

CHAPTER 11

Dietary treatment of food allergy and intolerance

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This paper is written from a dietitian's point of view and contains dietetic details which are often not referred to in scientific papers. It may therefore be regarded as somewhat empirical.

Dietary manipulation is the mainstay for both diagnosis and treatment of food allergy or intolerance. Rapid reactions to food producing symptoms occurring within an hour can happen when the subject has been exposed to a very small amount of the provoking food. In such cases the culprit food is generally obvious. Slow reactions to foods are likely to occur after hours or days and only when a considerable quantity of the food has been eaten. In such circumstances provoking foods are hard to pinpoint and an elimination diet may be useful.

The dietary manipulations used for diagnosis are broadly similar whatever the symptoms may be and they may also exclude a diagnosis that has been wrongly made. Since restricted diets require considerable effort on the part of the patient and possibly the whole family, a number of points must be considered before a diet is embarked upon: are the clinical symptoms severe enough to warrant a diet? For example, a child with eczema should not be put on a diet unless he/she has failed to respond to optimum topical treatment; is the child or parent motivated and able to adhere to the diet? Non-compliance renders the diet trial a waste of time; and, unless a relationship with food seems likely from diet history, other disease should be excluded before embarking on a diet trial, particularly if symptoms are very severe (e.g. headaches).

The dietary manipulations involved

The diagnosis and treatment of food allergy or intolerance will involve several phases of dietary manipulation if provoking foods have not already been identified. The first comprises an appropriate elimination diet which should be used for 2–6 weeks. The length of time will depend on frequency and type of symptoms and degree of restriction of diet (improvement in gastrointestinal symptoms may occur within a day or two whereas improvement in eczema may take a week or two). If successful, this diet will result in significant relief of the

symptoms. The second phase involves a series of open reintroductions to identify provoking foods and the third phase is the adherence to a maintenance diet excluding foods that have caused problems. A firm diagnosis can only be made, however, if intolerance to a food or foods as indicated from open reintroductions can be confirmed by a double-blind placebo-controlled food challenge (DBPCFC).

Attention must always be paid to nutritional adequacy during these dietary manipulations. The initial diagnostic diet may not be adequate and supplements particularly of vitamins and calcium may be used (Table 1). However, this initial diet is used for only a short time and it can be argued that supplements are unnecessary at this stage. Indeed, highly food-intolerant children may be adversely affected by the supplements themselves. The important thing is that close attention is paid to adequate nutrition during the reintroduction phase so that the final maintenance diet is adequate and supplements are incorporated if necessary.

Throughout the period of dietary manipulations and for at least a week before any diet starts it is extremely useful for the patient or parent to keep a symptom score diary. It is then possible to be less subjective about change in severity of symptoms. Physical effects can be listed at the end of each day and a numerical score can be inserted for each one, e.g. 0 for no symptoms and 1–3 for symptoms which are mild, moderate or severe. Where it is suspected that attention deficit and hyperactivity may be provoked by food it is useful to use a shortened form of the Conner's score (Table 2) [1], bearing in mind, however, that this system can do no more than assess the subjective view of the parents.

A full diet history is mandatory before embarking on a diet and may indicate possible provoking foods. It is not uncommon for a person to come to the wrong conclusions as to which foods affect them or their child and intolerance to foods eaten several times every day such as wheat or milk may go completely unnoticed. The initial diet may exclude one or a large number of foods. The choice of diet is a matter of clinical judgement taking into account age, severity and frequency of symptoms and whether diets have already been tried. There are four main types of diet: simple exclusion, empirical, few foods, or hypoallergenic formula.

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Table 1. Two examples of few food diets

Under 2-year-olds require a nutritionally adequate milk substitute. This diet should not be used for longer than 4 weeks.

<i>A</i>	<i>B</i>
Turkey	Lamb
Cabbage, sprouts, broccoli, cauliflower	Carrots, parsnips
Potato, potato flour	Rice, rice flour
Banana	
Soya oil	Pear
Tap water	Sunflower oil
	Tap water

Possible additions: whey-free margarine, sugar for baking, plain potato crisps, juice and jam from allowed fruits, salt, pepper and herbs in cooking, other root and green vegetables, especially onion.

Possible variations: bottle water, rabbit or pork instead of above meats, peaches, apricots, melon or pineapple instead of above fruits.

A calcium (300–400 mg/d) and vitamin supplement is advisable: calcium gluconate effervescent (1g) $\times 3$ daily or calcium lactate (300 mg) $\times 6$ daily or Sandocal 400 $\times 1$ daily. Abidec 0.6 mL/d.

NB. A less restricted approach consists of allowing all the foods listed in A and B.

Phase 1. Elimination diets

Simple exclusion

When reactions are rapid it is easy to identify the pro-

voking food which may be nutritionally unimportant, for example nuts. Sometimes rapid reactions happen with staples such as cow's milk and so an alternative to milk must be considered and is mandatory in infants. Quick reactions to food can be severe and are occasionally life-threatening, so complete avoidance is vital.

Empirical

An empirical diet is used where allergy or intolerance is suspected, but the causative agents are not known. Here, some of the most commonly provoking foods are avoided. In infants the most frequent offender is cow's milk-based infant formula or the milk itself, so a cow's milk protein free diet is frequently used. A combined US experience of frequency of food allergy (mostly in children) from DBPCFC results [2] shows that the eight most common provoking foods in order of frequency are egg, peanut, milk, soy, tree nuts, crustaceans, fish and wheat. These results refer mainly to immediate responses to food. Studies with children who have delayed reactions (where admittedly the results came from open reintroductions) indicate that the list of foods is similar but that chocolate and some food additives are more common and nuts less so [3–7]. Perhaps there is also a difference if one looks at the incidence in countries where the staple foods are different (e.g. could rice be a more frequently offending food in countries where that food is a staple?).

A diet avoiding milk and egg is recommended by several centres for children with severe eczema and the recommendations also suggest avoiding beef, chicken,

Table 2. Short form of Conner's scale for hyperactivity

Observation date	Degree of activity			
	Not at all	Just a little	Pretty much	Very much
Restless or overactive				
Excitable, impulsive				
Disturbs other children				
Short attention span				
Constantly fidgeting				
Inattentive, easily distracted				
Demands must be met immediately				
Cries often and easily				
Mood changes quickly and drastically				
Temper outbursts, explosive and unpredictable behaviour				

fish and some food additives. The additional avoidance of nuts and all fruit, except bananas, has been advocated by some workers in this field [8].

An empirical diet which is frequently used for a variety of symptoms involves avoiding cow's (and sheep's and goat's) milk, egg, all grains (sometimes rice is allowed), citrus fruit, chocolate and some food additives. The additives usually avoided here are azo, coal tar and erythrosine dyes; and benzoate, nitrite and sulphur dioxide preservatives. Food additives are discussed in more detail elsewhere. A diet similar to the above was described in 1959 by Rowe, Rowe and Young [9] for the diagnosis and treatment of food-induced asthma.

Empirical diets can have their problems when excluded foods are inadvertently replaced by others which are also capable of causing reactions. For example, a child on a milk-free diet may drink soya milk or orange juice instead which can also cause problems. Failure to respond to an empirical diet does not rule out the possibility of food intolerance. More restricted diets therefore have a role to play.

Few foods

There are considerable difficulties in advising people on avoiding a large number of foods. It is easier to teach the individual what he can eat rather than concentrating on what is forbidden. This is the few food diet which includes those foods least likely to cause problems. Three to four weeks is the longest time one should consider using this degree of restriction although improvement may occur in a shorter time.

The diet used by Minford *et al.* [10] for children, consisted of lamb, rice, carrots, pears, peaches and apricots, sugar, tea, milk-free margarine, soya or casein hydrolysate infant formula. In a variation of this, for children with severe atopic eczema who had not responded to a simple empirical diet, Atherton used two diets [11] similar to those shown in Table 1, the second one to be given if the first was ineffective. Bock and Sampson describe a diet using rice, tapioca, lamb, chicken, olive oil, sugar and honey, asparagus, beets, carrots, lettuce, sweet potato, pineapple, apricots, cranberries, peaches, pears, and apples [2]. Pike *et al.* [12] used a similar diet incorporating rarely eaten foods such as rabbit, duck, sweet potato, buckwheat, lychees, guavas, etc. although very small numbers completed the study. Having used Atherton's diet in children with migraine [3], Egger *et al.* used a less restricted diet (Table 1) in three further studies with children who had migraine and epilepsy [4], hyperactivity [5] and migraine or hyperactivity with enuresis [6]. This diet was also used

by Carter *et al.* for a further study with hyperactive children [7]. This less restricted regime is much easier to follow but it is very difficult to find a completely different set of foods for a second attempt if the first is not helpful. It is necessary, therefore, to monitor progress closely and change or further restrict the diet during the third or fourth week in an attempt to achieve eventual success. As with other types of open diet the psychological effects of suggestion should be borne in mind before a 'third week improvement' is accepted as a basis for further dietary measures.

The acceptability of the few food diet depends greatly on the dietitian's advice as regards planning menus, giving ideas for main meals and recipes for baking with permitted flours [13]. Ideas for packed lunches should be given as most school canteens could not cope adequately with such a restricted diet. For vegetarians one would probably have to allow a larger range of vegetables, including pulses. The dietitian should keep in touch with the family and be available by telephone during this time.

Few foods and empirical diets should, where possible, be carried out in the home environment. It is important that the child's lifestyle is not altered otherwise changes in symptoms could be attributed to factors other than change in diet. For example, children with eczema may be affected by contact with or inhalation of substances so if they improve on a diet in hospital improvement may be due to change in the environment alone. Medication should not be changed for a few weeks prior to, or during, the dietary manipulations for the same reasons. Children on regular medication, such as antihistamines, should remain on these but be changed on to colour/additive free versions where possible. Attention should be paid to non-food items which may be consumed by a small child such as toothpaste (white toothpaste should be used), chalks and paints.

Hypoallergenic formula

Hypoallergenic or semi-elemental formulae can occasionally be justified for individuals who have not responded to a restricted diet, but this treatment should be very much a last resort as suitable products do not have a good taste and tube feeding may be necessary to achieve adequate nutrition. This will mean a hospital admission. Suitable products are listed in Table 3. These formulae have been used mainly for children with severe eczema [14] and also to obtain remission in Crohn's disease [15]. Any improvements in patients with Crohn's disease may relate to the lack of residue rather than low allergenicity.

Table 3. Extensively hydrolysed formulae available in the UK

Name	Manufacturer	Protein source
<i>Suitable for infants</i>		
Pregestimil	Mead Johnson	Hydrolysed casein
Nutramigen	Mead Jonson	Hydrolysed casein
Pepdite 0-2	SHS	Hydrolysed beef & soya
Pregomin	Milupa	Hydrolysed beef & soya
Alfare	Nestlé	Hydrolysed whey
Peptijunior	Cow and Gate	Hydrolysed whey
Neocate	SHS	Amino acids
<i>Suitable for older children and adults</i>		
Elemental 028	SHS	Amino acids
Pepdite 2+	SHS	Hydrolysed beef & soya
Flexical	Mead Johnson	Hydrolysed casein
Peptamen	Clintec	Hydrolysed whey

Hypoallergenic formulae for infants

The hypoallergenic or semi-elemental formula is often the feed of choice for an infant with cow's milk protein allergy or intolerance. There are a variety of such infant formulae available where the protein has been extensively hydrolysed (Table 3). Casein hydrolysates have been in use for over 40 years, whey hydrolysates for rather less time and hydrolysates of beef/soya have been recently introduced. A problem with these products, however, is their palatability (the latter have a slightly better taste) and whilst the infant will accept them quite readily, the child over 1 year or so may not. Although all the hydrolysates listed in Table 3 are regarded as extensively hydrolysed, there is some variation in the degree of hydrolysis, the casein products being the most highly hydrolysed (peptide sizes below 1200 Da). Although most of the studies showing the efficacy of these products in treating cow's milk protein intolerance have been carried out with casein and whey-based products, all the products listed in Table 3 are currently in use in the UK.

It should not be assumed that these extensively hydrolysed formulae will always be tolerated and anaphylactic reactions have been described with both casein and whey hydrolysates. This is reviewed by Sampson *et al.* [16]. The use of an amino acid based formula (Neocate) can be considered if hydrolysates are not tolerated. Sampson *et al.* have confirmed the usefulness of the product [16].

There are partially hydrolysed whey-based formulae available in some European countries and in the United States and Canada but not in the UK and these are intended for prophylaxis rather than treatment. These products are much more palatable than the extensively hydrolyzed formulae but are unlike them in that they

contain a considerable proportion of peptides with a molecular weight above 4000 Da. Frequent reports of adverse reactions to such products has prompted the American Academy of Pediatrics Subcommittee on Nutrition and Allergic Disease to recommend that a formula can be designated 'hypoallergenic' only when the base protein has been modified to reduce antigenicity so that 90% of subjects allergic to it can tolerate the formula with 95% confidence [17]. The partially hydrolysed products would be unlikely to meet these criteria. A committee within the European Society of Paediatric Allergy and Clinical Immunology (ESPACI) has endorsed this view and suggested that at present the extensively hydrolysed formulae should be used for both treatment and prevention of IgE mediated cow's milk intolerance [18]. It has been suggested that before the partially hydrolysed formulae can be endorsed for use in the general population some well conducted trials should be performed looking at issues of antigenicity, efficacy, nutritional adequacy and prophylactic use [19].

A study by Rugo *et al.* illustrates the great differences in allergenic activities (using *in vitro* and *in vivo* methods) between the extensively and partially hydrolysed formulae when looking at children with quick IgE mediated allergy [20]. There were also some differences between the various extensively hydrolysed formulae used, casein hydrolysates having the least residual antigenic activity.

Much of the literature on the subject of the use of hydrolysate formulae relates to quick IgE-mediated disease. As far as cow's milk sensitive enteropathy is concerned, both extensively hydrolysed casein and whey based formulae have shown to be satisfactory [21].

Solely breastfed infants who develop symptoms may benefit from some restriction of the mother's diet particularly milk avoidance. Reports of intolerance to minute amounts of cow's milk protein in breast-milk have been reviewed by Barau and Dupont [22].

An area of great interest is the effect of food allergen avoidance on infants of atopic parents. A very detailed paper by Zeiger *et al.* [23] show that this is a complicated issue. Those interested should read the whole paper as it cannot be reviewed adequately here. A treated group of infants of atopic parents (maternal avoidance of foods during the last trimester of pregnancy and during lactation and infants fed breast-milk or hydrolysate and weaned carefully) was compared with an untreated group (unrestricted diet for mothers and infants). Outcomes were different for food-related symptoms particularly atopic dermatitis and urticaria during the first year of life. At 2 years of age the differences between the groups diminished. By 3 and 4 years of age the period prevalence of food allergy became similar in the two groups. The cumulative prevalence of food allergy

Table 4. Diagnostic procedure for the identification of suspected food allergy or intolerance

Stage 1	Stage 2	Stage 3	Stage 4
Avoid: Dairy products, egg	Avoid: Dairy products Egg Chicken Game Pork Offal Fish Shellfish Fruit (except Rhubarb and banana) Vegetables (except those listed in stage 3) Chemical additives Alcohol Herbs/spices Nuts	Foods allowed: Lamb or rabbit Cabbage Carrots Celery Lettuce Rhubarb Sugar Treacle Syrup Salt Sago Tomor margarine Water Tea (without milk)	Hospital admission: Vivonex* (unflavoured) or glucose and electrolytes + distilled water + sago

From Hathaway MJ & Warner JO [27]. *No longer available in the UK.

remained lower in the treated group at 3–4 years. There was no difference between the two groups as regards allergic rhinitis or asthma at any stage. It was felt that both genetic and environmental factors are critical in the development of atopy and that any attempt at food allergen avoidance should be accompanied by consideration of these factors.

Infant formulae based on whole soy protein isolate have been available over the counter for many years and no doubt have been used inappropriately, without medical supervision, for vague symptoms on a large scale. The use of soy formula by clinicians for infants with cow's milk protein intolerance has decreased because of an increasing number of reports that it can provoke adverse reactions including enteropathy [24, 25]. Although the soy formula is therefore not recommended for gastro-enteropathic milk intolerance, its use may be justified for atopic infants with cow's milk allergy. This, however, is a controversial issue. Other reasons for not dismissing whole soy infant formulae are first, they are cheaper than hydrolysates and second, they are much more palatable.

Other mammalian milks, ewe's and goat's milk, are not suitable for infants with cow's milk protein intolerance as their nutritional composition is unsuitable for infant feeding, there is concern about microbial control and their proteins can be as highly sensitizing as cow's milk protein. Dean *et al.* have shown that there is strong crossreactivity between allergens in all mammalian milks (except human milk) [26].

Which elimination diet to use?

Warner and Hathaway have suggested that an empirical diet should be tried first, with a steadily increasing set of restrictions if it does not result in relief of symptoms [27] (Table 4). When the diet history indicates multiple intolerances, or if diets have already been tried, the few food diet may be the preferred first step. The most important thing about a prescribed diet, however, is that it should be practical for the individual patient and for example, there is no point in prescribing sago or rhubarb for children who dislike such foods (Table 4).

The most difficult age group for the few food diet is between 1 and 2 years of age. Many of these children are still reliant on milk for a significant proportion of their nutritional intake and should ideally take one of the hydrolysate formulae. Unfortunately these are often refused.

Phase 2. Reintroduction of foods

The sufferer or the parent of a child who has experienced significant relief of symptoms on a diet will usually want to carry on with it. Young infants who had severe symptoms and failure to thrive before change of formula should not be challenged with cow's milk or cow's milk-based formula too soon. Between 9 and 12 months may elapse to allow the child to thrive.

In an older child or adult, if the initial diet avoids several foods, these should be reintroduced singly in

Table 5. Open reintroduction of foods.

Each food should be given in normal quantities daily for a week before being allowed freely in the diet. A test dose may be recommended initially. The order of reintroduction depends on the patient's preference and on which foods were avoided initially.

Oats	Porridge oats, Scottish oatcakes, home-made flapjacks (if sugar is already allowed).
Corn	Sweetcorn, home made popcorn, cornflour, maize flour, cornflakes if malt is tolerated.
Meats	Try meats (including offal) singly, e.g. chicken, beef, pork.
Wheat	Wholemeal or unbleached white flour for baking, egg free pasta, shredded wheat, puffed wheat.
Yeast	Pitta bread. Ordinary bread (this usually also contains soya).
Rye	Worth trying if wheat is not tolerated. Pure rye crisbread. Pumpnickel.
Cow's milk	Fresh cow's milk, cream, butter, plain yoghurt, milk containing foods with tolerated ingredients, e.g. rice pudding. Try cheese separately later.
Cow's milk substitute	If cow's milk is not tolerated try substitutes one by one. Infant soya formula or infant hydrolysate formula, Ewe's milk, goat's milk for over 1-year olds (boiled or pasteurized). Supermarket liquid soya milk with additional calcium.
Egg	Use one whole fresh egg per day for test period. It may be preferred to begin with small amounts of egg in baking.
Fish	Fresh or fresh frozen (not smoked, battered etc.), e.g. cod, herring etc. If one type is not tolerated others may be. Try shellfish separately later.
Tomatoes	Fresh tomatoes, canned and puree tomatoes, ketchup.
Peas/beans	These include peas, green beans, kidney beans, lentils. Baked beans in tomato sauce if tomato is tolerated.
Orange	Pure orange juice, oranges, satsumas. If oranges are tolerated all citrus fruit probably is too.
Sugar	Use ordinary sugar on cereal, in drinks and baking. Some parents of hyperactive children comment that small amounts are tolerated whereas larger amounts are not.
Chocolate	Try only if sugar is tolerated. If diet is milk-free use milk-free chocolate. Cocoa powder in drinks and cooking.
Carob	Carob confectionery can be tried if chocolate is not tolerated. Check other ingredients — it may contain milk or soya.
Tea/coffee	Add milk if this is already in the diet.
Peanuts	Plain or salted peanuts (not for under 4-year-olds), peanut butter. Beware of peanut (arachis) oil in patients who have immediate severe reactions to peanuts.
Other nuts	Try singly or mixed.
Malt	Malt/malt flavouring is present in most breakfast cereals. Try Rice Krispies if rice is tolerated, etc.
Nitrite/nitrate	Corned beef if beef is tolerated, ham and bacon if pork is tolerated.
Sodium benzoate	Supermarket lemonade provided other ingredients are tolerated.
Sodium glutamate	Stock cubes, gravy mixes, flavoured crisps provided the other ingredients are tolerated.
Sodium meta-bisulphite	Some squashes, sausages provided the other ingredients are tolerated, dried fruit.
Vitamins minerals	These may be given if needed to enhance nutritional adequacy and introduced singly to test tolerance.

Other foods, e.g. fruit and vegetables, can be introduced gradually as desired. Manufactured foods such as ice-cream, biscuits can be introduced taking into account known sensitivities. Many additives, e.g. colours, flavours' will be introduced as mixtures in manufactured foods such as sweets and canned/bottled drinks. For children with multiple cereal intolerances, flours such as buckwheat, soya, gram (chickpea), and wheat-starch may be tried. Some of the special dietary products for gluten-free and low-protein diets may be suitable but other ingredients must be checked (they are not strictly prescribable for food allergy).

order to identify those which provoke symptoms. Each new food may be tried in a small test quantity and then given in normal amounts every day for a week. If symptoms have not recurred the food may be incorporated into the diet. A guide to reintroduction of foods is given in Table 5. The order of reintroduction should depend on the person's preferences and the aim for nutritional adequacy.

It is not unusual to find that people with multiple symptoms and intolerances react differently to different foods in terms of both speed and type of reaction. Immediate and delayed reactions can occur in the same individual.

Where there is a risk of an immediate severe reaction to a food reintroduction, that food should be either avoided or only given under supervision in hospital.

Fatal immediate reactions, although rare, do happen [28] and even late anaphylactic reactions have been reported [29]. Infants are especially at risk and milk introductions are best performed under medical supervision.

Phase 3. Maintenance diet

The maintenance diet has been achieved when the introduction of all foods has been attempted and the child is having the widest variety of foods possible. Nutritional adequacy is paramount and supplements are sometimes necessary. Children without milk or a nutritionally adequate substitute will need a calcium supplement [30].

Where foods such as milk have to be avoided, the dietitian can give advice as to how to avoid these completely. This is done by giving up-to-date information on foods free from the offending items and teaching people how to read labels on manufactured foods.

Since people (especially children) often lose their intolerances over a period of time, attempts should be made every 6–12 months to reintroduce avoided foods (particularly if they are staples such as milk or wheat). In fact this may happen in an unsupervised way as the result of an accidental or deliberate break in the diet. It is extremely important that introductions of food are only performed at home if there is no danger of a severe immediate reaction. As already described, if there is any concern at all this should be performed under medical supervision where resuscitation equipment is available.

Confirmation of food allergy or intolerance

Double-blind, placebo-controlled food challenges (DBPCFC) are regarded as the 'gold standard' for the confirmation of food allergy or intolerance and are essential for research into this subject. The results of a workshop set up in Washington, DC, to discuss issues related to research in this subject were published in 1986 with Metcalfe and Sampson as editors [31]. There is a great deal of useful information here. It is stated that before a DBPCFC can be designed for an individual patient one needs the following information: a description of the symptoms for each food, the length of time between ingestion and onset of symptoms, the quantity of food required to produce symptoms, the most recent and the most severe reaction, and any extenuating circumstances that may be necessary to elicit symptoms, such as exercise. Advice is given as to deciding on a challenge dose for quick reactions and it is emphasized that great care should be taken in subjects with a history of anaphylaxis. It is suggested that up to three positive responses to blind challenge and a similar

number of negative responses to placebo may be necessary if results of the first two are equivocal or if the end-point is based on subjective criteria (e.g. headaches). There is some discussion regarding the evaluation of subjects who report late or delayed onset of symptoms and it is suggested that at least three challenges matched with placebos are necessary to ensure reliable observations. This is ideal but may be very difficult to achieve in some circumstances. In a series of studies designed to look into the possible relationship between diet and migraine and also hyperactivity [3–7], children had foods introduced openly after an initial few foods diet in order to target foods for use in DBPCFC. Where foods appeared to result in a relapse it was very common for the parents to report this after three days or more of eating normal amounts of food. It was felt that the design of the DBPCFC phase which followed reintroduction should take these open findings into account. This involved giving the challenge and placebo phases each for a week with a 2-week washout period in between. Only one placebo and one challenge period were attempted (three would have taken several months). During these studies there were many open reports of foods causing problems in the raw but not cooked state (e.g. apple, tomato, fresh milk as opposed to dried milk). Such phenomena have been described anecdotally by others [32]. It was felt, therefore that the DBPCFC phase should involve challenge foods in their native state. An additional problem was sometimes the amount of food which seemed to be needed to provoke a reaction openly. It was often impossible (e.g. with wheat) to disguise the necessary amount for DBPCFC. It may be extremely difficult to conduct a study where such delayed reactions seem to occur using the DBPCFC recommendations as described in the workshop document [31].

Niggemann, Wahn and Sampson [33] have published the results of a workshop where proposals were made for the standardization of oral food challenge tests in infants and children with special emphasis on atopic dermatitis. Here, the authors state that 'late reactions were regarded as usually being mostly eczematous reactions (and to a lesser extent gastrointestinal ones). Controversy exists as to whether there are late reactions or if late reactions only occur in combination with early ones'. An important area for further research should target possible late reactions including headaches, behavioural problems and other subjective symptoms.

Bock and Sampson have produced a manual where procedures including DBPCFC are outlined for use in an outpatient setting [2]. This again is a useful document. It deals mainly with rapid adverse reactions where the procedures can be performed on a day-care basis. It does discuss delayed reactions but some of the problems

related to performing DBPCFC as listed above may occur.

BDPCDC appear to be performed only rarely in the UK in the outpatient setting (i.e. outside the research field) (personal communications). In a paper entitled 'Food intolerance—a general paediatrician's view', Mary Rossiter says 'I believe that it is reasonable clinical practice to accept a partially substantiated diagnosis of food intolerance, which should be a self-limiting condition, provided that the diet is safe and that more serious disease has been excluded' [34]. If physicians in the UK wish to carry out these procedures, a dietitian (who has the time) is an essential member of the team. Dietitians can be very innovative in providing material for individually designed DBPCFC but must be involved closely with the patient and the professional team so that they have sufficient information, such as how much food seems to be needed to provoke a reaction, how quickly does the reaction occur after consumption of the food, what food can be used as a vehicle for the challenge if capsules are not used (it must be food which is known to be tolerated by that person) and, in the case of children, the material must be acceptable to the child or it will be refused.

Some problems with dietary treatment

In this controversial area of medicine it is important to avoid giving inappropriate emphasis to dietary treatment. On the other hand, people who feel that diet plays a role in their own or their child's illness should have the opportunity to discuss in an unbiased fashion the possibilities of dietary treatment and, where appropriate, should also have the opportunity to try a diet. A lack of sympathetic approach may easily lead to self-imposed diets or self-referral to an unqualified practitioner. It is imperative that the arduous nature of the diet is understood, together with the need to report any lapses, the need for careful follow up assessment and the importance of abandoning unhelpful diets.

Some people are already on a diet when referred and such diets are usually at least partially ineffective (hence the referral). Whatever the prejudices of the professionals involved, the question of diet must be discussed as the individual may be on an inadequate and inappropriate diet [35]. It is important to encourage the maintenance of helpful diets and broaden the diet as much as possible. It is equally important to encourage people to abandon unhelpful diets. The dietitian plays an invaluable role here. Occasionally parents will not take advice and in exceptional cases the restrictions imposed by the parent on the child may be regarded as a form of child abuse [36].

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