define bulimia and allow specific pharmacological questions to be asked in a sub-group of these patients.

THE PLASTIC ROSE SYNDROME

The reasons why food intolerance has got such a bad name is partly because of the lack of in vitro tests for diagnosis, the absence of an animal model for study, the "soft" symptoms that many of the patients display, not to mention the scepticism and arrogance of the medical profession. It is said that many of the patients with food intolerance have marked psychological problems and their symptoms are a stress response or a form of somatisation. Many patients also hyperventilate and this is often put down as the cause rather than the effect of their food sensitivity.

The Plastic Rose Syndrome may reconcile some of these divergent views. If a patient is allergic to roses and is then shown a plastic rose and sneezes, it might be suggested that their allergy is "all in the mind". It is indeed possible to induce pavlovian conditioning to produce an allergic response in animals, but only in those who have previously been sensitized to an allergen

(9,10). Where an animal has not been allergically sensitized, there is no allergic response. This model system clearly shows that psychological factors can affect an allergic response, as has been shown in paediatric migraine by Eggar and colleagues, but is not the cause of them(11). Once the allergen has been removed, the non-specific or psychological triggers no longer produce the clinical symptoms.

SYNDROMES ASSOCIATED WITH FOOD SENSITIVITY

There is increasing evidence that food sensitivity can be associated with various syndromes and that removal of food from the diet has considerable beneficial effect on the patients health and well-being. There is an increasing number of diseases that now respond to food elimination with the restoration of the patients health. The list now includes irritable bowel syndrome, Crohns disease, atopic eczema, rhinitis, asthma, arthritis, urticaria, migraine or other allergic manifestations (for review see 2). This list will surely grow in number as we understand more of the mechanisms underlying this protean response to food which ranks as the largest and most prolonged immunological, biochemical and pharmacological stimulus that the body receives.

REFERENCES

1. Immunology, 2nd. Ed. Roitt et al, Gower Medical Publishing, 1990
2. Food Allergy and Intolerance, Ed. Brostoff & Challacombe, Bailliere Tindall, 1987
3. Prausnitz C & Kustner H. 1921; translated in Clinical Aspects of Immunology, Ed. Gell & Coombs, Blackwells, 1962
4. Gray, G M. In: Nutrition and Gastroenterology, Ed. Winick, Wiley, New York, 1980
5. Littlewood et al, Lancet 1982, i, 983
6. Morley, et al, Gastroenterology, 1983, 84, 1517
7. Jones et al, Lancet 1986, i, 807
8. Apfelbaum et al, Lancet 1987 ii, 1088
9. Russell et al, 1984, Science, 225 733
10. MacQueen et al, 1989, Science, 243, 83
11. Eggar et al, 1983, Lancet, ii, 865

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