Insulin glulisine (rDNA origin) (in-su-lin gloo-lye-seen)

**Classification**
Therapeutic: antidiabetics, hormones
Pharmacologic: pancreaticis

**Pregnancy Category** C

**Indications**
Control of hyperglycemia in patients with type 1 or type 2 diabetes mellitus.

**Action**
Lowers blood glucose by: stimulating glucose uptake in skeletal muscle and fat, inhibiting hepatic glucose production. Other actions of insulin: inhibition of lipolysis and proteolysis, enhanced protein synthesis. A rapid-acting insulin with more rapid onset and shorter duration than human regular insulin; should be used with an intermediate- or long-acting insulin. **Therapeutic Effects:** Control of hyperglycemia in diabetic patients.

**Pharmacokinetics**
Absorption: Very rapidly absorbed from subcutaneous administration sites.
Distribution: Identical to endogenous insulin.
Metabolism and Excretion: Metabolized by liver, spleen, kidney and muscle.
Half-life: 42 min.

**TIME/ACTION PROFILE (hypoglycemic effect)**

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<tr>
<th>ROUTE</th>
<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
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<td>Subcu</td>
<td>within 15 min</td>
<td>1–2 hr</td>
<td>3–4 hr</td>
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**Contraindications/Precautions**
Contraindicated in: Hypoglycemia. Allergy or hypersensitivity to insulin glulisine.

**Use Cautiously in:** Stress and infection, which may temporarily increase insulin requirements. Renal/hepatic impairment, (use caution), (use caution).

**Adverse Reactions/Side Effects**
Endo: HYPOGLYCEMIA. Local: lipodystrophy, pruritis, erythema, swelling. Misc: anaphylactic reactions including urticaria.

**Interactions**
Drug-Drug: Beta blockers, clonidine, and reserpine may mask some of the signs and symptoms of hypoglycemia. Corticosteroids, thyroid supplements, cortisone, isoniazid, niacin, phenothiazines, and rifampin may increase insulin requirements. Alcohol, ACE inhibitors, MAO inhibitors, nonsteroidal anti-inflammatory agents, and thiazide diuretics may increase insulin requirements. Concurrent use with pioglitazone or rosiglitazone may increase risk of fluid retention and worsening HF. Drug-Natural Products: Glucosamine may worsen blood glucose control. Fenugreek, chromium, and coenzyme Q-10 may produce additive hypoglycemic effects.

**Route/Dosage**
Subcut, IV (Adults and Children ≥ 4 yr): Dose depends on blood glucose, response, exercise level, and many other factors. Should be administered within 15 min before a meal or within 20 min after starting a meal. May be given as an injection or via an external infusion device.

**NURSING IMPLICATIONS**
- Assess patient for signs and symptoms of hypoglycemia (anxiety; restlessness; tingling in hands, feet, lips, or tongue; chill; cold sweats; confusion; cool, pale skin; difficulty in concentration; dizziness; faintness; headache; irritability; nausea; nervousness; tachycardia; trembling; weakness; unsteady gait) periodically throughout therapy.
- Monitor body weight periodically. Changes in weight may necessitate changes in insulin dose.
- Monitor blood glucose periodically. Changes in blood glucose may necessitate changes in insulin dose.
- Assess patient for signs of allergic reactions (rash, shortness of breath, wheezing, rapid pulse, swelling, low BP) during therapy.

**High Alert**
Insulin glulisine is a High Alert medication. Use of a medication mnemonic to promote accuracy is advised.
Lab Test Considerations: Monitor blood glucose every 6 hr during therapy, more frequently in insulin-dependent diabetics and times of stress. A1C may be monitored every 3–6 mo to determine effectiveness of therapy.

Toxicity and Overdose: Overdose is manifested by symptoms of hypoglycemia. Mild hypoglycemia may be treated by ingestion of oral glucose. Severe hypoglycemia is a life-threatening emergency; treatment consists of IV glucose, glucagon, or epinephrine. Early signs of hypoglycemia may be less pronounced by long duration of diabetes, diabetic nerve disease, and use of beta blockers; may result in loss of consciousness prior to patient's awareness of hypoglycemia.

Potential Nursing Diagnoses

Noncompliance (Patient/Family Teaching)

Implementation

High Alert: Medication errors involving insulins have resulted in serious patient harm and death. Clarify all ambiguous orders, and do not accept orders using the abbreviation “u” for units, which can be misread as a zero, or the numeral 4 and has resulted in tenfold overdoses. Insulins are available in different types and strengths. Check type, dose, and expiration date with another licensed nurse. Do not interchange insulins without consulting health care professional.

Due to the short duration of action, insulin glulisine must be used with a longer acting insulin or insulin infusion pump therapy.

Use only U-100 insulin syringes to draw up dose.

When mixing insulins, draw insulin glulisine into syringe first to avoid contamination of insulin glulisine vial. May be mixed only with NPH insulin. Administer immediately after mixing. Solution should be clear and colorless with no particulate matter.

Store unopened vials of insulin glulisine in refrigerator. Keep open vials refrigerated or as cool as possible. Use within 28 days. Do not use vials past expiration date.

Subcut: When used as meal time insulin, administer 15 min before or within 20 min after starting a meal. Administer into abdominal wall, thigh, or upper arm subcutaneously. Rotate sites with each injection.

For administration via infusion pump, as a subcut infusion into abdominal wall. Solution is stable for 48 hr and at temperatures not higher than 98.6°F. Discard insulin sets (reservoir, tubing, catheter) after no more than 48 hr. Infusion sets that are eroded, precipitated or thickened should be reported to health care professional and a new site selected; continued infusion may increase skin reaction and alter absorption of insulin glulisine.

IV Administration

Intravenous Infusion: Dilute to a concentration of 1 unit/mL with 0.9% NaCl, using Polyvinyl Chloride (PVC) Y site infusion bags and Polyvinyl Chloride (PVC) tubing. Use a dedicated infusion line. The use of other bags and tubing has not been studied.

When administered via pump, change insulin glulisine in pump every 48 hr.

Storage Incompatibility: When used via infusion pump or IV, do not dilute or mix with any other insulin.

Y-Site Incompatibility: Dextrose solutions.

Ringer’s solutions.

Patient/Family Teaching

Instruct patient on proper technique for administration. Include type of insulin, equipment (syringe, cartridge pens, external pumps, alcohol swabs), storage, and place to discard syringes. Discuss the importance of not changing brands of insulin or syringes, selection and rotation of injection sites, and compliance with dietary and exercise regimen. Caution patient not to make any changes in type of insulin or dose without consulting health care professional. Advise patient to read Patient Information prior to use and each time prescription is refilled.

Demonstrate technique for mixing insulins by drawing up insulin glulisine first and rolling intermediate-acting insulin vials before mixing to avoid inaccuracy. Caution patient not to mix insulin glulisine with any other insulin.

Explain to patient that this medication controls hyperglycemia but does not cure diabetes. Therapy is lifelong.

Instruct patient in proper testing of serum glucose and ketones. These tests should be closely monitored during periods of stress or illness and health care professional notified of significant changes.

Advise patient not to share insulin glulisine with another person, even if they also have diabetes, may cause harm.

Emphasize the importance of compliance with nutritional guidelines and regular exercise as directed by health care professional.

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- Instruct patient to notify health care professional of all Rx or OTC medications, vitamins, or herbal products being taken and to consult health care professional before taking other Rx, OTC, herbal products, or alcohol.
- Advise patient to notify health care professional of medication regimen prior to treatment or surgery.
- Advise patient to notify health care professional if nausea, vomiting, or fever develops, if unable to eat regular diet, or if blood sugar levels are not controlled.
- Instruct patient on signs and symptoms of hypoglycemia and hyperglycemia and what to do if they occur.
- Advise patient to notify health care professional if pregnancy is planned or suspected or if breast feeding or planning to breast feed.
- Patients with diabetes mellitus should carry a source of sugar (candy, glucose gel) and identification describing their disease and treatment regimen at all times.
- Emphasize the importance of regular follow-up, especially during first few weeks of therapy.

Evaluation/Desired Outcomes

- Control of blood glucose levels in diabetic patients without the appearance of hypoglycemic or hyperglycemic episodes.

Why was this drug prescribed for your patient?