

ABSTRACT

Insulin glargine (LANTUS®) is a long-acting basal insulin analog. The aim of this observational study was to investigate the effect of adding insulin glargine basal therapy to support oral antidiabetic treatment in patients with type 2 diabetes in everyday practice. In this 9-month, uncontrolled observational study, 12,216 patients with type 2 diabetes not adequately controlled on oral antidiabetic drugs (OADs) received add-on insulin glargine treatment. Dosing decisions, including any changes to OADs, were made at the physician's discretion, reflecting everyday practice. Efficacy outcomes included baseline, 3-month and 9-month changes in A1c, fasting blood glucose (FBG), body weight and body mass index (BMI). At baseline, the mean (\pm SD) age of patients was 64 (\pm 11.3) years. Duration of diabetes was >5 years in 47% of patients, 1–5 years in 39% of patients and <1 year in 10% of patients. The remaining 4% of patients were newly diagnosed. After 3 months of treatment, reductions in FBG and A1c were observed (Table). Improvements in metabolic control were maintained for at least 9 months. The mean starting dose of insulin glargine was 13.7 \pm 7.0 IU. By 9 months, the mean dose was 20.3 \pm 9.6 IU. Adverse drug reactions were documented in a total of 26 patients (0.21%). Of 47 adverse events documented, 19 were due to hypoglycemia. These data suggest that, in daily clinical practice, insulin glargine in combination with OADs is effective in patients with type 2 diabetes inadequately controlled on OADs alone, and is consistent with results seen in other clinical trials.

	A1c (%)	FBG (mmol/L)	BMI (kg/m ²)
Baseline	8.7 \pm 1.4 (n=11,511)	11.2 \pm 3.1 (n=12,100)	29.0 \pm 4.7 (n=11,090)
3 months' insulin glargine	7.2 \pm 0.9 (n=11,296)	7.4 \pm 1.8 (n=11,872)	28.7 \pm 4.5 (n=10,692)
9 months' insulin glargine	7.0 \pm 1.0 (n=6,031)	7.3 \pm 1.9 (n=6,335)	28.5 \pm 4.8 (n=5,324)

INTRODUCTION

- In newly diagnosed patients with type 2 diabetes, diet and exercise are initially recommended to improve glycemic control
- Over time, this strategy is usually insufficient to maintain glycemic control, necessitating the introduction of oral antidiabetic agents (OADs)¹
- However, as the disease progresses, management becomes increasingly difficult and the addition of insulin therapy is required²
- NPH insulin is an intermediate-acting insulin, which has traditionally been used in patients with type 2 diabetes
- However, NPH insulin often requires twice-daily injections to provide 24-hour insulin coverage
- Furthermore, NPH insulin demonstrates a peak of activity at 4–6 hours following administration, which often leads to a sharp fall in fasting blood glucose (FBG) levels, resulting in an increased risk of hypoglycemia, particularly nocturnal hypoglycemia, following bedtime administration
- Insulin glargine (LANTUS®), a long-acting human insulin analog, mimics the action of endogenous basal insulin, providing control close to 24 hours with a once-daily dose³
- A large body of data obtained from clinical trials has shown the benefit of insulin glargine in patients with type 2 diabetes; however, this is the first large scale observational study to be completed in everyday practice

STUDY OBJECTIVE

- To investigate the effect of adding insulin glargine basal therapy to support OAD treatment in patients with type 2 diabetes in everyday practice

STUDY DESIGN AND METHODS

- This was an open-label, multicenter, observational study assessing the efficacy and safety of insulin glargine in patients with type 2 diabetes in everyday practice in Germany

Study population

- Patients with type 2 diabetes who were not adequately controlled on current oral therapy were eligible for participation in the study

Treatment regimen

- Patients were treated with insulin glargine (100 IU/mL), which was administered using OptiSet®, a disposable pen
- Patients continued on OADs
- During the study period, the decision regarding treatment and dosing was made at the physician's discretion, based on individual blood glucose (BG) levels, to reflect everyday practice

Outcome measures

- The following measures were documented at baseline and after 12 weeks and 9 months of therapy (endpoint):
 - Glycosylated hemoglobin (A1c)
 - Fasting blood glucose (FBG)
 - Daily insulin dose
 - Body mass index (BMI)

Safety

- All adverse events occurring during the course of the observational period were documented, whether thought related to the study treatment or not

Table 1. Baseline characteristics

Characteristic	n=12,216
Age (years)*	63.9 \pm 11.3
Patients >66 years (%)	46.2
Male/female (%)	50.2/49.8
BMI (kg/m ²)*	29.0 \pm 4.7
A1c (%)	8.7 \pm 1.4
FBG, mg/dL (mmol/L)	202 \pm 55.8 (11.2 \pm 3.1)
Previous OAD taken (%):	
Metformin	58.2
Sulfonylurea	72.1
Alpha-glucosidase inhibitors	10.2
Thiazolidinones	1.5
Others	7.6

*Presented as mean \pm standard deviation; †Some people were taking multiple OAD therapy; BMI=body mass index; OAD=oral antidiabetic agent; A1c=glycosylated haemoglobin; FBG=fasting blood glucose

Statistical analysis

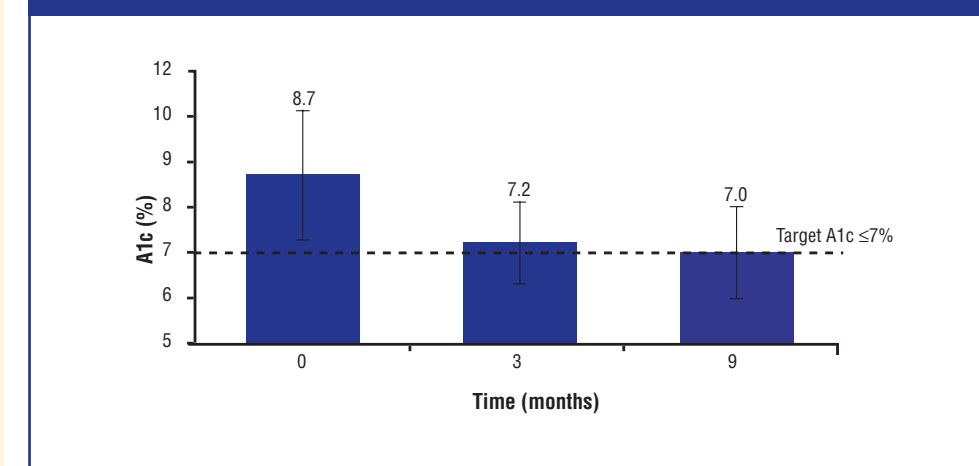
- Descriptive analyses only were performed

Study population

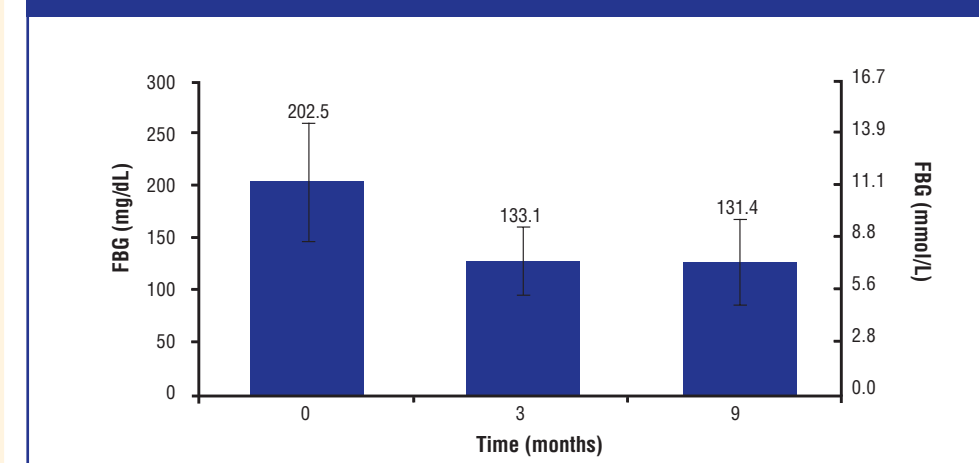
- A total of 12,216 patients with type 2 diabetes entered the study at baseline
- A total of 6,576 patients were treated with insulin glargine could be followed for a period of 9 months
- Baseline characteristics, metabolic control measures and previous treatment regimens of the total population are presented in Table 1

RESULTS**Metabolic control**

- There was a decrease in A1c from baseline to 9 months (endpoint) (8.7 \pm 1.4% vs 7.0 \pm 1.0%), which was evident at 3 months (7.2 \pm 0.9%) (n=5729; Figure 1)
- A total of 3,223 patients (49%) reached A1c level <7%
- Mean FBG levels decreased over the study period from 202.5 \pm 56.1 mg/dL (11.3 \pm 3.1 mmol/L) at baseline to 133.1 \pm 33.0 mg/dL (7.4 \pm 1.8 mmol/L) at 12 weeks and 131.4 \pm 34.5 mg/dL (7.3 \pm 1.9 mmol/L) at endpoint (n=6180; Figure 2)

Figure 1. Change in A1c levels over 9 months*

*Error bars represent standard deviation; data available for 5729 patients

Figure 2. Change in FBG over 9 months*

*Error bars represent standard deviation; data available for 6180 patients

Body mass index

- There was little change in BMI throughout the study period, with values at baseline and endpoint (n=4800; 9 months) being 29.0 \pm 4.7 kg/m² and 28.5 \pm 4.8 kg/m², respectively

Daily insulin dose

- The mean daily dose of insulin glargine increased during the study period from 13.8 \pm 6.9 IU at baseline to 18.1 \pm 8.3 at 3 months and 20.3 \pm 9.5 at study endpoint (n=6303)

Safety

- A total of 142 adverse events were reported in 12,216 patients (1.16%)
- A total of 26 patients (0.21%) experienced 47 adverse drug reactions, of which 19 events were due to hypoglycemia; none of the reactions were unexpected
- Treatment discontinuations were observed in 0.3% of treated patients due to adverse events

CONCLUSION

- This observational study in everyday practice supports data obtained in a number of clinical trials^{4,5}, demonstrating that in patients with type 2 diabetes inadequately controlled on OAD regimens, the introduction of insulin glargine greatly improves glycemic control with a neutral effect on weight over 9 months
- An increase in daily insulin glargine dose was noted in this cohort of treated patients due to therapy adjustment at the physician's discretion
- Improved disease control was achieved safely; few patients experienced adverse events during the 9-month study
- In conclusion, in everyday clinical practice, patients with type 2 diabetes who are inadequately controlled on OADs can benefit from the initiation of basal insulin therapy with insulin glargine, which can facilitate reaching the target of A1c \leq 7%

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