

PRODUCT MONOGRAPH

LANTUS[®]

Insulin glargine (rDNA origin)

Solution for injection 100 U/mL

ATC code: A10AE04
Antidiabetic Agent

Long-acting Recombinant Human Insulin Analogue

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PRODUCT MONOGRAPH

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PART I: HEALTH PROFESSIONAL INFORMATION

SUMMARY PRODUCT INFORMATION

Route of Administration	Dosage Form / Strength	Clinically Relevant Nonmedicinal Ingredients
Subcutaneous	Solution for injection 100 U/mL	glycerol 85%, m-cresol, polysorbate 20 (10 mL vial only), zinc, and water for injection. Hydrochloric acid and sodium hydroxide for pH adjustment.

DESCRIPTION

LANTUS [insulin glargine injection (rDNA origin)] is a recombinant human insulin analogue that is a long-acting, parenteral blood-glucose-lowering agent. LANTUS is produced by recombinant DNA technology utilizing a non-pathogenic laboratory strain of *Escherichia coli* (K12) as the production organism.

Insulin glargine differs from natural human insulin in that the amino acid asparagine at position 21 of the A-chain is replaced by glycine and two arginines are added to the C-terminus of the B-chain (see PHARMACEUTICAL INFORMATION, Drug Substance).

INDICATIONS AND CLINICAL USE

LANTUS [insulin glargine injection (rDNA origin)] is a novel recombinant human insulin analog indicated for once-daily subcutaneous administration in the treatment of patients over

17 years of age with Type 1 or Type 2 diabetes mellitus who require basal (long-acting) insulin for the control of hyperglycemia.

LANTUS is also indicated in the treatment of pediatric patients with Type 1 diabetes mellitus who require basal (long-acting) insulin for the control of hyperglycemia.

CONTRAINDICATIONS

LANTUS [insulin glargine injection (rDNA origin)] is contraindicated in patients who are hypersensitive to this drug or to any ingredient in the formulation or component of the container. For a complete listing, see DOSAGE FORMS, COMPOSITION AND PACKAGING.

WARNINGS AND PRECAUTIONS

Serious Warnings and Precautions

Hypoglycemia is the most common adverse effect of insulin, including LANTUS (see WARNINGS AND PRECAUTIONS, Endocrine and Metabolism, Hypoglycemia). As with all insulins, the timing of hypoglycemia may differ among various insulin formulations. Glucose monitoring is recommended for all patients with diabetes.

Uncorrected hypoglycemic or hyperglycemic reactions can cause loss of consciousness, coma, or death.

Any change of insulin should be made cautiously and only under medical supervision.

LANTUS is not intended for intravenous or intramuscular administration. The prolonged duration of activity of insulin glargine is dependent on injection into subcutaneous tissue. Intravenous administration of the usual subcutaneous dose could result in severe hypoglycemia.

LANTUS must not be mixed with any other insulin or diluted with any other solution. If LANTUS is diluted or mixed, the solution may become cloudy, and the pharmacokinetic/pharmacodynamic profile (e.g., onset of action, time to peak effect) of LANTUS and/or the mixed insulin may be altered in an unpredictable manner (see DOSAGE AND ADMINISTRATION).

Insulin products shall not be used if it is not water-clear and colourless or if it has formed a deposit of solid particles on the wall of the vial or cartridge (see DOSAGE AND ADMINISTRATION).

General

As with all insulin preparations, the time course of LANTUS action may vary in different individuals or at different times in the same individual and the rate of absorption is dependent on blood supply, temperature, and physical activity.

Hypokalemia is among the potential clinical adverse effect associated with the use of all insulin therapies, particularly when given intravenously. However, LANTUS should not be given intravenously (see DOSAGE AND ADMINISTRATION, Administration). This potential clinical adverse effect may be more relevant in patients who are on potassium lowering drugs, or losing potassium through other means (e.g. diarrhea).

Stress or concomitant illness, especially infectious and febrile conditions may change insulin requirements.

Insulin may cause sodium retention and edema, particularly if previously poor metabolic control is improved by intensified insulin therapy.

Patients with human insulin antibodies may be hypersensitive to other insulins, with a risk of hypoglycemia and/or cross-reactivity.

Thiazolidinediones (TZDs), alone or in combination with other antidiabetic agents (including insulin), can cause heart failure and edema. The combination of TZD with insulin is not indicated for the treatment of Type 2 Diabetes Mellitus. Please refer to the respective TZD product monograph WARNINGS AND PRECAUTIONS information when the use of these drugs in combination with any insulin, including LANTUS, is contemplated.

To avoid transmission of disease, cartridge or a prefilled syringe shall not be used by more than one person.

Accidental mix-ups between insulin glargine and other insulins, particularly short-acting insulins, have been reported. To avoid medication errors between insulin glargine and other insulins, patients should be instructed to always check the insulin label before each injection (see ADVERSE REACTIONS).

Endocrine and Metabolism

Hypoglycemia:

As with all insulin preparations, hypoglycemic reactions, especially during initiation of therapy, may be associated with the administration of LANTUS. Hypoglycemia is the most common adverse effect of insulins (see ADVERSE REACTIONS). Hypoglycemia may occur if the insulin dose is too high in relation to the insulin requirement (see OVERDOSAGE). Early warning symptoms of hypoglycemia may be different, be less pronounced or absent under certain conditions, as for example, in patients whose glycemic control is markedly improved, in

elderly patients, in patients where an autonomic neuropathy is present, in patients whose hypoglycemia is developing gradually, in patients with a long history of diabetes, in patients with psychiatric illness, or in patients receiving concurrent treatment with certain other drugs such as beta-blockers. Hypoglycemia may occur with other substances including alcohol and psychiatric medications, street drugs, birth control pills, injections and patches (see DRUG INTERACTIONS: Drug-Drug Interactions).

Such situations may result in severe hypoglycemia (and possibly, loss of consciousness) prior to patients' awareness of hypoglycemia.

The time of occurrence of hypoglycemia depends on the action profile of the insulins used and may, therefore, change when the treatment regimen or timing of administration is changed.

As with all insulins, prolonged or severe hypoglycemic attacks, especially if recurrent, may lead to neurological damage, loss of consciousness, coma or death (see ADVERSE REACTIONS).

As with all insulins, additional caution (including intensified blood glucose monitoring) should be exercised in patient populations who are at greater risk for clinically significant sequelae from hypoglycemic episodes.

In a clinical study, symptoms of hypoglycemia or counter regulatory hormone responses were similar after intravenous insulin glargine and regular human insulin both in healthy subjects and adult patients with type 1 diabetes.

Hypoglycemic reactions following treatment with insulin products such as LANTUS are mostly mild and easily managed. Changes in insulin therapy or changes in life style (i.e. diet, omission of a meal, exercise/ physical activity) may require a change in dosage to avoid hypoglycemia. Glucose monitoring is recommended for all patients with diabetes.

Diabetic patients should be instructed to carry a few lumps of sugar, candies or biscuits to prevent the progression of a hypoglycemic reaction, should one occur (see PART III: CONSUMER INFORMATION).

Hyperglycemia:

The use of too low insulin dosages or discontinuation of treatment, especially in Type 1 diabetes, may lead to hyperglycemia and diabetic ketoacidosis. Uncorrected hyperglycemic reactions can cause loss of consciousness, coma, or death.

Immune Injection Site and Local Allergic Reactions:

As with any insulin therapy, lipodystrophy may occur at the injection site and delay insulin absorption. Other injection site reactions with insulin therapy include redness, pain, itching at the

injection site, hives, swelling, and inflammation. Continuous rotation of the injection site within a given area may help to reduce or prevent these reactions. Most minor reactions to insulins usually resolve in a few days to a few weeks. They may occur if the injection is not properly made (irritants in the skin cleansing agent or poor injection technique), or if the patient is allergic to the insulin or any excipients.

Rarely, SC administration of insulin products can result in lipoatrophy (depression in the skin) or lipohypertrophy (enlargement or thickening of tissue). Patients should be advised to consult their doctor if they notice any of these conditions.

Reports of injection site pain were more frequent with LANTUS than NPH human insulin (2.7% insulin glargine versus 0.7% human NPH). The reports of pain at the injection site were usually mild and did not result in discontinuation of therapy. Other possibly related treatment-emergent injection site reactions occurred at similar incidences with both insulin glargine and NPH human insulin.

Systemic allergic reactions:

Immediate-type allergic reactions are rare. Such reactions to insulin (including insulin glargine) or the excipients may, for example, be associated with generalized skin reactions, angioedema, bronchospasm, hypotension, anaphylactic reaction or shock and may be life threatening (see CONTRAINDICATIONS and ADVERSE REACTIONS).

Antibody Production:

Insulin administration may cause insulin antibodies to form. In clinical studies, antibodies that cross-react with human insulin and insulin glargine were observed in both NPH human insulin and insulin glargine treatment groups with similar percents of increased and decreased titers. There was no correlation in either treatment group between increases or decreases in these antibody titers and changes in either A1_C or total insulin requirements. In theory, the presence of such insulin antibodies may necessitate adjustment of the insulin dose in order to correct a tendency to hyperglycemia or hypoglycemia, but has not been found on review of LANTUS clinical trials and available post-marketing data.

Intercurrent conditions

Insulin requirements may be altered during intercurrent conditions such as infection or illness, emotional disturbances, or stress.

Renal / Hepatic / Biliary / Pancreatic impairment

Although studies have not been performed in patients with diabetes and hepatic or renal impairment, LANTUS requirements may be diminished due to reduced capacity for gluconeogenesis and reduced insulin metabolism (see ACTION AND CLINICAL

PHARMACOLOGY, Special Populations and Conditions). Careful glucose monitoring and dose adjustments of insulin or insulin analogues including LANTUS may be necessary in patients with hepatic or renal dysfunction.

Transferring Patients from Other Insulins

Any change of insulin should be made cautiously and only under medical supervision. Changes in insulin strength, timing of administration, manufacturer, type (e.g., regular, NPH, or insulin analogs), species (animal, human), or method of manufacture (recombinant DNA versus animal-source insulin) may result in the need for a change in dosage. Concomitant oral antidiabetic treatment may need to be adjusted. As with all insulins, when transferring to LANTUS, the early warning symptoms of hypoglycemia may be changed, be less pronounced, or absent. The prolonged effect of subcutaneous LANTUS may delay recovery from hypoglycemia (see DOSAGE AND ADMINISTRATION).

Special Populations

Pregnant Women:

Teratogenic effects. There are no well-controlled clinical studies of the use of insulin glargine in pregnant women. Only a limited number of pregnancies were exposed during Post Marketing Surveillance with insulin glargine. As with other insulins, adverse pregnancy outcomes did not indicate any trends suggesting a link to insulin glargine. To date, no other relevant epidemiological data are available. It is essential for patients with diabetes or a history of gestational diabetes to maintain good metabolic control before conception and throughout pregnancy. Insulin requirements may decrease during the first trimester, generally increase during the second and third trimesters, and rapidly decline after delivery. Careful monitoring of glucose control is essential in such patients. Patients with diabetes should be advised to inform their doctor if they are pregnant or are contemplating pregnancy (Also see Part II: TOXICOLOGY, Reproduction Toxicity and Impairment of Fertility).

Nursing Women:

It is unknown whether insulin glargine is excreted in significant amounts in human milk. Many drugs, including human insulin, are excreted in human milk. There are no adequate and well-controlled studies in nursing women. For this reason, caution should be exercised when LANTUS is administered to a nursing woman. Lactating women may require adjustments in insulin dose and diet.

Pediatrics (> 6 years of age):

Safety and effectiveness of LANTUS has been established in children over 6 years of age with Type 1 diabetes mellitus (see ACTIONS AND CLINICAL PHARMACOLOGY, Special Populations and Conditions, and INDICATIONS AND CLINICAL USE).

Geriatrics (> 65 years of age):

In controlled clinical studies comparing insulin glargine to NPH human insulin, 593 of 3890 patients with type 1 and type 2 diabetes were 65 years and older. The only difference in safety or effectiveness in this subpopulation compared to the entire study population was an expected higher incidence of cardiovascular events in both insulin glargine and NPH human insulin treated patients.

In elderly patients with diabetes, the initial dosing, dose increments, and maintenance dosage should be conservative to avoid hypoglycemic reactions.

Hypoglycemia may be difficult to recognize in the elderly (see WARNINGS AND PRECAUTIONS, Endocrine and Metabolism, Hypoglycemia). In the elderly, progressive deterioration of renal function may lead to steady decrease in insulin requirements. Careful glucose monitoring and dose adjustments of insulin or insulin analogues including LANTUS may be necessary (see WARNINGS AND PRECAUTIONS, Renal/ Hepatic/ Biliary/ Pancreatic impairment).

Other:

The presence of diseases such as Acromegaly, Cushing's Syndrome, Hyperthyroidism, and Pheochromocytoma can complicate the control of Diabetes Mellitus.

Pens to be used with LANTUS cartridges

The LANTUS cartridges should only be used with the following pens: ClikSTAR[®] and Autopen[®] 24* and should not be used with any other reusable pen as the dosing accuracy has only been established with the listed pens.

Occupational Hazards

The patient's ability to concentrate and react may be impaired as a result of hypoglycemia or hyperglycemia or, for example, as a result of visual impairment. This may constitute a risk in

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situations where these abilities are of special importance (e.g. driving a car or operating machinery).

Patients should be advised to take precautions to avoid hypoglycemia whilst driving. This is particularly important in those who have reduced or absent awareness of the warning symptoms of hypoglycemia or have frequent episodes of hypoglycemia. It should be considered whether it is advisable to drive or operate machinery in these circumstances.

ADVERSE REACTIONS

Adverse Drug Reaction Overview

Type 1 and type 2 diabetes in adults:

The adverse events most commonly associated with LANTUS [insulin glargine injection (rDNA origin)] include the following:

Body as a whole: allergic reaction (see WARNINGS AND PRECAUTIONS).

Hypoglycemia: Hypoglycemia, a frequent adverse reaction to insulin therapy, may occur if the insulin dose is too high in relation to the insulin requirement.

As with all insulins, prolonged or severe hypoglycemic attacks, especially if recurrent, may lead to neurological damage, loss of consciousness, coma or death (see WARNINGS and PRECAUTIONS).

Skin and appendages: injection site reaction, lipodystrophy, pruritus, and rash (see WARNINGS AND PRECAUTIONS).

Other: antibodies formation (see WARNINGS and PRECAUTIONS).

Eyes

A marked change in glycemic control may cause temporary visual impairment, due to temporary alteration in the turgidity and refractive index of the lens.

Long-term improved glycemic control decreases the risk of progression of diabetic retinopathy. However, as for all insulin regimens, intensification of insulin therapy with abrupt improvement in glycemic control may be associated with temporary worsening of diabetic retinopathy.

In patients with proliferative retinopathy, particularly if not treated with photocoagulation, severe hypoglycemic episodes may result in transient amaurosis.

Retinopathy was evaluated in the clinical studies by means of retinal adverse events reported and fundus photography. The numbers of retinal adverse events reported for LANTUS and human NPH treatment groups were similar for patients with type 1 and type 2 diabetes.

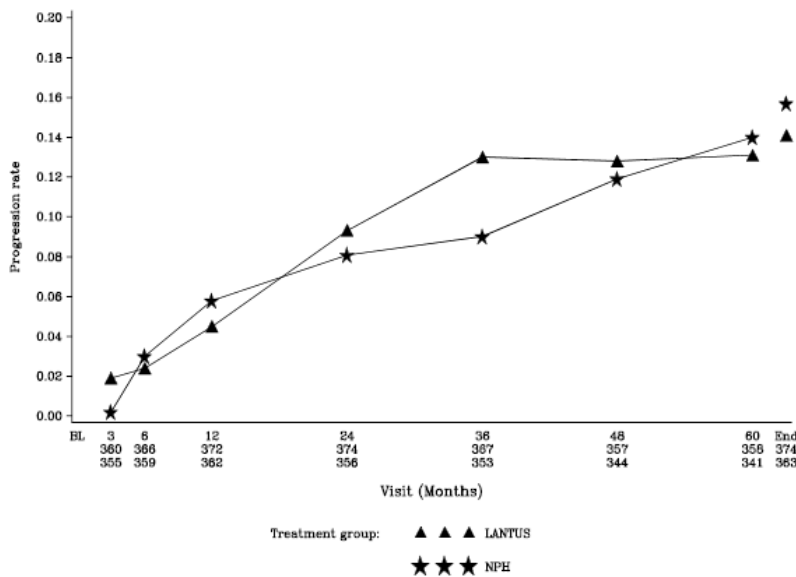
Effects of LANTUS on diabetic retinopathy were evaluated in a large 5-year NPH-controlled study in patients with type 2 diabetes in which progression of retinopathy was investigated by fundus photography using a grading protocol derived from the Early Treatment Diabetic Retinopathy Study (ETDRS). The primary outcome in this study was progression by 3 or more steps on the ETDRS scale at study endpoint. The results of this analysis are shown in the table below for the per-protocol (primary analysis) population and indicate non-inferiority of LANTUS to NPH in the progression of diabetic retinopathy as assessed by this outcome. The per-protocol population, which comprised 72.0% of randomized patients, were patients treated with study drug for at least 4 years and had fundus photographs at baseline and after at least 4.5 years post-baseline. The results in the Intent to Treat (ITT) population are similar to the results in the PP population.

Table 1 - Number (%) of subjects with 3-step or greater progression in ETDRS at endpoint – PP population

	LANTUS (N=374)	NPH (N=363)
Subjects with 3-step or greater progression (progression rate)	53/374 (14.2%)	57/363 (15.7%)
Difference in progression rate (SE) versus NPH	-1.98% (2.57%)	
95% CI versus NPH	(-7.02% to 3.06%)	

Note: % Calculated using number of PP subjects with non-missing data as denominator. ETDRS = early treatment diabetic retinopathy scale. Adjusted for baseline A1C stratum. Margin of noninferiority = 10%.

Figure 1 - Plot of 3-step or greater progression rate over time - PP population



Two pre-specified secondary outcomes were the development of “clinically significant macular edema” (CSME) and “proliferative diabetic retinopathy” (PDR), both based on fundus photograph assessment. CSME developed in 15.6% of the LANTUS group and 14.6% of the NPH group and PDR developed in 5.4% of the LANTUS group and 3.9% of the NPH group.

Cataracts were reported more commonly in the LANTUS group, in particular cortical (but not nuclear) cataracts. There was a baseline imbalance in cataracts with a greater incidence in the LANTUS treatment group. Diabetic retinopathy adverse events were reported in 4.9% of LANTUS treated patients vs. 3.8% of NPH treated patients.

Benign prostatic hyperplasia (BPH) was reported as an Adverse Event by 2.7% of the LANTUS group compared to 0.6% of the NPH group; urinary retention was reported by 1.2% vs. none, respectively. Neoplasms benign or malignant were seen in 11.1% of LANTUS patients, vs. 12.3% of NPH patients.

Type 1 diabetes in children and adolescents:

Adverse events that occurred in a pediatric controlled trial in at least 1% of patients treated with LANTUS are shown below.

Table 2. Adverse Events by Body System ≥1% reported in Study 3003. (Percent Incidence)

Adverse event (diagnosis) Body System/Coded Term	Number (%) of subjects	
	LANTUS n= 174	Human NPH n=175
Body as a whole		
Infection	24 (13.8)	31 (17.7)
Accidental injury	5 (2.9)	4 (2.3)
Abdominal pain	2 (1.1)	2 (1.1)
Allergic reaction	2 (1.1)	- (-)
Flu syndrome	- (-)	3 (1.7)
Pain in extremity	2 (1.1)	- (-)
Digestive system		
Gastroenteritis	8 (4.6)	10 (5.7)
Diarrhea	2 (1.1)	2 (1.1)
Sore throat	2 (1.1)	- (-)
Endocrine system		
Diabetes mellitus	1 (0.6)	4 (2.3)
Injection site reactions		
Injection site mass	8 (4.6)	6 (3.4)
Injection site reaction	5 (2.9)	6 (3.4)
Injection site hemorrhage	2 (1.1)	2 (1.1)
Metabolic and nutritional disorders		
Hypoglycemic reaction*	3 (1.7)	7 (4.0)
Hyperglycemia	1 (0.6)	3 (1.7)
Ketosis	1 (0.6)	5 (2.9)
Lipodystrophy	3 (1.7)	2 (1.1)
Musculo-skeletal system		
Bone fracture (not spontaneous)	3 (1.7)	3 (1.7)
Bone disorder	2 (1.1)	- (-)
Nervous system		
Headache	6 (3.4)	5 (2.9)
Respiratory system		
Upper respiratory infection	24 (13.8)	28 (16.0)

Adverse event (diagnosis) Body System/Coded Term	Number (%) of subjects	
	LANTUS n= 174	Human NPH n=175
Pharyngitis	13 (7.5)	15 (8.6)
Rhinitis	9 (5.2)	9 (5.1)
Bronchitis	6 (3.4)	7 (4.0)
Sinusitis	5 (2.9)	5 (2.9)
Asthma	1 (0.6)	2 (1.1)
Cough increased	3 (1.7)	- (-)
Skin and appendages		
Fungal dermatitis	1 (0.6)	2 (1.1)
Skin benign neoplasm	1(0.6)	2 (1.1)
Eczema	2 (1.1)	1 (0.6)
Herpes zoster	2 (1.1)	1 (0.6)
Urticaria	2 (1.1)	- (-)

*Non-serious hypoglycemia episodes are reported separately.

Study 3003: The most commonly reported event was lipodystrophy, a known consequence of insulin injections. The intensity was mostly mild. Injection site events were assessed as possibly related in 9 (5.2%) LANTUS subjects and 5 (2.9%) human NPH subjects however none of these subjects discontinued due to these events.

Study 3013: extension of Study 3003, uncontrolled long-term follow-up study of 143 patients who were well-controlled on LANTUS from 3003, for 201-1159 days. The most common adverse events were upper respiratory infections, infection, and rhinitis. Note that when comparing safety findings between studies, the difference in length of exposure needs to be kept in mind.

Study 4005: controlled, randomized, double-cross-over: 26 subjects (age range 12 - 20), regimen of LANTUS + lispro vs. human NPH + human regular. Adverse events were equally distributed between the two treatment regimens. The most common adverse events were upper respiratory tract infection and gastroenteritis.

Patients in the pediatric clinical trials of LANTUS were treated with a human NPH-based regimen pre-study, and patients assigned to receive human NPH during the study began study treatment on the same human NPH regimen they had taken pre-study. This may have been a factor in the increased incidence of hypoglycemia seen in LANTUS -treated patients during (but not following) initial titration in these trials, as an increase in hypoglycemia may be expected when switching from one insulin to another and titrating the dose of the new insulin.

Post-Market Adverse Drug Reactions

Other:

Medication errors have been reported in which other insulins, particularly short-acting insulins, have been accidentally administered instead of LANTUS.

DRUG INTERACTIONS

A number of substances affect glucose metabolism and may require insulin dose adjustment and particularly close monitoring.

Drug-Drug Interactions

Substances that may increase the blood-glucose-lowering effect and susceptibility to hypoglycemia, for example: oral antidiabetic products, ACE inhibitors, disopyramide, fibrates, fluoxetine, MAO inhibitors, pentoxifylline, propoxyphene, salicylates, somatostatin analog (e.g. octreotide), sulfonamide antibiotics.

Substances that may reduce the blood-glucose-lowering effect, for example: corticosteroids, danazol, diazoxide, diuretics, sympathomimetic agents (e.g., epinephrine, salbutamol, terbutaline), glucagon, isoniazid, phenothiazine derivatives, somatropin, thyroid hormones, estrogens, progestogens (e.g., in oral contraceptives), protease inhibitors and atypical antipsychotic medications (e.g., olanzapine and clozapine).

Beta-blockers, clonidine, lithium salts, and alcohol may either potentiate or weaken the blood-glucose-lowering effect of insulin. Pentamidine may cause hypoglycemia, which may sometimes be followed by hyperglycemia. In addition, under the influence of sympatholytic medicinal products such as beta-blockers, clonidine, guanethidine, and reserpine, the signs of hypoglycemia may be reduced or absent.

Other:

To avoid the risk of developing new or worsening heart failure, the use of TZDs in combination therapy with insulin is not indicated (see WARNINGS AND PRECAUTIONS).

Drug-Food Interactions

Interactions with food have not been established.

Drug-Herb Interactions

Interactions with herbal products have not been established.

Drug-Laboratory Interactions

Interactions with laboratory tests have not been established.

DOSAGE AND ADMINISTRATION

Dosing Considerations

LANTUS [insulin glargine injection (rDNA origin)] is a novel recombinant human insulin analogue. Its potency is approximately the same as human insulin. It exhibits a glucose-lowering profile with no pronounced peak with a prolonged duration of action that permits once-daily

basal dosing. LANTUS is administered subcutaneously once a day. It may be administered at any time during the day as long as it is administered at the same time every day.

The desired blood glucose levels as well as the doses and timing of antidiabetic medications must be determined and adjusted individually.

Dose adjustment may be required, for example, if the patient's timing of administration, weight or lifestyle changes or other circumstances arise that increase susceptibility to hypoglycemia or hyperglycemia (see WARNINGS AND PRECAUTIONS, Endocrine and Metabolism, Hypoglycemia and Hyperglycemia). The dose may also have to be adjusted during intercurrent illness (see WARNINGS AND PRECAUTIONS, Intercurrent Conditions). Any change in insulin dose should be made under medical supervision.

The prolonged duration of activity of LANTUS is dependent on injection into subcutaneous space. LANTUS is not intended for intravenous or intramuscular administration. Intravenous administration of the usual subcutaneous dose could result in severe hypoglycemia (see WARNINGS AND PRECAUTIONS).

In cases of insufficient glucose control or a tendency to hyper- or hypoglycemic episodes, patient's compliance with the prescribed insulin regimen, injection sites and proper injection techniques, the handling of injection devices and all other relevant factors must be reviewed before dose adjustment is considered.

Blood glucose monitoring is recommended for all patients with diabetes.

LANTUS must not be used for the treatment of diabetic ketoacidosis. Intravenous short-acting insulin should be the preferred treatment.

Recommended Dose and Dosage Adjustment

Initiation of LANTUS therapy

In clinical studies with insulin naïve patients with type 2 diabetes, LANTUS was started at a dose of 10 U once daily, and subsequently adjusted according to the patient's need (see CLINICAL TRIALS).

Changeover to LANTUS

When changing from a treatment regimen with an intermediate or long-acting insulin to a regimen with LANTUS, the amount and timing of short-acting insulin or fast-acting insulin analogue or the dose of any oral antidiabetic drug may need to be adjusted secondary to the risk of hypoglycemia. In clinical studies when patients were transferred from once-daily NPH human insulin or ultralente human insulin to once-daily LANTUS, the initial dose was usually not changed.

However, in studies when patients were transferred from twice-daily NPH human insulin to LANTUS once daily, the initial dose (U) was usually reduced by approximately 20% (compared to total daily IU of NPH human insulin) and then adjusted based on patient response.

A program of close metabolic monitoring under medical supervision is recommended during transfer and in the initial weeks thereafter. The amount and timing of short-acting insulin or fast-acting insulin analogue may need to be adjusted. This is particularly true for patients with acquired antibodies to human insulin needing high-insulin doses and occurs with all insulin analogues. Such patients may experience a greater insulin response to LANTUS.

With improved metabolic control and resulting increase in insulin sensitivity, adjustment of the dose(s) of antidiabetic treatments may become necessary.

Administration

LANTUS is administered by subcutaneous injection. The injection area must not be rubbed.

As with all insulins, injection sites within an injection area (abdomen, thigh, buttock or deltoid) must be alternated from one injection to the next. Patients should be rigorous with site rotation secondary to prolonged deposition. In clinical studies, there was no relevant difference in insulin glargine absorption after abdominal, thigh, or deltoid subcutaneous administration. As for all insulins, the rate of absorption, and consequently the onset and duration of action, may be affected by exercise and other variables.

Preparation and handling:

LANTUS is a clear solution, not a suspension.

Parenteral drug products should be inspected visually prior to administration whenever the solution and the container permit. LANTUS must only be used if the solution is clear and colorless with no particles visible. To minimize local irritation at the injection site, it is recommended to allow the insulin to reach room temperature before injection.

Cartridge version only: If the injection pen malfunctions, LANTUS may be drawn from the cartridge into an insulin syringe and injected. **A new sterile syringe must be used.**

Mixing and diluting:

LANTUS must not be mixed with any other insulin. Mixing can change the time/action profile of LANTUS and cause precipitation.

When LANTUS and regular human insulin were mixed immediately before injection in dogs, a delayed onset of action and time to maximum effect for regular human insulin was observed. The total bioavailability of the mixture was also slightly decreased compared to separate injections of

LANTUS and regular human insulin. The relevance of these observations in dogs to humans is not known.

LANTUS must not be diluted. Diluting can change the time/action profile of LANTUS.

OVERDOSAGE

Symptoms: An excess of insulin relative to food intake, energy expenditure or both may lead to severe and sometimes prolonged and life-threatening hypoglycemia (see WARNINGS AND PRECAUTIONS).

Management: Mild episodes of hypoglycemia can usually be treated with oral carbohydrates. Adjustments in drug dosage, meal patterns, or exercise may be needed.

More severe episodes with coma, seizure, or neurologic impairment may be treated with intramuscular/subcutaneous glucagon or concentrated intravenous glucose.

After apparent clinical recovery from hypoglycemia, continued observation and additional carbohydrate intake may be necessary to avoid reoccurrence of hypoglycemia.

For management of a suspected drug overdose, contact your regional Poison Control Centre.

ACTION AND CLINICAL PHARMACOLOGY

Pharmacodynamics

The primary activity of insulin, including insulin glargine, is regulation of glucose metabolism. Insulin and its analogues lower blood glucose levels by stimulating peripheral glucose uptake, especially by skeletal muscle and fat, and by inhibiting hepatic glucose production. Insulin inhibits lipolysis in the adipocyte, inhibits proteolysis, and enhances protein synthesis.

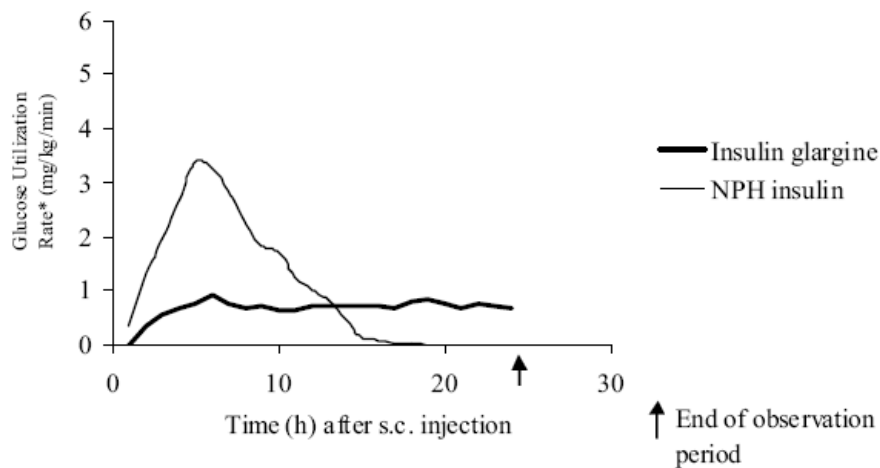
Insulin glargine is a human insulin analogue designed to have low solubility at neutral pH. At pH 4, as in the LANTUS injection solution, it is completely soluble. After injection into the subcutaneous tissue, the acidic solution is neutralized, leading to formation of microprecipitates from which small amounts of insulin glargine are slowly released, resulting in a relatively constant concentration/time profile over 24 hours with no pronounced peak. This allows once-daily dosing to meet a patient's basal insulin needs.

Insulin glargine and human insulin have been shown to be equipotent in glucose-lowering effect on a molar basis (when administered intravenously at the same doses). In euglycemic clamp studies in healthy subjects or in patients with type 1 diabetes, the onset of action of subcutaneous insulin glargine was slower than NPH human insulin. The effect profile of insulin glargine was

relatively constant with no pronounced peak, and the duration of its effect was prolonged compared to NPH human insulin.

Figure 2 shows results from a study in patients with type 1 diabetes conducted for a maximum of 24 hours after the injection. The median time between injection and the end of pharmacological effect was 14.5 hours (range: 9.5 to 19.3 hours) for NPH human insulin, and 24 hours (range: 10.8 to >24.0 hours) (24 hours was the end of the observation period) for insulin glargine.

Figure 2 – Activity Profile in Patients with Type 1 Diabetes



*Determined as amount of glucose infused to maintain constant plasma glucose levels (hourly mean values). Indicative of insulin activity. Between-patient variability (CV, coefficient of variation), insulin glargine, 84% and human NPH, 78%

Pharmacokinetics

Absorption and Bioavailability. After subcutaneous injection of insulin glargine in healthy subjects, and patients with diabetes, the insulin serum concentrations indicated a slower, more prolonged absorption and a relatively constant concentration/time profile over 24 hours with no pronounced peak in comparison to NPH human insulin. Serum insulin concentrations were thus consistent with the time profile of the pharmacodynamic activity of insulin glargine.

After subcutaneous injection of 0.3 U/kg insulin glargine in patients with type 1 diabetes, a relatively constant concentration-time profile has been demonstrated. The duration of action after abdominal, thigh, or deltoid subcutaneous administration was similar.

Metabolism. A metabolism study in man indicates that insulin glargine is partly metabolized at the carboxyl terminus of the B chain in the subcutaneous depot to form two active metabolites with similar in vitro activity to insulin, M1 (21^A-Gly-insulin) and M2 (21^A-Gly-des-30^B-Thr-insulin). Unchanged drug and degradation products are also present in the circulation.

Special Populations and Conditions

Age, race, and gender: Information on the effect of age, race, and gender on the pharmacokinetics of LANTUS is unavailable. However, in controlled clinical trials in adults (n=3890, Studies 3001, 3002, 3004, 3005, and 3006), and a controlled clinical trial in pediatric patients (n=349, Study 3003) subgroup analyses based on age, race (white, black, Asian /oriental, multiracial and Hispanic) and gender did not show differences in safety and efficacy between insulin glargine and NPH human insulin.

Hepatic Insufficiency: No studies were performed in patients with hepatic insufficiency. However, some studies with human insulin have shown increased circulating levels of insulin in patients with liver failure. Careful glucose monitoring and dose adjustments of insulin or insulin analogues including LANTUS may be necessary in patients with hepatic dysfunction (see WARNINGS AND PRECAUTIONS, Renal/ Hepatic/ Biliary/ Pancreatic impairment).

Renal Insufficiency: No studies were performed in patients with renal insufficiency. However, some studies with human insulin have shown increased circulating levels of insulin in patients with renal failure. Careful glucose monitoring and dose adjustments of insulin or insulin analogues including LANTUS may be necessary in patients with renal dysfunction (see WARNINGS AND PRECAUTIONS, Renal/ Hepatic/ Biliary/ Pancreatic impairment).

Pregnancy: The effect of pregnancy on the pharmacokinetics and pharmacodynamics of LANTUS has not been studied (see WARNINGS AND PRECAUTIONS, Special Populations).

Obesity: In controlled clinical trials, which included patients with Body Mass Index (BMI) up to and including 49.6 kg/m^2 , subgroup analyses based on BMI did not show any differences in safety and efficacy between insulin glargine and NPH human insulin.

Smoking: Information on the effect of smoking on the pharmacokinetics of LANTUS is unavailable.

Duration of Effect

The longer duration of action (up to 24 hours) of LANTUS is directly related to its slower rate of absorption and supports once-daily subcutaneous administration. The time course of action of insulins including LANTUS may vary between individuals and/or within the same individual. The doses and timing of antidiabetic medications must be determined and adjusted individually, to achieve the desired blood glucose levels.

STORAGE AND STABILITY

Vials

Unopened Vial:

Unopened LANTUS vials should be stored in a refrigerator, between 2°C – 8°C. Keep LANTUS away from direct heat and light. LANTUS should not be stored in the freezer and should not be allowed to freeze. If LANTUS freezes or overheats, discard it.

Opened (In Use) Vial:

The opened vial can be kept refrigerated or unrefrigerated (15 – 30°C) for up to 28 days away from direct heat and light, as long as the temperature is not greater than 30°C. Opened LANTUS vials, whether or not refrigerated, must be discarded after 28 days even if they contain insulin.

Opened LANTUS vials should not be stored in the freezer and should not be allowed to freeze. If a vial freezes or overheats, discard it.

Cartridges

Unopened Cartridge:

Unopened LANTUS cartridges should be stored in a refrigerator, between 2°C - 8°C. Keep LANTUS away from direct heat and light. LANTUS should not be stored in the freezer and should not be allowed to freeze. If LANTUS freezes or overheats, discard it.

Opened (In Use) Cartridge:

The opened cartridge in use must be kept unrefrigerated (15 - 30°C) for up to 28 days away from direct heat and light, as long as the temperature is not greater than 30°C. If the cartridge overheats or if there is any remaining insulin after 28 days, discard it. The opened cartridge in use must never be removed from and reinserted into the injection pen.

SoloSTAR®

Unopened SoloSTAR:

Unopened LANTUS SoloSTAR should be stored in a refrigerator, between 2°C - 8°C. Keep LANTUS away from direct heat and light. LANTUS SoloSTAR should not be stored in the freezer and should not be allowed to freeze. If LANTUS SoloSTAR freezes or overheats, discard it.

Opened (In Use) SoloSTAR:

Opened LANTUS SoloSTAR in use must be kept unrefrigerated (15-30°C) for up to 28 days away from direct heat and light, as long as the temperature is not greater than 30°C. If the LANTUS SoloSTAR overheats or if there is any remaining insulin after 28 days, discard it.

Opened LANTUS SoloSTAR should not be stored in the freezer and should not be allowed to freeze. If LANTUS SoloSTAR freezes, discard it.

As with all medications and devices, keep out of reach of children.

SPECIAL HANDLING INSTRUCTIONS

Information to be provided to the Patient

LANTUS must only be used if the solution is clear and colorless with no particles visible (see DOSAGE and ADMINISTRATION: Administration). LANTUS is a clear solution, not a suspension. LANTUS can be confused with other insulin types, since it visually resembles short-acting insulins and its name resembles the ‘Lente’ brand of insulins. It is not necessary to shake or rotate the vial/cartridge/SoloSTAR before use. Patients must be advised that LANTUS must not be mixed with any other insulin or diluted with any other solution (see WARNINGS AND PRECAUTIONS).

Patients should be instructed on self-management procedures including glucose monitoring, proper injection technique, and hypoglycemia and hyperglycemia management. Patients must be instructed on handling of special situations such as intercurrent conditions (illness, stress, or emotional disturbances), an inadequate or skipped insulin dose, inadvertent administration of an increased insulin dose, inadequate food intake or skipped meals. The extent of patient participation in his/her diabetes management is variable and is generally determined by the physician.

Insulin treatment requires constant alertness to the possibility of hyper- and hypoglycemia. Patients and their relatives must know what steps to take if hyperglycemia or hypoglycemia occurs or is suspected, and they must know when to inform a physician.

Patients with diabetes should be advised to inform their doctor if they are pregnant or are contemplating pregnancy.

See also INFORMATION FOR THE PATIENT and refer patients to the LANTUS Information for the Patient circular for LANTUS VIALS, LANTUS CARTRIDGE, and LANTUS SOLOSTAR for additional information. Refer patients to the User Manual for ClikSTAR, Autopen 24, and LANTUS SoloSTAR for additional information on use of the pens.

DOSAGE FORMS, COMPOSITION AND PACKAGING

The vials, cartridges, and SoloSTAR contain a sterile solution of insulin glargine for use as an injection. LANTUS [insulin glargine injection (rDNA origin)] consists of insulin glargine dissolved in a clear aqueous fluid.

Each milliliter of LANTUS (insulin glargine injection) contains insulin glargine 100 units. Each milliliter also contains excipients: glycerol 85%, polysorbate 20 (10 mL vial only), m-cresol, zinc, and water for injection. LANTUS has a pH of approximately 4. The pH is adjusted by addition of aqueous solutions of hydrochloric acid and sodium hydroxide.

LANTUS [insulin glargine (rDNA origin)] 100 units per mL (U 100) is available in the following package sizes:

- 10-mL vials
- 3-mL cartridges in package of 5, for use only withClikSTAR and Autopen 24.
- 3-mL SoloSTAR (pre-filled disposable pen), package of 5

PART II: SCIENTIFIC INFORMATION

PHARMACEUTICAL INFORMATION

Drug Substance

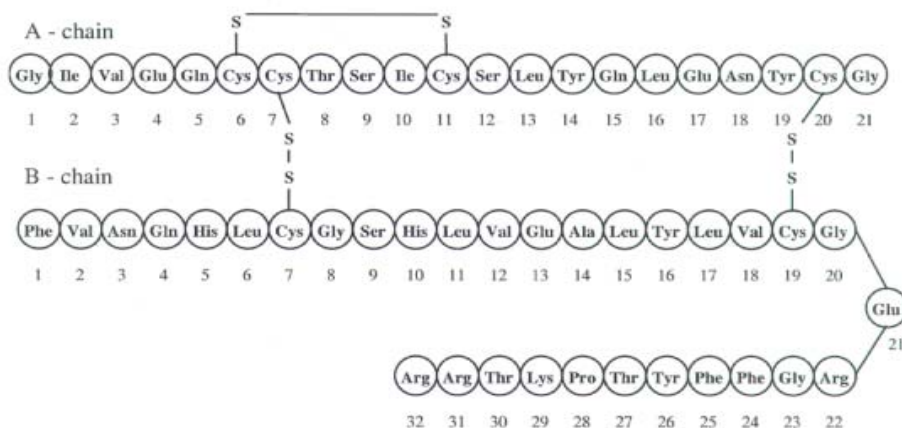
Proper name: insulin glargine (rDNA origin)

Chemical name: 21^A-Gly-30^B_a-L-Arg-30^B_b-L-Arg-human insulin

Molecular formula: C₂₆₇H₄₀₄N₇₂O₇₈S₆

Molecular weight: 6063 daltons

Structural formula:



Physical Form: fine white powder

Solubility: 3 to 7 µg/mL at pH 7
at least 10 mg/mL at pH 5,
greater than 100 mg/mL at pH 2

CLINICAL TRIALS

The safety and efficacy of once-daily insulin glargine at bedtime was compared to that of once-daily and twice-daily NPH human insulin in open-label, randomized, active-control, parallel studies of 2327 adult patients and 518 pediatric patients with type 1 diabetes mellitus and 1563 adult patients with type 2 diabetes mellitus.

In general, insulin glargine maintained the level of glycemic control as measured by glycohemoglobin and fasting glucose.

Type 1 diabetes in adults (see Table 4). In two large, randomized, controlled Phase III studies (Studies 3001 and 3004), patients with type 1 diabetes (n=1119) were randomized to basal-bolus treatment with LANTUS (insulin glargine) once daily or with NPH human insulin once or twice daily and treated for 28 weeks. Regular human insulin was administered before each meal. LANTUS was administered at bedtime. NPH human insulin was administered once daily at bedtime or in the morning and at bedtime when used twice daily. In these studies, LANTUS and human NPH had a similar effect on glycohemoglobin with a similar overall rate of hypoglycemia.

In another large, randomized, controlled Phase III study, patients with type 1 diabetes (Study 3005, n=619) were treated for 16 weeks with a basal-bolus insulin regimen where insulin lispro was used before each meal. LANTUS was administered once daily at bedtime and NPH human insulin was administered once or twice daily. In this study, LANTUS and NPH human insulin had a similar effect on glycohemoglobin with a similar overall rate of hypoglycemia.

Type 2 diabetes in adults (see Table 4). In one large, randomized, controlled Phase III study (Study 3002, n=570), LANTUS was evaluated for 52 weeks as part of a regimen of combination therapy with insulin and oral antidiabetic agents (93.9% sulfonylureas, 51.1% biguanides, 12.3% acarbose, or 2.8% other, percentages add up to greater than 100% due to combination therapy). LANTUS administered once daily at bedtime was as effective as NPH human insulin administered once daily at bedtime in reducing glycohemoglobin and fasting glucose. There was a low rate of hypoglycemia that was similar in LANTUS and NPH human insulin treated patients.

In another large, randomized, controlled Phase III study in patients with type 2 diabetes not using oral antidiabetic agents (Study 3006, n=518), a basal-bolus regimen of LANTUS once daily at bedtime or NPH human insulin administered once or twice daily was evaluated for 28 weeks. Regular human insulin was used before meals as needed.

LANTUS had similar effectiveness as either once- or twice-daily NPH human insulin in reducing glycohemoglobin and fasting glucose with a similar incidence of hypoglycemia.

Type 2 Diabetes - Adults (see Table 3). In a randomized, open-label, parallel, 24-week clinical study in adult patients with type 2 diabetes (Study 4002, n=756) with an A1C>7.5% (mean 8.6%) on one or two oral antidiabetes agents (88.5% sulfonylureas, 82.8% biguanides, or 9.0% TZDs, percentages add up to greater than 100% due to combination therapy), LANTUS or NPH human insulin, once daily at bedtime, was added to their prior regimen. In order to reach the target fasting plasma glucose ≤ 5.5 mmol/L, the dose of LANTUS and NPH human insulin was adjusted according to the structured dose-titration regimen as described in Table 3.

Table 3. Dose titration schedule

Period	Dose or dose adjustment
Start of treatment	10 U/day
Then adjustment every 7 days based on FPG (Fasting Plasma Glucose) as follows:	
Mean FPG ≥ 10 mmol/L for the last 2 consecutive days and no episodes of severe hypoglycemia or no PG < 4.0 mmol/L	Increase daily dose by 8 U
Mean FPG ≥ 7.8 mmol/L and < 10 mmol/L for the last 2 consecutive days and no episodes of severe hypoglycemia or no PG < 4.0 mmol/L	Increase daily dose by 6 U
Mean FPG ≥ 6.7 mmol/L and < 7.8 mmol/L for the last 2 consecutive days and no episodes of severe hypoglycemia or no PG < 4.0 mmol/L	Increase daily dose by 4 U
Mean FPG > 5.5 mmol/L and < 6.7 mmol/L for the last 2 consecutive days and no episodes of severe hypoglycemia or no PG < 4.0 mmol/L	Increase daily dose by 2 U
Then maintain target FPG ≤ 5.5 mmol/L	

PG = Plasma Glucose

Using this dose-titration schedule, A1C was reduced to a mean of 6.96% for LANTUS and 6.97% for NPH human insulin. More than half of the subjects in each group achieved an A1C value of $\leq 7.0\%$ LANTUS, 58.0%; NPH human insulin, 57.3%; mean dose at study endpoint was 47.2 U for LANTUS and 41.8 IU for NPH human insulin). In the LANTUS -treated group, 33.2% of the patients reached the primary efficacy endpoint (A1C value of $\leq 7.0\%$ in the absence of plasma glucose-confirmed nocturnal hypoglycemia ≤ 4.0 mmol/L, compared to 26.7% in the NPH human insulin-treated group (p=0.0486).

In this study, fewer patients with type 2 diabetes treated with LANTUS experienced nocturnal hypoglycemia compared with patients treated with NPH human insulin. Other clinical trials in type 2 diabetes showed similar results with less nocturnal hypoglycemia with patients treated with LANTUS compared to patients treated with NPH human insulin.

Type 1 and type 2 diabetes in adults. Table 4 compares regimens of LANTUS once daily to NPH human insulin either once or twice daily in subgroups of patients from Phase III studies based upon prior basal insulin regimens.

Summary of main therapeutic outcomes of the clinical studies

Table 4. Adult Patients

Type 1 diabetes mellitus					
Diabetes population	Treatment	n ^a	n ^b	Endstudy mean (mean change from baseline)	
				Glycated hemoglobin (%) ^c	Fasting blood glucose (mmol/L) ^c
Previous use of once-daily basal injection regimen					
with regular human insulin	LANTUS	222	206	7.98 (0.01)	8.51 (-0.93)
	NPH human insulin	218	205	7.95 (-0.05)	8.16 (-1.21)
with insulin lispro	LANTUS	73	71	7.11 (-0.25)	8.01 (-1.26)
	NPH human insulin	69	64	7.46 (-0.23)	8.65 (-1.17)
Previous use of more than once-daily basal injection regimen					
with regular human insulin	LANTUS	334	303	7.77 (0.06)	7.83 (-1.31) ^d
	NPH human insulin (x2)	345	315	7.69 (-0.05)	8.78 (-0.72)
with insulin lispro	LANTUS	237	224	7.66 (-0.03)	8.0 (-1.42) ^d
	NPH human insulin (x2)	240	229	7.64 (-0.05)	8.57 (-0.81)
Type 2 diabetes mellitus					
Diabetes population	Treatment	n ^a	n ^b	Endstudy mean (mean change from baseline)	
				Glycated hemoglobin (%) ^c	Fasting blood glucose (mmol/L) ^c
Insulin in combination with oral antidiabetic agents					
No previous insulin use	LANTUS	222	218	8.07 (-1.00)	7.22 (-3.14)
	NPH human insulin	204	194	7.92 (-1.00)	7.29 (-3.19)
Previous insulin use	LANTUS	67	61	8.71 (-0.14)	7.43 (-0.82)
	NPH human insulin	77	68	8.75 (-0.05)	7.72 (-0.79)
Insulin without oral antidiabetic agents					
Previous use of once-daily basal insulin	LANTUS	52	47	8.07 (-0.34)	8.49 (-0.95)
	NPH human insulin	48	46	7.92 (-0.45)	7.94 (-1.13)
Previous use of more than once-daily basal insulin	LANTUS	207	184	8.15 (-0.44)	7.71 (-1.34)
	NPH human insulin (x2)	211	192	7.96 (-0.61)	8.05 (-1.19)
a Number of patients randomized and treated.					
b Number of patients randomized, treated, and completed study (without early endpoint)					
c Intention to treat population					
d p<0.05; LANTUS compared with NPH human insulin					

Type 1 diabetes in children and adolescents (see Table 5)

Study 3003: pivotal study: randomized, open-label, parallel study of 349 Type 1 diabetic children aged 6 to 15 years: treated for 28 weeks with LANTUS once daily versus the most commonly used insulin in children, human NPH once or twice daily. LANTUS had a significant reduction in FBG and similar A1_C and 24-hour BG profile when compared to human NPH once or twice daily. The results of this study show that the overall level of glycemic control as measured by A1_C and incidence of hypoglycemia achieved after initial titration following switching to LANTUS from pre-study human NPH is similar to that achieved by once or twice daily NPH human insulin.

Table 5. Pediatric Patients

**Type 1 Diabetes Mellitus
Study 3003**

Treatment duration	28 weeks	
Treatment in combination with	Regular insulin	
	<u>LANTUS</u>	<u>Human NPH</u>
Number of subjects treated	174	175
GHb		
Endstudy mean	8.91	9.18
Adjusted mean change from baseline	+0.28	+0.27
Basal insulin dose		
Endstudy mean	18.2	21.1
Mean change from baseline	-1.3	+2.4
Total insulin dose		
Endstudy mean	45.0	46.0
Mean change from baseline	+1.9	+3.4
Fasting blood glucose (mmol/L)		
Endstudy mean	9.48	10.15
Adjusted mean change from baseline	-1.29	-0.68

Study 3013: pivotal study: extension of Study 3003: open-labelled, uncontrolled long-term follow-up study of 143 patients who were well-controlled on LANTUS from 3003, for 201-1159 days, 26 subjects did not continue for administrative and unknown reasons. The level of glycemic control established in Study 3003 was maintained in this study, despite an increase of 0.35% in A1_C from baseline in Study 3003. This increase can be attributed to many factors; the deterioration of control with time; puberty, which often has a detrimental impact on glycemic control and is associated with increased insulin resistance and increased insulin requirements; although less common in a post-pubescent population, lack of aggressive titration could be another factor, since pediatricians and parents are often afraid of the deleterious effects of hypoglycemia on children.

Study 4005: open-label, controlled, randomized, double-cross-over: 26 subjects (age range 12 - 20), Tanner B2G2 (puberty stages) or greater were on 16 weeks of each regimen of LANTUS + lispro vs. human NPH + human regular. This non-pivotal trial lacked the necessary power to demonstrate significance for the primary outcome.

The higher episodes of all symptomatic hypoglycemia with LANTUS (308 vs. 237) were only observed in the second period and were associated with a lower A1_C for LANTUS (8.6% vs. 9.9%).

The combination of LANTUS and lispro was chosen to best approximate a normal physiologic insulin response during the day. LANTUS' peakless 24-hour duration better resembles true basal

pancreatic insulin secretion than NPH human insulin, and lispro insulin has a more rapid appearance and disappearance from the plasma than regular human insulin, resulting in lower prandial glucose excursions and a lower incidence of postprandial hypoglycemia, compared to regular human insulin.

Compared to human NPH, LANTUS had similar 24-hour BG profile and A_{1C} in Study 3003. In the uncontrolled extension study, Study 3013, the level of glycemic control established in Study 3003 was maintained, despite an increase of 0.35% in A_{1C} from baseline in Study 3003.

During initiation of treatment (and consequent dose titration) with any insulin, the risk of hypoglycemia is higher than after the dose has stabilized following titration. In pediatric clinical trials comparing LANTUS to NPH human insulin, all patients were on human NPH-based regimens prior to the study, which were not changed for patients entering treatment in the human NPH arm. Patients beginning treatment with LANTUS, however, all required dose titration on the new insulin, which may have been in large measure responsible for the increase in hypoglycemia seen in LANTUS-treated patients during titration. In addition, in some studies (Study 4005) A_{1C} and glucose levels were lower in the LANTUS group than in the human NPH group during the titration phase, which would also tend to foster more episodes of hypoglycemia. Post-initiation in Study 3003, LANTUS treatment was associated with a significantly greater reduction in mean FBG and no significant difference in A_{1C}, 24-hr BG profile, and hypoglycemia incidence compared to NPH human insulin given once or twice daily. Post-initiation in crossover Study 4005, LANTUS treatment was associated with no significant difference in FBG, 24-hr BG profile or hypoglycemia incidence compared to NPH human insulin. During the first treatment phase of Study 4005, A_{1C} decreased in both treatment groups. In the second treatment phase, improvement in A_{1C} was maintained in patients on LANTUS + lispro, while A_{1C} increased in subjects who switched to human NPH + human regular.

LANTUS Flexible Daily Administration

The safety and efficacy of LANTUS administered pre-breakfast, pre-dinner or at bedtime were evaluated in a large, randomized, controlled clinical study (Study 4007). In this study in patients with type 1 diabetes (n=378), who were also treated with insulin lispro at meals, LANTUS administered at different times of the day resulted in equivalent glycemic control to that at bedtime (see Table 6).

The safety and efficacy of LANTUS administered pre-breakfast or at bedtime were also evaluated in a large, randomized, active-controlled clinical study (Study 4001, n=697) in type 2 diabetic patients no longer adequately controlled on oral agent therapy. All patients in this study also received AMARYL[®] (glimepiride) 3 mg daily. LANTUS given before breakfast was as effective in lowering glycated hemoglobin A_{1C} as LANTUS given at bedtime or NPH human insulin given at bedtime (see Table 6).

Table 6. Flexible LANTUS Daily Administration in Type 1 and Type 2 Diabetes Mellitus

Diabetes population Treatment duration Treatment in combination with:	Type 1 diabetes mellitus 24 weeks Insulin lispro			Type 2 diabetes mellitus 24 weeks AMARYL® (glimepiride)		
	LANTUS			LANTUS		NPH
	Breakfast	Dinner	Bedtime	Breakfast	Bedtime	Bedtime
n ^a	112	124	128	234	226	227
n ^b	104	123	125	226	211	205
Glycated Hemoglobin A1c ^c						
Baseline mean	7.56	7.53	7.61	9.13	9.07	9.09
Endstudy mean	7.39	7.42	7.57	7.87	8.12	8.27
Mean change from baseline	-0.17	-0.11	-0.04	-1.26	-0.95	-0.83
Basal insulin dose (U) ^c						
Endstudy mean	27.3	24.6	22.8	40.4	38.5	36.8
Mean change from baseline	5	1.8	1.5			
Total insulin dose (U) ^c				NA	NA	NA
Endstudy mean	53.3	54.7	51.5			
Mean change from baseline	1.6	3	2.3			

a Number of patients randomized and treated

b Number of patients randomized, treated, and completed study (without early endpoint)

c Intention to treat population

All data collected during study treatment are included in the calculations whenever possible, unless specified for a particular purpose (such as per-protocol population which may exclude patients with very early withdrawal), regardless if patients withdrew or not during the study.

Comparative Bioavailability Study

In a randomized, controlled, double-blind, four-way crossover trial in healthy male volunteers, LANTUS with Polysorbate 20 (Test) was found to be bioequivalent to LANTUS (Reference).

Table 7. Pharmacokinetic parameters from measured insulin serum concentration data

LANTUS (Formulation: 100 U/mL; dosing: 0.4 U/kg body weight) From measured insulin serum concentration				
Geometric Mean Arithmetic Mean (CV %)				
PK Parameter	Test LANTUS with Polysorbate 20	Reference LANTUS (sanofi-aventis Deutschland GmbH, Germany)	% Ratio of Geometric Means	Confidence Interval (90%)
AUC ₍₀₋₂₄₎ (μU.h/mL)	343 359 (34%)	355 367 (26%)	96.6	(91.0 ; 102.6)
AUC _(0-inf) (μU.h/mL)	672 716 (37)	694 757 (46)	96.9	(87.1 ; 107.7)
C _{MAX} (μU/mL)	20 21 (34%)	22 23 (28%)	89.6	(83.5; 96.1)
T _{MAX} ¹ (h)	14.4 (1.0-30.0)	12.5 (0.5-30.0)		
T _{1/2} ² (h)	14.3 (59%)	16.0 (96%)		

¹ Median (range) only.

² Arithmetic mean (CV%) only.

Table 8. Pharmacodynamic parameters from standardized glucose infusion rate data

LANTUS (Formulation: 100 U/mL; dosing: 0.4 U/kg body weight) From standardized glucose infusion rate measured data (GIR)				
Arithmetic Mean (CV %) Geometric Mean				
PD Parameter	Test LANTUS with Polysorbate 20	Reference LANTUS (sanofi-aventis Deutschland GmbH, Germany)	% Ratio of Means	% Confidence Interval (90%)
AUC ₍₀₋₂₄₎ (mg/kg)	2373 (41%) 2195	2367 (40%) 2197	100.1	(88.1; 113.8)
AUC _(0-end) (mg/kg)	2796 (39%) 2605	2743 (37%) 2576	101.9	(90.6; 114.7)
GIR _{MAX} ¹ (mg/(min.kg))	3.1 (35%)	3.2 (42%)	95.6	(83.3; 109.7)
Time to GIR _{MAX} ² (h)	12.8 (3.2-29.0)	12.5 (5.2-30.0)		

¹ Based on smoothed GIR profiles. Expressed as the arithmetic mean (CV%) only.

² Based on smoothed GIR profiles. Expressed as median (range) only.

DETAILED PHARMACOLOGY

Insulin receptor binding: Insulin glargine has insulin receptor binding kinetics that are similar to those of human insulin. It is, therefore, considered to mediate the same type of effect via the insulin receptor as insulin.

IGF-1 receptor binding: Human insulin binds with low affinity to the insulin-like growth factor 1 receptor (IGF-1 receptor). The primary effect of IGF-1 receptor activation is mediation of growth promoting (mitogenic) effects. In vitro studies using various cellular assay systems have shown that the affinity of insulin glargine to the IGF-1 receptor is 1.4 to 14 times higher than the affinity of human insulin. However, its affinity is still 200 to 2300 fold less than the affinity of IGF-1. The circulating degradation products of insulin glargine have the same affinity as human insulin.

TOXICOLOGY

Acute toxicity: The acute toxicity of i.v. and s.c. administration of insulin glargine was tested in mice and rats. The LD50 in each species was in the range of greater than or equal to 1000 U/kg.

Chronic toxicity: In repeated subcutaneous dose toxicity studies of insulin glargine in mice, rats, and dogs only expected pharmacodynamic results were observed.

Carcinogenesis: The carcinogenic potential of insulin glargine was evaluated in mice and rats at three different dose levels. These two-year carcinogenicity studies were performed in mice and rats. The results do not suggest a cancer risk to humans.

In mice and rats, standard two-year carcinogenicity studies with insulin glargine were performed at doses up to 0.455 mg/kg, which is for the rat approximately 10 times and for the mouse approximately 5 times the recommended human subcutaneous starting dose of 10 U (0.008 mg/kg/day), based on mg/m². The findings in female mice were not conclusive due to excessive mortality in all dose groups during the study. No clear explanation was found for the excessive mortalities. A similar effect was seen in the female mice control groups: the saline controls mortality (34%) was comparable to the mortality of high dosed female mice (28%) whereas in the vehicle controls mortality reached 42% which is in the same range as the mortality of low dosed female mice (46%). In contrast, the mortality was the same in the male mice saline and vehicle control groups (both 16%). Therefore, these findings are considered as an accidental one due to biological variability. Histiocytomas were found at injection sites in male rats (statistically significant) and male mice (not statistically significant) in acid vehicle containing groups. These tumors were not found in female animals, in saline control, or insulin comparator groups using a different vehicle. The relevance of these findings to humans is unknown.

Mutagenesis: Insulin glargine was not mutagenic in tests for detection of gene mutations in bacteria and mammalian cells (Ames- and HGPRT-test) and in tests for detection of chromosomal aberrations (cytogenetics in vitro in V79 cells and in vivo in Chinese hamsters).

Reproduction Toxicity and Impairment of Fertility: In an embryotoxicity study in rats, hypoglycemia, but no maternal toxicity, occurred. Insulin glargine was not embryotoxic and not teratogenic. In an embryotoxicity study in rabbits, maternal (hypoglycemic shock, intrauterine deaths) and embryo-fetal hypoglycemia-induced toxicity, including single anomalies in the middle- and high-dose groups, were observed. Similar effects were observed with NPH human insulin.

In a combined fertility and prenatal and postnatal study in male and female rats at subcutaneous doses up to 0.36 mg/kg/day, which is approximately 7 times the recommended human subcutaneous starting dose of 10 U (0.008 mg/kg/day), based on mg/m², maternal toxicity due to dose-dependent hypoglycemia, including some deaths, was observed. Consequently, a reduction of the rearing rate occurred in the high-dose group only. Similar effects were observed with NPH human insulin.

Studies in rats with doses up to 40 times the average daily basal human dose (0.5 U/kg) and a study in rabbits at two times the human dose (0.5 U/kg) do not indicate direct harmful effects on the pregnancy during the different stages of pregnancy. The effects of insulin glargine did not generally differ from those observed with regular human insulin; however, in rabbits, five fetuses from 2 litters of the high dose group exhibited dilation of the cerebral ventricles.

Because animal reproduction studies are not always predictive of human response, this drug should be used during pregnancy only if clearly needed.

REFERENCES

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PART III: CONSUMER INFORMATION

LANTUS® Vial Insulin glargine (rDNA origin)

This leaflet is part III of a three-part “Product Monograph” published when LANTUS was approved for sale in Canada and is designed specifically for Consumers. This leaflet is a summary and will not tell you everything about LANTUS. Contact your healthcare professional if you have any questions about the drug.

ABOUT THIS MEDICATION

What the medication is used for:

LANTUS [insulin glargine injection (rDNA origin)] is a recombinant human insulin analogue that is a long-acting blood-glucose-lowering agent administered subcutaneously (under the skin) once a day. LANTUS is indicated in the treatment of patients over 17 years of age with Type 1 or Type 2 diabetes mellitus who require basal (long-acting) insulin for the control of hyperglycemia. LANTUS is also indicated in the treatment of pediatric patients with Type 1 diabetes mellitus who require basal (long-acting) insulin for the control of hyperglycemia.

What it does:

Insulin is a hormone produced by the pancreas, a large gland that lies near the stomach. This hormone is necessary for the body's correct use of food, especially sugar. Diabetes occurs when the pancreas does not make enough insulin to meet your body's needs or when your body cannot use properly the insulin you normally produce.

When your body does not make enough insulin, you need an external source of insulin. That is why you must take insulin injections. LANTUS is similar to the insulin made by your body.

You have been instructed to test your blood and/or your urine regularly for glucose; it is especially important to test even more often when changing insulins or dosing schedule. If your blood tests consistently show above- or below- normal glucose

levels, or your urine tests consistently show the presence of glucose, your diabetes is not properly controlled and you must let your healthcare professional know.

Insulin injections play an important role in keeping your diabetes under control. But the way you live – your diet, careful monitoring of your glucose levels, exercise, or planned physical activity and following your healthcare professional’s recommendations– all work with your insulin to help you control your diabetes.

Always keep an extra supply of insulin as well as a spare syringe and needle on hand. Always wear medical alert identification and carry information about your diabetes so that appropriate treatment can be given if complications occur away from home.

When it should not be used:

LANTUS should not be used:

- if you are allergic to this drug or to any ingredient in the formulation or component of the container;
- if you have diabetes ketoacidosis;
- for intravenous or intramuscular injections.

What the medicinal ingredient is:

The active ingredient in LANTUS is insulin glargine (rDNA origin).

What the nonmedicinal ingredients are:

The nonmedicinal ingredients in the 10 mL vial are glycerol 85%, polysorbate 20, m-cresol, water, zinc, and hydrochloric acid and sodium hydroxide for pH adjustment.

What dosage forms it comes in:

LANTUS is a solution for injection (100 U/mL) available in the following package size:
10-mL vials

It is also available in:

-3-mL Cartridges, package of 5 (for use only with ClikSTAR and Autopen 24*)

- 3-mL SoloSTAR (pre-filled disposable pen), package of 5

WARNING AND PRECAUTIONS

Serious Warnings and Precautions

- Hypoglycemia is the most common adverse effect of insulin, including LANTUS.
- Glucose monitoring is recommended for all patients with diabetes.
- Uncorrected hypoglycemic or hyperglycemic reactions can cause loss of consciousness, coma, or death.
- Any change of insulin should be made cautiously and only under medical supervision.
- LANTUS is not intended for intravenous or intramuscular administration.
- **LANTUS must not be mixed with any other insulin or diluted with any other solution because it might not work as intended.**
- Insulin products shall not be used if it is not water-clear and colourless or if it has formed a deposit of solid particles on the wall of the vial or cartridge.

Concomitant oral antidiabetic treatment may need to be adjusted.

The use of thiazolidinediones (such as rosiglitazone and pioglitazone), alone or in combination with other antidiabetic agents (including insulin), has been associated with heart failure and swelling of the lower extremities. Please contact your physician immediately if you develop symptoms of shortness of breath, fatigue, exercise intolerance, or swelling of the lower extremities while you are on these agents.

Accidental mix-ups between insulin glargine and other insulins, particularly short-acting insulins, have been reported. To avoid medication errors between insulin glargine and other insulins, insulin labels should always be checked before each injection.

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BEFORE you use LANTUS talk to your healthcare professional if:

- You are planning to have a baby, are pregnant, or are nursing a baby;
- You are taking any medication.

INTERACTIONS WITH THIS MEDICATION

Other medicines, including non-prescription medicines, and dietary supplements (such as vitamins) can change the way insulin works. Your dose of insulin or other medications may need to be changed in consultation with your healthcare professional. Please see “Proper use of medication” section below for potential medication interactions with insulin.

INSTRUCTIONS FOR USE

Your doctor has recommended the type of insulin that he/she believes is best for you. **DO NOT USE ANY OTHER INSULIN EXCEPT ON THE ADVICE AND DIRECTION OF YOUR DOCTOR.**

LANTUS is a clear solution and looks like some short-acting insulins. Always check the carton and the vial label for the name of the insulin you receive from your pharmacy to make sure it is the same as the one your doctor has recommended.

Correct Syringe

It is important to use a syringe that is marked for U-100 insulin preparations since LANTUS contains 100 units/mL. Using an incorrect syringe could lead to a mistake in dosing and cause medical problems for you, such as a blood glucose level that is too low or too high.

Syringe Use

CAREFULLY FOLLOW THE DIRECTIONS SUPPLIED BY YOUR HEALTHCARE PROFESSIONAL ON HOW TO USE SYRINGES TO HELP AVOID CONTAMINATION AND POSSIBLE INFECTION.

Disposable syringes and needles should be used only once and then properly discarded.

NEEDLES AND SYRINGES MUST NOT BE SHARED.

Preparing the Dose

1. To avoid medication errors, check the vial label of the insulin before each injection.
2. Inspect the insulin. LANTUS should be a clear and colorless solution with no visible particles. Do not use it if you notice anything unusual in the appearance of the solution.
3. Make sure the insulin is at room temperature to minimize local irritation at the injection site.
4. Wash your hands.
5. It is not necessary to shake or rotate the vial before use.
6. If using a new vial, remove the protective cap, but DO NOT remove the stopper.
7. Wipe the top of the vial with an alcohol swab.
8. A new sterile syringe must be used.
9. Draw air into the syringe equal to your insulin dose. Put the needle through the rubber top of the insulin vial and inject the air into the vial.
10. Turn the vial and syringe upside down. Hold the vial and syringe firmly in one hand.
11. Make sure the tip of the needle is in the insulin and withdraw the correct dose of insulin into the syringe.
12. Before removing the needle from the vial, check your syringe for air bubbles. If bubbles are present, hold the syringe straight up and tap its side until the bubbles float to the top. Push them out with the plunger and withdraw the correct dose.
13. Remove the needle from the vial. Do not let the needle touch anything prior to injection.
14. An empty vial must never be reused and must be properly discarded

Injection

Cleanse the skin with alcohol where the injection is to be made. Pinch and hold the skin and insert the needle as instructed by your healthcare professional. Slowly push the plunger of the syringe in completely. Slowly count to 10 before removing the needle from the injection site and gently apply pressure for several seconds. DO NOT RUB THE AREA.

There is no relevant difference in absorption of LANTUS between abdominal, thigh, or upper arm subcutaneous injection areas. However, injection sites within an injection area (abdomen, thigh, buttock, or upper arm) must be rotated from one injection to the next.

Hypo- or hyperglycemia can result from injecting insulin in the wrong site or incorrectly.

Hypoglycemia can result from injection directly into a blood vessel and if not recognized or treated may be followed by hyperglycemia since there was no LANTUS deposition for long-term absorption.

PROPER USE OF THIS MEDICATION

Dosage

The dosage of LANTUS should be individualized and determined based on your healthcare professional's advice in accordance with your needs. You may take LANTUS at any time during the day, but you must take it at the same time every day.

Many factors may affect your usual LANTUS dose, which may include changes in your diet, activity, or work schedule. Follow your healthcare professional's instructions carefully. Consult your healthcare professional if you notice your insulin requirements changing markedly. Other factors that may affect your dose of insulin or your need to do additional blood/urine testing are:

Illness

Illness, especially with nausea and vomiting, diarrhea and/or fever, may change how much insulin you need. Even if you are not eating, you will still require insulin. You and your healthcare professional should establish a sick day plan for you to use in case of illness. When you are sick, test your blood/urine frequently and call your healthcare professional as instructed.

Pregnancy

If you are planning to have a baby, are pregnant, or are nursing a baby, consult your healthcare professional. Good control of diabetes is especially important for you and your unborn baby. Pregnancy may make managing your diabetes more difficult.

Medication

Always discuss any medications you are taking, prescription or "over-the-counter", with your health care provider. To prevent drug interactions, volunteer the names of everything you are taking even before they ask if there have been any changes. Insulin requirements may be increased in the presence of drugs with hyperglycemic activity, such as contraceptives (for example, birth control pills, injections and patches), and hormone replacement therapies, corticosteroids, thyroid replacement

therapy, and sympathomimetic agents such as decongestants and diet pills. Insulin requirements may be reduced in the presence of drugs with hypoglycemic activity, such as oral antidiabetic agents, salicylates (for example, aspirin), sulfa antibiotics, blood pressure medications including ACE inhibitors, and certain psychiatric medications including MAO inhibitors or antidepressants and anti-anxiety medications.

Substances including beta-blockers, used for conditions including blood pressure, heart arrhythmias, palpitations and headache, and alcohol may enhance or weaken the blood-glucose-lowering effect of insulins, and signs of hypoglycemia may be reduced or absent.

Exercise

If your exercise routine changes, discuss with your healthcare professional the possible need to adjust your insulin regimen. Exercise may lower your body's need for insulin during, and for some time after, the activity. As for all insulins, the rate of absorption, and consequently the onset and duration of action, may be affected by exercise and other variables.

Travel

Consult your healthcare professional concerning possible adjustments in your insulin schedule if you will be traveling across time zones. You may want to take along extra insulin and supplies whenever you travel.

Missed dose:

If you **have missed a dose of LANTUS** or if you **have not injected enough insulin**, your blood sugar level may become too high (hyperglycemia). Check your blood sugar frequently. For information on the treatment of hyperglycemia, see “Side Effects and What To Do About Them” below.

Do not take a double dose to make up for a forgotten dose.

Overdose:

If you **have injected too much LANTUS**, your blood sugar level may become too low (hypoglycemia). Check your blood sugar frequently. In general, to prevent hypoglycemia you must eat more food and monitor your blood sugar. For information on the treatment of hypoglycemia, see “Side Effects and What To Do about Them” below.

Hypoglycemia may occur as a result of an excess of insulin relative to food intake, energy expenditure or both.

In case of drug overdose, contact a health professional, hospital emergency department or regional Poison Control Centre immediately, even if there are no symptoms.

SIDE EFFECTS AND WHAT TO DO ABOUT THEM

COMMON PROBLEMS OF DIABETES

Hypoglycemia (Insulin Reaction)

Hypoglycemia (too little glucose in the blood) is one of the most frequent adverse events experienced by insulin users. It can be brought on by situations such as:

- intercurrent conditions (illness, stress, or emotional disturbances),
- accidental injection of an increased insulin dose,
- malfunction and/or misuse of medical devices,
- too-low food intake, or skipped meals,
- an increase in exercise,
- a new insulin type or schedule,
- some new medications, including prescriptions, over-the counter medication, herbs, vitamins and street drugs.

Symptoms of mild to moderate hypoglycemia may occur suddenly and can include:

- abnormal behavior (anxiety, irritability, restlessness, trouble concentrating, personality changes, mood changes, confusion or nervousness),
- fatigue,
- tingling in your hands, feet, lips, or tongue,
- tremor (shaking),
- unsteady gait (walking),
- dizziness, light-headedness, or drowsiness,
- headache,
- blurred vision,
- slurred speech,
- palpitations (rapid heartbeat),
- cold sweat,
- pale skin,
- nightmares or trouble sleeping,

- nausea,
- hunger.

Mild to moderate hypoglycemia may be treated by consuming foods or drinks that contain sugar. Patients should always carry a quick source of sugar, such as candy, juice or glucose tablets, prominently labelled for rescuers. Contact your healthcare professional about appropriate proportions of carbohydrates.

Signs of severe hypoglycemia can include:

- disorientation,
- convulsions,
- loss of consciousness,
- seizures.

Severe hypoglycemia may require the assistance of another person. Patients who are unable to take sugar orally or who are unconscious may require an injection of glucagon or should be treated with intravenous administration of glucose by medical personnel. Without immediate medical help, serious reactions or even death could occur.

The early warning symptoms of hypoglycemia may be changed, be less pronounced, or be absent, as for example, in patients whose sugar levels are markedly improved, in elderly patients, in patients with diabetic nerve disease, in patients with a long history of diabetes, or in patients receiving treatment with certain other drugs. Such situations may result in severe hypoglycemia (and possibly, loss of consciousness) before a patient has symptoms.

Some people may not recognize when their blood sugar drops low. Without recognition of early warning symptoms, you may not be able to take steps to avoid more serious hypoglycemia. Be alert for all of the various types of symptoms that may indicate hypoglycemia. Patients who experience hypoglycemia without early warning symptoms should monitor their blood glucose frequently, especially prior to activities such as driving a car or use mechanical equipment. If the blood glucose is below your normal fasting glucose, you should consider eating or drinking sugar-containing foods to treat your hypoglycemia.

If you have frequent episodes of hypoglycemia, experience difficulty in recognizing the symptoms, or if your diabetes is getting worse, you should consult your healthcare professional to discuss possible

changes in therapy, meal plans, and/or exercise programs to help you avoid hypoglycemia.

Hyperglycemia

Hyperglycemia (too much glucose in the blood) may develop if your body has too little insulin.

Hyperglycemia can be brought about by:

- intercurrent conditions (illness, stress, or emotional disturbances),
- not taking your insulin or taking less than recommended by your healthcare professional,
- malfunction and/or misuse of medical devices,
- eating significantly more than your meal plan suggests,
- a new insulin type or schedule,
- some new medications, including prescriptions, over-the counter medication, herbs, vitamins and street drugs.

Symptoms of hyperglycemia include:

- confusion or drowsiness,
- increased thirst,
- decreased appetite, nausea, or vomiting,
- rapid heart rate,
- increased urination and dehydration (too little fluid in your body),
- blurred vision,
- flushed dry skin,
- acetone odour of breath.

Hyperglycemia can be mild or severe. It can **progress to high glucose levels, diabetic ketoacidosis (DKA), and result in unconsciousness and death.**

Diabetic ketoacidosis (DKA)

The first symptoms of diabetic ketoacidosis usually come on over a period of hours or days. With ketoacidosis, urine tests show large amounts of glucose and acetone.

Symptoms of diabetic ketoacidosis include:

First symptoms:

- drowsiness,

- flushed face,
- thirst,
- loss of appetite,
- fruity smelling breath,
- rapid, deep breathing,
- abdominal (stomach area) pain.

Severe symptoms:

- heavy breathing,
- rapid pulse.

Prolonged hyperglycemia or diabetic ketoacidosis can lead to:

- nausea,
- vomiting,
- dehydration,
- loss of consciousness,
- death.

Severe or continuing hyperglycemia or DKA requires prompt evaluation and treatment by your healthcare professional. LANTUS should not be used to treat DKA, and the persons treating you should be advised you are taking a long-acting insulin and about your regimen.

Allergic reactions

In rare cases, a patient may be allergic to an insulin product. Severe insulin allergies may be life-threatening. If you think you are having an allergic reaction, seek medical help immediately.

Signs of insulin allergy include:

- a rash all over your body,
- shortness of breath,
- wheezing (trouble breathing),
- a fast pulse,
- sweating,
- low blood pressure.

Possible reactions on the skin at the injection site

Injecting insulin can cause the following reactions on the skin at the injection site:

- a little depression in the skin (lipoatrophy),
- skin thickening (lipohypertrophy),
- redness, swelling, or itching at injection site.

In some instances, these reactions may be related to factors other than insulin, such as irritants in the skin cleansing agent or poor injection technique. You can reduce the chance of getting an injection site reaction if you change the injection site each time. If you have local injection site reactions, contact your healthcare professional.

This is not a complete list of side effects. For any unexpected effects while taking LANTUS, contact your healthcare professional.

REPORTING SUSPECTED SIDE EFFECTS

You can report any suspected adverse reactions associated with the use of health products to the Canada Vigilance Program by one of the following 3 ways:

- Report online at:
www.healthcanada.gc.ca/medeffect
- Call toll-free at 1-866-234-2345
- Complete a Canada Vigilance Reporting Form and:
 - Fax toll-free to 1-866-678-6789, or
 - Mail to:
 - Canada Vigilance Program
 - Health Canada
 - Postal Locator 0701E
 - Ottawa, ON K1A 0K9

Postage paid labels, Canada Vigilance Reporting Form and the adverse reaction reporting guidelines are available on the MedEffect™ Canada Web site at www.healthcanada.gc.ca/medeffect.

NOTE: Should you require information related to the management of side effects, contact your health professional. The Canada Vigilance Program does not provide medical advice.

HOW TO STORE IT

Unopened Vial:

Unopened LANTUS vials should be stored in a refrigerator, between 2°C – 8°C. Keep LANTUS away from direct heat and light. LANTUS should not be stored in the freezer and should not be allowed to freeze. If LANTUS freezes or overheats, discard it.

Opened (In Use) Vial:

The opened vial can be kept refrigerated or unrefrigerated (15 – 30°C) for up to 28 days away from direct heat and light, as long as the temperature is not greater than 30°C. Opened LANTUS vials, whether or not refrigerated, must be discarded after 28 days even if they contain insulin.

Opened LANTUS vials should not be stored in the freezer and should not be allowed to freeze. If a vial freezes or overheats, discard it.

Do not use a vial of LANTUS after the expiration date stamped on the label or if it is cloudy or if you see particles.

As with all medications and devices, keep out of reach of children.

MORE INFORMATION

Your physician, pharmacist, and nurse are always your best source of information about your condition and treatment. If you have additional questions or concerns, be sure to ask them.

This document is available at www.sanofi-aventis.ca

This document is available in large print format by contacting the sponsor, sanofi-aventis Canada Inc., at: 1-888-8LANTUS (1-888-852-6887).

The size of the large print can be further enlarged if needed.

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PART III: CONSUMER INFORMATION

LANTUS[®] Cartridge Insulin glargine (rDNA origin)

Cartridges are for use ONLY with ClikSTAR[®] and Autopen[®] 24.

This leaflet is part III of a three-part “Product Monograph” published when LANTUS was approved for sale in Canada and is designed specifically for Consumers. This leaflet is a summary and will not tell you everything about LANTUS. Contact your healthcare professional if you have any questions about the drug.

ABOUT THIS MEDICATION

What the medication is used for:

LANTUS [insulin glargine injection (rDNA origin)] is a recombinant human insulin analogue that is a long-acting blood-glucose-lowering agent administered subcutaneously (under the skin) once a day. LANTUS is indicated in the treatment of patients over 17 years of age with Type 1 or Type 2 diabetes mellitus who require basal (long-acting) insulin for the control of hyperglycemia. LANTUS is also indicated in the treatment of pediatric patients with Type 1 diabetes mellitus who require basal (long-acting) insulin for the control of hyperglycemia.

What it does:

Insulin is a hormone produced by the pancreas, a large gland that lies near the stomach. This hormone is necessary for the body's correct use of food, especially sugar. Diabetes occurs when the pancreas does not make enough insulin to meet your body's needs or when your body cannot use properly the insulin you normally produce.

When your body does not make enough insulin, you need an external source of insulin. That is why you must take insulin injections. LANTUS is similar to the insulin made by your body.

You have been instructed to test your blood and/or your urine regularly for glucose; it is especially

important to test even more often when changing insulins or dosing schedule. If your blood tests consistently show above- or below- normal glucose levels, or your urine tests consistently show the presence of glucose, your diabetes is not properly controlled and you must let your healthcare professional know.

Insulin injections play an important role in keeping your diabetes under control. But the way you live – your diet, careful monitoring of your glucose levels, exercise, or planned physical activity and following your healthcare professional's recommendations– all work with your insulin to help you control your diabetes.

Always keep an extra supply of insulin as well as a spare syringe and needle on hand. Always wear medical alert identification and carry information about your diabetes so that appropriate treatment can be given if complications occur away from home.

When it should not be used:

LANTUS should not be used:

- if you are allergic to this drug or to any ingredient in the formulation or component of the container;
- if you have diabetes ketoacidosis;
- for intravenous or intramuscular injections.

What the medicinal ingredient is:

The active ingredient in LANTUS is insulin glargine (rDNA origin).

What the nonmedicinal ingredients are:

The nonmedicinal ingredients in the 3 mL cartridges are glycerol 85%, m-cresol, water, zinc, and hydrochloric acid and sodium hydroxide for pH adjustment.

What dosage forms it comes in:

LANTUS is a solution for injection (100 U/mL) available in the following package size:
3-mL Cartridges, package of 5 (for use only with ClikSTAR and Autopen 24)

It is also available in:

- 10-mL vials
- 3-mL SoloSTAR (pre-filled disposable pen), package of 5

WARNING AND PRECAUTIONS

Serious Warnings and Precautions

- Hypoglycemia is the most common adverse effect of insulin, including LANTUS.
- Glucose monitoring is recommended for all patients with diabetes.
- Uncorrected hypoglycemic or hyperglycemic reactions can cause loss of consciousness, coma, or death.
- Any change of insulin should be made cautiously and only under medical supervision.
- LANTUS is not intended for intravenous or intramuscular administration.
- **LANTUS must not be mixed with any other insulin or diluted with any other solution because it might not work as intended.**
- Insulin products shall not be used if it is not water-clear and colourless or if it has formed a deposit of solid particles on the wall of the vial or cartridge.

Concomitant oral antidiabetic treatment may need to be adjusted.

The use of thiazolidinediones (such as rosiglitazone and pioglitazone), alone or in combination with other antidiabetic agents (including insulin), has been associated with heart failure and swelling of the lower extremities. Please contact your physician immediately if you develop symptoms of shortness of breath, fatigue, exercise intolerance, or swelling of the lower extremities while you are on these agents.

Accidental mix-ups between insulin glargine and other insulins, particularly short-acting insulins, have been reported. To avoid medication errors between insulin glargine and other insulins, insulin labels should always be checked before each injection.

BEFORE you use LANTUS talk to your healthcare professional if:

- You are planning to have a baby, are pregnant, or are nursing a baby;
- You are taking any medication.

INTERACTIONS WITH THIS MEDICATION

Other medicines, including non-prescription medicines, and dietary supplements (such as vitamins) can change the way insulin works. Your dose of insulin or other medications may need to be changed in consultation with your healthcare professional. Please see “Proper use of medication” section below for potential medication interactions with insulin.

INSTRUCTIONS FOR USE

Your doctor has recommended the type of insulin that he/she believes is best for you. **DO NOT USE ANY OTHER INSULIN EXCEPT ON THE ADVICE AND DIRECTION OF YOUR DOCTOR.**

LANTUS is a clear solution and looks like some short-acting insulins. Always check the carton and the cartridge label for the name of the insulin you receive from your pharmacy to make sure it is the same as the one your doctor has recommended.

It is important to use the LANTUS cartridge only with ClikSTAR and Autopen 24. Using the cartridge in any other injection pen not suitable for the LANTUS cartridge could lead to a mistake in dosing and cause medical problems for you, such as a blood glucose level that is too low or too high.

Although rare, technical problems with the cartridge can occur which may prevent correct dosing. They include: broken, cracked or damaged cartridges, air bubbles or foam, and blocked needles. If technical problems occur or are suspected, contact the call center, your physician, pharmacist or nurse.

CAREFULLY FOLLOW THE DIRECTIONS SUPPLIED BY YOUR HEALTHCARE PROFESSIONAL ON HOW TO USE ClikSTAR and Autopen 24, TO HELP:

- **AVOID CONTAMINATION AND POSSIBLE INFECTION**
- **TO OBTAIN AN ACCURATE DOSE.**

INJECTION PENS, CARTRIDGES, NEEDLES, AND SYRINGES MUST NOT BE SHARED.

Preparing the LANTUS Cartridge for Insertion into the injection pen

1. To avoid medication errors, check the cartridge label of the insulin before each insertion.

2. Inspect the insulin cartridge. LANTUS should be a clear and colorless solution with no visible particles. Do not use it if you notice anything unusual in the appearance of the solution.
3. Make sure the insulin is at room temperature to minimize local irritation at the injection site.
4. Wash your hands.
5. Carefully follow the injection pen directions for loading the cartridge into the injection pen.

Injecting Each Dose:

1. Wash your hands.
2. Inspect the insulin. LANTUS should be a clear and colorless solution with no visible particles. Do not use it if you notice anything unusual in the appearance of solution.
3. It is not necessary to shake or rotate the cartridge inserted into the injection pen before use.
4. Remove the protective cap.
5. Follow the injection pen directions for attaching and changing the needle.
6. Check the cartridge inserted into the injection pen for air bubbles. If bubbles are present, remove them as instructed in the injection pen directions.
7. **Follow the injection pen directions for performing the Safety Test or Priming.**
8. Set the injection pen to the correct LANTUS dose as instructed in the injection pen directions.
9. There is no relevant difference in absorption of LANTUS between abdominal, thigh, or upper arm subcutaneous injection areas. However, injection sites within an injection area (abdomen, thigh, buttock, or upper arm) must be rotated from one injection to the next.
10. Cleanse the skin with alcohol where the injection is to be made.
11. Pinch and hold the skin and insert the needle attached to the injection pen as instructed by your doctor or diabetes educator.
12. To inject LANTUS, follow the directions for the injection pen.
13. Slowly count to 10 before removing the needle from the injection site and gently apply pressure for several seconds. **DO NOT RUB THE AREA.**
14. Remove the needle from the injection pen immediately after each injection as instructed in the directions for the injection pen. Dispose of

the needle appropriately. Do not reuse the needle.

If the injection pen malfunctions, LANTUS may be drawn from the cartridge into an insulin syringe and injected. A new sterile syringe must be used at each injection.

Hypo- or hyperglycemia can result from injecting insulin in the wrong site or incorrectly. Hypoglycemia can result from injection directly into a blood vessel and if not recognized or treated may be followed by hyperglycemia since there was no LANTUS deposition for long-term absorption.

PROPER USE OF THIS MEDICATION

Dosage

The dosage of LANTUS should be individualized and determined based on your healthcare professional's advice in accordance with your needs. You may take LANTUS at any time during the day, but you must take it at the same time every day.

Many factors may affect your usual LANTUS dose, which may include changes in your diet, activity, or work schedule. Follow your healthcare professional's instructions carefully. Consult your healthcare professional if you notice your insulin requirements changing markedly. Other factors that may affect your dose of insulin or your need to do additional blood/urine testing are:

Illness

Illness, especially with nausea and vomiting, diarrhea and/or fever, may cause your insulin requirements to change. Even if you are not eating, you will still require insulin. You and your doctor should establish a sick day plan for you to use in case of illness. When you are sick, test your blood/urine frequently and call your doctor as instructed.

Pregnancy

If you are planning to have a baby, are pregnant, or are nursing a baby, consult your doctor. Good control of diabetes is especially important for you and your unborn baby. Pregnancy may make managing your diabetes more difficult.

Medication

Always discuss any medications you are taking, prescription or "over-the-counter", with your health care provider. To prevent drug interactions, volunteer

the names of everything you are taking even before they ask if there have been any changes. Insulin requirements may be increased in the presence of drugs with hyperglycemic activity, such as contraceptives (for example, birth control pills, injections and patches), and hormone replacement therapies, corticosteroids, thyroid replacement therapy, and sympathomimetic agents such as decongestants and diet pills. Insulin requirements may be reduced in the presence of drugs with hypoglycemic activity, such as oral antidiabetic agents, salicylates (for example, aspirin), sulfa antibiotics, blood pressure medications including ACE inhibitors, and certain psychiatric medications including MAO inhibitors or antidepressants and anti-anxiety medications.

Substances including beta-blockers, used for conditions including blood pressure, heart arrhythmias, palpitations and headache, and alcohol may enhance or weaken the blood-glucose-lowering effect of insulins, and signs of hypoglycemia may be reduced or absent.

Exercise

If your exercise routine changes, discuss with your healthcare professional the possible need to adjust your insulin regimen. Exercise may lower your body's need for insulin during, and for some time after, the activity. As for all insulins, the rate of absorption, and consequently the onset and duration of action, may be affected by exercise and other variables.

Travel

Consult your healthcare professional concerning possible adjustments in your insulin schedule if you will be traveling across time zones. You may want to take along extra insulin and supplies whenever you travel.

Missed dose:

If you **have missed a dose of LANTUS** or if you **have not injected enough insulin**, your blood sugar level may become too high (hyperglycemia). Check your blood sugar frequently. For information on the treatment of hyperglycemia, see “Side Effects and What To Do About Them” below.

Do not take a double dose to make up for a forgotten dose.

Overdose:

If you **have injected too much LANTUS**, your blood sugar level may become too low (hypoglycemia). Check your blood sugar frequently. In general, to prevent hypoglycemia you must eat more food and monitor your blood sugar. For information on the treatment of hypoglycemia, see “Side Effects and What To Do About Them” below.

Hypoglycemia may occur as a result of an excess of insulin relative to food intake, energy expenditure or both.

In case of drug overdose, contact a health professional, hospital emergency department or regional Poison Control Centre immediately, even if there are no symptoms.

SIDE EFFECTS AND WHAT TO DO ABOUT THEM

COMMON PROBLEMS OF DIABETES

Hypoglycemia (Insulin Reaction)

Hypoglycemia (too little glucose in the blood) is one of the most frequent adverse events experienced by insulin users. It can be brought on by situations such as:

- intercurrent conditions (illness, stress, or emotional disturbances),
- accidental injection of an increased insulin dose,
- malfunction and/or misuse of medical devices,
- too-low food intake, or skipped meals,
- an increase in exercise,
- a new insulin type or schedule,
- some new medications, including prescriptions, over-the counter medication, herbs, vitamins and street drugs.

Symptoms of mild to moderate hypoglycemia may occur suddenly and can include:

- abnormal behavior (anxiety, irritability, restlessness, trouble concentrating, personality changes, mood changes, confusion or nervousness),
- fatigue,
- tingling in your hands, feet, lips, or tongue,
- tremor (shaking),
- unsteady gait (walking),

- dizziness, light-headedness, or drowsiness,
- headache,
- blurred vision,
- slurred speech,
- palpitations (rapid heartbeat),
- cold sweat,
- pale skin,
- nightmares or trouble sleeping,
- nausea,
- hunger.

Mild to moderate hypoglycemia may be treated by consuming foods or drinks that contain sugar. Patients should always carry a quick source of sugar, such as candy, juice or glucose tablets, prominently labelled for rescuers. Contact your healthcare professional about appropriate proportions of carbohydrates.

Signs of severe hypoglycemia can include:

- disorientation,
- convulsions,
- loss of consciousness,
- seizures.

Severe hypoglycemia may require the assistance of another person. Patients who are unable to take sugar orally or who are unconscious may require an injection of glucagon or should be treated with intravenous administration of glucose by medical personnel. Without immediate medical help, serious reactions or even death could occur.

The early warning symptoms of hypoglycemia may be changed, be less pronounced, or be absent, as for example, in patients whose sugar levels are markedly improved, in elderly patients, in patients with diabetic nerve disease, in patients with a long history of diabetes, or in patients receiving treatment with certain other drugs. Such situations may result in severe hypoglycemia (and possibly, loss of consciousness) before a patient has symptoms.

Some people may not recognize when their blood sugar drops low. Without recognition of early warning symptoms, you may not be able to take steps to avoid more serious hypoglycemia. Be alert for all of the various types of symptoms that may indicate hypoglycemia. Patients who experience hypoglycemia without early warning symptoms should monitor their blood glucose frequently, especially prior to activities such as driving a car or

use mechanical equipment. If the blood glucose is below your normal fasting glucose, you should consider eating or drinking sugar-containing foods to treat your hypoglycemia.

If you have frequent episodes of hypoglycemia, experience difficulty in recognizing the symptoms, or if your diabetes is getting worse, you should consult your healthcare professional to discuss possible changes in therapy, meal plans, and/or exercise programs to help you avoid hypoglycemia.

Hyperglycemia

Hyperglycemia (too much glucose in the blood) may develop if your body has too little insulin.

Hyperglycemia can be brought about by:

- intercurrent conditions (illness, stress, or emotional disturbances),
- not taking your insulin or taking less than recommended by your healthcare professional,
- malfunction and/or misuse of medical devices,
- eating significantly more than your meal plan suggests,
- a new insulin type or schedule,
- some new medications, including prescriptions, over-the counter medication, herbs, vitamins and street drugs,

Symptoms of hyperglycemia include:

- confusion or drowsiness,
- increased thirst,
- decreased appetite, nausea, or vomiting,
- rapid heart rate,
- increased urination and dehydration (too little fluid in your body),
- blurred vision,
- flushed dry skin,
- acetone odour of breath.

Hyperglycemia can be mild or severe. It can **progress to high glucose levels, diabetic ketoacidosis (DKA), and result in unconsciousness and death.**

Diabetic ketoacidosis (DKA)

The first symptoms of diabetic ketoacidosis usually come on over a period of hours or days. With

ketoacidosis, urine tests show large amounts of glucose and acetone.

Symptoms of diabetic ketoacidosis include:

First symptoms:

- drowsiness,
- flushed face,
- thirst,
- loss of appetite,
- fruity smelling breath,
- rapid, deep breathing,
- abdominal (stomach area) pain.

Severe symptoms:

- heavy breathing,
- rapid pulse.

Prolonged hyperglycemia or diabetic ketoacidosis can lead to:

- nausea,
- vomiting,
- dehydration,
- loss of consciousness,
- death.

Severe or continuing hyperglycemia or DKA requires prompt evaluation and treatment by your healthcare professional. LANTUS should not be used to treat DKA, and the persons treating you should be advised you are taking a long-acting insulin and about your regimen.

Allergic reactions

In rare cases, a patient may be allergic to an insulin product. Severe insulin allergies may be life-threatening. If you think you are having an allergic reaction, seek medical help immediately.

Signs of insulin allergy include:

- a rash all over your body,
- shortness of breath,
- wheezing (trouble breathing),
- a fast pulse,
- sweating,
- low blood pressure.

Possible reactions on the skin at the injection site

Injecting insulin can cause the following reactions on the skin at the injection site:

- a little depression in the skin (lipoatrophy),
- skin thickening (lipohypertrophy),
- redness, swelling, or itching at injection site.

In some instances, these reactions may be related to factors other than insulin, such as irritants in the skin cleansing agent or poor injection technique. You can reduce the chance of getting an injection site reaction if you change the injection site each time. If you have local injection site reactions, contact your healthcare professional.

This is not a complete list of side effects. For any unexpected effects while taking LANTUS, contact your healthcare professional.

REPORTING SUSPECTED SIDE EFFECTS

You can report any suspected adverse reactions associated with the use of health products to the Canada Vigilance Program by one of the following 3 ways:

- Report online at:
www.healthcanada.gc.ca/medeffect
- Call toll-free at 1-866-234-2345
- Complete a Canada Vigilance Reporting Form and:

- Fax toll-free to 1-866-678-6789, or

- Mail to:

Canada Vigilance Program
Health Canada
Postal Locator 0701E
Ottawa, ON K1A 0K9

Postage paid labels, Canada Vigilance Reporting Form and the adverse reaction reporting guidelines are available on the MedEffect™ Canada Web site at www.healthcanada.gc.ca/medeffect.

NOTE: Should you require information related to the management of side effects, contact your health professional. The Canada Vigilance Program does not provide medical advice.

HOW TO STORE IT

Unopened Cartridge:

Unopened LANTUS cartridges should be stored in a refrigerator, between 2°C - 8°C. Keep LANTUS

away from direct heat and light. LANTUS should not be stored in the freezer and should not be allowed to freeze. If LANTUS freezes or overheats, discard it.

Opened (In Use) Cartridge:

The opened cartridge in use must be kept unrefrigerated (15 - 30°C) for up to 28 days away from direct heat and light, as long as the temperature is not greater than 30°C. If the cartridge overheats or if there is any remaining insulin after 28 days, discard it. The opened cartridge in use must never be removed from and reinserted into the injection pen.

Do not use a cartridge of LANTUS after the expiration date stamped on the label or if it is cloudy or if you see particles.

As with all medications and devices, keep out of reach of children.

MORE INFORMATION

Your physician, pharmacist, and nurse are always your best source of information about your condition and treatment. If you have additional questions or concerns, be sure to ask them.

This document is available at www.sanofi-aventis.ca

This document is available in large print format by contacting the sponsor, sanofi-aventis Canada Inc., at: 1-888-8LANTUS (1-888-852-6887).

The size of the large print can be further enlarged if needed.

sanofi-aventis Canada Inc.
Laval, Quebec
H7L 4A8

This leaflet was prepared by sanofi-aventis Canada Inc.

Last revised: November 17, 2011

PART III: CONSUMER INFORMATION

LANTUS® SoloSTAR® (Pre-filled disposable pen) Insulin glargine (rDNA origin)

This leaflet is part III of a three-part “Product Monograph” published when LANTUS was approved for sale in Canada and is designed specifically for Consumers. This leaflet is a summary and will not tell you everything about LANTUS. Contact your healthcare professional if you have any questions about the drug.

ABOUT THIS MEDICATION

What the medication is used for:

LANTUS [insulin glargine injection (rDNA origin)] is a recombinant human insulin analogue that is a long-acting blood-glucose-lowering agent administered subcutaneously (under the skin) once a day. LANTUS is indicated in the treatment of patients over 17 years of age with Type 1 or Type 2 diabetes mellitus who require basal (long-acting) insulin for the control of hyperglycemia. LANTUS is also indicated in the treatment of pediatric patients with Type 1 diabetes mellitus who require basal (long-acting) insulin for the control of hyperglycemia.

What it does:

Insulin is a hormone produced by the pancreas, a large gland that lies near the stomach. This hormone is necessary for the body's correct use of food, especially sugar. Diabetes occurs when the pancreas does not make enough insulin to meet your body's needs or when your body cannot use properly the insulin you normally produce.

When your body does not make enough insulin, you need an external source of insulin. That is why you must take insulin injections. LANTUS is similar to the insulin made by your body.

You have been instructed to test your blood and/or your urine regularly for glucose; it is especially important to test even more often when changing insulins or dosing schedule. If your blood tests consistently show above- or below- normal glucose levels, or your urine tests consistently show the

presence of glucose, your diabetes is not properly controlled and you must let your healthcare professional know.

Insulin injections play an important role in keeping your diabetes under control. But the way you live – your diet, careful monitoring of your glucose levels, exercise, or planned physical activity and following your healthcare professional’s recommendations– all work with your insulin to help you control your diabetes.

Always keep an extra supply of insulin as well as a spare syringe and needle on hand. Always wear medical alert identification and carry information about your diabetes so that appropriate treatment can be given if complications occur away from home.

When it should not be used:

LANTUS should not be used:

- if you are allergic to this drug or to any ingredient in the formulation or component of the container,
- if you have diabetes ketoacidosis;
- for intravenous or intramuscular injections.

What the medicinal ingredient is:

The active ingredient in LANTUS is insulin glargine (rDNA origin).

What the nonmedicinal ingredients are:

The nonmedicinal ingredients in the 3 mL SoloSTAR are glycerol 85%, m-cresol, water, zinc, and hydrochloric acid and sodium hydroxide for pH adjustment.

What dosage forms it comes in:

LANTUS is a solution for injection (100 U/mL) available in the following package size:
3-mL SoloSTAR (pre-filled disposable pen), package of 5.

It is also available in:

- 10-mL vials
- 3-mL Cartridges, package of 5 (for use only with ClikSTAR and Autopen 24)

WARNING AND PRECAUTIONS

Serious Warnings and Precautions

- Hypoglycemia is the most common adverse effect of insulin, including LANTUS.
- Glucose monitoring is recommended for all patients with diabetes.
- Uncorrected hypoglycemic or hyperglycemic reactions can cause loss of consciousness, coma, or death.
- Any change of insulin should be made cautiously and only under medical supervision.
- LANTUS is not intended for intravenous or intramuscular administration.
- **LANTUS must not be mixed with any other insulin or diluted with any other solution because it might not work as intended.**
- Insulin products shall not be used if it is not water-clear and colourless or if it has formed a deposit of solid particles on the wall of the vial or cartridge.

Concomitant oral antidiabetic treatment may need to be adjusted.

The use of thiazolidinediones (such as rosiglitazone and pioglitazone), alone or in combination with other antidiabetic agents (including insulin), has been associated with heart failure and swelling of the lower extremities. Please contact your physician immediately if you develop symptoms of shortness of breath, fatigue, exercise intolerance, or swelling of the lower extremities while you are on these agents.

Accidental mix-ups between insulin glargine and other insulins, particularly short-acting insulins, have been reported. To avoid medication errors between insulin glargine and other insulins, insulin labels should always be checked before each injection.

BEFORE you use LANTUS talk to your healthcare professional if:

- You are planning to have a baby, are pregnant, or are nursing a baby;
- You are taking any medication.

INTERACTIONS WITH THIS MEDICATION

Other medicines, including non-prescription medicines, and dietary supplements (such as vitamins) can change the way insulin works. Your

dose of insulin or other medications may need to be changed in consultation with your healthcare professional. Please see “Proper use of medication” section below for potential medication interactions with insulin.

INSTRUCTIONS FOR USE

Your doctor has recommended the type of insulin that he/she believes is best for you. **DO NOT USE ANY OTHER INSULIN EXCEPT ON THE ADVICE AND DIRECTION OF YOUR DOCTOR.**

LANTUS is a clear solution and looks like some short-acting insulins. Always check the carton and the SoloSTAR label for the name of the insulin you receive from your pharmacy to make sure it is the same as the one your doctor has recommended.

CAREFULLY FOLLOW THE DIRECTIONS SUPPLIED BY YOUR HEALTHCARE PROFESSIONAL ON HOW TO USE THE SOLOSTAR TO HELP AVOID:

- **CONTAMINATION AND POSSIBLE INFECTION**
- **AND TO OBTAIN AN ACCURATE DOSE.**

INJECTION PENS, CARTRIDGES, NEEDLES, AND SYRINGES MUST NOT BE SHARED.

Preparing the Dose

1. To avoid medication errors, check the label of the insulin of the SoloSTAR pen to make sure you have the correct insulin.
2. Inspect the insulin. LANTUS should be a clear and colorless solution with no visible particles. Do not use it if you notice anything unusual in the appearance of the solution.
3. Make sure the insulin is at room temperature to minimize local irritation at the injection site.
4. Wash your hands.
5. It is not necessary to shake or rotate the SoloSTAR before use.
6. Remove the protective cap.
7. Follow the SoloSTAR directions for attaching and changing the needle.
8. Check the SoloSTAR for air bubbles. If bubbles are present, remove them as instructed in the SoloSTAR directions.

9. **Follow the SoloSTAR directions for performing the Safety Test.**
10. Set the SoloSTAR to the correct LANTUS dose as instructed in the SoloSTAR directions.
11. There is no relevant difference in absorption of LANTUS between abdominal, thigh, or upper arm subcutaneous injection areas. However, injection sites within an injection area (abdomen, thigh, buttock, or upper arm) must be rotated from one injection to the next.
12. Cleanse the skin with alcohol where the injection is to be made.
13. Pinch and hold the skin and insert the needle attached to the SoloSTAR as instructed by your doctor or diabetes educator.
14. To inject LANTUS, follow the directions for the SoloSTAR.
15. Slowly count to 10 before removing the needle from the injection site and gently apply pressure for several seconds. **DO NOT RUB THE AREA.**
16. Remove the needle from the SoloSTAR immediately after each injection as instructed in the directions for the SoloSTAR. Dispose of the needle appropriately. Do not reuse the needle.

Hypo- or hyperglycemia can result from injecting insulin in the wrong site or incorrectly. Hypoglycemia can result from injection directly into a blood vessel and if not recognized or treated may be followed by hyperglycemia since there was no deposition for long-term absorption.

PROPER USE OF THIS MEDICATION

Dosage

The dosage of LANTUS should be individualized and determined based on your healthcare professional's advice in accordance with your needs. You may take LANTUS at any time during the day, but you must take it at the same time every day.

Many factors may affect your usual LANTUS dose, which may include changes in your diet, activity, or work schedule. Follow your healthcare professional's instructions carefully. Consult your healthcare professional if you notice your insulin requirements changing markedly. Other factors that may affect your dose of insulin or your need to do additional blood/urine testing are:

Illness

Illness, especially with nausea and vomiting, diarrhea and/or fever, may cause your insulin requirements to change. Even if you are not eating, you will still require insulin. You and your doctor should establish a sick day plan for you to use in case of illness. When you are sick, test your blood/urine frequently and call your doctor as instructed.

Pregnancy

If you are planning to have a baby, are pregnant, or are nursing a baby, consult your doctor. Good control of diabetes is especially important for you and your unborn baby. Pregnancy may make managing your diabetes more difficult.

Medication

Always discuss any medications you are taking, prescription or "over-the-counter", with your health care provider. To prevent drug interactions, volunteer the names of everything you are taking even before they ask if there have been any changes. Insulin requirements may be increased in the presence of drugs with hyperglycemic activity, such as contraceptives (for example, birth control pills, injections and patches) and hormone replacement therapies, corticosteroids, thyroid replacement therapy, and sympathomimetic agents such as decongestants and diet pills. Insulin requirements may be reduced in the presence of drugs with hypoglycemic activity, such as oral antidiabetic agents, salicylates (for example, aspirin), sulfa antibiotics, blood pressure medications including ACE inhibitors, and certain psychiatric medications including MAO inhibitors or antidepressants and anti-anxiety medications.

Substances including beta-blockers, used for conditions including blood pressure, heart arrhythmias, palpitations and headache, and alcohol may enhance or weaken the blood-glucose-lowering effect of insulins, and signs of hypoglycemia may be reduced or absent.

Exercise

If your exercise routine changes, discuss with your healthcare professional the possible need to adjust your insulin regimen. Exercise may lower your body's need for insulin during, and for some time after, the activity. As for all insulins, the rate of absorption, and consequently the onset and duration of action, may be affected by exercise and other variables.

Travel

Consult your healthcare professional concerning possible adjustments in your insulin schedule if you will be traveling across time zones. You may want to take along extra insulin and supplies whenever you travel.

Missed dose:

If you **have missed a dose of LANTUS** or if you **have not injected enough insulin**, your blood sugar level may become too high (hyperglycemia). Check your blood sugar frequently. For information on the treatment of hyperglycemia, see “Side Effects and What To Do About Them” below.

Do not take a double dose to make up for a forgotten dose.

Overdose:

If you **have injected too much LANTUS**, your blood sugar level may become too low (hypoglycemia). Check your blood sugar frequently. In general, to prevent hypoglycemia you must eat more food and monitor your blood sugar. For information on the treatment of hypoglycemia, see “Side Effects and What To Do About Them” below.

Hypoglycemia may occur as a result of an excess of insulin relative to food intake, energy expenditure or both.

In case of drug overdose, contact a health professional, hospital emergency department or regional Poison Control Centre immediately, even if there are no symptoms.

SIDE EFFECTS AND WHAT TO DO ABOUT THEM

COMMON PROBLEMS OF DIABETES

Hypoglycemia (Insulin Reaction)

Hypoglycemia (too little glucose in the blood) is one of the most frequent adverse events experienced by insulin users. It can be brought on by situations such as:

- intercurrent conditions (illness, stress, or emotional disturbances),
- accidental injection of an increased insulin dose,

- malfunction and/or misuse of medical devices,
- too-low food intake, or skipped meals,
- an increase in exercise,
- a new insulin type or schedule,
- some new medications, including prescriptions, over-the counter medication, herbs, vitamins and street drugs.

Symptoms of mild to moderate hypoglycemia may occur suddenly and can include:

- abnormal behavior (anxiety, irritability, restlessness, trouble concentrating, personality changes, mood changes, confusion or nervousness),
- fatigue,
- tingling in your hands, feet, lips, or tongue,
- tremor (shaking),
- unsteady gait (walking),
- dizziness, light-headedness, or drowsiness,
- headache,
- blurred vision,
- slurred speech,
- palpitations (rapid heartbeat),
- cold sweat,
- pale skin,
- nightmares or trouble sleeping,
- nausea,
- hunger.

Mild to moderate hypoglycemia may be treated by consuming foods or drinks that contain sugar. Patients should always carry a quick source of sugar, such as candy, juice or glucose tablets, prominently labelled for rescuers. Contact your healthcare professional about appropriate proportions of carbohydrates.

Signs of severe hypoglycemia can include:

- disorientation,
- convulsions,
- loss of consciousness,
- seizures.

Severe hypoglycemia may require the assistance of another person. Patients who are unable to take sugar orally or who are unconscious may require an injection of glucagon or should be treated with intravenous administration of glucose by medical personnel. Without immediate medical help, serious reactions or even death could occur.

The early warning symptoms of hypoglycemia may be changed, be less pronounced, or be absent, as for example, in patients whose sugar levels are markedly improved, in elderly patients, in patients with diabetic nerve disease, in patients with a long history of diabetes, or in patients receiving treatment with certain other drugs. Such situations may result in severe hypoglycemia (and possibly, loss of consciousness) before a patient has symptoms.

Some people may not recognize when their blood sugar drops low. Without recognition of early warning symptoms, you may not be able to take steps to avoid more serious hypoglycemia. Be alert for all of the various types of symptoms that may indicate hypoglycemia. Patients who experience hypoglycemia without early warning symptoms should monitor their blood glucose frequently, especially prior to activities such as driving a car or use mechanical equipment. If the blood glucose is below your normal fasting glucose, you should consider eating or drinking sugar-containing foods to treat your hypoglycemia.

If you have frequent episodes of hypoglycemia, experience difficulty in recognizing the symptoms, or if your diabetes is getting worse, you should consult your healthcare professional to discuss possible changes in therapy, meal plans, and/or exercise programs to help you avoid hypoglycemia.

Hyperglycemia

Hyperglycemia (too much glucose in the blood) may develop if your body has too little insulin.

Hyperglycemia can be brought about by:

- intercurrent conditions (illness, stress, or emotional disturbances),
- not taking your insulin or taking less than recommended by your healthcare professional,
- malfunction and/or misuse of medical devices,
- eating significantly more than your meal plan suggests,
- a new insulin type or schedule,
- some new medications, including prescriptions, over-the-counter medication, herbs, vitamins and street drugs,

Symptoms of hyperglycemia include:

- confusion or drowsiness,
- increased thirst,
- decreased appetite, nausea, or vomiting,
- rapid heart rate,
- increased urination and dehydration (too little fluid in your body),
- blurred vision,
- flushed dry skin,
- acetone odour of breath.

Hyperglycemia can be mild or severe. It can **progress to high glucose levels, diabetic ketoacidosis (DKA), and result in unconsciousness and death.**

Diabetic ketoacidosis (DKA)

The first symptoms of diabetic ketoacidosis usually come on over a period of hours or days. With ketoacidosis, urine tests show large amounts of glucose and acetone.

Symptoms of diabetic ketoacidosis include:

First symptoms:

- drowsiness,
- flushed face,
- thirst,
- loss of appetite,
- fruity smelling breath,
- rapid, deep breathing,
- abdominal (stomach area) pain.

Severe symptoms:

- heavy breathing,
- rapid pulse.

Prolonged hyperglycemia or diabetic ketoacidosis can lead to:

- nausea,
- vomiting,
- dehydration,
- loss of consciousness,
- death.

Severe or continuing hyperglycemia or DKA requires prompt evaluation and treatment by your healthcare professional. LANTUS should not

be used to treat DKA, and the persons treating you should be advised you are taking a long-acting insulin and about your regimen.

Allergic reactions

In rare cases, a patient may be allergic to an insulin product. Severe insulin allergies may be life-threatening. If you think you are having an allergic reaction, seek medical help immediately.

Signs of insulin allergy include:

- a rash all over your body,
- shortness of breath,
- wheezing (trouble breathing),
- a fast pulse,
- sweating,
- low blood pressure.

Possible reactions on the skin at the injection site

Injecting insulin can cause the following reactions on the skin at the injection site:

- a little depression in the skin (lipoatrophy),
- skin thickening (lipohypertrophy),
- redness, swelling, or itching at injection site.

In some instances, these reactions may be related to factors other than insulin, such as irritants in the skin cleansing agent or poor injection technique. You can reduce the chance of getting an injection site reaction if you change the injection site each time. If you have local injection site reactions, contact your healthcare professional.

This is not a complete list of side effects. For any unexpected effects while taking LANTUS, contact your healthcare professional.

REPORTING SUSPECTED SIDE EFFECTS

You can report any suspected adverse reactions associated with the use of health products to the Canada Vigilance Program by one of the following 3 ways:

- Report online at:
www.healthcanada.gc.ca/medeffect
- Call toll-free at 1-866-234-2345
- Complete a Canada Vigilance Reporting Form and:
 - Fax toll-free to 1-866-678-6789, or
 - Mail to:

Canada Vigilance Program
Health Canada
Postal Locator 0701E
Ottawa, ON K1A 0K9

Postage paid labels, Canada Vigilance Reporting Form and the adverse reaction reporting guidelines are available on the MedEffect™ Canada Web site at www.healthcanada.gc.ca/medeffect.

NOTE: Should you require information related to the management of side effects, contact your health professional. The Canada Vigilance Program does not provide medical advice.

HOW TO STORE IT

Unopened SoloSTAR:

Unopened LANTUS SoloSTAR should be stored in a refrigerator, between 2°C - 8°C. Keep LANTUS away from direct heat and light. LANTUS SoloSTAR should not be stored in the freezer and should not be allowed to freeze. If LANTUS SoloSTAR freezes or overheats, discard it.

Opened (In Use) SoloSTAR:

Opened LANTUS SoloSTAR in use must be kept unrefrigerated (15-30°C) for up to 28 days away from direct heat and light, as long as the temperature is not greater than 30°C. If the LANTUS SoloSTAR overheats or if there is any remaining insulin after 28 days, discard it.

Opened LANTUS SoloSTAR should not be stored in the freezer and should not be allowed to freeze. If LANTUS SoloSTAR freezes, discard it.

Do not use a LANTUS SoloSTAR after the expiration date stamped on the label or if it is cloudy or if you see particles.

As with all medications and devices, keep out of reach of children.

MORE INFORMATION

Your physician, pharmacist, and nurse are always your best source of information about your condition and treatment. If you have additional questions or concerns, be sure to ask them.

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