

Nutrition and Dietetic Foods

NUTRITION AND DIETETIC FOODS

being the second edition of Dietetic Foods

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PREFACE

A number of diseases can be controlled by dietary means; in addition nutritionally vulnerable groups such as infants, feeding mothers and the elderly may benefit from specially prepared foods. The formulation, preparation and use of these foods are, in many instances, the result of collaboration between clinician, nutritionist, dietitian and food technologist. However, some clinicians and dietitians who use these special preparations may not be particularly knowledgeable about the raw materials and methods of manufacture, and some food technologists may not be aware of the principles on which the food was originally formulated nor why it is used.

This book is intended, in the first part, to describe the foods that are used for various special purposes, the composition of some of these on the market in Great Britain or the United States, together with such general information about their preparation that is available. The second part discusses the principles on which the dietetic foods are based.

Second edition

In many countries there are few, if any, regulations controlling the composition of dietetic foods—sometimes with unfortunate results. Since the first edition was published the joint FAO/WHO Standards Programme Codex Committee has begun to draw up standards for *Foods for Special Dietary Uses*.

Another change that is taking place is the replacement of the calorie by the more correct term, the joule, and the replacement of international units of vitamins by micrograms. There is not yet complete agreement on the nomenclature of vitamins but the position has been largely clarified.

The rapid changes in the field of biochemistry demand the collaboration of the specialist, and I am indebted to Dr David A. Bender of The Middlesex Hospital Medical School for rewriting the chapter on Metabolism.

THERAPEUTIC DIETS

The treatment of disease by modification of the diet lies within the province of the doctor and the dietitian. Such modifications can be, and often are, effected without the use of special foods simply by changing the methods of food preparation or by restricting the diet. However, this approach can have two drawbacks. First, the patient needs his full complement of nutrients, indeed, since he is under stress he may have higher demands than when in good health, and restrictions due to the omission of various foods may tend to reduce nutrient intake. Secondly, a limited diet can become monotonous and lead the patient to break his regimen. For example, surveys have shown that among chronically ill patients, as many as one-third may suffer from undernutrition. In one survey 13% of the patients were consuming less than 1 000 kcal (4.20MJ) per day.

The body has a continuing requirement for the whole range of nutrients and any modification to the diet for specific purposes must take account of these demands. A low-calorie diet must still provide adequate protein, vitamins and minerals, and a low-salt diet must supply adequate energy and nutrients. Individuals can go without nutrients for a limited period, but a breakdown will occur if this period is prolonged. The length of time for which a person can go without a particular nutrient depends on the nutrient itself, as well as the body reserves of the individual. For example, in experiments designed to measure the requirements of vitamin A, the subjects continued for as long as two years on a diet devoid of this vitamin before signs of deficiency appeared. On the other hand, the liver, at least in experimental animals, shows signs of deprivation after as little as 48 hours on a protein-free diet. A patient, by virtue of the fact that he is a patient, is in a poor state of health, which may cause or partly be caused by a dietary deficiency; he is under stress, and certainly requires an adequate supply of every nutrient for convalescence. He must, therefore, be supplied with a diet that is complete in every respect, apart from the changes dictated by medical necessity.

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Malnutrition can easily arise from faulty therapeutic diets. Some regimens for the treatment of ulcers have been found to be low in protein, B vitamins and vitamin C, low-sodium diets have been deficient in protein, calcium and B2, and clearly, there is always the danger that a low-calorie reducing diet can be short of all the nutrients. It is obvious that care has to be taken to supplement low-fat diets where milk and butter are omitted, with vitamin A, and to supplement high-fat diets with water-soluble vitamins, and to take care of the vitamin C content of low-residue diets.

Consequently it is often advantageous to prepare special foods which fulfil the requirements of the clinician and both supply nutrients and are attractive to the consumer. Thus while the dietitian continues to prepare the special diets by selection of available foods, the manufacturer plays a valuable part in helping the patient to eat normally.

DIETETIC FOODS

Foods for special dietary use differ from ordinary foods by their special composition and/or by their physical, chemical, biological or other modifications resulting from processing. They are prepared in order to meet the particular nutritive need of persons whose normal processes of assimilation or metabolism are modified or for whom a particular effect is to be obtained by a controlled intake of foods. They are foods not medicines.

Such foods fall into two categories.

(1) Those foods which meet the special nutritional needs of healthy persons such as foods designed for infants and children, pregnant and nursing mothers, elderly persons, and persons engaged in intensive physical exertion or living under special environmental conditions.

(2) Those formulated for persons suffering from physiological disorders, such as foods low in sodium, gluten, fat, carbohydrates and specific amino acids, low and high in energy or protein, hypoallergenic foods and those of modified texture.

Foods to which components are added or subtracted are not necessarily foods for dietary uses unless such treatment serves a special dietary purpose and is so stated on the label.

Dietetic foods are more clearly defined by two criteria, namely, foods that differ in their composition from ordinary foods and are intended for a limited, defined section of the community. In this way enriched foods intended for general consumption, and iodized foods which may be considered borderline, are not dietetic foods.

Generally, because of the small size of the market and, to a lesser extent, because of the cost of processing, dietetic foods are more expensive than their counterparts.

Many foods specially prepared for use in certain disease states have no standards. For example, in most countries it is possible to label a food 'low-sodium' or 'carbohydrate-reduced' without standardizing to any particular

level of sodium or carbohydrate. In fact the term 'low-sodium' has sometimes been used to indicate simply that no extra sodium chloride was added during processing. While this is clearly an unsatisfactory state of affairs some authorities would be satisfied if the labels indicated the amounts of the particular substances present while others insist on the establishment of specific standards.

At the present time the Joint Food and Agriculture Organization/World Health Organization Standards Programme Codex Committee, which is drawing up standards for foods in general, has under discussion *Foods for Special Dietary Uses*. As might be expected in discussions involving a large number of countries there are many differences of opinion on the necessity for standards, on the ways in which these special foods may be presented to the public and on scientific and clinical matters. Where possible the current suggested regulations are referred to in this book in the appropriate chapter but these may be modified before they are finally accepted.

NORMAL DIET

Three quarters of a century of nutrition research has produced a vast amount of basic information, yet not enough from which to compile 'perfect' diets. For example, we know the total needs of groups of people engaged in different labours but cannot say in what proportion they should be supplied by fats, carbohydrates and proteins. Many people appear to be living in good health on very different proportions of these nutrients, but we do not have enough information to decide whether or not their accepted and traditional ailments may be due to an excess or deficiency of one or other of these food-stuffs.

It has been suggested from time to time that we are eating too much or too little of the animal fats or the vegetable fats, or starch or sugar. With regard to proteins we know the minimum daily intake compatible with life; we know the much higher levels that many people consume with apparent good health; but between the two levels lies what has so appropriately been termed 'the area of ignorance'.

We certainly know that some forty nutrients are essential to maintain the functioning of the body, and that disease, sometimes specific, accompanies any deficiency. Logically, therefore, if a diet includes all these nutrients we should be free from these diseases. This is the basis of the nutritionist's dictum, 'a mixed diet is a good diet'. In other words, if many different foods are eaten, then all forty of the nutrients will be obtained. But this provides only freedom from deficiency diseases; it might not bear any relation to positive good health—indeed the definition of good health is far from specific.

Nutrition research has itself misled us into believing that maximum growth rates are synonymous with good health. In attempts to determine the nutrients present in a 'natural' diet, purified foods were used as the basic starting materials; these often sustained only slow growth. As the vitamins or

minerals or amino acids were in turn discovered and added to the purified diet, better, i.e. faster, growth resulted—evidence that the added nutrients were essential to good growth. Each addition that resulted in faster growth was hailed as a new discovery, as, indeed, it was. However, such an approach implies that the fastest growth rate is synonymous with the best health of the animal involved.

This concept is no longer accepted. The best diet would nowadays be defined as one which leads to the proper development to maturity, resistance to disease, and an extended and disease-free old age. Such a diet might not be the same as the one producing the fastest growth. On the contrary, we have evidence from animal experiments that diets which actually restrict growth because of a quantitative deficiency can extend the life span. We have no information whether or not the same applies to man.

TERMINOLOGY

Therapeutic diets fall into a number of categories. If there is an inability to metabolize one of the normal constituents of the diet then this must be removed from the diet. For example, the inability to metabolize carbohydrate in diabetes is treated to some extent by limiting the amount of carbohydrate in the diet; the inability of the phenylketonuric to metabolize phenylalanine is treated by reducing the amount of this amino acid to the minimum needed for protein tissue synthesis; the inability to metabolize galactose in galactosaemia requires the complete removal of this sugar from the diet.

There may be a need to rest an organ, for example the gall bladder, by prescribing a low-fat diet, or the kidneys on a low-protein diet. The direct dietary treatment of oedema of heart disease is a low-sodium diet. Diseases of the digestive tract call for diets that do not irritate the damaged areas and are free from irritating matter and substances such as fibre and condiments, and in some cases it is necessary to avoid fried foods that delay the emptying of the stomach.

Diets with a high nutrient content are required to combat long-standing malnutrition; high-protein diets are used for treatment of certain diseases of the liver. There are also disorders such as overweight which more obviously call for dietary treatment.

Hospital diets include those classed as liquid, soft and convalescent. Liquid diets are used in cases of acute infection and inflammation of the gastro-intestinal tract, and after surgery. They consist of strained fruit juices, gruels, egg-nogs, milk in various forms, ice cream, custard, gelatin and beverages. Such diets tend to be low in nutritional value and this can be rectified by the addition of eggs and skim milk powder, while the energy content can be increased by the addition of cream, lactose and glucose.

A soft diet is one low in roughage and consists of liquids and semi-liquids. It is used in certain post-operative conditions, acute infections, some gastro-

intestinal disturbances, and for debilitated patients for ease of eating. It is easily digested and comprises cooked fruits without seeds, coarse skin or fibre, cereals free from bran and fibre, ground meat, chicken and fish, puréed vegetables. Salads, condiments and spices are excluded.

At the higher end of the scale is the light or convalescent diet which differs from the normal diet mainly in consistency and method of preparation. Fried foods and fatty foods such as pork, pastries and salad dressings are avoided. Vegetables and fruits are permitted only when cooked. Bran is avoided but cereals, bread, spaghetti and macaroni are permitted as well as fish, chicken and tender meat.

Some diets that have been used in the treatment of specific disorders have been given the name of that disorder, such as kidney, cardiac and diabetic diets. This practice is now discouraged for many reasons. First, the diet is not a specific treatment for, say, kidney disease or diabetes, but is specifically low in sodium or in carbohydrate and is an adjunct to treatment. Secondly, such labelling can lead to self medication. Thirdly, many of the diets are suitable for other conditions. Fourthly, the patient should not be perpetually reminded of his condition. Moreover the new international agreement on the naming of dietetic foods, Codex Alimentarius, has specifically rejected the disease title and uses the correct ingredient description.

The standard books on therapeutic diets provide detailed information on diet therapy, including menus and recipes used in hospitals and the specific treatment of patients. As in the case of all scientific matters, new knowledge can stimulate reappraisal of methods of treatment. For example, text books of diet therapy recommend the treatment of diverticulosis with low-residue diets. Recent work (Painter, N.S. & Birkett, D. P., *Brit. med. J.*, 1971, 1, 450) reported that symptoms were alleviated by the opposite treatment, namely adding bran to the diet. The authors suggest that the development of the disorder in the first place is due to lack of roughage in the diet. Another new observation is that dyspeptic patients appear to benefit from a low-carbohydrate diet rather than the hitherto orthodox regimen (Yudkin, J., Evans, E. & Smith, M. G., *Proc. Nutr. Soc.*, 1972, 31, 12A). The following description briefly covers the types of diets in use.

BLAND DIET

A bland diet is one that contains a minimum of connective tissue and leaves little or no residue. It is used to neutralize acid, reduce gastric secretion and motility and avoid gastro-intestinal irritation, in disorders such as gastric and duodenal ulcers, gastritis, diarrhoea and ulcerative colitis. Little or no condiment except salt is allowed and the diet is low in acid content. Foods to be omitted from a bland diet include fried and fatty foods, smoked and preserved meat and fish, pork and all raw vegetables.

Foods such as peas, beans, cabbage, savoy, sprouts, lettuce, celery, swedes,

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parsnips and turnips, contain large amounts of cellulose liable to irritate a damaged intestine. The only cooked vegetables permitted are potatoes, carrots, beets and spinach. No raw fruits are included other than ripe bananas and orange juice; canned peaches, pears and apricots are permitted together with prunes and baked apple without skins.

Fruits with pips, skins and seeds, such as raspberries, blackberries, tomatoes, figs, damsons, plums and nuts, and preserves with these pips and seeds must be avoided. All fruits are passed through a fine sieve (which leads to much destruction of vitamin C). Whole cereals such as coarse oatmeal, all bran, wholemeal flour and bread must be avoided.

LOW-RESIDUE DIETS

Low-residue diets are used in severe diarrhoea, early stages of ulcerative colitis, preceding and following operations on the colon or rectum, and in partial intestinal obstruction.

Low-residue foods include milk and cream. On a very low residue diet boiled or evaporated milk may be tolerated better than pasteurized milk possibly because of the smaller curds. Other foods low in residue include fats, eggs (poached and scrambled), minced chicken, fish and beef, fruit juice and vegetable juice, cottage cheese, white bread and cereals, ice cream, cereal puddings, custard, gelatin, plain cake and biscuits.

If the diet is to be only moderately low in residue, then the above diet can be extended to include cheddar cheese, strained cream soups, purées of vegetables and fruits, ripe bananas, cooked peeled apples, apricots, peaches, pears and plums.

Some foods tend to form gas in the intestine and are to be avoided in functional indigestion (i.e. of no organic cause), e.g. cabbage, sprouts, broccoli, cauliflower, dried peas and beans, turnips, green peppers, cucumbers, radishes and melons.

Foods that stimulate the flow of digestive juice are avoided in cases of peptic ulcer, e.g. meat extractives as used in the preparation of broths, soups and gravies, caffeine drinks (tea, coffee, cocoa, cola drinks) and alcoholic drinks. Spices, pickles and acid fruit juices that would irritate the inflamed gastric mucosa are omitted, and sugar and sweets given in only small amounts to avoid any osmotic effect. Mechanical irritation is avoided by omitting tough, fibrous meats, whole grain cereals and most fruits and vegetables.

On the positive side a peptic ulcer diet contains foods which neutralize gastric acidity, and it is given in frequent small feeds, e.g. milk and eggs. Fats inhibit gastric secretion and delay the emptying of the stomach so they are useful to neutralize gastric acidity by retaining food in the stomach.

In diseases of the gall bladder a low-fat diet is used to avoid the stimulation of the secretion of cholecystokinin from the walls of the duodenum which stimulates contraction of the gall bladder and its ducts causing pain. In such cases heated fats are even less tolerated.

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