

**HUMULIN R - insulin human injection, solution**  
**A-S Medication Solutions**

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**INFORMATION FOR THE PHYSICIAN**  
**HUMULIN® R**  
**REGULAR**  
**INSULIN HUMAN INJECTION, USP**  
**(rDNA ORIGIN)**  
**100 UNITS PER ML (U-100)**

**DESCRIPTION**

Humulin® R U-100 is a polypeptide hormone structurally identical to human insulin synthesized through rDNA technology in a special non-disease-producing laboratory strain of *Escherichia coli* bacteria. Humulin R U-100 has the empirical formula  $C_{257}H_{383}N_{65}O_{77}S_6$  and a molecular weight of 5808.

Humulin R U-100 is a sterile, clear, aqueous, and colorless solution that contains human insulin (rDNA origin) 100 units/mL, glycerin 16 mg/mL and metacresol 2.5 mg/mL, endogenous zinc (approximately 0.015 mg/100 units) and water for injection. The pH is 7.0 to 7.8. Sodium hydroxide and/or hydrochloric acid may be added during manufacture to adjust the pH.

Adequate insulin dosage permits patients with diabetes to effectively utilize carbohydrates, proteins and fats. Regardless of dose strength, insulin enables carbohydrate metabolism to occur and thus to prevent the production of ketone bodies by the liver. Some patients develop severe insulin resistance such that daily doses of several hundred units of insulin or more are required.

**CLINICAL PHARMACOLOGY**

Regulation of glucose metabolism is the primary activity of insulin. Insulin lowers blood glucose by stimulating peripheral glucose uptake by skeletal muscle and fat, and by inhibiting hepatic glucose production. Insulins inhibit lipolysis, proteolysis, and gluconeogenesis, and enhance protein synthesis and conversion of excess glucose into fat.

Administered insulin, including Humulin R U-100, substitutes for inadequate endogenous insulin secretion and partially corrects the disordered metabolism and inappropriate hyperglycemia of diabetes mellitus, which are caused by either a deficiency or a reduction in the biologic effectiveness of insulin. When administered in appropriate doses at prescribed intervals to patients with diabetes mellitus, Humulin R U-100 restores their ability to metabolize carbohydrates, proteins and fats.

As with all insulin preparations, the duration of action of Humulin R U-100 is dependent on dose, site of injection, blood supply, temperature, and physical activity.

Humulin R U-100 is human insulin with a short duration of action. With subcutaneous use, the pharmacologic effect of Humulin R U-100 begins approximately 30 minutes (range: 10 to 75 minutes) after administration of doses in the 0.05 to 0.4 units/kg range. The effect is maximal at approximately 3 hours (range: 20 minutes to 7 hours) and terminates after approximately 8 hours (range: 3 to 14 hours). With intravenous use, the pharmacologic effect of Humulin R U-100 begins at approximately 10 to 15 minutes and terminates at a median time of approximately 4 hours (range: 2 to 6 hours) after administration of doses in the range of 0.1 to 0.2 units/kg. The time course of action of any insulin may vary considerably in different individuals or at different times in the same individual.

**CLINICAL STUDIES**

**Subcutaneous use of Humulin R U-100**

A 48-month multicenter, open-label, single-arm study was conducted in insulin-naive patients with type 1 or type 2 diabetes (N=129) to assess the safety and efficacy of Humulin R U-100. Humulin R U-100 and Humulin<sup>®</sup> N (alone or in combination) were administered by subcutaneous injection. Eighty-four percent of patients were Caucasian. Fifty-seven percent of the patients were male. The mean age was 45 years (range: 4 to 83 years). The average weight was 72 kg.

Total mean ( $\pm$  SD) glycohemoglobin improved from baseline to endpoint (baseline:  $14.3 \pm 3.1\%$ , endpoint:  $10.1 \pm 2.8\%$ ). Hemoglobin A<sub>1c</sub> was not measured in this study. At baseline, patients weighed  $72 \pm 23$  kg; at endpoint mean weight was  $80 \pm 22$  kg. At endpoint, mean ( $\pm$  SD) total daily insulin doses for Humulin R U-100 were  $0.18 \pm 0.17$  units/kg. At 48 months, 16 patients (21%) reported hypoglycemia. During the study, 4 patients experienced diabetic ketoacidosis.

### **Intravenous use of Humulin R U-100**

The intravenous administration of Humulin R U-100 was tested in 21 patients with type 1 diabetes. The patients' usual doses of insulin were temporarily held, and blood glucose concentrations were maintained at a range of 200 – 260 mg/dL for one to three hours during a run-in phase of intravenous Humulin R U-100 followed by a 6-hour assessment phase. During the assessment phase patients received intravenous Humulin R at an initial dose of 0.5 U/h, adjusted to maintain blood glucose concentrations near normoglycemia (100 to 160 mg/dL).

The mean blood glucose levels during the assessment phase for patients on Humulin R U-100 therapy are summarized below in Table 1. All patients achieved near normoglycemia during the 6-hour assessment phase. At the endpoint, blood glucose was within the target range (100 to 160 mg/dL) for 20 of 21 patients treated with Humulin R U-100. The average time ( $\pm$  SE) required to attain near normoglycemia was  $161 \pm 14$  minutes for Humulin R U-100.

**Table 1: Mean Blood Glucose Concentrations (mg/dL) during Intravenous Infusions of Humulin R U-100**

Time from Start of Infusion (min)	Mean Blood Glucose (mg/dL) Intravenous <sup>a</sup>
0	$220 \pm 11$
30	$204 \pm 17$
60	$193 \pm 18$
120	$172 \pm 28$
180	$153 \pm 30$
240	$139 \pm 24$
300	$131 \pm 22$
360	$128 \pm 18$

<sup>a</sup> Results shown as mean  $\pm$  Standard Deviation.

### **INDICATIONS AND USAGE**

Humulin R U-100 is indicated as an adjunct to diet and exercise to improve glycemic control in adults and children with type 1 and type 2 diabetes mellitus.

Humulin R U-100 may be administered intravenously under proper medical supervision in a clinical setting for glycemic control (*see* DOSAGE AND ADMINISTRATION *and* Storage).

### **CONTRAINDICATIONS**

Humulin R U-100 is contraindicated during episodes of hypoglycemia and in patients hypersensitive to Humulin R U-100 or any of its excipients.

## WARNINGS

**Needles or syringes must never be reused or shared between patients. Sharing poses a risk for transmission of blood-borne pathogens.**

**Any change in insulin should be made cautiously and only under medical supervision. Changes in insulin strength, manufacturer, type (e.g., regular, NPH, analog, etc.), species, or method of administration may result in the need for a change in dosage.**

### **Fluid retention and heart failure with concomitant use of PPAR-gamma agonists:**

Thiazolidinediones (TZDs), which are peroxisome proliferator-activated receptor (PPAR)-gamma agonists, can cause dose-related fluid retention, particularly when used in combination with insulin. Fluid retention may lead to or exacerbate heart failure. Patients treated with insulin, including Humulin R U-100, and a PPAR-gamma agonist should be observed for signs and symptoms of heart failure. If heart failure develops, it should be managed according to current standards of care, and discontinuation or dose reduction of the PPAR-gamma agonist must be considered.

## PRECAUTIONS

### **Hypoglycemia**

Hypoglycemia is the most common adverse reaction of all insulin therapies, including Humulin R U-100. Severe hypoglycemia may lead to unconsciousness and/or convulsions and may result in temporary or permanent impairment of brain function or death. Severe hypoglycemia requiring the assistance of another person and/or parenteral glucose infusion or glucagon administration has been observed in clinical trials with insulin, including trials with Humulin R U-100.

As with all insulin preparations, the time course of Humulin R U-100 action may vary in different individuals or at different times in the same individual and is dependent on dose, site of injection, blood supply, temperature, and physical activity.

Adjustment of dosage of any insulin may be necessary if patients change their physical activity or their usual meal plan. Insulin requirements may be altered during illness, emotional disturbances, or other stresses. Concomitant antihyperglycemic agents may need to be adjusted.

The timing of hypoglycemia usually reflects the time-action profile of the administered insulin formulations. Other factors such as changes in food intake (e.g., amount of food or timing of meals), injection site, exercise, and concomitant medications may also alter the risk of hypoglycemia (see PRECAUTIONS, Drug Interactions).

As with all insulins, use caution in patients with hypoglycemia unawareness and in patients who may be predisposed to hypoglycemia (e.g., the pediatric population and patients who fast or have erratic food intake). The patient's ability to concentrate and react may be impaired as a result of hypoglycemia. This may present a risk in situations where these abilities are especially important, such as driving or operating other machinery.

### **Hyperglycemia, Diabetic Ketoacidosis, and Hyperosmolar Non-Ketotic Syndrome**

Hyperglycemia, diabetic ketoacidosis, or hyperosmolar coma may develop if the patient takes less Humulin R U-100 than needed to control blood glucose levels. This could be due to increases in insulin demand during illness or infection, neglect of diet, omission or improper administration of prescribed insulin doses or use of drugs that affect glucose metabolism or insulin sensitivity. Early signs of diabetic ketoacidosis include glycosuria and ketonuria. Polydipsia, polyuria, loss of appetite, fatigue, dry skin, abdominal pain, nausea and vomiting and compensatory tachypnea come on gradually, usually over a period of some hours or days, in conjunction with hyperglycemia and ketonemia. Severe sustained hyperglycemia may result in hyperosmolar coma or death.

### **Hypokalemia**

Insulin stimulates potassium movement into the cells, possibly leading to hypokalemia, that left untreated may cause respiratory paralysis, ventricular arrhythmia, and death. Since intravenously administered insulin has a rapid onset of action, increased attention to hypokalemia is necessary. Therefore, potassium levels must be monitored closely when Humulin R U-100 or any other insulin is administered intravenously. Use caution in patients who may be at risk for hypokalemia (e.g., patients using potassium-lowering medications, patients taking medications sensitive to serum potassium concentrations).

### **Hypersensitivity and Allergic Reactions**

Severe, life-threatening, generalized allergy, including anaphylaxis, can occur with insulin products, including Humulin R U-100 (*see* ADVERSE REACTIONS).

Localized reactions and generalized myalgias have been reported with the use of metacresol as an injectable excipient.

### **Renal or Hepatic Impairment**

Frequent glucose monitoring and insulin dose reduction may be required in patients with renal or hepatic impairment.

### **Drug Interactions**

Some medications may alter insulin requirements and the risk for hypoglycemia and hyperglycemia (*see* ADVERSE REACTIONS, Drug Interactions).

### **Use in Pregnancy**

Pregnancy Category B. All pregnancies have a background risk of birth defects, miscarriage, or other adverse outcome regardless of drug exposure. This background risk is increased in pregnancies complicated by hyperglycemia and is decreased with good glucose control. It is important for patients to maintain good control of diabetes before conception and during pregnancy. Special attention should be paid to diet, exercise and insulin regimens. Insulin requirements may decrease during the first trimester, usually increase during the second and third trimesters, and rapidly decline after delivery. Careful monitoring is essential in these patients. Female patients should be advised to tell their physician if they intend to become, or if they become pregnant.

Studies show that endogenous insulin only crosses the placenta in minimal amounts. While there are no adequate and well-controlled studies in pregnant women, an extensive body of published literature demonstrates the maternal and fetal benefits of insulin treatment in patients with diabetes during pregnancy. Humulin R is a recombinant human insulin that is identical to the endogenous hormone; therefore, reproduction and fertility studies were not performed in animals.

### **Labor and Delivery**

Careful glucose monitoring and management of patients with diabetes during labor and delivery are required.

### **Nursing Mothers**

Endogenous insulin is present in human milk. Insulin orally ingested is degraded in the gastrointestinal tract. No adverse reactions have been associated with infant exposure to insulin through the consumption of human milk. In a study of eight preterm infants between 26 to 30 weeks gestation, enteral administration of Humulin R did not result in hypoglycemia. Good glucose control supports lactation in patients with diabetes. Patients with diabetes who are lactating may require adjustments in insulin dose and/or diet.

## ADVERSE REACTIONS

### Hypoglycemia

Hypoglycemia is one of the most frequent adverse events experienced by insulin users.

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

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- sweating
  - dizziness
  - palpitation
  - tremor
  - hunger
  - restlessness
  - tingling in the hands, feet, lips, or tongue
  - lightheadedness
  - inability to concentrate
  - headache
  - drowsiness
  - sleep disturbances
  - anxiety
  - blurred vision
  - slurred speech
  - depressed mood
  - irritability
  - abnormal behavior
  - unsteady movement
  - personality changes
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Signs of severe hypoglycemia can include:

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- disorientation
  - unconsciousness
  - death
  - seizures
  - coma
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Early warning symptoms of hypoglycemia may be different or less pronounced under certain conditions, such as long duration of diabetes, autonomic diabetic neuropathy, use of medications such as beta-adrenergic blockers, changing insulin preparations, or intensified control (3 or more insulin injections per day) of diabetes.

Without recognition of early warning symptoms, the patient may not be able to take steps to avoid more serious hypoglycemia. Patients who experience hypoglycemia without early warning symptoms should monitor their blood glucose more frequently, especially prior to activities such as driving. Mild to moderate hypoglycemia may be treated by eating foods or taking drinks that contain sugar. Patients should always carry a quick source of sugar, such as hard candy, non-diet carbohydrate-containing drinks or glucose tablets.

### Hypokalemia

See Precautions

## **Lipodystrophy**

Administration of insulin subcutaneously can result in lipodystrophy (depression in the skin) or lipohypertrophy (enlargement or thickening of tissue).

## **Allergy**

*Local Allergy* – Patients occasionally experience erythema, local edema, and pruritus at the site of injection. This condition usually is self-limiting. In some instances, this condition may be related to factors other than insulin, such as irritants in the skin cleansing agent or poor injection technique.

*Systemic Allergy* – Less common, but potentially more serious, is generalized allergy to insulin, which may cause rash over the whole body, shortness of breath, wheezing, reduction in blood pressure, fast pulse, or sweating. Severe cases of generalized allergy (anaphylaxis) may be life threatening.

## **Weight Gain**

Weight gain can occur with some insulin therapies and has been attributed to the anabolic effects of insulin and the decrease in glycosuria.

## **Peripheral Edema**

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

## **Drug Interactions**

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

Drugs that may increase the blood-glucose-lowering effect of Humulin R U-100 and susceptibility to hypoglycemia:

- Oral antihyperglycemic agents, salicylates, sulfa antibiotics, certain antidepressants (monoamine oxidase inhibitors, selective serotonin reuptake inhibitors [SSRIs]), pramlintide, disopyramide, fibrates, fluoxetine, propoxyphene, pentoxifylline, ACE inhibitors, angiotensin II receptor blocking agents, beta-adrenergic blockers, inhibitors of pancreatic function (e.g., octreotide), and alcohol.

Drugs that may reduce the blood-glucose-lowering effect:

- Corticosteroids, isoniazid, certain lipid-lowering drugs (e.g., niacin), estrogens, oral contraceptives, phenothiazines, danazol, diuretics, sympathomimetic agents, somatropin, atypical antipsychotics, glucagon, protease inhibitors and thyroid replacement therapy.

Drugs that may increase or decrease blood-glucose-lowering effect:

- Beta-adrenergic blockers, clonidine, lithium salts, and alcohol.
- Pentamidine may cause hypoglycemia, which may sometimes be followed by hyperglycemia.

Drugs that may mask the signs of hypoglycemia:

- Beta-adrenergic blockers, clonidine, guanethidine, and reserpine.

## **OVERDOSAGE**

Excess insulin may cause hypoglycemia and hypokalemia, particularly after intravenous administration. Hypoglycemia may occur as a result of an excess of insulin relative to food intake, energy expenditure, or both. Mild episodes of hypoglycemia usually can be treated with oral glucose. 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. Sustained carbohydrate intake and observation may be necessary because

hypoglycemia may recur after apparent clinical recovery. Hypokalemia must be corrected appropriately.

## **DOSAGE AND ADMINISTRATION**

Humulin R U-100, when used subcutaneously, is usually given three or more times daily before meals. The dosage and timing of Humulin R U-100 should be individualized and determined, based on the physician's advice, in accordance with the needs of the patient. Humulin R U-100 may also be used in combination with oral antihyperglycemic agents or longer-acting insulin products to suit the needs of the individual patients with diabetes. The injection of Humulin R U-100 should be followed by a meal within approximately 30 minutes of administration.

The average range of total daily insulin requirement for maintenance therapy in insulin-treated patients without severe insulin resistance lies between 0.5 and 1 unit/kg/day. However, in pre-pubertal children it usually varies from 0.7 to 1 unit/kg/day, but can be much lower during the period of partial remission. In situations of insulin resistance, e.g. during puberty or due to obesity, the daily insulin requirement may be substantially higher. Initial dosages for patients with diabetes are often lower, e.g., 0.2 to 0.4 units/kg/day.

Humulin R U-100 may be administered by subcutaneous injection in the abdominal wall, the thigh, the gluteal region or in the upper arm. Subcutaneous injection into the abdominal wall ensures a faster absorption than from other injection sites. Injection into a lifted skin fold minimizes the risk of intramuscular injection. Injection sites should be rotated within the same region. As with all insulin, the duration of action will vary according to the dose, injection site, blood flow, temperature, and level of physical activity.

Intravenous administration of Humulin R U-100 is possible under medical supervision with close monitoring of blood glucose and potassium levels to avoid hypoglycemia and hypokalemia.

For intravenous use, Humulin R U-100 should be used at concentrations from 0.1 unit/mL to 1 unit/mL in infusion systems with the infusion fluids 0.9% sodium chloride using polyvinyl chloride infusion bags.

Parenteral drug products should be inspected visually for particulate matter and discoloration prior to administration, whenever solution and container permit. Never use Humulin R U-100 if it has become viscous (thickened) or cloudy; use it only if it is clear and colorless. **Humulin R U-100 should not be used after the printed expiration date.**

### **Mixing of Insulins**

- Humulin R U-100 should only be mixed as directed by the physician.
- Humulin R U-100 is short-acting and is often used in combination with intermediate- or long-acting insulins.
- The order of mixing and brand or model of syringe should be specified by the physician. A U-100 insulin syringe should always be used. Failure to use the correct syringe can lead to dosage errors.
- In general, when an intermediate-acting insulin (e.g., NPH insulin isophane suspension) is mixed with short-acting soluble insulin (e.g., regular), the short-acting insulin should be drawn into the syringe first.

### **Storage**

**Not in-use (unopened):** Humulin R U-100 vials not in-use should be stored in a refrigerator (2° to 8°C [36° to 46°F]), but not in the freezer.

**In-use (opened):** The Humulin R U-100 vial currently in-use can be kept unrefrigerated as long as it is kept as cool as possible [below 30°C (86°F)] away from heat and light. In-use vials must be used within 31 days or be discarded, even if they still contain Humulin R U-100.

**Admixture:** Infusion bags prepared with Humulin R U-100 as indicated under DOSAGE AND

ADMINISTRATION are stable when stored in a refrigerator (2° to 8°C [36° to 46°F]) for 48 hours and then may be used at room temperature for up to an additional 48 hours.

**Do not use Humulin R U-100 after the expiration date stamped on the label or if it has been frozen.**

## **HOW SUPPLIED**

Product: 50090-0353

NDC: 50090-0353-0 10 mL in a VIAL

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**Marketed by: Lilly USA, LLC, Indianapolis, IN 46285, USA**

**[www.lilly.com](http://www.lilly.com)**

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## **PATIENT INFORMATION**

**HUMULIN® R  
REGULAR  
INSULIN HUMAN INJECTION, USP  
(rDNA ORIGIN) 100 UNITS PER ML (U-100)**

### **WARNINGS**

**Do not share your syringes with other people, even if the needle has been changed. You may give other people a serious infection or get a serious infection from them.**

**THIS LILLY HUMAN INSULIN PRODUCT DIFFERS FROM ANIMAL-SOURCE INSULINS BECAUSE IT IS STRUCTURALLY IDENTICAL TO THE INSULIN PRODUCED BY YOUR BODY'S PANCREAS AND BECAUSE OF ITS UNIQUE MANUFACTURING PROCESS.**

**ANY CHANGE OF INSULIN SHOULD BE MADE CAUTIOUSLY AND ONLY UNDER MEDICAL SUPERVISION. CHANGES IN STRENGTH, MANUFACTURER, TYPE (E.G., REGULAR, NPH, ANALOG), SPECIES, OR METHOD OF MANUFACTURE MAY RESULT IN THE NEED FOR A CHANGE IN DOSAGE.**

**SOME PATIENTS TAKING HUMULIN® (HUMAN INSULIN, rDNA ORIGIN) MAY REQUIRE A CHANGE IN DOSAGE FROM THAT USED WITH OTHER INSULINS. IF AN ADJUSTMENT IS NEEDED, IT MAY OCCUR WITH THE FIRST DOSE OR DURING THE FIRST SEVERAL WEEKS OR MONTHS.**

**Humulin R may cause serious side effects, including:**

- **swelling of your hands and feet**
- **heart failure.** Taking certain diabetes pills called thiazolidinediones or “TZDs” with Humulin R may cause heart failure in some people. This can happen even if you have never had heart failure or heart problems before. If you already have heart failure it may get worse while you take TZDs with Humulin R. Your healthcare provider should monitor you closely while you are taking TZDs with Humulin R. Tell your healthcare provider if you have any new or worse symptoms of heart failure including:
  - shortness of breath
  - swelling of your ankles or feet
  - sudden weight gain



Treatment with TZDs and Humulin R may need to be adjusted or stopped by your healthcare provider if you have new or worse heart failure.

## **DIABETES**

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.

To control your diabetes, your doctor has prescribed injections of insulin products to keep your blood glucose at a near-normal level. You have been instructed to test your blood regularly for glucose. Studies have shown that some chronic complications of diabetes such as eye disease, kidney disease, and nerve disease can be significantly reduced if the blood sugar is maintained as close to normal as possible. Proper control of your diabetes requires close and constant cooperation with your doctor. Despite diabetes, you can lead an active and healthy life if you eat a balanced diet, exercise regularly, and take your insulin injections as prescribed by your doctor.

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

## **REGULAR HUMAN INSULIN**

### **Description**

Humulin is synthesized in a special non-disease-producing laboratory strain of *Escherichia coli* bacteria that has been genetically altered to produce human insulin. Humulin R [Regular insulin human injection, USP (rDNA origin)] consists of zinc-insulin crystals dissolved in a clear fluid. It takes effect within 30 minutes and has a duration of activity of approximately 4 to 12 hours. The time course of action of any insulin may vary considerably in different individuals or at different times in the same individual. As with all insulin preparations, the duration of action of Humulin R is dependent on dose, site of injection, blood supply, temperature, and physical activity. Humulin R is a sterile solution and is for subcutaneous injection. It should not be used intramuscularly. The concentration of Humulin R is 100 units/mL (U-100).

### **Identification**

Human insulin from Eli Lilly and Company has the trademark Humulin. Your doctor has prescribed the type of insulin that he/she believes is best for you.

### **DO NOT USE ANY OTHER INSULIN EXCEPT ON YOUR DOCTOR'S ADVICE AND DIRECTION.**

Always check the carton and the bottle label for the name and letter designation of the insulin you receive from your pharmacy to make sure it is the same as prescribed by your doctor. There are two Humulin R formulations: Humulin R U-100 and Humulin R U-500. Make sure that you have the formulation prescribed by your doctor.

Always check the appearance of your bottle of Humulin R before withdrawing each dose. Humulin R is a clear and colorless liquid with a water-like appearance and consistency. Do not use Humulin R:

- if it appears cloudy, thickened, or slightly colored, or
- if solid particles are visible.

If you see anything unusual in the appearance of Humulin R solution in your bottle or notice your insulin requirements changing, talk to your doctor.

### **Storage**

**Not in-use (unopened):** Humulin R U-100 bottles not in-use should be stored in a refrigerator (36° to 46°F [2° to 8°C]), but not in the freezer.

**In-use (opened):** The Humulin R U-100 bottle you are currently using can be kept unrefrigerated as long as it is kept as cool as possible [below 86°F (30°C)] away from heat and light. In-use bottles must be used within 31 days or be thrown out, even if they still contain Humulin R U-100.

**Do not use Humulin R after the expiration date stamped on the label or if it has been frozen.**

## **DOSAGE**

Your doctor has told you which insulin to use, how much, and when and how often to inject it. Because each patient's diabetes is different, this schedule has been individualized for you.

Your usual dose of Humulin R may be affected by changes in your diet, activity, or work schedule. Carefully follow your doctor's instructions to allow for these changes. Other things that may affect your Humulin R dose are:

### **Illness**

Illness, especially with nausea and vomiting, 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 glucose frequently. If instructed by your doctor, test your ketones and report the results to your doctor.

### **Pregnancy**

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

### **Medication**

Insulin requirements may be increased if you are taking other drugs with blood-glucose-raising activity, such as oral contraceptives, corticosteroids, or thyroid replacement therapy. Insulin requirements may be reduced in the presence of drugs that lower blood glucose or affect how your body responds to insulin, such as oral antidiabetic agents, salicylates (for example, aspirin), sulfa antibiotics, alcohol, certain antidepressants and some kidney and blood pressure medicines. Your healthcare provider may be aware of other medications that may affect your diabetes control. Therefore, always discuss any medications you are taking with your doctor.

### **Before you use Humulin R, tell your healthcare provider if you:**

- take any other medicines, especially ones commonly called TZDs (thiazolidinediones).
- have heart failure or other heart problems. If you have heart failure, it may get worse while you take TZDs with Humulin R.

### **Exercise**

Exercise may lower your body's need for insulin during and for some time after the physical activity. Exercise may also speed up the effect of an insulin dose, especially if the exercise involves the area of injection site (for example, the leg should not be used for injection just prior to running). Discuss with your doctor how you should adjust your insulin regimen to accommodate exercise.

### **Travel**

When traveling across more than 2 time zones, you should talk to your doctor concerning adjustments in your insulin schedule.

## **COMMON PROBLEMS OF DIABETES**

### **Hypoglycemia (Low Blood Sugar)**

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

1. **Missing or delaying meals.**

2. Taking too much insulin.
3. Exercising or working more than usual.
4. An infection or illness associated with diarrhea or vomiting.
5. A change in the body's need for insulin.
6. Diseases of the adrenal, pituitary, or thyroid gland, or progression of kidney or liver disease.
7. Interactions with certain drugs, such as oral antidiabetic agents, salicylates (for example, aspirin), sulfa antibiotics, certain antidepressants and some kidney and blood pressure medicines.
8. Consumption of alcoholic beverages.

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

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• sweating	• drowsiness
• dizziness	• sleep disturbances
• palpitation	• anxiety
• tremor	• blurred vision
• hunger	• slurred speech
• restlessness	• depressed mood
• tingling in the hands, feet, lips, or tongue	• irritability
• lightheadedness	• abnormal behavior
• inability to concentrate	• unsteady movement
• headache	• personality changes

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Signs of severe hypoglycemia can include:

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• disorientation	• seizures
• unconsciousness	• death

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Therefore, it is important that assistance be obtained immediately.

Early warning symptoms of hypoglycemia may be different or less pronounced under certain conditions, such as long duration of diabetes, diabetic nerve disease, use of medications such as beta-blockers, changing insulin preparations, or intensified control (3 or more insulin injections per day) of diabetes.

**A few patients who have experienced hypoglycemic reactions after transfer from animal-source insulin to human insulin have reported that the early warning symptoms of hypoglycemia were less pronounced or different from those experienced with their previous insulin.**

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. If the blood glucose is below your

normal fasting glucose, you should consider eating or drinking sugar-containing foods to treat your hypoglycemia.

Mild to moderate hypoglycemia may be treated by eating foods or drinks that contain sugar. Patients should always carry a quick source of sugar, such as hard candy or glucose tablets. More severe hypoglycemia may require the assistance of another person. Patients who are unable to take sugar orally or who are unconscious require an injection of glucagon or should be treated with intravenous administration of glucose at a medical facility.

You should learn to recognize your own symptoms of hypoglycemia. If you are uncertain about these symptoms, you should monitor your blood glucose frequently to help you learn to recognize the symptoms that you experience with hypoglycemia.

If you have frequent episodes of hypoglycemia or experience difficulty in recognizing the symptoms, you should talk to your doctor to discuss possible changes in therapy, meal plans, and/or exercise programs to help you avoid hypoglycemia.

### **Hyperglycemia (High Blood Sugar) and Diabetic Ketoacidosis (DKA)**

Hyperglycemia (too much glucose in the blood) may develop if your body has too little insulin. Hyperglycemia can be brought about by any of the following:

1. Omitting your insulin or taking less than your doctor has prescribed.
2. Eating significantly more than your meal plan suggests.
3. Developing a fever, infection, or other significant stressful situation.

In patients with type 1 or insulin-dependent diabetes, prolonged hyperglycemia can result in DKA (a life-threatening emergency). The first symptoms of DKA usually come on gradually, over a period of hours or days, and include a drowsy feeling, flushed face, thirst, loss of appetite, and fruity odor on the breath. With DKA, blood and urine tests show large amounts of glucose and ketones. Heavy breathing and a rapid pulse are more severe symptoms. If uncorrected, prolonged hyperglycemia or DKA can lead to nausea, vomiting, stomach pain, dehydration, loss of consciousness, or death. Therefore, it is important that you obtain medical assistance immediately.

### **Lipodystrophy**

Rarely, administration of insulin subcutaneously can result in lipoatrophy (seen as an apparent depression of the skin) or lipohypertrophy (seen as a raised area of the skin). If you notice either of these conditions, talk to your doctor. A change in your injection technique may help alleviate the problem.

### **Allergy**

*Local Allergy* — Patients occasionally experience redness, swelling, and itching at the site of injection. This condition, called local allergy, usually clears up in a few days to a few weeks. In some instances, this condition may be related to factors other than insulin, such as irritants in the skin cleansing agent or poor injection technique. If you have local reactions, talk to your doctor.

*Systemic Allergy* — Less common, but potentially more serious, is generalized allergy to insulin, which may cause rash over the whole body, shortness of breath, wheezing, reduction in blood pressure, fast pulse, or sweating. Severe cases of generalized allergy may be life threatening. If you think you are having a generalized allergic reaction to insulin, call your doctor immediately.

### **ADDITIONAL INFORMATION**

Information about diabetes may be obtained from your diabetes educator.

Additional information about diabetes and Humulin can be obtained by calling The Lilly Answers Center at 1-800-LillyRx (1-800-545-5979) or by visiting [www.LillyDiabetes.com](http://www.LillyDiabetes.com).

Patient Information revised February 25, 2015

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LINR100-0001-PPI-20150225

## **Instructions for Use**

**HUMULIN® (HU-mu-lin) R**  
**insulin human injection, USP (rDNA origin)**  
**vial (100 Units/mL, U-100)**

**Do not share your syringes with other people, even if the needle has been changed. You may give other people a serious infection or get a serious infection from them.**

### **Correct Syringe Type**

Doses of insulin are measured in **units**. U-100 insulin contains 100 units/mL (1 mL=1 cc). With Humulin R, it is important to use a syringe that is marked for U-100 insulin preparations. Failure to use the proper syringe can lead to a mistake in dosage, causing serious problems for you, such as a blood glucose level that is too low or too high.

### **Syringe Use**

To help avoid contamination and possible infection, follow these instructions exactly.

Disposable syringes and needles should be used only once and then discarded by placing the used needle in a puncture-resistant disposable container. Properly dispose of the puncture-resistant container as directed by your Health Care Professional.

### **Preparing the Dose**

1. Wash your hands.
2. Inspect the insulin. Humulin R solution should look clear and colorless. Do not use Humulin R if it appears cloudy, thickened, or slightly colored, or if you see particles in the solution. Do not use Humulin R if you notice anything unusual in its appearance.
3. If using a new Humulin R bottle, flip off the plastic protective cap, but **do not** remove the stopper. Wipe the top of the bottle with an alcohol swab.
4. If you are mixing insulins, refer to the “Mixing Humulin R with Longer-Acting Human Insulins” section below.
5. Always use a new syringe or needle for each injection to help ensure sterility and prevent blocked needles. Do not reuse or share your syringes or needles with other people. You may give other people a serious infection or get a serious infection from them.
6. Draw an amount of air into the syringe that is equal to the Humulin R dose. Put the needle through rubber top of the Humulin R bottle and inject the air into the bottle.
7. Turn the Humulin R bottle and syringe upside down. Hold the bottle and syringe firmly in one hand.
8. Making sure the tip of the needle is in the Humulin R solution, withdraw the correct dose of Humulin R into the syringe.
9. Before removing the needle from the Humulin R bottle, check the 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 the bubbles out with the plunger and then withdraw the correct dose.
10. Remove the needle from the bottle and lay the syringe down so that the needle does not touch anything.
11. If you do not need to mix your Humulin R with a longer-acting insulin, go to the “Injection Instructions” section below and follow the directions.

### **Mixing Humulin R with Longer-Acting Human Insulins**

1. Humulin R should be mixed with longer-acting human insulins only on the advice of your doctor.

2. Draw an amount of air into the syringe that is equal to the amount of longer-acting insulin you are taking. Insert the needle into the longer-acting insulin bottle and inject the air. Withdraw the needle.
3. Draw an amount of air into the syringe that is equal to the amount of Humulin R you are taking. Insert the needle into the Humulin R bottle and inject the air, but **do not** withdraw the needle.
4. Turn the Humulin R bottle and syringe upside down.
5. Making sure the tip of the needle is in the Humulin R solution, withdraw the correct dose of Humulin R into the syringe.
6. Before removing the needle from the Humulin R bottle, check the 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 the bubbles out with the plunger and then withdraw the correct dose.
7. Remove the syringe with the needle from the Humulin R bottle and insert it into the longer-acting insulin bottle. Turn the longer-acting insulin bottle and syringe upside down. Hold the bottle and syringe firmly in one hand and shake gently. Making sure the tip of the needle is in the longer-acting insulin, withdraw the correct dose of longer-acting insulin.
8. Remove the needle from the bottle and lay the syringe down so that the needle does not touch anything.
9. Follow the directions under “Injection Instructions” section below.

Follow your doctor's instructions on whether to mix your insulins ahead of time or just before giving your injection. It is important to be consistent in your method.

Syringes from different manufacturers may vary in the amount of space between the bottom line and the needle. Because of this, do not change:

- the sequence of mixing, or
- the model and brand of syringe or needle that your doctor has prescribed.

### **Injection Instructions**

1. To avoid tissue damage, choose a site for each injection that is at least 1/2 inch from the previous injection site. The usual sites of injection are abdomen, thighs, and arms.
2. Cleanse the skin with alcohol where the injection is to be made.
3. With one hand, stabilize the skin by spreading it or pinching up a large area.
4. Insert the needle as instructed by your doctor.
5. Push the plunger in as far as it will go.
6. Pull the needle out and apply gentle pressure over the injection site for several seconds. **Do not rub the area.**
7. Do not reuse or share your syringes or needles with other people. You may give other people a serious infection or get a serious infection from them. Place used syringes and needles in a puncture-resistant disposable container and properly dispose of the puncture-resistant container as directed by your Health Care Professional.

Instructions for Use revised February 25, 2015

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LINR100VL-0001-IFU-20150225

### **PURPOSE**

### **KEEP OUT OF REACH OF CHILDREN**

**Insulin human**



## HUMULIN R

insulin human injection, solution

### Product Information

<b>Product Type</b>	HUMAN OTC DRUG	<b>Item Code (Source)</b>	NDC:50090-0353(NDC:0002-8215)
<b>Route of Administration</b>	PARENTERAL		

### Active Ingredient/Active Moiety

Ingredient Name	Basis of Strength	Strength
INSULIN HUMAN (UNII: 1Y17CTI5SR) (INSULIN HUMAN - UNII:1Y17CTI5SR)	INSULIN HUMAN	100 [iU] in 1 mL

### Inactive Ingredients

Ingredient Name	Strength
glycerin (UNII: PDC6A3C0OX)	16 mg in 1 mL
Metacresol (UNII: GGO4Y809LO)	2.5 mg in 1 mL
Water (UNII: 059QF0KO0R)	
Hydrochloric acid (UNII: QTT17582CB)	
Sodium hydroxide (UNII: 55X04QC32I)	

### Packaging

#	Item Code	Package Description	Marketing Start Date	Marketing End Date
1	NDC:50090-0353-0	1 in 1 CARTON	11/28/2014	
1		10 mL in 1 VIAL; Type 0: Not a Combination Product		

### Marketing Information

Marketing Category	Application Number or Monograph Citation	Marketing Start Date	Marketing End Date
NDA	NDA018780	06/27/1983	

**Labeler** - A-S Medication Solutions (830016429)

**Establishment**

Name	Address	ID/FEI	Business Operations
A-S Medication Solutions		830016429	RELABEL(50090-0353)

Revised: 10/2017

A-S Medication Solutions