

Evolution of the diabetic diet: Fats and fallacies

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The Diabetes Control and Complications Trial and United Kingdom Prospective Diabetes Study (UKPDS) trials have provided evidence for the pivotal importance of optimizing glycaemic control to prevent complications in type 1 and 2 diabetes mellitus. Both patients and diabetes professionals consider lifestyle change and appropriate medication as cornerstones for achieving good glycaemic control. The frequent reversals in the recommended diabetic diet in the past century warn that in the nutritional area the hypotheses are many, but the proofs are few. In type 1 diabetes, the patient is still advised to spread out carbohydrate foods during the day with three short-acting insulin injections at meal times to minimize postprandial hyperglycaemia. In type 2 diabetes, weight loss is the major target, because 80% of patients are overweight or obese. However, it is salutary to note that in the UKPDS trial, no modality of treatment delayed the relentless deterioration of glycaemic control in type 2 diabetes, the extent of which was predicted by the insulin secretion. Controversy still exists regarding whether lowering the dietary fat enhances weight loss of itself and whether dietary carbohydrate, fat and fibre influence insulin sensitivity and glycaemia. The American Diabetes Association's evidence-based recommendations currently offer a choice between a high carbohydrate and modified fat diet, with monounsaturated fat replacing the saturated fat instead of carbohydrate. The role of omega-3 fatty acids in man is not resolved. The reason for the surprising lack of definitive evidence lies in the limitations of nutritional research. Under-reporting of diet is common and dietary assessment tools are often inaccurate. Sustained weight loss is unattainable by the majority of patients, perhaps because of the strongly genetic nature of obesity and the sedentary lifestyle. Compliance may be improved by suggesting small, sustained dietary changes, setting small weight loss targets and encouraging a permanent increase in total activity.

Key words: diabetes, diet, fat, monounsaturated, carbohydrate.

Introduction

The past few years have finally seen the establishment of some universally agreed targets for the management of diabetes mellitus. The Diabetes Control and Complications Trial and United Kingdom Prospective Diabetes Study (UKPDS) provided definitive evidence in support of optimizing glycaemic control to prevent or lessen the microvascular complications of Type 1 and 2 diabetes mellitus.^{1,2} The two studies were in surprisingly close agreement regarding the target level of HbA1c (< 7%) to be achieved by intensive management in the two different types of diabetes. Professionals received the results as scientific evidence supporting the management therapy already being used in daily practice. Both patients and diabetes professionals in general accept that a combination of lifestyle change (involving diet and physical activity) and medication is the cornerstone for achieving the targets of glycaemic control. They also share a belief that patient non-compliance or non-adherence to recommended therapy is largely responsible for the fact that many patients' glycaemic control fails to meet these goals. It is therefore salutary to point out to those treating diabetes that in the UKPDS trial, neither dietary treatment nor any form of medication delayed the slow deterioration of glycaemic control in type 2 diabetes, the extent of which was predicted by the initial insulin secretion.³ Also, the frequent major reversals in the recommended diabetic diet in the past century should be a warning that in the nutritional area of diabetes management, the hypotheses have been many but the proofs are relatively few.⁴

The dearth of indisputable nutritional proof lies partly in the limitations specific to nutritional research (Table 1). Self-reported data are notoriously unreliable. In particular, under-reporting of diet is common and may be selective, with evidence of fat intake being most under-reported.⁵ If this is so, any relationship between dietary fat intake and body fat will be over-estimated. Cross-sectional correlations between dietary components and other measures do not provide a proof of causation. However, long-term nutritional intervention studies are extremely difficult to carry out, particularly in a 'blinded' fashion like a placebo-controlled drug trial. Changing one nutrient in an intervention study can change proportions of other dietary components, making the results difficult to interpret. The compliance of 'free-range' subjects with recommended diet change is difficult to assess without 'lockup' conditions, which can themselves alter the outcomes.

Despite these problems, there is some overall consensus that to prevent macrovascular disease in diabetic diets, saturated fat should be limited and replaced by either carbohydrates or other dietary fat, based on an assessment of the individual.^{4,6} This approach is a welcome formalization of what is regarded as good practice: an initial assessment of

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Table 1. Some limitations of nutritional research

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| Inaccuracy of diet and activity estimation |
| Reliance on self-reported data |
| Selective under-reporting of fat intake |
| Relatively short duration of studies |
| Lock-up versus 'free range' eating |
| Difficulty of isolating a single nutrient effect |

age, ethnic background, current diet, adiposity, glycaemic control and lipid levels before individualization of therapy for that patient.

Current approach: Type 1 diabetes

In Type 1 diabetes, the patient is still advised to spread out carbohydrate foods during the day. The insulin regimen includes three short-acting insulin injections at meal times to minimize postprandial hyperglycaemia, and an intermediate-acting insulin at night to lower the fasting blood glucose level. For many adolescent diabetic patients the rigidity of the meal times and the necessity for fixed meals and snacks has been a recognized factor in lessened compliance. The inflexibility of the meal times is socially difficult and a constant reminder that the person with diabetes is 'different'. The use of the rapidly acting modified human insulin and pen injection devices immediately before meals has allowed greater flexibility of meal times and often allows freedom from the necessity of eating a carbohydrate-containing snack between meals. It has also helped meet the challenge of reducing postprandial hyperglycaemia without causing hypoglycaemia immediately before the next meal or at night. In fact, eating low-glycaemic index carbohydrates may actually lead to hypoglycaemia because of the rapid onset of action of the insulin and the slow absorption of the carbohydrate.

The recent acceptance of data showing that both simple sugars and complex carbohydrates have the same impact on glycaemia has widened the range of sugar-containing foods able to be included on a daily basis.^{4,6} This reversal of the traditional nutritional doctrine has been welcomed by patients and permits them to adjust the meal-time insulin dose to the approximate amount (rather than type) of carbohydrate in the meal. While the glycaemic response to various starches varies, the major impact on blood glucose level is from the quantity of carbohydrate ingested. In practice, the use of rapidly acting insulin has allowed a further 'top-up' injection during a meal when a larger than expected carbohydrate intake has occurred.

Current approach: Type 2 diabetes

In Type 2 diabetes, weight loss remains a major target because 80% of subjects are overweight or obese. The obesity is central in type, and there is a strong link between abdominal fat deposition and insulin resistance and cardiovascular risk. In a weight loss study in obese subjects with and without diabetes, we found that improvement in insulin sensitivity was related only to fat loss from the abdominal area and not from any other fat compartment.⁷ Controversy still exists in nutritional circles regarding whether lowering the dietary fat intake enhances weight loss of itself. However, the majority of evidence shows that energy restriction is the

overriding factor linked to weight loss from low-fat diets in Type 2 diabetes.⁸ The composition of the weight-reducing diet can affect glycaemia and lipids – the monounsaturated fat-reducing diet having the best effects in both when compared to a similar high-carbohydrate or saturated fat-reducing diet.⁹

While physical activity does not achieve large short-term weight loss, it has been shown to be important in long-term maintenance of weight lost.¹⁰ It also has beneficial effects on body composition, muscle strength, cardiovascular risk factors, insulin sensitivity and mood. In managing the obese diabetic patient, increased daily activity is to be encouraged as strongly as dietary change; for example, walking the dog, the children to school, to work and/or back; the use of stairs not lifts and public transport instead of cars. Water exercise classes are very popular with elderly or arthritic people.

While even a small weight loss (5–10%) can favourably alter glycaemia, blood pressure and lipid levels, it is difficult for many diabetic (and other) people to maintain weight loss in the long term.¹¹ Prevention of further weight gain can be an acceptable compromise goal in some women who have dieted repeatedly throughout their lives but continued to gain weight inexorably with time. It is not surprising that eating disorders in overweight diabetic women may be even higher than in other women in our excessively weight-conscious society.¹²

In the area of dietary treatment of Type 2 diabetes that is independent of weight concerns, we have reported that diabetic subjects find a monounsaturated fat diet to be as cheap, easy to prepare and palatable as a high-carbohydrate diet, also confirming findings of better day-time glycaemia and fasting triglyceride levels than with a high-carbohydrate diet.^{13,14} Setting metabolic effects aside, it is difficult for many people to consume a very high carbohydrate diet, such as was once recommended, of up to 60% energy intake. Even using an intensive motivational programme in Type 2 diabetes, to help people make such dietary changes we have found that the patients could just attain a mean carbohydrate intake of 50% of energy.¹⁵ However, if the patients prefer to replace saturated fats with a high-carbohydrate diet, use of low-glycaemic index foods can help lower the accompanying elevation in glycaemia and may prevent the rise in triglycerides. A low-fat diet is still advised in severe dyslipidaemia. The role of omega-3 fatty acids in man is not resolved despite their beneficial effects in rat models, although eating fish is encouraged.¹⁶ Fibre, alcohol and salt recommendations are as for the general population.^{4,6}

Conclusion

In summary, while much has changed recently, the diabetic diet remains in evolution. The patient with Type 1 diabetes can eat more sugars and has more flexibility with meal times and meal carbohydrate content. As both types of diabetes carry an increased vascular risk, there remains a universal recommendation for lessened dietary saturated fat. The role of physical activity in weight maintenance is now recognized and all forms of daily physical activity should be encouraged in the obese. There is a need for evidence to demonstrate any extra role in obesity for dietary fat beyond its energy content.

Much more high-quality nutritional research is needed to resolve completely the effects of individual types of fat,

carbohydrate and fibre on glycaemic control and other metabolic parameters. Until then, the diet remains based on an individual patient assessment and a choice of replacement of saturated fat with carbohydrate and/or monounsaturated fats.

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