was in the amount of unbound, presumably biologically active insulin found after administration by jet spray. Lucas et al. did not measure the amount of free insulin available in their subjects. They also report that the rise of total insulin occurred more rapidly when the insulin was given with the Medi-Jector II. They indicate that the mean time to peak was 120 min after injection with the Medi-Jector II and 300 min after adminstration with the needle and syringe. This 3-h difference seems significant until it is realized that the blood was only sampled at 3-h intervals. We found that the peak levels of insulin after needle and jet-spray injection differed by 60 min when the blood levels were measured at 60-min intervals. The difference in time of peak levels may be even less than 60 min if sampling was more frequent. Thus, we are uncertain about the interpretation by Lucas et al. of the data, but we do agree with the cautions that they suggest when changing a patient from needle to jet injections of insulin.

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REFERENCE

1. Malone JI, Lowitt S, Grove NP, Shah SC: Comparison of insulin levels after injection by jet stream and disposable insulin syringe. *Diabetes Care* 9:637–40, 1986

Record Books and Patients With NIDDM

Waste of Time?

Long-term good metabolic control improves the quality of life of diabetic patients and reduces the risk of diabetic complications (1,2). The use of a record book as an aid in controlling the disease is one of the major objectives of educational programs and is a great help to the physician and patient (3).

A recent study based on a diabetic population attending an outpatient clinic in England has shown good participation in the compilation of booklets by patients with insulin-dependent diabetes mellitus (IDDM) but not non-insulin-dependent diabetes mellitus (NIDDM) (4). Northern and southern Europeans differ much in life-style, educational programs, and doctor-patient relationships. Therefore, we undertook a similar study in Rome to determine the attitude of diabetic patients toward keeping a record book of their disease.

Patients attending the outpatient diabetic clinic of the University of Rome "La Sapienza" were asked to answer a questionnaire and to produce their record book or charts of self-monitoring glucose of blood glucose. On the basis of results obtained, patients were divided into three categories: *1*) those who produced excellent record books (i.e., the doctor could clearly understand data reported), *2*) those who produced fair record books (i.e., the doctor could interpret data with some difficulty), and *3*) those who produced poor record books (data were impossible to evaluate). Other specific questions were also asked (e.g., about difficulties in booklet compilation, urine- and/or blood-test monitoring, and waste of time in recording data).

As shown in Table 1, many (81%) IDDM patients produced record books compared with NIDDM patients (36%). The major reasons given for not keeping a record book were: *1*) patients felt there was no need for it because metabolic control was good and *2*) old age. No significant differences were observed between those patients who kept a record book and those who did not with respect to sex, age, and duration of disease. We found, however, that IDDM patients compiled their record books better than NIDDM patients (40% of IDDM received excellent assessment compared to 14% of NIDDM). Interestingly, none of the IDDM patients considered the compilation of a record book a waste of time, whereas 75% of NIDDM patients thought it was.

The results of the study in Rome are very similar to those reported in England, showing that despite the marked differences in life-style, a large proportion of IDDM patients produced a record book compared with NIDDM patients. As in the British study, we found that IDDM patients are more compliant. Insulin dependence is considered a much more serious disease by most patients; this is the main reason for the better metabolic control and in particular the correct use of a record book in these patients.

TABLE 1
Compilation of record books by IDDM (*n* = 37) and NIDDM (*n* = 39) patients

	IDDM	NIDDM
Books produced	30 (81.1)	14 (35.8)
Book assessment		
Excellent	12 (40)	2 (14.3)
Fair	12 (40)	8 (57.1)
Poor	6 (20)	4 (28.6)
Self-monitoring		
Blood	3 (10.4)	5 (6.3)
Urine	13 (43.3)	24 (30.4)
Both	14 (46.6)	10 (12.7)
Self-monitoring complaints	7 (18.9)	5 (12.8)
Outpatient clinic attendance (yr)*	3.4 ± 4.2	2.5 ± 2.4
Duration of diabetes (yr)*	10.7 ± 7	8.5 ± 7.5

Percentages given in parentheses.
*Values are means ± SD.

The primary problem with NIDDM patients seems to be that they do not take their disease seriously and are less aware of possible long-term harmful complications. Educational programs for teaching self-care seldom succeed in NIDDM patients, which is why it is difficult for the diabetologist to convince them to maintain a record book.

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REFERENCES

1. Tchobroutsky G: Relation of diabetic control to development of microvascular complication. *Diabetologia* 15:143–52, 1978
2. Scobie IN, Tey BH, Bowden VK, Judd SL, Lowy C, Sonksen P: A consumer-orientated survey of long-term home blood glucose monitoring. *Pract Diabetes* 2:33–35, 1985
3. McNeal B, Salisbury Z, Baumgardner P, Wheeler FC: Comprehension assessment of diabetes education program participants. *Diabetes Care* 7:232–35, 1984
4. Bodansky HJ: Tales from a diabetic clinic: why patients do not bring a record book to the clinic. *Pract Diabetes* 5:247–48, 1986

Exaggerated Plasma Catecholamines and Cortisol Responses to Hypoglycemic Stress in Essential Hypertension

An estimated 30–60% of diabetic patients may have associated hypertension, and the simultaneous presence of these two conditions increases the morbidity and mortality in a subgroup already at high risk for atherosclerosis. Many studies have pointed out the importance and the benefits of tight antihypertensive therapy in these patients. Furthermore, early diagnosis of both impaired glucose tolerance and hypertension appears to be crucial in the prevention of cardiovascular attacks, especially brain and myocardial infarction. The association between hypertension and diabetes mellitus has generally been attributed to an abnormal vascular volume (1) and/or to hyperinsulinemia that may per se increase the blood pressure (2). However, an interference of plasma catecholamines and cortisol cannot be completely excluded.

We studied 20 subjects with mild impaired glucose tolerance (detected by 75-g oral glucose tolerance test and diagnosed with National Diabetes Data Group criteria; 3) without (n = 10) and with (n = 10) mild essential hypertension (diagnosed with World Health Organization criteria). In the latter group, no subject had renal impairment or papilledema, and no cause of high blood pressure or any associated disease was detected after complete examination; consequently, all subjects were considered to have benign essential hypertension. There were no significant differences in age (47 ± 8 vs. 53 ± 7 yr), body mass index (23 ± 2 vs. 24 ± 4), basal plasma glucose (86 ± 8 vs. 84 ± 9 mg/dl), or diastolic blood pressure (90 ± 5 vs. 91 ± 4 mmHg) between the two groups. In contrast, basal plasma insulin (13 ± 6 vs. 9 ± 4 mU/L, $P < .01$) and systolic blood pressure (163 ± 22 vs. 138 ± 10 mmHg, $P < .01$) were significantly enhanced in subjects with hypertension. No subjects had taken any drugs for at least 6 wk before the study. All subjects gave informed consent, and the study was approved by the ethics committee of our institution. All subjects were consuming a weight-maintaining diet. After an overnight fast (12 h), both groups of subjects underwent a test for hypoglycemia according to the method of White et al. (4). Plasma glucose was determined by a glucose oxidase technique immediately after the experiment (Auto-Analyzer, Beckman, Fullerton, CA; intra-assay variability 2.9%). Plasma samples for hormone determinations were stored at −20°C until assay. Plasma insulin (Bio-Data kit, Italy; intra-assay variability 3.7%), cortisol (Bio-Data kit, intra-assay variability 4.1%), growth hormone (Bio-Data kit, intra-assay variability 3.9%), and glucagon (with a 30K Unger's antibody, Byk-Gulden mat kit, Cormano, Italy; intra-assay variability 4.9%) levels were all determined by radioimmunoassay methods. Plasma catecholamine levels were determined by a classic radioenzymatic method (5). After preliminary ANOVA, statistical comparison was performed via nonparametric (Wilcoxon's rank-sum test) and parametric (t test for unpaired data) tests and r of Pearson. A P value of .05 was chosen as level of significance. All results were expressed as means ± SE.

As depicted in Fig. 1, basal plasma counterregulatory hormone levels did not achieve statistically significant differences. During insulin infusion, plasma glucose declined significantly lower in subjects with essential hypertension. In the same subjects, exaggerated plasma catecholamine and cortisol responses were also observed, whereas plasma glucagon and growth hormone levels had a similar surge. Furthermore, in subjects with essential hypertension, basal systolic blood pressure was positively correlated with basal plasma insulin (r = .79, $P < .01$) and with plasma epinephrine, norepinephrine, and cortisol responses (evaluated as area under the curve) (r = .65, $P < .01$; r = .68, $P < .01$; r = .71, $P < .01$, respectively).

Our data, in agreement with those reported by Ferriss et al. (6), who studied diabetic subjects under different stressful conditions, are interesting in light of the deranging effects of catecholamines and cortisol on glucose tolerance. These hormones may increase hepatic