

Nutritional Recommendations in Diabetes Management

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INTRODUCTION

The first position statement on diet in diabetes care was made by Diabetes UK, formerly the British Diabetic Association, 20 years ago (1). The recommendations liberalised the diet for people with diabetes. Previous advice had focused specifically on carbohydrate intake and sugar restriction. The new recommendations promote a diet in line with healthy eating recommendations for the general population and compatible with dietary advice for people at high cardiovascular risk. Further review, 10 years later, resulted in an update that re-enforced the high-carbohydrate, low-fat diet (2). These recommendations have now been superseded by recommendations from other parts of the world including Europe (3) and America (4). A more recent technical review of the nutritional management of patients with diabetes also helps to put a clear perspective on dietary education in diabetes care (5).

CURRENT POSITION

Recommendations will change in time as new data becomes available and consensus and views on emphasis differ. Any recommendations require careful interpretation and communication for the maximum benefit of those individuals with diabetes.

The biggest change in emphasis of the recommendations currently in use compared to previous recommendations focuses on a greater flexibility between the proportion of energy from carbohydrate and fat, with promotion of the use of monounsaturated fat. Diets rich in monounsaturated fat reduce total and low-density lipoprotein cholesterol without adverse effects on high-density lipoprotein cholesterol or triglyceride levels (6). It is necessary to restrict the total fat content of the diet where obesity is an issue and calorie intake needs to be limited. Otherwise, a range of carbohydrate (45–60%) and fat (25–35%) intakes is compatible with good diabetes control provided that low glycaemic index carbohydrates and foods high in monounsaturated fat are promoted.

Other significant changes in the recommendations include:

- There is less emphasis on the benefits of cereal fibre other than for gastrointestinal health and its satiety value.
- The precise effects of antioxidant nutrients with regard to being potential cardio-protective factors is still uncertain and so clear guidance is not possible in the light of the evidence available.
- In most European countries, the average intake of protein is in excess of the recommended intake and for those people with Type 1 diabetes, especially in those with hypertension, intakes of protein should not exceed 10–20% total energy because of the increased risk of nephropathy.
- The benefits of physical activity for people with diabetes are becoming increasingly evident. Regular, moderate intensity exercise is associated with a reduced risk of developing Type 2 diabetes in men, women and individuals who are overweight (7,8). Exercise can produce a reduction in plasma triglycerides, increases HDL and can also aid weight loss (9). The overall impact of exercise on blood pressure is also beneficial (10).

AIMS OF THE NUTRITIONAL RECOMMENDATIONS

The goals of dietary advice are to achieve and maintain good health and quality of life, with avoidance and management of short-term symptoms, including hypoglycaemia and freedom from the long-term complications of the disease, for as long as possible. Evidence available from America from the Diabetes Control and Complications Trial in Type 1 diabetes (11) and also from the United Kingdom Prospective Diabetes Study in Type 2 diabetes (12) suggests that normalisation of metabolic markers like blood glucose levels and management of blood pressure constitute key aims. There needs to be a balance between the attainment of objectives of care and the demands that they may impose on the individual person with diabetes.

The recommendations should be adapted to an individual's lifestyle, culture and socio-economic status. Personalised targets, based on the recommendations, need to be negotiated, clearly defined and communicated. There should be regular review and on-going dietary education.

The Practice Guidelines for Medical Nutrition Therapy developed in the USA for Type 1 diabetes have been shown to result in significant improvements in glycaemic control, and require more frequent and longer contacts between dietitians and patients (13). Patients from UKPDS, in centres with a greater availability of dietetic advice, lost more weight than those with less advice and also tended to have a greater decrease in plasma glucose (14), thus showing the need for more intensive care of diabetic patients.

APPLICATION OF THE NUTRITIONAL GUIDELINES

Since diabetes is a life-long disease that affects all groups of the population, irrespective of age, culture or socio-economic status, it is vitally important to identify the most appropriate approach to the application of the nutritional guidelines, from the outset. Dietetic intervention requires an appropriate level of knowledge, experience and skill if dietary habits and eating behaviour are to be adjusted, effectively (15). The Clinical Standards Advisory Group (CSAG) in the UK recommended that all newly diagnosed patients should be offered a dietetic consultation within four weeks of diagnosis and that non-crisis dietetic review should be available, annually, to all people with diabetes (16). UKPDS showed that the first three months were vitally important in determining response to dietary intervention (14). Currently in the UK one current issue of dietary management in diabetes care is the under-provision of dietetic services in diabetes care (17).

PROVISION OF SERVICES IN DIABETES CARE

In 1997, Diabetes UK, formerly the British Diabetic Association, investigated the provision of dietetic services in diabetes care. They carried out a postal survey to dietitians in the UK to assess level of provision and current practices including application of nutritional guidelines, audit and evaluation. The survey showed that 85% of dietitians worked in situations where dietetic provision was less than the current recommendation of 22.5 hours per 100 000 of the population, made by Diabetes UK, in 1999 (18). One of the outcomes of this situation is that people with diabetes may not receive dietary education from a State Registered Dietitian. Dietary education may be part of an education package offered in general practice by the practice nurse. The evolution of the nutritional guidelines for people with diabetes to a status

which is in line with healthy eating recommendations for the general population may have 'de-mystified' the diet in diabetes care to the extent that it was perceived as being a package that could be relayed without the expertise of a dietitian.

There is a need for a consistent approach from health care professionals. Co-ordination of training of all health care professionals involved in diabetes education on nutrition and diabetes as well as overall management of dietary education in diabetes care is essential to ensure a high-quality service to all people with diabetes. Continuing professional development is essential to update knowledge and skills.

THE ROLE OF THE DIETITIAN IN DIABETES CARE

Ideally, it is the role of the dietitian to provide the dietetic intervention. A vital part of the dietetic consultation is the assessment of readiness to change eating behaviour (19). Exploration of barriers to change and awareness of psychosocial issues form part of the dietary consultation process. In the short term, food intake needs to be regulated and balanced against medication, in order to optimise blood glucose control. This also includes assessment of whether current medication matches the meal pattern and therefore whether it is appropriate, as well as the management and prevention of hypoglycaemia and hyperglycaemia. Long-term dietary control can offer protection against cardiovascular disease with weight management and modification of other lifestyle factors being essential. Dietary counselling should be innovative and specific to the requirements of the individual, rather than being rigid, prescriptive and restricted to a particular system of teaching, as may be the case when knowledge, experience and skills in diet therapy are limited.

AUDIT AND EVALUATION

Since the 1970s, the success or failure of diet in diabetes care has been based on compliance (20). The most important consideration being whether or not a patient was deemed to have modified their dietary intake and achieved a particular dietary prescription. Evaluation needs to consider the impact of diet on clinical outcomes like body weight, lipid levels and HbA_{1c}. Application of the nutritional guidelines is not about achieving the gold standard but about the modification of an individual's dietary intake to shift the balance in the direction of the gold standard and at the same time, maximise health benefits and quality of life for that individual.

Findings of the Diabetes UK survey in 1997 show that a quantitative method of dietary prescription is no longer applied in practice. The survey also shows

that most dietitians reported, at the time, following the 1992 nutritional guidelines. The nutritional recommendations in the UK are under review and the more up-to-date guidelines from Europe and America should be applied until updated recommendations are published in the UK.

RECOMMENDATIONS: TYPE 1 AND TYPE 2 DIABETES

Although the nutritional recommendations for people with Type 1 and Type 2 diabetes are in essence the same, there may be a difference in emphasis. Cardiovascular disease is the main cause of mortality in both Type 1 and Type 2 diabetes, so restriction of saturated fat is a prime aim for all people with diabetes. However, there should be greater emphasis on modification of fat intake for people with Type 2 diabetes where lipid abnormalities are more common.

People with diabetes who are overweight or obese have a wide range of complications of their obesity: more symptoms can be related to BMI (body mass index) than can be related to blood glucose, so weight management is a fundamental aspect of treatment in Type 2 diabetes.

For Type 1 diabetes greater emphasis should be placed on attempts to modify the progression of microvascular disease, especially nephropathy, by restricting protein intake.

The ultimate goals of management depend on the priorities relevant to the individual person with diabetes.

ENERGY BALANCE AND BODY WEIGHT

Obesity is recognised as a leading cause of insulin resistance (21). It therefore contributes to the development of Type 2 diabetes. This is particularly true for a central distribution of body fat, associated with a range of metabolic disturbances. Weight management is crucial in controlling blood glucose levels in people with Type 2 diabetes, although from UKPDS there is evidence that to normalise glucose tolerance usually requires major weight loss. Studies suggest that at least 80% of newly diagnosed patients with Type 2 diabetes are overweight and weight loss in people with Type 2 diabetes who are overweight increases life expectancy. Obesity is an additional risk factor for coronary heart disease and stroke. All cardiac risk factors (glycaemia, hypertension, lipids) are improved with weight management (22). This is true for individuals with Type 1 diabetes as well as Type 2 diabetes. However, it is also important to make sure that energy requirements are adequate in children and adolescents with Type 1 diabetes.

Dietary strategies for weight management should be based on realistic target weights. Assessment of target weights and the appropriate level of energy

Table 1.1

Age range (yr)	BMR (kcal/day)	Activity level	24-h Energy expenditure (kcal/day)
Men			
10–18	$17.5W + 651$	Inactive	$\text{BMR} \times 1.30$
18–30	$15.3W + 679$	Light	$\text{BMR} \times 1.55$
30–60	$11.6W + 879$	Moderate	$\text{BMR} \times 1.78$
> 60	$13.5W + 487$	Heavy	$\text{BMR} \times 2.10$
Women			
10–18	$12.2W + 746$	Inactive	$\text{BMR} \times 1.30$
18–30	$14.7W + 496$	Light	$\text{BMR} \times 1.56$
30–60	$8.7W + 829$	Moderate	$\text{BMR} \times 1.64$
> 60	$10.5W + 596$	Heavy	$\text{BMR} \times 1.82$

W = weight (kg).

restriction is not a precise science. Equations are available for estimating basal metabolic rate and daily energy expenditure from body weight in kilograms and activity level, when prescribing calorie-controlled diets (23), see Table 1.1.

In general, long-term lifestyle changes and strategies are more likely to result in sustained weight loss. Realistic calorie deficits of 500 kcal/day usually produce better end results than very restrictive diets (24). Strategies to support individuals trying to lose weight may range from individual counselling to group therapy. The use of very low calorie diets (VLCDs) in people with diabetes has however been shown to have positive effects on plasma lipids, lowering triglyceride levels and raising HDL cholesterol (25). Most of the benefits relate to energy restriction not weight loss (26). Although more weight is lost over a 3–6 month period than using conventional diets there is no evidence that in the long term (1–2 years) the continued benefit of using VLCDs is maintained. VLCDs should only be used in a specialist setting as complications of VLCD therapy can include alterations in body composition including bone loss and possibly loss of cardiac muscle (27). As a generalisation the use of anti-obesity drugs should be restricted to specialist medical centres in the absence of large-scale studies of their application in diabetes. The Royal College of Physicians (28) produced guidelines for the use of anti-obesity drugs for obesity treatment.

Individuals who are overweight should have the necessary advice and support to reduce their calorie intake and to increase their energy expenditure in order to shift their energy balance and weight in the direction of a more ideal BMI. Sustained weight loss and prevention of weight regain are important goals which are preferable to more rapid weight loss which usually results in excessive loss of lean body mass. Even modest weight loss confers benefits to health (29). Whenever possible those people who are overweight should be

offered a multi-disciplinary structured approach to weight management. Dietary advice should take into account an increase in physical activity, which may also facilitate weight loss and help to maintain muscle mass. Normally, people's appetites increase with exercise automatically. However, for those with Type 1 diabetes adequate or additional carbohydrate before, during and after exercise as well as insulin adjustment needs to be anticipated, see Chapter 2. For those people with Type 2 diabetes on oral hypoglycaemic therapy, adjustment of medication is usually not necessary unless on sulphonylureas where hypoglycaemia may be a risk with sustained exercise. The level of activity will depend on age and degree of fitness but moderate activity (walking) for at least 20–30 min a day will be beneficial. Adjustment of medication for both Type 1 and Type 2 may be necessary if weight loss occurs and is maintained in the long term.

MACRONUTRIENT COMPOSITION OF THE DIET

The main dietary components of the diet for an individual with diabetes should be carbohydrate-containing foods with a low glycaemic index and *cis*-monounsaturated fat.

Although it is important to give people with diabetes advice to modify their dietary intakes so that they shift the balance of their nutritional intake in the direction of the recommendations, the relative proportions of macronutrients may vary depending on the markers of diabetes control for the individual.

A combination of carbohydrate and *cis*-monounsaturated fatty acids should provide 60–70% total daily energy intake. Total fat intake should be restricted to 35% total energy. *Cis*-monounsaturated fatty acids should provide between 10 and 20% total energy. Saturated and *trans*-fatty acids should provide under 10% total energy. Polyunsaturated fatty acids should not exceed 10% total energy. Protein intake should range between 10 and 20% total energy. Protein intake should not go below 0.6 g/kg normal body weight/day but should be at the lower end of the range (0.8 g/kg body weight/day) in cases of nephropathy or where abnormal microalbuminuria has been identified.

The relative proportions of macronutrients recommended in diabetes:

- Protein (10–20%)
- Carbohydrate (45–60%)
- Cis*-monounsaturated fat (10–20%)
- Polyunsaturated fat (< 10%)
- Saturated/*trans* fat (< 10%)

CARBOHYDRATE

The proportion of energy derived from carbohydrate is related to the level of fat intake. Recommendations in the past have tended to be narrow and precise with regard to fat and carbohydrate intake. Although good diabetes control can be achieved with a range of carbohydrate intake (45–60%), it can be difficult to maintain a high-carbohydrate/low-fat balance in practical terms. The current emphasis is on a more flexible approach dependent upon the individual's lifestyle, habits and diabetes management.

To minimise the risk of hypertriglyceridaemia and an associated increased risk for cardiovascular disease, high-carbohydrate diets for people with diabetes should incorporate a high intake of soluble fibre and resistant starch (30).

In cases where a lower carbohydrate intake is optimal for control and lifestyle, intake of energy from monounsaturated fat can be increased, as long as calorie control is monitored.

GLYCAEMIC INDEX

The glycaemic index (GI), see Chapter 11, was proposed as a method to guide food selection in the early 1980s by Jenkins and colleagues. It is based on the assessment of carbohydrate foods in terms of glycaemic response compared to the same amount of a standard carbohydrate-containing food (usually bread or glucose) (31).

The GI of a food is determined by a number of factors, including the rate of digestion and absorption. The soluble fibre content as well as the structure of the food and other meals and foods consumed as part of the overall diet are all significant influences on the glycaemic index of a particular food (32).

FIBRE

Dietary fibre or non-starch polysaccharides may broadly be classed as soluble fibre (gums, gels and pectins) and insoluble fibre (cellulose and lignin).

There is epidemiological evidence that low intakes of insoluble fibre are associated with an increased risk of Type 2 diabetes (33). In general, the benefits of insoluble fibre are limited to promoting healthy gut functioning. The intake of soluble fibre is however beneficial to glycaemic and lipid control (34).

SUGAR AND SWEETENERS

SUCROSE

The diabetic diet has in the past been referred to as the sugar-free diet but many studies have shown that consuming iso-caloric amounts of other carbohydrates can raise blood glucose levels and aggravate hyperglycaemia more than sucrose itself (35,36). The consensus view is that sucrose may be consumed in the diet of people with diabetes at the same level, 10% of total calories, as that recommended for the general population.

FRUCTOSE

Fructose has been shown to invoke a lower glucose and insulin response compared to other carbohydrates (37). However, dietary fructose in amounts comparable to those of sugars in Western diets (7.5–20% daily energy) can result in raised fasting triglycerides and LDL concentrations. There may also be a greater risk of gastrointestinal disturbances with large doses (38). There is no reason to believe that fructose either confers special benefits for people with diabetes or that it is detrimental to health in the amounts found in everyday foods.

NUTRITIVE SWEETENERS

Polyols or sugar alcohols like sorbitol, xylitol, mannitol and isomalt are bulk or nutritive sweeteners which contain calories and raise blood glucose levels. They must still be accounted for in meal planning. They have a slightly lower glycaemic response than sucrose and a slightly lower calorie value (2.4 kcal/g) because they are not completely digested and absorbed. Polyols may therefore cause diarrhoea, particularly if consumed in large amounts (> 25 g). Although they have a lower cardiogenic effect compared to sucrose, polyols offer no special benefit to people with diabetes.

NON-NUTRITIVE SWEETENERS

Intense or non-nutritive sweeteners are sugar-free and calorie-free. Permitted sweeteners in the UK and Europe include aspartame, saccharin, acesulfame potassium, cyclamate, sucralose and alitame. These substances are very often used in combination as table-top sweeteners or in food products in order to produce a better flavour synergy or heat stability. There has been ongoing public debate about the safety of these substances, but there is no conclusive evidence to suggest that particular health problems are implicated by their use. In the UK the government Food Standards Agency (FSA) (formerly the

Ministry of Agriculture, Foods and Fisheries (MAFF)) monitors consumption of sweeteners and provides guidelines to the food industry regarding levels of intense sweeteners permitted in foods. In this way there is deemed to be control over intake.

ALCOHOL

Recommendations regarding alcohol consumption and diabetes currently relate to a number of different sources but focus on two main issues, hypoglycaemia for Type 1 diabetes and the increased cardiovascular risks with Type 2 diabetes, see Chapters 9 & 12. The Nutrition Subcommittee of Diabetes UK produced a paper in 1985 which refers to a maximum safe intake of 30 g (3 units) per day for men and 20 g (2 units) per day for women (39). The government's report, *Sensible Drinking*, published in 1997 (40), refers to a maximum intake of 3 units per day for women and 4 for men. Precautions which apply to the general population also apply to people with diabetes. However, for people on insulin therapy and sulphonylureas, alcohol should always be consumed with carbohydrate-containing foods. This is because of the increased risk of hypoglycaemia as alcohol suppresses gluconeogenesis (41). Alcohol can also interfere with the action of glucagon in insulin-induced hypoglycaemia (42). People taking sulphonylureas can experience facial flushing with alcohol.

Daily alcohol intake has been associated with cataract development which is independent of the effects of diabetes itself.

Alcohol contributes 7 kcal/g and so may contribute to calorie intake and impact on weight control in people with Type 2 diabetes as well as aggravate hypertriglyceridaemia.

More recent studies on people with Type 2 diabetes suggest that people with well-controlled diabetes can safely consume 21–28 g/d alcohol with no change in glycaemic control (43). There are possible beneficial effects of alcohol on blood lipids and coagulability. Moderate intake of wine (one or two glasses per day) which contains flavonoids and phenolic compounds may confer benefits by virtue of antioxidant properties (44).

DIETARY FATS

People with diabetes have a two- to fourfold increased risk of coronary heart disease, and an increased risk of mortality due to the low HDL with high triglyceride syndrome that is seen in Type 2 diabetes, even when well treated (45). Epidemiological evidence suggests that populations of people with

diabetes who consume a low-fat diet have a lower mortality rate, see Chapters 9 & 12 (46).

SATURATED FAT

Reducing intake of saturated fat can lower levels of total and LDL cholesterol, risk factors for coronary heart disease (47). The recommended level is less than 10% energy from saturated fat. Although there are no large studies of diabetic populations it is considered appropriate to base the prevention and management of heart disease on the same principles as in non-diabetic populations.

Individual fatty acids have different effects, with lauric, myristic and palmitic having a hypercholesterolaemic effect and stearic being neutral.

TRANS FATTY ACIDS

Most *trans* fatty acids are formed during partial hydrogenation of vegetable oils to produce margarine and certain baked foods including biscuits and pastries. *Trans* fatty acids have a similar impact on lipid levels as saturated fat, decreasing HDL and increasing LDL (48). Specific information relating to people with diabetes is lacking but there are some large studies that show the evidence is not conclusive regarding coronary risk and *trans* fatty acid intake. The Nurses Health Study (49) shows that high intakes of foods that are a significant source of *trans* fat may be associated with a risk of coronary heart disease. The EURAMIC study (50) however found no significant effect.

POLYUNSATURATED FATS (n-6)

The WHO recommendation for the general population is a maximum intake of 3–7% dietary energy. This is because polyunsaturated fats are more susceptible to oxidation and therefore more atherogenic. In addition, a reduction in HDL may occur when larger amounts are consumed.

FISH OILS (n-3)

The general recommendation with regard to fish oils for the population as a whole is not to take therapeutic doses but to consume one helping of oily fish per week. Increasing fish intake in the non-diabetic population is associated with reduced mortality from coronary heart disease. However, despite available evidence showing that fish oils can reduce plasma triglycerides and VLDL concentrations in the diabetic population (51), as well as reducing blood pressure (52), there are also potential deleterious effects of fish oils on LDL cholesterol and glycaemic control in people with diabetes (53).

MONOUNSATURATED FATS

In the Mediterranean, where the prevalence of coronary heart disease is lower, the typical diet is high in monounsaturated fatty acids (54). The beneficial effects of monounsaturated fats include the fact that they are more resistant to lipid peroxidation and increased MUFA intakes have also been associated with lower daytime blood pressures. There have been studies in both diabetic and non-diabetic populations which show falls in total cholesterol with no changes in HDL levels or triglyceride levels. The choice of MUFA as the prime source of dietary fat is therefore recommended.

CHOLESTEROL

Restriction of saturated fat will also limit intake of cholesterol. The EASD recommendations refer to a maximum intake of 300 mg/day.

PROTEIN

There is a need for more long-term studies on protein intake for people with diabetes in order to be able to make evidence-based recommendations. The WHO (55) recommendation for intake of protein for adults is 0.8 g/kg/day (56) but most European populations consume more than this. There is epidemiological evidence to suggest that diets rich in protein may contribute to the pathogenesis of early nephropathy (57). There are also studies which indicate that protein intakes at the lower end of the recommendation may have advantages in people with diabetes with renal changes. In people with evidence of clinical diabetic nephropathy a protein restriction to < 0.6 g/kg/day can reduce the elevated GFR and albuminuria (55). In people with persistent proteinuria a similar protein restriction has been shown to modify the progression of the disease (58). There is no conclusive evidence about the different properties of animal or vegetable proteins and their effect on diabetic renal disease. The recommendation for protein intake for people with diabetes is that it should range between 10 and 20% of total energy.

VITAMINS AND ANTIOXIDANTS

There is a need for more conclusive evidence on the benefits of vitamins and antioxidant nutrients in terms of protection from cardiovascular disease and general health benefits for the diabetic and non-diabetic population. Pharmacological doses of supplements are therefore not advised. However, it

is recommended that a diet rich in foods which naturally contain significant quantities of antioxidants, especially fruit and vegetables, is followed.

MINERALS

SALT

The general population has been recommended to restrict intake of salt to 6 g/day. Normal intake in Northern Europe is twice this amount. Dietary sodium restriction can reduce systolic blood pressure in mild hypertension in Type 2 diabetes (59). However, there is still debate about the efficacy of sodium restriction with regard to hypertension. In addition, the impact of weight loss in treating people who are overweight with hypertension also makes it difficult to distinguish between the benefits of salt restriction and energy restriction.

People with diabetes should be advised to eat plenty of fruit and vegetables and other fresh, rather than processed, foods, which contribute to a significant proportion of the sodium in the diet, in order to cut down on salt intake.

CHROMIUM

There has been a lot of media hype over chromium and its ability to improve glycaemic control in people with Type 2 diabetes. Chromium is an essential trace element that has a role in glucose, insulin and lipid metabolism. Sub-optimal dietary intake of chromium is related to increased risk factors associated with diabetes and cardiovascular disease. There are a number of small clinical trials which show supplements of chromium have been related to improvement in glucose tolerance in Type 1, Type 2 and steroid-induced diabetes. However, these studies are very small and carried out over a short period of time. There is an urgent need for properly powered research before the reported benefits of chromium supplementation can be assessed (60).

MEAL PLANNING

There are a number of teaching systems available for meal planning but they are all subject to limitations. The emphasis should be on appropriate advice conveyed in the most appropriate way for a particular individual. There should not necessarily be a focus on one specific teaching system.

In the past, the main educational tool in the dietary education of people with diabetes, particularly for Type 1 diabetes, was the exchange system. Measurement of carbohydrate intake by using an exchange system devised by R. D. Lawrence was considered to be essential for good blood glucose

control. The exchange system was devised to ensure that carbohydrate was included with meals and snacks but it resulted in a restriction of carbohydrate.

People with diabetes were advised on the amount of carbohydrate they should consume by the prescription of a number of exchanges per meal or snack, over the day. The exchanges were based on units of 10 g carbohydrate and lists of foods containing 10 g were used to swap foods and vary dietary intake.

Another tool, the plate model, can be used to assess and convey the proportions of the different foods that make up the appropriate macronutrient composition of the diet. There are various adaptations including the Balance of Good Health, a national teaching model for food selection, launched in 1993 in the UK, by the Department of Health, Ministry of Agriculture, Fisheries and Food and the Health Education Authority.

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