be consistent with the hypercoagulable and hyperfibrinolytic state of diabetes. Furthermore, the direct correlation between Lp(a) and α2PIC may reflect a physiologic interaction of the two parameters because Lp(a) competes with plasminogen, a precursor of plasmin enzyme that dissolves blood clots and α2PIC reflects the fibrinolytic enzyme system.

The fact that those diabetic patients with higher Lp(a) concentrations tended to have greater amounts of α2PIC may lend some support to the notion that α2PIC may compensate for the elevation of Lp(a), which induces thrombosis.

TAKASHI NAGAI, MD
TAKASHI TOMIZAWA, MD
MASATOMO MORI, MD

From the First Department of Internal Medicine, Gunma University School of Medicine, Gunma; Maebashi and the Department of Internal Medicine, Public Tomioka General Hospital, Gunma, Japan.

Address correspondence to Takashi Nagai, Department of Internal Medicine, Public Tomioka General Hospital, 2073–1 Tomioka, Tomioka, Gunma, 370–23, Japan.

Lp(a), lipoprotein(a); NIDDM, non-insulin-dependent diabetes mellitus; AEI, albumin excretion index; TG, triglyceride; LDL, low-density lipoprotein; ApoB100, apoprotein B100; apoA-I, apoprotein AI; PT, prothrombin time; APTT, active partial thromboplastin time; ELISA, enzyme-linked immunosorbent assay; TAT, thrombin-antithrombin III complex; $_a$2PIC, $_a$2 plasmin inhibitor-plasmin complex; BMI, body mass index.

Reference

1. McLean JW, Tomlinson JE, Kuang WJ, Eaton DL, Chen EY, Fless GM, Scanu AM, Lawn RM: cDNA sequence of human apolipoprotein(a) is homologous to plasminogen. *Nature (Lond)* 330:132–37, 1987

Insulin Administration via a Subcutaneous Catheter

Effects on absorption

This study evaluates whether a plastic subcutaneous catheter (Insuflon®, Pharma-Plast International A/S, Lynge, Denmark) can be recommended for insulin administration as an alternative to conventional insulin injections. We compared plasma free insulin profiles when insulin was injected either conventionally or via Insuflon®.

The study population was comprised of two series with 8 diabetic adolescent subjects in each series. All subjects were treated with highly purified biosynthetic human insulin. Short-acting insulin was given before meals and intermediate-acting insulin given once a day before supper. Series 1 subjects were examined while receiving conventional insulin injections and on day 1 of administration via the Insuflon® cannula, whereas series 2 subjects were examined on day 1 and day 5 of Insuflon® administration. The mean ± age in series 1 was 14.4 ± 2.2 yr, and the mean GHb was 10.9 ± 2.4% corresponding to a SD score of 5.5. The mean daily insulin dose was 0.84 ± 0.18 IU/kg. In series 2 the mean age was 13.4 ± 1.7 yr, and the mean GHb concentration was 11.7 ± 3.1%, i.e., a SD score of 6.6 and the mean daily insulin dose 0.89 ± 0.21 IU/kg.

The insulin was injected subcutaneously into the abdominal wall, the same area being used for both conventional and Insuflon® injections. The Insuflon® catheter was inserted in the evening and used for the first injection the following morning. The protocol was approved by the local ethical committee. Blood samples were collected before the insulin injections and at intervals of 30 min for 2 h after receiving short-acting insulin. After the intermediate-acting evening insulin, the blood samples were taken every 2 h during the night. Blood glucose concentrations were determined enzymatically and plasma concentrations of free insulin with a specific RIA (1). Antibody-bound insulin was precipitated immediately after collecting the blood samples (2). Two-way ANOVA for repeated measures was used to compare the 24-h plasma free insulin and blood glucose profiles.

The mean plasma insulin profiles, while receiving conventional injections and during day 1 of Insuflon® administration, are presented in Fig. 1*A*. No differences between the mean insulin concentrations were found at any time of the day. Also, no differences were observed between the two regimens in mean blood glucose levels (data not shown). The daily profiles of mean plasma insulin concentrations during

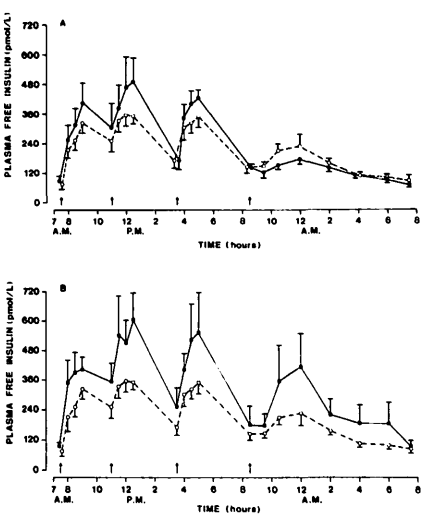

Figure 1—*Plasma free insulin concentrations over 24 h in 8 adolescent IDDM subjects receiving conventional insulin injections (●——●) and on day 1 receiving insulin via the Insuflon® catheter (○----○) (A) and in 8 other adolescent IDDM subjects on day 1 (●——●) and day 5 (■——■) of insulin administration via the Insuflon® catheter (B). The arrows mark the insulin injections. Data are means ± SE.*

day 1 of Insuflon® administration and after 5 days are shown in Fig. 1*B*. Although the insulin concentrations tended to be higher on average after 5 days, the difference was not significant. No differences in mean blood glucose levels during day 1 and day 5 were detected.

Our results indicate that the absorption and biological efficiency of injected insulin remained basically unchanged after administration via a subcutaneous catheter relative to conventional injections. The use of the subcutaneous catheter for 5 days did not significantly alter the absorption kinetics of the injected insulin. Accordingly, the subcutaneous catheter appears to offer a feasible alternative to conventional injections for the administration of exogenous insulin. Subcutaneous external access ports may carry a high risk of infections (3). No major infection requiring systemic antibiotics and/or surgical treatment was seen, however, in a Swedish survey comprising 22 diabetic subjects using a total of 239 catheters over a 2-mo period (4).

MARJA-LIISA KÄÄR, MD
JORMA MÄENPÄÄ, MD
MIKAEL KNIP, MD

From the Department of Pediatrics, University of Oulu, Oulu and the Department of Pediatrics, Aurora Hospital, Helsinki, Finland.

Address correspondence to Mikael Knip, MD, Department of Pediatrics, University of Oulu, SF-90220 Oulu, Finland.

RIA, radioimmunoassay; ANOVA, analysis of variance; IDDM, insulin-dependent diabetes mellitus.

References

1. Kuzuya H, Blix PM, Horwitz DL, Steiner DF, Rubenstein AH: Determination of free and total insulin and C-peptide in insulin-treated diabetics. *Diabetes* 26: 22–29, 1977
2. Rudkowski R, Antony G: The effect of immediate polyethylene glycol precipitation on free insulin measurements in diabetic patients with insulin antibodies. *Diabetes* 36:253–57, 1986
3. Selam J-L, Charles MA: Devices for insulin administration. *Diabetes Care* 13: 955–79, 1990
4. Hanås R, Ludvigsson J: Side effects and indwelling times of subcutaneous catheters for insulin injections: a new device for injecting insulin with a minimum of pain in the treatment of insulin-dependent diabetes mellitus. *Diabetes Res Clin Pract* 10:73–83, 1990

Utility of Routine Ophthalmologic Examination in Patients with Gestational Diabetes Mellitus

Few studies have been conducted to determine the need for routine screening ophthalmologic examinations in GDM patients. This study evaluates the results of ophthalmologic examinations performed routinely on GDM patients at our institution over a 4-yr period.

Patients were screened for GDM with the O'Sullivan screening test, consisting of a 50-g oral glucose load given without regard to time of last meal (1). Screening was performed on the first obstetrical visit and between 24 and 25 wk of gestation. A 1-h venous plasma glucose level >135 mg/dl (7.5 mM) was considered a positive test. Patients with a positive test were given a standard 3-h 100-g OGTT after an overnight fast. Patients were diagnosed with GDM if ≥2 of the venous plasma glucose concentrations met or exceeded the following values: fasting, 105 mg/dl (5.8 mM); 1 h, 190 mg/dl (10.6 mM); 2 h, 165 mg/dl (9.2 mM); or 3 h, 145 mg/dl (8.1 mM) (1). Ophthalmologic examination was performed within 2 wk of the diagnosis of GDM.

From January 1986 to January 1990, 80 patients were diagnosed with GDM. Of these, the records of the ophthalmologic examinations were available in 64 (80%) patients. No difference was detected in the age or severity of the GDM between the patients whose ophthalmologic records were available and those whose records were not available. An ophthalmologic exam was performed early (11–23 wk gestation) in the pregnancy in 10 (16%) patients because of early diagnosis of GDM. The remainder of the 64 patients were diagnosed and examined during 24–33 wk of gestation. The mean age for the cohort was 27 yr (range 20–41), and the mean parity was 1.1 (range 0–7).

Our results indicated that of the 64 patients with GDM, none (0 of 64) had evidence of diabetic retinopathy.

This study demonstrates that when the diagnosis of GDM is made the patient is not at risk for diabetic retinopathy. This conclusion is in agreement with the findings of Horvat et al. (2) in their prospective 12-yr study of diabetes in pregnancy. Of 107 patients with GDM in 119 pregnancies, none had retinopathy at the initial exam and none developed retinopathy during pregnancy (2). To our knowledge no other existing studies, prospective or retrospective, address the incidence of retinopathy in GDM. To date, no recommendations are available regarding the necessity of performing a screening ophthalmologic examination in GDM patients.

We conclude from our results, and the results of Horvat et al. (2) support the conclusion, that a screening ophthalmologic examination is not necessary in GDM patients. This represents a significant cost savings with no negative impact on the quality of patient care.

The opinions and assertions stated above are the private views of the