

abetic) population, the incidence decreases from 3.38 to 2.68 ($P = 0.013, \chi^2$). When data are expressed in terms of the total population, the benefit of changes in management may be obscured by the increasing prevalence of the disease.

Although the decrease in amputation incidence was only 20%, the actual incidence in 2004 was well within the range reported by other European centers. Since the magnitude of any such decrease is dependent on the baseline value, we suggest that rather than aim for a percentage reduction in incidence, future health care targets should specify an absolute value. Evidence from the published literature suggests that this should be of the order of 2 to 3 per 10^3 of those with diabetes or even lower.

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Decreased Insulin Secretion but Not Insulin Sensitivity in Normal Glucose Tolerant Thai Subjects

Reduced insulin secretion and insulin sensitivity has been demonstrated in normal glucose tolerant (NGT) subjects whose 2-h plasma glucose levels after an oral glucose tolerance test were 5.6-7.7 mmol/l compared with those with 2-h plasma glucose levels <5.6 mmol/l (1-3). These data are from high-risk ethnic subjects. Whether these data are true in Asians is uncertain.

We studied insulin secretion and insulin sensitivity in 51 NGT and 15 impaired glucose tolerant Thai subjects. Subjects were grouped according to 2-h plasma glucose levels after an oral glucose tolerance test into four groups (Table 1). Insulin sensitivity was determined by euglycemic-hyperinsulinemic clamp and expressed as glucose infusion rate. Insulin secretion was determined by homeostasis model assessment (HOMA) of steady-state β -cell function (%B) from a HOMA2 model (available at <http://www.dtu.ox.ac.uk/homa>) and adjusted with glucose infusion rate (HOMA%B_{adjusted}) to obtain the accurate result of insulin secretion. For statistical analysis, ANOVA was used for group comparison, and between-

group differences were compared using Bonferroni post hoc analysis.

As shown in Table 1, age, BMI, and waist circumference were significantly different between groups. Glucose infusion rate was also different between groups, but the difference disappeared after adjustment with age, BMI, and waist circumference. HOMA%B_{adjusted} of gr.IV was significantly lower than those of gr.I ($P = 0.003$) and gr.II ($P = 0.039$) but was not different from that of gr.III. The difference of HOMA%B_{adjusted} between groups could still be demonstrated after adjustment with age ($P = 0.005$).

This study demonstrated that insulin secretion adjusted for insulin sensitivity in NGT subjects started to decline progressively from 2-h plasma glucose >5.6 mmol/l. This study agrees with others (1-3). This is the first study in Asians where the declined β -cell function adjusted for insulin sensitivity is demonstrated in NGT subjects. These findings are in accordance with those from studies of other ethnic populations, including Mexican Americans, African Americans, Hispanics, and Caucasians, indicating that the results are not ethnic specific. It can be hypothesized that these high-normal oral glucose tolerance test subjects may have an increased risk of developing diabetes; therefore, lifestyle modification should be implemented early in this group as in impaired glucose tolerant subjects.

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Table 1—Clinical characteristics of subjects

	2-h plasma glucose (mmol/l) after OGTT				P
	NGT (n = 51)		IGT (n = 15)		
	gr.I (<5.6)	gr.II (5.6-6.7)	gr.III (6.7-7.8)	gr.IV (7.8-11.1)	
Sex (female/male)	5/10	12/11	8/5	6/9	NS
Age (years)	32.2 ± 1.2	34.1 ± 1.8	36.2 ± 2.9	45.1 ± 1.4*†‡	<0.0001
BMI (kg/m ²)	21.7 ± 0.9	23.1 ± 0.9	25.6 ± 1.0*	27.2 ± 0.8*†	<0.0001
Waist circumference (cm)	74.9 ± 2.7	75.6 ± 2.4	81.4 ± 2.6	91.8 ± 2.8*†	<0.0001
Glucose infusion rate (mg · kg _{FFM} ⁻¹ · min ⁻¹)	9.31 ± 0.82	9.43 ± 0.71	7.49 ± 0.51	6.04 ± 0.67*†	0.004
HOMA%B	127.9 ± 6.9	116.0 ± 8.6	129.0 ± 13.7	124.0 ± 12.2	NS
HOMA%B _{adjusted}	1150.9 ± 89.2	1012.2 ± 67.8	951.1 ± 111.1	690.9 ± 73.4*†	0.005

Data are means ± SE. HOMA%B_{adjusted} = HOMA%B × glucose infusion rate. * $P < 0.05$ compared with gr.I; † $P < 0.05$ compared with gr.II; ‡ $P < 0.05$ compared with gr.III. IGT, impaired glucose tolerance; OGTT, oral glucose tolerance test.

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Could Blood Ketone Monitoring Be A Tool for Managing Gestational Diabetes Mellitus?

Nutritional management of gesta-
tional diabetes mellitus (GDM) is
based on guidelines from diabetol-
ogy societies (1). Ketonuria is often mon-
itored, but clear management guidelines
have not been established. Home-based
methods of measuring ketonemia are
available. We believe that it is important
to evaluate the utility of this tool in GDM.

We measured ketonemia in a control
population of pregnant women and a
GDM population. Pregnant women were
systematically screened for GDM between
the 24th and 28th weeks (75-g oral glu-
cose tolerance test [OGTT], World Health
Organization guidelines). A total of 56
women (29.98 \pm 4.86 years of age,
prepregnancy BMI 23.14 \pm 4.62 kg/m²,
weight gain 14.49 \pm 4.93 kg) with a nor-
mal OGTT and 49 women (31.35 \pm 5.39
years, prepregnancy BMI 25.96 \pm 5.91
kg/m², weight gain 9.25 \pm 5.52 kg) with
GDM were included.

Each subject was monitored in accor-
dance with the appropriate guidelines; in
addition, the control subjects performed

glycemia and ketonemia self-monitoring
three times a day (upon waking and be-
fore the midday and evening meals).
GDM women were also asked to measure
their postprandial glycemia. All subjects
measured their fasting ketonuria.

Glycemia measurement was per-
formed using test strips and a meter (Ab-
bott), and capillary blood ketonemia
measurement was performed using Op-
tium β -Ketone test strips and the same
meter (2). The replicate analysis resulted
in CVs of 3.3%. The study protocol was
approved by an ethics committee.

The two groups did not differ in terms
of age, but BMI and weight gain were
higher in the GDM than in the control
group ($P < 0.01$). The mean ketonemia
was lower in the control than in the GDM
group (0.01 \pm 0.10 vs. 0.04 \pm 0.009
mmol/l, $P < 0.001$). Fasting ketonemia
did not differ between the control and
GDM groups (0.01 \pm 0.11 vs. 0.01 \pm
0.06 mmol/l, respectively). Ketonemia
values measured before the midday and
the evening meal were lower for control
than for GDM patients (midday 0.01 \pm
0.08 vs. 0.05 \pm 0.11 mmol/l, $P = 0.002$;
evening 0.02 \pm 0.09 vs. 0.05 \pm 0.10
mmol/l, $P = 0.005$).

A ketonemic episode was defined as
the unbroken period during which each
day is a part of a sliding 7-day interval
containing $>25\%$ of height value. Of the
control subjects, 6 (12%) experienced at
least one ketonemic episode (average
length 10.5 days) versus 23 (47%) in the
GDM group (average length 13.8 days) (a
total of 37 episodes).

For women with GDM, we are not
currently in a position to conclude
whether their ketonemia levels have clin-
ical significance in terms of the pregnancy
outcome or the health of the child. Ket-
onemia values differ from those recorded
in control subjects, and this difference is
not irrelevant. A study needs to be per-
formed to be certain that higher ketone-
mia has a detrimental prognostic
significance for fetal development.

Reports from the literature have fo-
cused exclusively on ketonuria. A nega-
tive correlation between ketonuria and
intellectual quotient in children born to
diabetic mothers has been reported (3,4).
A relationship between high fasting ket-
onemia during the last trimester and de-
layed educational development has been
suggested (5).

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Blood Pressure Measurement in Diabetes Clinic

Are we paying enough attention?

The American Diabetes Association statement (1), "Care of Children and Adolescents With Type 1 Diabetes," outlines recommendations for management of hypertension in children with type 1 diabetes. Hypertension in children can be missed if appropriate norms are not used, and, as the authors state, "clinicians who care for children with diabetes often pay little or no attention to blood pressure." Here, we report results of a retrospective chart review of serial clinic