should, however, be more realistic and accept the fact that most patients with diabetes mellitus, congestive heart failure, hyperlipidemia, etc., do not follow their diets as well as we would like. The study by Najemnik et al.[7] was of interest because it showed that the supplementation of ususal diets with guar caused significant improvement in their metabolism, carbohydrate, and lipids.

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REFERENCES

[1] Simpson, R. W., Mann, J. I., Eaton, J., Carter, R. D., and Hockaday, T. D. R.: High-carbohydrate diets and insulin-dependent diabetics. Br. Med. J. 1979; 2:523–25.

[2] Simpson, R. W., Mann, J. I., Eaton, J., Moore, R. A., Carter, R., and Hockaday, T. D. R.: Improved glucose control in maturity-onset diabetes treated with high-carbohydrate modified fat diet. Br. Med. J. 1979; 1:1753–56.

[3] Simpson, H. C. R., Simpson, R. W., Lousley, S., et al.: A high carbohydrate leguminous fibre diet improves all aspects of diabetic control. Lancet 1981; 1:1–5.

[4] Kinmonth, A.-L., Angus, R. M., Jenkins, P. A., Smith, M. A., and Baum, J. D.: Whole foods and increased dietary fibre improve blood glucose control in diabetic children. Arch. Dis. Child. 1982; 57:187–94.

[5] Vaaler, S., Hanssen, K. F., Dahl-Jorgensen, L., et al.: Improvement in long-term diabetic control after high fibre (bran and guar) diets. Diabetologia 1983; 25:200.

[6] Aro, A., Uusitupa, M., Voutilainen, E., Hersio, K., Korhonen, T., and Sittonen, O.: Improved diabetic control and hypocholesterolaemic effect induced by long-term dietary supplementation with guar gum in type 2 (insulin-dependent) diabetes. Diabetologia 1981; 21:29–33.

[7] Najemnik, C., Kritz, H., Irsigler, K., Laube, H., Knick, B., Klimm, H. D., Wahl, P., Vollmar, J., and Brauning, C.: Guar and its effects on metabolic control in type II diabetic subjects. Diabetes Care 1984; 7:215–20.

Mathematical Model to Obtain Cholesterol, P/S Ratio, and Fiber Daily Intake

There is a great deal of interest in estimating the cholesterol, fatty acid (P/S ratio), and fiber content of the diet of diabetic patients.[1] Nonetheless, this computation is fairly tedious. On the other hand, calculation of the protein, lipid, and carbohydrate content and the ratio of vegetable origin lipids to animal origin lipids (VL/AL) is simply and rapidly carried out. From these data, we propose an efficient and rapid mathematical model that permits an estimation of the amount of dietary cholesterol, fiber, and P/S ratio. One hundred thirty seven–day dietary surveys were carried out. The composition of protein, lipid, and carbohydrate of the diet, the P/S ratio, and the amount of cholesterol were calculated using the food composition table established by Renaud.[2] The content of fibers was estimated using the Paul index.[3] An ascending step-by-step multiple linear curve was produced to determine the most representative parameters of the variables under investigation. Results are expressed as mean ± SD.

Our subjects ingested 2400 ± 890 kcal daily, distributed as follows: lipids, 117 ± 53 g; proteins, 86 ± 33 g; carbohydrates, 250 ± 108 g. The ratio VL/AL was 0.55 ± 0.56, whereas the P/S ratio was 0.34 ± 0.33. The quantity of cholesterol ingested was 479 ± 228 mg/24 h and quantity of fiber was 12.55 ± 8.0 g/24 h. Calculation of the ratios P/S and VL/AL required 6 ± 1 min and 35 ± 7 s, respectively.

There exists a positive linear correlation between the P/S ratio and VL/AL: $P/S = 0.6\ VL/AL$; $r = 0.98$; $P < 0.001$.

The mulitple linear curve allows an estimation of the daily intake of cholesterol and fiber with respect to the quantity of essential nutrients ingested:

$$\text{Cholesterol (mg/24 h)} = (3.57 \times L) - (168 \times P/S) + (0.8 \times P) - (0.09 \times \text{kcal}) + 267,\ P < 0.01$$

$$\text{Fiber (g/24 h)} = (0.024 \times \text{kcal}) + (0.057 \times P) - (0.075 \times Hc) - (0.24 \times L) - 3.2,\ P < 0.01$$

The reliability of our research is based on the validity of the data published in the food composition tables. Our results provide a simple, rapid, easily programmable means to estimate the P/S ratio and the amount of cholesterol and dietary fiber ingested. Our subjects take in one-third of dietary cholesterol from butter. Moreover, they ingest very few dried vegetables. In our country, the extraction rate of bread flour is around 75%. So, the proposed model for the estimation of fiber intake is only right if the study population ingests white bread.

Thus, this type of calculation should be tested again if the total energy input and the distribution of essential nutrients are quite different from those of our subjects. The formulae are valid only for the food composition tables that we used. For example, an energy input of 2500 kcal/24 h (comprised of 55% carbohydrate, 30% lipid, and 15% protein) should contain 1.66 times more vegetable lipid than animal, 250 mg of cholesterol, and 17 g of fiber.

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REFERENCES

[1] American Diabetes Association: Principles of nutrition and dietary recommendations for individuals with diabetes mellitus. Diabetes 1979; 28:1027–30.

[2] Renaud, S., Godsey, F., Ortchanian, E., and Boudier, F.: Table de Composition des Aliments. Paris, Astra-Calve Ed., 1976.
[3] Paul, A. A., and Southgate, D. A.: The Composition of Foods, 4th edit. London, HMSO, 1978.

More on SMBG Techniques

I read with fascination the article entitled "Use of Tactile Techniques for Self-Monitoring of Blood Glucose in Visually Impaired Patients with Diabetes Mellitus," which appeared recently in DIABETES CARE (1984; 7:313–17). Knowing that independent control is a key issue for blind diabetic patients, I was very impressed with the attempts to design and evaluate tactile techniques that enable legally blind patients to self-monitor blood glucose.

Boehringer Mannheim Diagnostics, Bio-Dynamics Division, was approached by The American Foundation for the Blind with the request to design and develop a system that visually impaired patients could use to reliably test their own blood glucose levels. I am very happy to report that we honored the request and are now ready to introduce a system called Reflocheck-S.

The Reflocheck-S is a complete, speaking blood glucose monitoring system. It contains a sampling device equipped with a photo detector that virtually guarantees a standard size blood drop and its precise placement on a test strip. When the drop is detected, it signals the start of a timing cycle. In addition to a reflectance photometer, a voice synthesizer provides audible step-by-step instructions, timing announcements, and results. To allow for an accurate, easy to accomplish calibration, a lot specific bar code is attached to each test strip. All necessary components are contained in a carrying case and operate on either house current or batteries.

The system was evaluated and modified based on inputs from blind patients throughout its development. The final design was tested by 67 patients, 44 of whom were visually impaired or blind. A comparison to the reference hexokinase method resulted in a correlation coefficient of 0.988, a slope of 1.01, and an intercept of 5.12 mg/dl.

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Microcomputers in Diabetes Management and Education

In addition to the letters of Morrisett[1] and Rodbard et al.,[2] we would like to present our package for clinical applications at a diabetes center. This package operates on an eight-bit microcomputer, with a CP/M compatible operative system and a mass memory of at least five megabytes. (We use a DMD 1000, DMD Computers, Torino, Italy.) The package uses a compiled Basic and a DBMS (Data Base Management System).

The following uses are offered:

1. Fully automated diabetes record for in-patients, with many facilities: print, statistical analysis, updating, etc.

2. Management of out-patient clinic, with two different procedures:

(A) Slave units to be given to the patients involved in a regimen of self-monitoring of blood glucose (SMBG), to collect routine daily parameters (blood sugar, glycosuria, and ketonuria, meals, hypo- and hyperglycemic episodes, etc.). The slave unit is connected to the master unit at each visit to the center, and data are displayed and graphically printed. Individual data are stored on the patient's floppy disk.

(B) A program for storing data collected during periodic consultation at the center for patients without slave units. Future appointments and exams (fluoroangiography, microproteinuria, etc.) may be pre-planned.

3. Computer-assisted instruction (CAI). Two programs for continuous diabetes education, in a global approach to the patient, are available:

(A) EDICO1. A questionnaire for self-appraisal of basic information, with 20 multiple-choice questions covering principal knowledge and skills. Explanations are displayed when wrong answers are provided.

(B) EDICO2. A second-level questionnaire for assessment of behavioral attitudes in patients on SMBG with 10 multiple-choice questions. Lateral fluxes are activated by unsatisfactory answers. Results and patient's comments may be stored for evaluation and education of the teaching team.

4. Other utilities. Several routines for medical guidance in clinical conditions, such as autonomic neuropathy and diabetic coma (monitoring of plasma osmolality, hemo-gas analysis, actual fluid deficit, etc.).

The package has been proved useful and user-friendly in the management and education of diabetic patients. Revision and further development of the programs are in progress.

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REFERENCES

[1] Morrisett, W.: More on patient education: use of microcomputers. Diabetes Care 1984; 7:105.
[2] Rodbard, D., Pernick, N., and Jaffe, M. L.: Diabetes data management program available for microcomputers. Diabetes Care 1984; 7:401–402.