Medical.

THE CLINIC CONTROL OF DIABETES MELLITUS.

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IF it be true that to have diabetes treated successfully implies intelligence, it is equally true that the diabetic's troubles really begin when he leaves hospital. Up to that point the difficulties have been largely technical—troubles in connection with emaciation, ketosis, infection, etc.—and almost entirely in the hands of other people; but, when the diabetic has been brought to a state of metabolic and economic equilibrium, it is the maintenance of that state which demands the clinic. In this short article I propose therefore to explain the principle of co-operation which we use in the diabetic section of our Dietetic clinic at the David Lewis Northern Hospital in Liverpool.

The essentials of control demand, to my mind, that one must have, in every single case, the help of the factors which I have set out below:—

- (1) A working clinical classification of the types of diabetics.
- (2) Some knowledge of the individual patient's metabolism, economic position and *bona fides*.
- (3) A diet scheme which the patient can understand.
- (4) A dietitian, or someone who can explain, advise and control menus, cooking, etc., dealing with the patient directly.
- (5) An organization to keep records, see patients weekly or less often, and measure weights, amount of sugar in the blood, and other simple details.

Diabetic Types. Based on a mixture of clinical and metabolic distinctions, the following classification has been found to be of great value, not only in treatment, but in general management and prognosis; it divides all diabetics into three types, which are separable from each other by a very recognizable definition.

(1) Type I. Carbohydrate tolerance usually lost temporarily, in nitrogenous equilibrium and without ketosis, respond to carbohydrate (CHO) restriction, and easily regain tolerance without the use of insulin. Often young.

(2) Type II. The common and severe, emaciated diabetic, not in nitrogenous equilibrium and often with ketosis, require insulin always, tend to pass into coma and to react severely to sepsis.

(3) Type III. The elderly, often obese, arthritic or hyperpietic group with a high blood-sugar and little or no ketosis, often show no reaction to insulin or CHO restriction, suffer essentially from defect in storage and often have gangrene.

The value of recognizing these types is obvious. Type I form the most favourable group of diabetics, which, after a short metabolic survey in the wards may be passed on to the clinic, where a slow and steady increase of tolerance may almost always be brought about. Type II are the most difficult and require more careful control than the others; always in need of preliminary hospitalization, their diet and insulin adjust-

ments are a matter of constant care, whilst the onset of sepsis is always liable to sweep away their hard-won tolerance. Some of our patients in this group have had coma several times ; whilst others, from opposite causes, may constantly exhibit carotinæmia

FIG. 1.

1. DIET SCALE (for making up any diet).

One ounce (30 grammes) of Carbohydrate (CHO) or of Protein (P) yields 120 calories.

One ounce (30 grammes) of Fat (F) yields 270 calories.

Proteins contain 16·5 % of Nitrogen.

One ounce of Whisky, Brandy, Rum or Gin yields 105 calories.

CONVENIENT TABLES	{	30 grammes = 1 ounce.
	{	1,000 grammes = 1 kilogramme.
	{	1 kilogramme = 2·2 lb.
	{	30 cubic centimetres = 1 fluid ounce.
	{	1,000 cubic centimetres = 1 litre.

Test Diet A. (1,787 calories; N value 10 grm.)

Breakfast.—2 thick slices white bread; $\frac{1}{2}$ oz. of margarine or butter; tea or coffee (without sugar); 1 oz. milk.

Dinner.—3 oz. roast beef or white fish; 2 medium-sized boiled potatoes; 3 oz. cabbage; 1 oz. cheese; $\frac{1}{2}$ slice of bread.

Tea.—1 thick slice white bread; $\frac{1}{2}$ oz. butter or margarine; tea (without sugar).

Supper.—1 thick slice white bread; $\frac{1}{2}$ oz. butter or margarine; 1 large egg; tea or coffee (no sugar).

Carbohydrate-Free Diet.

(1,600 calories; N value 11·5 grm.)

Breakfast.—2 oz. (uncooked weight) smoked bacon; $\frac{1}{2}$ oz. margarine; 7 Kalari biscuits; $\frac{1}{2}$ oz. cream; tea or coffee (without sugar).

Dinner.—3 oz. roast beef or white fish; 3 oz. cabbage; 7 Kalari biscuits; $\frac{1}{2}$ oz. margarine or butter; 1 oz. cheese.

Tea.—3 average sardines or 1 egg; $\frac{1}{2}$ oz. butter or margarine; 6 Kalari biscuits; tea or coffee (without sugar).

A.—One ounce of Protein is contained in:

	Also contains	Vitamin	CHO	F
10 oz. uncooked smoked bacon	...	AB	6	3
6 oz. uncooked bacon or tripe	...	AB	6	3
5 oz. lean smoked ham	...	AB	1	1
5 oz. lean uncooked mutton, beef or lamb	...	AB	$\frac{1}{2}$	$\frac{1}{2}$
4 oz. roasted lean beef or leg of mutton	...	AB	1	1
6½ oz. corned beef	...	...	2	2
5 oz. fresh fowl	...	...	$\frac{3}{4}$	$\frac{3}{4}$
5 oz. chicken, fresh grouse, partridge or pheasant	...	AB	$\frac{1}{10}$	$\frac{1}{10}$
5 oz. boiled cod, haddock, sole, whiting, mackerel	...	A	1	1
5 oz. herring	...	AB	$\frac{1}{8}$	$\frac{1}{8}$
5 oz. salmon	...	AB	$\frac{1}{2}$	$\frac{1}{2}$
6 oz. lobster or crab	...	A	1	1
16 oz. oysters	...	...	$\frac{1}{2}$	$\frac{1}{2}$
7 average sardines	...	A	1	1
4 hens' eggs	...	AB	1	1
4 oz. cheese (American, Cheddar, Cheshire)	...	A	$\frac{1}{2}$	$\frac{1}{2}$
12 Kalari biscuits	...	...	$\frac{1}{2}$	$\frac{1}{2}$

B.—One ounce of Fat is contained in:

	P	CHO
1½ oz. fresh butter	A	1
1 oz. oleo-margarine	...	...
1 oz. lard, cod-liver or olive oil	...	...

C.—One ounce of Carbohydrate is contained in:

	Also contains	Vitamin	P	F
1 oz. sugar	...	...	...	...
1½ oz. wheat flour or grape nuts	...	ABE	$\frac{1}{7}$	$\frac{1}{10}$
1½ oz. dry oatmeal	...	B	$\frac{1}{4}$	$\frac{1}{4}$
1 pint of milk	...	ABC	$\frac{2}{3}$	$\frac{2}{3}$
1½ pints of cream	...	ABD	1	6
1½ oz. bread or toast	...	B	$\frac{1}{6}$	$\frac{1}{6}$
1½ oz. marmalade	...	...	...	...
20 oz. *lettuce, cabbage, cucumber, spinach, asparagus, marrow, celery, tomatoes, sprouts, watercress, cauliflower, leeks; §ripe olives, grape fruit	...	ABC	$\frac{1}{2}$	4
(There is no Carbohydrate in thrice-cooked cabbage, spinach and celery.)	...	...	...	...
10 oz. onions, turnips, beets, carrots; strawberries, lemons, peaches, oranges, gooseberries, blackberries, pineapple; *Brazil nuts, *filberts	...	ABC	$\frac{1}{2}$	$\frac{1}{2}$
6 oz. *green peas, artichokes, parsnips, apples, currants, pears, cherries, grapes, raspberries	...	ABC	$\frac{1}{2}$	$\frac{1}{2}$
5 oz. *potatoes, beans, boiled rice and macaroni, plums, bananas, prunes, French beans	...	ABC	$\frac{1}{6}$	$\frac{1}{6}$
1 pint of beer; ½ pint of stout	...	...	...	...
The Carbohydrate in soya bean and mushrooms is not assimilated.	...	...	...	...

5 % Carbohydrate Group:

Lettuce, cucumber, marrow, celery, leeks, tomatoes (fresh and tinned), Brussels sprouts, watercress, sea kale, broccoli, cauliflower, radishes, artichokes, grape fruit, ripe olives.

Milk, buttermilk, whey, cocoa ($\frac{1}{2}$ oz. to 1 pint of milk). Home-made chicken and meat broths, broth cubes and oatmeal gruel.

Dry wines, beer and cider.

Mustard, mixed pickles.

10 % Carbohydrate Group:

Onions, turnips, beets, carrots: strawberries, lemons, peaches, oranges, gooseberries, blackberries, pineapple: Brazil nuts, *filberts.

or mild hypoglycæmia. Type III require the least attention from the point of view of diabetes ; it is the associated conditions of obesity, arthritis or hyperpiesia, which more frequently need consideration ; we now scarcely ever admit these patients to the wards, but pass them straight to the clinic.

Diet Schemes.

Two schemes are in use. The first (fig. 1) was originally devised some years ago [1], and has since been revised from time to time ; its principle is obvious. Protein, fat and CHO may be ordered in more or less exact amounts, the choice of the food being left to the patient, who is required to do the simple arithmetic necessary. This arithmetic often, however, proves the stumbling-block, and we make a practice of trying out our patients on some such small book as that of Joslin's [2] ; if they can grasp that they can usually grasp the diet table, and may even be trusted to increase their CHO ration—always, of course, under clinical control.

The second scheme is more fool-proof. Here amounts of protein and fat are arranged in daily rations of from 90 to 150 grm. each, with three menus to each daily amount, the increments being by 30 grm. or 1 oz. each—so that there are twelve separate diets made up as follows :—

90 grm. protein	}	3 menus
90 „ fat		
90 grm. protein	}	„
120 „ fat		
120 grm. protein	}	„
120 „ fat		
120 grm. protein	}	„
150 „ fat		

and in which the quantities are laid down by weight beyond any possibility of mistake ; whilst the allowance of carbohydrate is specified in $\frac{1}{2}$ oz. or 15 grm. stamps (bread, potato, tomatoes, lettuce, etc.) which are placed in the spaces to the right of the diet.

FIG. 2.

DIET No. 1.

Protein, 90 grm. Fat, 90 grm.

<i>Breakfast.</i>	2½ oz. uncooked ham ; 1 egg.
<i>Dinner.</i>	6½ oz. boiled cod, haddock, sole or whiting ; boiled cabbage.
<i>Tea.</i>	7 Skipper sardines ; ¾ oz. butter.
<i>Supper.</i>	2 eggs ; ½ oz. butter.

CHO RATION.

Breakfast.
e.g.—½ oz.
bread.

Supper.
e.g.—10 oz.
lettuce.

DIET No. 2.

Protein, 90 grm. Fat, 90 grm.

<i>Breakfast.</i>	2 eggs ; ¼ oz. butter.
<i>Dinner.</i>	4 oz. lean meat or 5 oz. rabbit ; boiled cabbage.
<i>Tea.</i>	2 oz. cheese ; ¼ oz. butter.
<i>Supper.</i>	5 oz. boiled white fish ; ¼ oz. butter.

Breakfast.
e.g.—10 oz.
grape-fruit.

DIET No. 3.

Protein, 90 grm. Fat, 90 grm.

<i>Breakfast.</i>	2 eggs ; ¼ oz. butter.
<i>Dinner.</i>	7½ oz. boiled white fish ; boiled cabbage.
<i>Tea.</i>	3½ oz. corned beef ; ½ oz. butter.
<i>Supper.</i>	7 Skipper sardines ; ¼ oz. Butter.

Dinner.
e.g.—10 oz.
tomatoes.

On the back of each diet are certain printed instructions in which it will be noted that so-called diabetic foods are not recommended ; this is done for several reasons, the main one being that it interferes with a clear view of CHO tolerance.

FIG. 3.

- You must** weigh your food cooked (except ham) ; boil your cabbage three times ; eat slowly ; visit the dentist regularly ; keep your bowels open ; spend eight hours in bed.
- You must not** fry with fat or take it with meat ; take diabetic foods or saccharin ; get wet or catch cold ; eat much salt.
- You may** take tea or coffee (without milk or sugar), water, soda-water, pepper, mustard, and boiled cabbage in any quantity.

With these essentials—a classification, some knowledge of the patient and a diet scheme—it is possible to organize and conduct a clinic. The clinic which I direct and which has been described elsewhere [3] has the general lay-out which the diagram below represents.

FIG. 4.

Each patient, whether he comes originally from the wards or not, has a clinic card, which serves for whatever condition dietetic therapy is thought desirable and not for diabetes alone, although it is true that 50 per cent. of the patients in the clinic are diabetics.

Date.					
Diet	e.g. P 4, F 4, CHO 1.				
Other Therapy.	e.g. Insulin 0.5 cc.				
Blood	e.g. amounts of sugar, urea, cholesterol, CO ₂ combining power etc.				
F. T. M.					
X-ray					
Urine.					
Weight.					
Remarks.					

FIG. 5.

On entering the clinic, the patient passes to the left (see fig. 4) where he is weighed and then, card in hand, he is examined as to his state so far as this is shown by weight, blood-sugar, etc. : if there is any alteration in his diet, his doctor is informed by letter and he is passed on to the dietitian for explanation and adjustment.

In the conduct of the clinic itself, I would like to refer briefly to some of our working principles. In the first place we base our treatment largely on the use of the classification to which I have referred above ; that is, CHO restriction alone as a rule for Type I, CHO restriction with insulin for Type II, and calorie restriction without too much dietetic hardship for Type III ; in this latter group, a typical diet is shown below.

FIG. 6.

DAVID LEWIS NORTHERN HOSPITAL.**Dietetic Clinic—Thursdays, 4.30 p.m.****DIET. O.O.**

<i>Breakfast.</i>	Tea or coffee with little milk. No sugar. 1 orange, apple or $\frac{1}{2}$ grapefruit. 1 slice toast thinly spread with butter.
<i>Mid-morning.</i>	Beef tea.
<i>Mid-day.</i>	Usual helping lean meat or steamed or boiled fish. Usual helping greens. Small helping carrots, turnips, onions. Fresh fruit or fruit stewed without sugar, or fruit jelly or egg custard, junket or milk jelly.
<i>Tea.</i>	Tea with little milk.
<i>Supper.</i>	Usual helping steamed fish or lean meat, or small portion cheese or 1 egg. Green salad (lettuce or watercress). 1 slice bread and little butter, or two unsweetened biscuits and butter.
<i>Drink.</i>	Tea or coffee with little milk and no sugar. Beef tea. Clear soups. Do not drink during meals until all the solid food has been eaten.
<i>After</i>	(breakfast, mid-morning, mid-day, tea, supper), take —
<i>Before</i>	(breakfast, mid-morning, mid-day, tea, supper), take —
<i>Avoid.</i>	Bread, except as allowed. Sugar, jams, cakes, pastry, puddings, biscuits, potatoes, parsnips, beans, peas and lentils, bananas, dried fruits, nuts, sauce, thickened gravies and soups, fat meats and fish such as pork, salmon, eels and herrings.
<i>General Instructions.</i>	The diet should be made up as far as possible from white fish, lean meat, chicken, rabbit, eggs, green vegetables, carrots, turnips, beetroot, green salads. Fresh fruits, and fruits stewed without sugar. Take $\frac{1}{2}$ oz. butter daily. Take $\frac{1}{2}$ pint milk daily. The rooms should be cool and the clothes light. A daily walk should be taken out of doors.

In the proportion of CHO to fat and protein, very little attention is paid to any hard-and-fast rule of ketogenic-antiketogenic ratio; there are many patients in the clinic with ratios of 1 : 8 without ketosis. The CHO ration, as will be inferred from the above, is almost invariably kept low : high CHO diets plus a correspondingly large amount of insulin are not used; in fact an attempt is made in almost every case (even in Type II diabetics) to get rid of insulin so soon as possible and, equally, to envisage so soon and as clearly as possible the patient's own native tolerance for CHO, however small in amount. It is on this margin we feel that the patient can live his own life; guarded against sepsis through clinic control and with insulin always available to re-establish a diminishing tolerance.

REFERENCES.

- [1] PEMBERTON, H. S. *Brit. Med. Journ.*, 1923, i, 679.
- [2] JOSLIN, E. P. *A Diabetic Manual*: various editions.
- [3] PEMBERTON, H. S. *Liverpool Medico-surgical Journ.*, July, 1932.