Insulin requirement after one year of insulin therapy in type 2 diabetic patients dependent on fasting C-peptide

Dear Editor,

The aim of our study was to evaluate any relationship between fasting C-peptide level and insulin requirement in newly insulin-treated type 2 diabetic patients with sulphonylurea failure. Additionally, we determined the predictive value of C-peptide as a parameter for insulin requirement. A total of 110 patients with secondary failure of sulphonylurea were investigated.

Patients were divided into four groups: patients with C-peptide <1.0 ng/ml (n=16), 1.0 to 1.9 ng/ml (n=44), 2.0 to 3.4 ng/ml (n=36) and >3.5 ng/ml (n=14) as groups with low, normal, moderately high and very high peptide. We measured insulin requirement, fasting blood glucose (FBG), HbA_{1c} and body weight at the beginning of insulin therapy and one year later. In addition, the C-peptide/FBG quotient was calculated in all patient groups.

Patients with higher C-peptide showed a higher body weight, the difference was significant ($p<0.01$). At the beginning as well as at the end of the study, insulin requirement was greater in the group with low C-peptide after adjustment for the body weight.

The insulin requirement was IU/kg/day 0.52 ± 0.21 in the low C-peptide group and 0.37 ± 0.15 in patients with

Figure 1. *Insulin requirement – weight adjusted – at the beginning (4 weeks insulin therapy) and at the end (12 months insulin therapy) – dependent on the C-peptide levels before the start of insulin therapy*
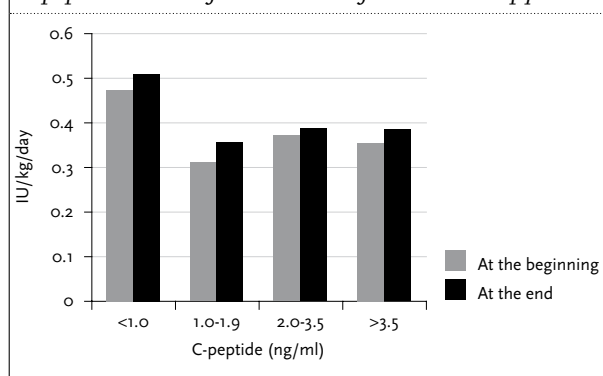
normal C-peptide ($p<0.01$) as can be seen in *figure 1*. HbA1c decreased similarly (1.5 to 1.8%) and the gain in body weight was also the same in each group (on average 2.5%) All the data are summarised in *table 1*. The ratio of C-peptide/FBG <0.01 was the most sensitive predictor for

Table 1. *Insulin requirement, weight gain and metabolic control dependent on the basal C-peptide one year after the start of insulin therapy*

	C-peptide			
	<1.0 ng/ml	1.0-1.9 ng/ml	2.0-3.4 ng/ml	≥3.5 ng/ml
Body weight (kg)	73 ± 134[*]	76 ± 12[*]	78 ± 14	95 ± 17[*]
Gain in body weight (%)	2.8	2.9	2.5	2.3
HbA_{1c} (5)	7.9 ± 1.2	7.8 ± 1.2	8.1 ± 1.1	7.9 ± 1.4
Decrease (%)	1.7	1.8	1.5	1.8
Triglycerides (mg/dl)	188 ± 82	198 ± 99	202 ± 102	212 ± 96
Decrease (%)	11.3	20.1	16.5	19.1
Cholesterol (mg/dl)	199 ± 56	202 ± 64	204 ± 69	199 ± 54
Decrease (%)	6.8	9.8	12	13.1
Insulin dose (IU/day)	38 ± 16[*]	28 + 12[*]	31 ± 15	37 ± 13[*]
Increase (%)	11.7	8.4	6.4	8.3
Insulin dose (IU/kg/day)	0.52 ± 0.21[**]	0.37 + 0.15[**]	0.40 ± 0.17	0.40 ± 0.13
Increase (%)	8.3	2.7	5.2	7.5

[*]$p<0.05$; [**]$p<0.002$.

insulin requirement in the groups with low and normal C-peptide (100 and 93%, respectively), but not in patients with higher C-peptide (67 and 21% respectively).

In earlier years, basal as well as stimulated C-peptide (after glucagon stimulation) were used as an indicator for insulin requirement in type 2 diabetic patients undergoing oral antidiabetic therapy.[1-3] In several studies it has been shown that low C-peptide concentrations demonstrate insulin deficiency, and high concentrations insulin resistance.[4,5] The relation between fasting C-peptide and fasting blood sugar has been described as a more potent marker for insulin dependency.[1,4,6] In our study a ratio of C-peptide/NBG <0.01 was found in all patients with low and in nearly all subjects with normal C-peptide. Thus, this quotient was only a potent predictor for insulin requirement in patients with low and normal C-peptide (<2.0 ng/ml).

In summary, insulin requirement was significantly higher in the low C-peptide group, though the body weight increases with the rising C-peptide levels. The ratio C-peptide/FBG <0.01 has a predictive potency only in patients with low and normal C-peptide.

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