ABC of Diabetes

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TREATMENT

Aims

The aims of treatment are first to save life and alleviate symptoms, and, secondly, to achieve the best possible control of diabetes with blood glucose concentrations maintained as near normal as possible to minimise long-term complications. The first aim is relatively easy to attain, and in some elderly patients or those who lack motivation or ability it is the only aim.

Control is achieved by lowering blood glucose using either diet alone, diet and oral hypoglycaemics, or diet and insulin. Patients who need insulin immediately have been described in the last article. All others are normally started first on a diet alone, and tablets are added if that fails.

The ideal in non-insulin-dependent patients is to aim for sugar-free urine tests together with a post-prandial blood glucose concentration no greater than 8 mmol/l.

Diet

Diet is the cornerstone of diabetic treatment. Eliminating sugar (sucrose and glucose) and imposing other restrictions (see below) lower blood glucose in both insulin-dependent and non-insulin dependent diabetics. Artificial sweeteners can be used. Good dietary advice is essential to the proper care of diabetics; ill-considered advice can be very damaging or else it is ignored. I recall one patient who kept to the same sample menu for many years before she reported it to be rather boring. Diet needs to be tailored to the patient's age and weight, type of work, race, and creed.

Diets for non-insulin-dependent diabetics

KING'S COLLEGE HOSPITAL—DIABETIC DEPARTMENT

A DIABETIC DIET

DO NOT EAT OR DRINK :

Sugar or glucose in any form and do not use sugar in your cooking.

Jam, marmalade, honey, syrup or lemon curd.

Sweets or chocolates.

Cakes and sweet biscuits.

Tinned Fruit.

Lucozade, Ribena, Coca-Cola, Pepsi-Cola, lemonade and other fizzy drinks.

Apart from these foods and drinks, you may eat and drink anything else, just as you did before you were diabetic.

You may use artificial sweeteners, such as saccharin, Sweetex, Hermesetas, Saxin, but NOT Sucron and any sugar free drinks including Squashes and Slimline range.

KCH 335

polyunsaturated fats is probably desirable, although the debate continues. High-fibre diets are of value and may help to reduce blood glucose concentrations if enough fibre is taken. Bran, All Bran, wholemeal bread, and beans have a relatively high fibre content, and are therefore recommended, but foodstuffs with really high fibre content, such as guar gum, are unpalatable.

For some elderly patients it is enough simply to eliminate all forms of sugar from the diet. Their blood glucose concentrations then fall and symptoms resolve. Optimal control may not be needed or even desirable, and it is best to interfere as little as possible with a patient's usual way of life. Dietary advice for these patients can be presented on a postcard.

Diets for insulin-dependent patients

Artificial sweeteners

Ingredients

Saccharin tablets	Sodium saccharin
Hermesetas	Sodium saccharin
Sweet 'n' Low powder	Lactose, saccharin, cream of tartar
Sweetex liquid	Saccharin, propylene glycol, glycerine
Sweetex powder	Sorbitol, saccharin
Sionon powder	Sorbitol, saccharin
Sorbitol powder	Sorbitol
Dietade fructose crystals	Fructose

Sugarlite and sucrose powders contain sugar and should not be used by diabetics. The calorie content of fructose and sorbitol is significant and they should be avoided by overweight patients.

Greater finesse is required in managing the diets of insulin-dependent patients: if they eat too much diabetic control deteriorates; if they eat too little they become hypoglycaemic. The important principles are that the carbohydrate intake be steady from day to day and that it should be taken at fairly regular times each day. If this discipline is not followed diabetic control becomes difficult. Severe carbohydrate restriction is not necessarily required; indeed, if the diet is fairly generous patients are less likely to resort to a high-fat intake, which may be harmful in the long term.

Insulin-treated diabetics must therefore be able to calculate the carbohydrate content of their food; they need no longer weigh the foodstuffs. The actual requirement of carbohydrate varies considerably: it is unsatisfactory to prescribe less than 100 g daily, and control may become more difficult if more than 250 g daily is allowed. The smaller amounts are more suitable for elderly, sedentary diabetics while the larger amounts are more appropriate for younger very active people. Although it has been observed that not all carbohydrate-containing foodstuffs are equally absorbed and they therefore do not have the same influence on blood glucose values, there is little factual information on this problem and it is impossible to make allowances, other than recommending that sugar (sucrose) should be avoided except for the treatment of hypoglycaemia.

For social convenience it is customary to advise that most of the carbohydrate should be taken at the main meals—breakfast, lunch, and dinner—even though these are not necessarily the times when, according to blood glucose profiles, most carbohydrate is needed; for example, less carbohydrate at breakfast and more at mid-morning and lunch often improves the profile. Snacks should be taken between meals—that is, at elevenses, during the afternoon, and at bedtime—to prevent hypoglycaemia; at least the morning and night snacks are essential and should never be missed.

For convenience 10 g of carbohydrate is described as "one portion," so that a 170-g carbohydrate diet is described to patients as one of "17 portions." Patients need to know the number of carbohydrate portions of different foodstuffs.

The following will increase the fibre content of the diet

Bread	Wholemeal or stoneground - wholemeal, for preference. If these are not available use HiBran or wheatmeal or granary loaves.
Biscuits and crispbreads	Rivita, Macvita and similar varieties, Digestive, oatcakes, coconut, and bran biscuits etc. CrackaWheat
Breakfast cereals	Porridge, Weetabix, Weetafakes, All Bran, Bran Buds, Shredded Wheat, Oat Crunchies, muesli, Alpen, and similar cereals
Wholemeal flour or 100% rye flour	Should be used with white flour for making bread, scones, cakes, biscuits, puddings, etc.
Fresh fruit and vegetables	Should be included at least twice daily. The skin and peel of fruit and vegetables, apples, pears, plums, tomatoes, and potatoes, should be eaten.
Dried fruit and nuts	Use frequently
Brown rice, wholemeal pasta	
Pulse vegetables	Such as pea and all varieties of beans

Oral hypoglycaemics

Sulphonylureas	Dose range (mg)
Tolbutamide	500-2000
Chlorpropamide	100-375
Acetohexamide	500-1500
Tolazamide	100-750
Glymidine	500-2000
Glibenclamide	2.5-15
Glipizide	2.5-30
Glibornuride	12.5-75
Gliclazide	40-320
Gliquidone	15-180
Biguanide	
Metformin	1000-2000

There are two types of oral hypoglycaemic drugs with entirely different modes of action: sulphonylureas and biguanides. They can be used singly or together. They have an established place in treatment and are used by 30% of all diabetics. Unlike insulin, they are not essential for life and should be withdrawn whenever dietary treatment alone will suffice.

An oral hypoglycaemic agent should be given when diet has failed. Sulphonylureas are generally preferred to biguanides because they are more potent and have fewer side effects. There should be no reluctance to use sulphonylureas even in overweight patients who remain symptomatic despite proper dietary management. A biguanide may occasionally be used as the first-line of treatment in grossly obese patients, chiefly because they

Slightly smaller than life size.

will help weight reduction to a small extent. Otherwise, a biguanide is generally added to a sulphonylurea if this alone has failed. There are unfortunately many overweight diabetics who never achieve adequate control, and medical advice is frustratingly of no avail. If a patient remains unwell and continues to lose weight, it is best to switch to insulin without delay. Some patients who just manage to maintain adequate control with maximum doses of oral hypoglycaemics together with a minute diet are extremely grateful when they are changed to insulin and a more generous diet.

Oral hypoglycaemics should not usually be used during pregnancy. If a diet alone is insufficient then insulin should be given.

Drug interactions are uncommon. Alcohol may dangerously potentiate the hypoglycaemic effect of oral hypoglycaemics. Aspirin, butazolidine, sulphonamides, and monoamine oxidase inhibitors may enhance the hypoglycaemic effect of sulphonylureas, but the hazard is probably small and should not prohibit the use of such drugs if they are needed. Corticosteroids have a powerful hyperglycaemic action, especially in larger doses, and may necessitate a change of treatment to insulin. The indications for their use are, however, the same as in non-diabetics, and they should not be withheld just because the patient is diabetic. Thiazide diuretics and oral contraceptives have a weak hyperglycaemic effect but rarely disturb diabetic control.

Sulphonylureas

The hypoglycaemic effect of early sulphonamides was observed during the 1940s, and in the next decade first tolbutamide (1956) and then chlorpropamide (1957) were introduced into clinical practice. They act chiefly by stimulating insulin release from the B cells of the pancreatic islets.

Nine sulphonylureas are available, together with glymidine, which is a sulphapyrimidine. They are remarkably safe and free from side effects although rare toxic effects have been reported, including rashes and jaundice. Glymidine does not crossreact with other sulphonylureas, which can be useful if a rash has occurred with one of the other preparations. Only one sulphonylurea should be used at a time since there is nothing to be gained from any combination of these drugs and there is no evidence that any one drug is likely to be more successful than another.

Selecting a sulphonylurea is largely a matter of personal choice. Chlorpropamide, however, has an exceptionally long duration of action (half life 36 hours) and may cause profound hypoglycaemia: it should therefore be avoided in the elderly, who may take too much chlorpropamide or eat too little food, and in renal failure, since it is excreted almost unchanged by the kidneys. Drugs which are chiefly metabolised before excretion, such as glibenclamide, tolazamide, and glipizide, should be chosen for patients with renal failure.

Many diabetics taking chlorpropamide experience an unpleasant facial burning and flushing very shortly after drinking even small amounts of alcohol. This is sometimes an inherited trait and it may be sufficiently disagreeable to warrant changing to a different sulphonylurea.

Biguanides

Biguanides act chiefly by reducing hepatic glucose production. Metformin is now the only biguanide which should be used because phenformin has, albeit rarely, caused fatal lactic acidosis in some patients. This side effect has also been reported with metformin in patients in renal failure or any state of shock: metformin should therefore, never be used in these conditions or in the elderly or those with serious liver disease.

Metformin has several unpleasant side effects, which include nausea, diarrhoea, and vomiting, and may cause a disagreeable metallic taste in the mouth. Some patients suffer an insidious malaise and are grateful when the drug is withdrawn.

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The third illustration, of how 10 fat men and 10 lean men fare on the journey through life, is taken, by permission, from *Diabetic Manual* by Elliott P Joslin, published by Lea and Febiger.