bose mode when a test result is below some threshold that suggests mental confusion.

E. BRUCE MACDOUGALL, PHD

FROM THE DEPARTMENT OF LANDSCAPE ARCHITECTURE AND REGIONAL PLANNING, UNIVERSITY OF MASSACHUSETTS AT AMHERST, AMHERST, MASSACHUSETTS.

ADDRESS CORRESPONDENCE TO E. BRUCE MACDOUGALL, PHD, DEPT. OF LANDSCAPE ARCHITECTURE AND REGIONAL PLANNING, UNIVERSITY OF MASSACHUSETTS AT AMHERST, HILLS NORTH, AMHERST, MA 01003.

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Lipid and Lipoprotein Levels in Young IDDM Patients

In a recent report of the DCCT Research Group (1), minor differences in lipid and lipoprotein levels were found comparing young (13–40 yr of age) IDDM volunteers with control values of the LRC program. Only in young females with relatively higher HbA_{1c} levels were elevated cholesterol, LDL-cholesterol, and TG values observed.

However, more profound differences in lipid levels between diabetic and nondiabetic populations have been noted in older studies. The authors (1) comment on this discrepancy—that a major change in dietary habits during the past 10–20 yr with a decrease in fat and increase in carbohydrate intake may play an important role.

In 1979, we investigated the lipid and lipoprotein levels in diabetic children (8–12 yr of age, $n = 30$) at a summer camp of 4-wk duration (2). Their caloric intake and dietary pattern was monitored by a dietian. The mean caloric intake was 2793 ± 814 cal/day, consisting of 40–45% fat, 20–25% protein, and 35–40% carbohydrate. The distribution of calories differed clearly from the current dietary advice and practice.

The mean HbA_{1c} was 9.8 ± 0.4% (normal range 4.6–6.6%); the mean insulin dosage was 0.8 ± 0.29 U/kg. Only on admission day did we observe increased total cholesterol ($P < 0.05$) and TG in females and elevated TG levels in males, compared with lipid levels of 64 healthy children. These differences were no longer apparent after 4 wk camping on the rather fat-rich diet described above; and total cholesterol, HDL cholesterol, LDL cholesterol, VLDL cholesterol, and TG were in the normal range for boys and girls.

This observation, although made among only a small group of patients, indicates that in otherwise healthy and normally active young diabetic patients with moderate metabolic control, lipid and lipoprotein levels are in the normal range. In accordance with the DCCT study, the evidence indicates that females may be more prone to alterations of the lipid levels in this age group. Changes in dietary habits may only partly explain the lower lipid levels reported by DCCT study (1).

E. SCHOBER, MD

FROM THE UNIVERSITY CHILDREN'S HOSPITAL, VIENNA, AUSTRIA.

ADDRESS CORRESPONDENCE TO E. SCHOBER, MD, UNIVERSITY CHILDREN'S HOSPITAL, WAHRINGER GURTEL 18–20, 1–1090 VIENNA, AUSTRIA.

DCCT, DIABETES CONTROL AND COMPLICATIONS TRIAL; IDDM, INSULIN-DEPENDENT DIABETES MELLITUS; LDL, LOW-DENSITY LIPOPROTEIN; TG, TRIGLYCERIDES; HDL, HIGH-DENSITY LIPOPROTEIN; VLDL, VERY-LOW-DENSITY LIPOPROTEIN.

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Response to Dr. Schober

We read with great interest the comments by E. Schober comparing the baseline lipid and lipoprotein measurements of the DCCT cohort (1) with lipid data from IDDM children attending a summer camp in 1979 (2). There are several notable differences between the DCCT study cohort and the population studied by Scrober et al. (2), including differences in nationality and period of study, and younger age (2–12 yr) in the Austrian study. Despite these differences, we consider the results with regard to lipid measurements to be mutually confirmatory. At baseline, the 19 Austrian children had lipid values that were similar to a nondiabetic population except for higher TG levels in the diabetic girls and boys. The diabetic girls had a slightly higher total cholesterol than the diabetic boys, although no significant difference was observed in total cholesterol between the diabetic and nondiabetic girls. Of note, a study by

Cruikshanks et al. (3) in the early 1980s generally confirmed these findings. That study also noted only modest differences in lipid levels between adolescent IDDM patients and nondiabetic control subjects with the major differences occurring in younger girls with IDDM.

At this point, we can only speculate what specific role diet plays in the modest differences in lipid and lipoprotein levels noted in some IDDM patient groups when compared with nondiabetic control subjects. In the DCCT, associations between lipid levels and dietary variables such as total calories, fat, carbohydrate, and cholesterol intake (derived from baseline diet histories) were very weak ($r^2 < 0.04$). Schober notes that the modest differences in lipid levels between IDDM campers and nondiabetic control subjects disappeared after 4 wk of camping—with the diabetic children eating a relatively high-fat diet. Because the authors did not obtain any measure of baseline diets, it is conceivable that the camp diet, albeit high in fat, had a lower fat content than the childrens' usual diet. Moreover, other variables, such as tighter metabolic control or changed exercise patterns, may explain the change in lipids while at summer camp. Until more data become available from the DCCT and other studies, explanations for the altered lipid and lipoprotein profiles in IDDM remain speculative.

DCCT Research Group

Address correspondence DCCT Research Group, Box NDIC/DCCT, Bethesda, MD 20892.

DCCT, Diabetes Complications and Control Trial; IDDM, insulin-dependent diabetes mellitus; TG, triglyceride.

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Stability of Mailed and Couriered Capillary HbA_{1c} Samples

We previously evaluated the accuracy and stability of the Bio-Rad capillary HbA_{1c} collection system (Hercules, CA) for samples collected and assayed at a single location (1). The Bio-Rad system is designed specifically for the Diamat HPLC and requires no pretreatment when assayed ≥24 h after collection. Although other capillary HbA_{1c} collections have been used with affinity chromatography (2) and colorimetric assays (3), they are not readily adapted to HPLC. We undertook this study to substantiate the stability of mailed or couriered capillary HbA_{1c} samples using the Bio-Rad collection system.

Three simultaneous capillary HbA_{1c} samples were obtained from 100 pediatric patients attending diabetes outreach clinics in rural Minnesota. One set of samples was mailed from the collection site. Another set of samples was stored at ambient temperatures (couriered) for up to 4 days before being delivered to the laboratory. The reference samples were stored on ice for up to 4 days before being delivered to the laboratory. We instructed 52 of the patients to collect a sample (home) during the following 24 h and to mail it to the laboratory. All samples were sent to Park Nicollet Medical Center Laboratory.

The study was conducted in April 1992, during which the low and high daily temperatures throughout Minnesota averaged 31 and 48°F and ranged from a daily low of 12–53°F and a daily high of 28–90°F. The capillary HbA_{1c} values ranged from 4.7 to 15.9% with an average value of 9.1% (reference range 4.2–5.8%). All chromatographs were normal in appearance.

The maximum difference from the reference for each collection method was 0.4%, with >90% within 0.2%. No significant difference was observed between the reference and couriered samples and between the reference and home samples using a paired Student's *t* test. Although the average of the reference samples exceeded the average of the mailed samples by 0.067 (SE = 0.013, $P < 0.001$), this difference is not clinically significant.

Mailing of capillary HbA_{1c} samples offers an important service to patients in rural areas. Collection kits could be sent to patients for collection before a clinic visit; the results would then be available at the time of the clinic visit. We have shown that capillary HbA_{1c} samples collected with the Bio-Rad capillary HbA_{1c} collection system can be mailed or couriered, at ambient temperatures, without a loss in accuracy or stability. Likewise, samples can be collected by the patient at home and mailed to the laboratory.

Ellen M. Voss, BS, MT
George S. Cembrowski, MD, PhD
Broatch Haig, RD, CDE
Martha L. Spencer, MD

From the Park Nicollet Medical Center and the International Diabetes Center, Minneapolis, Minnesota.

Address correspondence to Ellen M. Voss, BS, MT, Park Nicollet Medical Center, 5000 West 39th Street, Minneapolis, MN 55416.

HPLC, high-performance liquid chromatography.

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