Insulin lispro, rDNA origin
HumaLOG
Insulin lispro protamine suspension/insulin lispro injection mixtures, rDNA origin
HumaLOG Mix 75/25, HumaLOG Mix 50/50

Classification
Therapeutic: antidiabetics, hormones
Pharmacologic: pancreatics

Pregnancy Category B

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

Action
Lowers blood glucose by: stimulating glucose uptake in skeletal muscle and fat, inhibiting hepatic glucose production. Other actions include: 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 (within a few minutes).
Distribution: Identical to endogenous insulin.
Metabolism and Excretion: Metabolized by liver, spleen, kidney, and muscle.
Half-life: Approximately 1 hr.

TIME/ACTION PROFILE (hypoglycemic effect)

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
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</thead>
<tbody>
<tr>
<td>Subcut</td>
<td>within 15 min</td>
<td>1–2 hr</td>
<td>3–4 hr</td>
</tr>
<tr>
<td>75% insulin lispro protamine suspension</td>
<td>within 15 min</td>
<td>1.5 hr</td>
<td>12 hr</td>
</tr>
<tr>
<td>25% insulin lispro injection mixtures</td>
<td>within 15 min</td>
<td>1 hr</td>
<td>20 hr</td>
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</tbody>
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Contraindications/Precautions
Contraindicated in: Hypoglycemia; Allergy or hypersensitivity to insulin lispro; Hypoglycemia.

Use Cautiously in: Stress or infection—may temporarily increase insulin requirements; concomitant use with pioglitazone or rosiglitazone may increase risk of fluid retention and worsening HF; OB: Pregnancy may temporarily increase insulin requirements; Ped: Children <3 yr (safety of lispro insulin not established) or <30 yr (safety of 75/25 mix not established).

Adverse Reactions/Side Effects

Interactions
Drug-Drug: Beta blockers, clonidine, and reserpine may mask some of the signs and symptoms of hypoglycemia. Corticosteroids, thyroid supplements, estrogens, isoniazid, niacin, phenothiazines, and rifampin may increase insulin requirements. Alcohol, ACE inhibitors, MAO inhibitors, octreotide, oral hypoglycemic agents, and valproates may increase insulin requirements. Patients with concomitant use with pioglitazone or rosiglitazone may have 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
Dose depends on blood glucose, response, and many other factors.
Subcut (Adults and Children): Initial dose range—0.2–0.6 units/kg/day. Usual maintenance range—0.5–1.2 units/kg/day. Adolescents during rapid growth—1.5 units/kg/day.

NURSING IMPLICATIONS
Assessment
● Assess for symptoms of hypoglycemia (anxiety; restlessness; tingling in hands, feet, lips; cold sweats; confusion; headache; irritability; nausea; nervousness; sweating; trembling; weakness; weakness; waxy feeling). Monitor frequent BP and pulse during insulin initiation and dose adjustments.

Nursing Considerations
● Teach patient to check blood glucose as needed, monitor intake and output, and report any signs of hypoglycemia or hyperglycemia. Inspect injection site for redness, swelling, or warmth.

Patient Information
● Avoid alcoholic beverages and drugs that may alter blood glucose levels. Report any symptoms of hypoglycemia or hyperglycemia immediately. Medication may be ordered only by designated health care professional.

Geriatric
● Use minimum effective dose; monitor closely for hypoglycemia.

Pregnancy
● Category B. Use during pregnancy only if clearly needed.

Lactation
● Use during lactation only if clearly needed.

 Pediatric
● Use with caution. Safety for children <3 yr or <30 yr not established.

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tachycardia; tremor; weakness; unsteady gait; and hyperglycemia (confusion, drowsiness, flushed, dry skin, fruity breath odor; rapid, deep breathing, polyuria; loss of appetite; unusual thirst) periodically during therapy.

● Monitor body weight periodically. Changes in weight may necessitate changes in insulin dose.

● Lab Test Considerations: Monitor blood glucose every 6 hr during therapy, more frequently in ketosis and times of stress. A1C may be monitored every 3–6 mo to determine effectiveness.

● Tachycardia: Tachycardia is a life-threatening emergency; treatment consists of IV glucose, glucagon, or epinephrine.

Potential Nursing Diagnoses
Noncompliance (Patient/Family Teaching)

Implementation

● High alert: Medication errors involving insulins have resulted in serious patient harm and death. Cast no 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 physician or other health care professional.

● Do not confuse Humalog with Humulin.

● Due to the short duration of action, insulin lispro must be used with a longer acting insulin, insulin infusion pump or in combination with oral sulfonylurea agents.

● Use only insulin syringes to draw up dose. The unit markings on the insulin syringe must match the insulin’s units/mL. Special syringes for doses ≥ 50 units are available. Use only U-100 insulin syringes to draw up insulin lispro dose. Prior to withdrawing dose, rotate vial between palms to ensure uniform solution; do not shake.

● When mixing insulins, draw insulin lispro into syringe first to avoid contamination of regular insulin vial.

● Insulin should be stored in a cool place but does not need to be refrigerated.

● Subcut: Administer insulin lispro within 15 min before a meal. Rotate injection sites. Do not administer IV.

● May be administered via disposable external insulin pump. Do not administer solution that appears discolored, cloudy, discolored or contains particles. Store cartridges for pump in refrigerator. Do not mix with other insulins or solutions when used with pump. Choose a new injection site and insert new site at least every 5 days. Discard cartridges after 7 days, even if solution remains.

● Storage Compatibility: May be diluted with sterile diluent for Humalog, Humulin N, Humulin 50/50, Humulin 70/30, and NPH insulin in a concentration of 1:10 or 1:2.

IV Administration

● Continuous infusion: Administer IV under medical supervision with close monitoring of blood glucose and potassium levels to avoid hypoglycemia and hypokalemia. Concentration: 0.1 unit/mL to 1.0 unit/mL. Diluent: 0.9% NaCl. Solutions of insulin lispro and 0.9% NaCl can be stored for 48 hrs in refrigerator, then used at room temperature for another 48 hrs.

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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 therapeutic regimen.

● Demonstrate technique for mixing insulins by drawing up insulin lispro first and rolling intermediate-acting insulin vial between palms to mix, rather than shaking (may cause inaccurate dose).

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

● 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.

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

● Advise patient to notify health care professional of all Rx or OTC medications, vitamins, or herbal products being taken and to consult with health care professional before taking any medications or alcohol.

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insulin lispro, rDNA origin

- Advise patient to notify health care professional of medication regimen prior to treatment or surgery.
- Advise patient to notify health care professional of nausea, vomiting, or fever develops, if unable to eat regular diet, or if blood glucose 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?