DISCLAIMER

All labeling reflected on this website is for informational and promotional purposes only. It is not intended to be used by healthcare professionals or patients for the purpose of prescribing or administering these products. Questions regarding the current content of product labeling should be directed to Akorn's Customer Service department at 800.932.5676.
Labetalol HCl has the molecular formula C_{16}H_{21}N_{4}O_{3} • HCl and a molecular weight of 364.87. It has two asymmetric centers and therefore exists as a molecular complex of two diastereoisomeric pairs. Dilevalol, the R,R’ stereoisomer, makes up 25% of racemic labetalol. Labetalol HCl is a white or off-white crystalline powder, soluble in water.

Labetalol Hydrochloride Injection is a clear, colorless to light yellow aqueous sterile isotonic solution for intravenous injection. It has a pH range of 3.0 to 4.0.

Each ml contains:
- Active: Labetalol Hydrochloride USP, 5 mg.
- Preservatives: Methylparaben, 0.80 mg; Propylparaben, 0.10 mg.
- Inactives: Anhydrous Dextrose, 45 mg; Edetate Disodium 0.10 mg; Citric Acid Anhydrous and/or Sodium Hydroxide may be added to adjust pH (3.0 to 4.0), and Water for Injection.

CLINICAL PHARMACOLOGY
Labetalol combines both selective, competitive alpha- and nonselective, competitive beta-adrenergic blocking activity in a single substance. In man, the ratios of alpha- to beta-blockade have been estimated to be approximately 1:3 and 1:7 following oral and intravenous administration, respectively. Beta-receptor agonist activity has been demonstrated in animals with minimal beta-agonist (ISA) activity detected. In animals, at doses greater than those required for alpha- or beta-adrenergic blockade, a membrane-stabilizing effect has been demonstrated.

Pharmacodynamics The capacity of labetalol to block alpha-receptors in man has been demonstrated by attenuation of the pressor effect of phenylephrine and by a significant reduction of the pressor response caused by immediately the hand in ice-cold water ("coldpressor test"). Labetalol beta-receptor blockade in man was demonstrated by a small decrease in the resting heart rate, attenuation of tachycardia produced by isoproterenol or exercise, and by attenuation of the reflex tachycardia to the hypotension produced by acute hemorrhage. Beta-receptor blockade was demonstrated with minimal effect of the isoproterenol-induced fall in diastolic blood pressure. Both the alpha- and beta-blocking actions of orally administered labetalol HCl contribute to a decrease in blood pressure in hypertensive patients. Labetalol consistently, in dose-related fashion, blunted increases in exercise-induced blood pressure and heart rate, and in their double product. The pulmonary circulation during exercise was not affected by labetalol HCl dosing.

Single oral doses of labetalol HCl administered in patients with coronary artery disease had no significant effect on sinus rate, intraventricular conduction, or QRS duration. The AV conduction time was modestly prolonged in 2 of 7 patients. In another study, intravenous labetalol slightly prolonged AV nodal conduction time and atrial effective refractory period with only small changes in heart rate. The effects on AV nodal refractoriness were inconsistent.

Labetalol produces dose-related falls in blood pressure without reflex tachycardia and with nonsignificant changes in cardiac output seen in some studies but not others, and small decreases in total peripheral resistance. Elevated plasma renins are reduced.

Doses of labetalol HCl that controlled hypertension did not affect renal function in mild to severe hypertensive patients with normal renal function.

Due to the alpha-2-receptor blocking activity of labetalol, blood pressure is lowered more in the standing than in the supine position, and symptoms of postural hypotension can occur. During dosing with intravenous labetalol HCl, the contribution of the postural component should be considered when positioning patients for treatment, and patients should not be allowed to move to an erect position unmonitored until their ability to do so is established.

In a clinical pharmacologic study in severe hypertensives, an initial 0.25 mg/kg injection of labetalol HCl, administered to patients in the supine position, decreased blood pressure by an average of 11/7 mmHg. Additional injections of 0.5 mg/kg at 15-minute intervals up to a total cumulative dose of 1.75 mg/kg of labetalol HCl caused further dose-related decreases in blood pressure. Some patients required cumulative doses of up to 3.25 mg/kg. The maximal effect of each dose level occurred within 5 minutes.

Following discontinuation of intravenous treatment with labetalol HCl, the blood pressure rose gradually and progressively, approaching pretreatment baseline values within an average of 16 - 18 hours in the majority of patients.

Similar results were obtained in the treatment of patients with severe hypertension requiring urgent blood pressure reduction with an initial dose of 20 mg (which corresponds to 0.25 mg/kg for an 80 kg patient) followed by additional doses of either 40 or 80 mg at 10-minute intervals to achieve the desired effect or to a cumulative dose of 300 mg.

Labetalol HCl administered as a continuous intravenous infusion, with a mean dose of 136 mg (27 to 300 mg) over a period of 2 to 3 hours (mean of 2 hours and 39 minutes) lowered the blood pressure by an average of 60/35 mmHg.

Exacerbation of angina and, in some cases, myocardial infarction and ventricular dysrhythmias have been reported after abrupt discontinuation of therapy with beta-adrenergic blocking agents in patients with coronary artery disease. Abrupt withdrawal of these agents in patients without coronary artery disease has resulted in transient symptoms, including tachycardia, sweating, palpitation, headache, and malaise. Severe hypotension may rarely be avoided or possibly be reversed by interfering with endogenous adrenergic bronchodilator activity in patients subject to bronchospasm and may also interfere with exogenous bronchodilators in such patients.

Pharmacokinetics and Metabolism Following intravenous infusion, the elimination half-life is about 5.5 hours and the total body clearance is approximately 33 mL/min/kg. The plasma half-life of labetalol following oral administration is about 6 to 8 hours. In patients with decreased hepatic or renal function, the elimination half-life of labetalol is not altered; however, the oral bioavailability may be decreased. Hemodialysis removes a significant amount of labetalol from the general circulation (≈1%).

INDICATIONS AND USAGE
Labetalol HCl Injection is indicated for control of blood pressure in severe hypertension.

CONTRAINDICATIONS
Labetalol HCl Injection is contraindicated in bronchial asthma, overt cardiac failure, greater than first degree heart block, cardiogenic shock, severe bradycardia, other conditions associated with severe and prolonged hypotension, and in patients with a history of hypersensitivity to any component of the product (see WARNINGS).

Beta-blockers, even those with apparent cardioselectivity, should not be used in patients with a history of obstructive airway disease, including asthma.

WARNINGS
Hepatic Injury Severe hepatocellular injury, confirmed by rechallenge in at least one case, occurs rarely with therapy with labetalol. The hepatic injury is usually reversible, but hepatic necrosis and death have been reported. Injury has occurred after both short- and long-term treatment and may be slowly progressive despite minimal histological changes. Similar hepatic events have been reported with a related compound, dilevalol HCl, including one death where dilevalol HCl was the only drug administered. Dilevalol HCl is one of the four isomers of labetalol HCl. Thus, patients taking labetalol, periodic determination of suitable hepatic laboratory tests would be appropriate. Laboratory testing should also be done at the very first symptom or sign of liver dysfunction (eg, pruritus, dark urine, persistent anorexia, jaundice, right upper quadrant tenderness, or unexplained “flu-like” symptoms). If the patient has jaundice or laboratory evidence of liver injury, labetalol should be stopped and not restarted.

Cardiac Failure Sympathetic stimulation is a vital component supporting circulatory function in congestive heart failure. Beta-blockade carries a potential hazard of further depressing myocardial contractility and precipitating more severe failure. Although beta-blockers should be avoided in overt congestive heart failure, if necessary, labetalol can be used with caution in patients with a history of heart failure who are well compensated. Congestive heart failure has been observed in patients receiving labetalol HCl. Labetalol does not abolish the inotropic action of digitalis on heart muscle.

In Patients Without a History of Cardiac Failure In patients with latent cardiac insufficiency, controlled depressor agents with beta-blocking effects have been used without apparent harm. Beta-blockade may be associated with further reduction in cardiac output and myocardial oxygen demand. Caution should be exercised in using labetalol in patients with a history of heart failure. Labetalol may cause further reduction in cardiac output and myocardial oxygen demand in this patient population. It is not known if labetalol carries a potential hazard of further reduction in cardiac output and myocardial oxygen demand, and other measures appropriate for the management of unstable angina should be taken.

Ischemic Heart Disease Angina pectoris has not been reported upon labetalol discontinuation. However, following abrupt cessation of therapy with some beta-blocking agents in patients with coronary artery disease, exacerbations of angina pectoris and, in some cases, myocardial infarction have been reported. Therefore, such patients should be cautioned against interruption of therapy without the physician’s advice. Even in the absence of overt angina pectoris, when discontinuation of labetalol is planned, the patient should be carefully observed and should be advised to limit physical activity. If angina recurrence occurs, labetalol administration should be reinstated promptly, at least temporarily, and other measures appropriate for the management of unstable angina should be taken.

Nonallergic Bronchospasm (e.g., chronic bronchitis and emphysema) Since labetalol HCl injection at the usual intravenous therapeutic doses has not been studied in patients with nonallergic bronchospastic disease, it should not be used in such patients.

Pheochromocytoma Intravenous labetalol has been shown to be effective in lowering the blood pressure and relieving symptoms in patients with pheochromocytoma; higher than usual doses may be required. However, paradoxical hypertensive responses have been observed.
Beta-adrenergic blockade may prevent the appearance of pre-monitory signs and symptoms (eg, tachycardia) of acute hypoglycemia. This is especially important with labile diabetics. Beta-blockade also reduces the release of insulin in response to hyperglycemia, it may therefore be necessary to adjust the dose of anti-diabetic drugs.

Major Surgery The necessity or desirability of withdrawing beta-blocking therapy prior to major surgery is controversial. Protracted severe hypotension and difficulty in restarting or maintaining a heartbeat have been reported with beta-blockers. The effect of labetalol alpha-adrenergic activity has not been evaluated in this setting. Several deaths have occurred when labetalol HCl injection was used during surgery (including when used in cases to control bleeding).

A synergism between labetalol and halothane anesthesia has been shown (see PRECAUTIONS - Drug Interactions).

Rapid Decreases of Blood Pressure Caution must be observed when reducing severely elevated blood pressure. A number of adverse reactions, including cerebral infarction, optic nerve infarction, anagia, and ischemic changes in the electrocardiogram, have been reported with other agents when severely elevated blood pressure was reduced over time courses of several hours to as long as 1 or 2 days. The desired blood pressure lowering should therefore be achieved over as long a period of time as is compatible with the patient’s status.

PRECAUTIONS

General: Impaired Hepatic Function may diminish metabolism of labetalol.

Following Coronary Artery Bypass Surgery In one uncontrolled study, patients with low cardiac indices and elevated systemic vascular resistance following intravenous labetalol experienced significant declines in cardiac output with little change in systemic vascular resistance. One of these patients developed hypotension following labetalol HCl treatment. Therefore, use of labetalol should be avoided in such patients.

High-Dose Labetalol HCl Administration of up to 3 g per day as an infusion for up to 3 to 3 days has been anecdotally reported; several patients experienced hypotension or bradycardia (see DOSAGE AND ADMINISTRATION).

Hypotension Symptomatic postural hypotension (incidence 58%) is likely to occur if patients are tilted or allowed to assume the upright position within 3 hours of receiving labetalol HCl injection. Therefore, the patient’s ability to tolerate an upright position should be established before permitting any ambulation.

Jaundice or Hepatic Dysfunction (see WARNINGS).

Information for Patients: The following information is intended to aid in the safe and effective use of this medication. It is not a disclosure of all possible adverse or intended effects. During treatment with labetalol HCl tablets, patients should be instructed to report symptomatic postural hypotension, which may be more likely to occur if they are tilted or allowed to assume the upright position within 3 hours of receiving labetalol HCl injection. The patient should remain supine. Subsequently, the patient should be advised on how to proceed gradually to become ambulatory, and should be observed at the time of first ambulation.

When the patient is started on labetalol HCl tablets following adequate control of blood pressure with labetalol HCl injection, appropriate directions for titration of dosage should be provided (see DOSAGE AND ADMINISTRATION).

As with all drugs with beta-blocking activity, certain advice to patients being treated with labetalol HCl is appropriate. While no incident of the abrupt withdrawal phenomenon (exacerbation of angina pectoris) has been reported with labetalol, dosing with labetalol HCl tablets should not be interrupted or discontinued without a physician’s advice. Patients being treated with labetalol HCl tablets should consult a physician at any signs or symptoms of impending cardiac failure or hepatic dysfunction (see WARNINGS). Also, transient scalp tingling may occur, usually when treatment with labetalol HCl tablets is initiated (see ADVERSE REACTIONS).

Laboratory Tests: Routine laboratory tests are ordinarily not required before or after intravenous labetalol. In patients with concomitant illnesses, such as impaired renal function, appropriate tests should be done to monitor these conditions.

Drug Interactions: Since labetalol HCl injection may be administered to patients already being treated with other medications, including other antihypertensive agents, careful monitoring of these patients is necessary to detect and treat promptly any undesired effect from concomitant administration.

In one survey, 23% of patients taking labetalol orally in combination with tricyclic antidepressants experienced tremor as compared to 0.7% reported to occur with labetalol alone. The contribution of each of the treatments to this adverse reaction is unknown but the possibility of a drug interaction cannot be excluded.

Drugs possessing beta-blocking properties can blunt the bronchodilator effect of beta-receptor agonist drugs in patients with bronchospasm; therefore, doses greater than the normal antiasthmatic dose of beta-agonist bronchodilator drugs may be required.

Cimetidine has been shown to increase the bioavailability of labetalol administered orally. Since this could be explained either by enhanced absorption or by an alteration of hepatic metabolism of labetalol, special care should be used in establishing the dose required for blood pressure control in such patients.

Synergism has been shown between halothane anesthesia and intravenously administered labetalol. During controlled hypotensive anesthesia using labetalol in association with halothane, high concentrations (3% or above) of halothane should not be used because the degree of hypotension will be increased and because of the possibility of a large reduction in cardiac output and an increase in central venous pressure. The anesthesiologist should be informed when a patient is receiving labetalol.

Labetalol blunts the reflex tachycardia produced by nitroglycerin without preventing its hypotensive effect. If labetalol is used with nitroglycerin in patients with angina pectoris, additional antihypertensive effects may occur.

Care should be taken if labetalol is used concomitantly with calcium antagonists of the verapamil type.

When drug products that are alkaline, such as furosemide, have been administered in combination with labetalol, a white precipitate has been noted. Therefore, these drugs should not be administered in the same infusion line.

Risk of Anaphylactic Reaction While taking beta-blockers, patients with a history of severe anaphylactic reactions to a variety of allergens may be more reactive to repeated challenge, either accidental, diagnostic, or therapeutic. Such patients may be unresponsive to the usual doses of epinephrine used to treat anaphylactic reaction.

Drug/Laboratory Test Interactions: The presence of labetalol metabolites in the urine may result in falsely elevated levels of urinary catecholamines, metanephrine, normetanephrine, and vanillylmandelic acid (VMA) when measured by fluorimetric or photometric methods. In screening patients suspected of having a pheochromocytoma and being treated with labetalol, a specific method, such as a high-performance liquid chromatographic assay with solid phase extraction (eg, J Chromatogr 385:241, 1987) should be employed in such cases.

Labetalol has also been reported to produce a false-positive test for amphetamine when screening urine for the presence of drugs using the commercially available assay methods Toxi-Lab A® (thin-layer chromatographic assay) and Emit-d.a.u.® (radioenzymatic assay). When patients being treated with labetalol have a positive urine test for amphetamine using these techniques, confirmation should be made by using more specific methods, such as a gas chromatographic-mass spectrometer technique.

Carcinogenesis, Mutagenesis, Impairment of Fertility: Long-term oral dosing studies with radiolabeled labetalol have shown the drug to be excreted in human milk. Caution should be exercised when labetalol HCl tablets are administered to a nursing woman.

Pediatric Use: Safety and effectiveness in pediatric patients have not been established.

ADVERSE REACTIONS

Labetalol HCl Injection is usually well tolerated. Most adverse effects have been mild and transient and in controlled trials involving 92 patients they did not require labetalol withdrawal. Symptomatic postural hypotension (incidence 58%) is likely to occur if patients are tilted or allowed to assume the upright position within 3 hours of receiving labetalol HCl injection. Moderate hypotension occurred in 1 of 100 patients while supine. Increased sweating was noted in 4 of 100 patients, and flushing occurred in 1 of 100 patients. The following also were reported with labetalol HCl injection with the incidence per 100 patients as noted:

Cardiovascular System Ventricular arrhythmia in 1.

Central and Peripheral Nervous System Dizziness in 9; tingling of the scalp/skin in 7; hypotension (numbness) and vertigo, 1 each.

Gastrointestinal System Nausea in 13; vomiting 4; dyspepsia and taste distortion, 1 each.

Metabolic Disorders Transient increases in blood urea nitrogen and serum creatinine levels occurred in 8 of 100 patients; these were associated with drops in blood pressure, generally in patients with prior renal insufficiency.

Psychiatric Disorders Somnolence/yawning in 3.

Respiratory System Wheezing in 1.

Skin Pruritus in 1.

The incidence of adverse reactions depends upon the dose of labetalol HCl. The largest experience is with oral labetalol HCl (see oral labetalol HCl product information for details). Certain of the side effects increased with increasing oral dose as shown in the table below which depicts the entire U.S. therapeutic trials data base for adverse reactions that are clearly or possibly dose related.
Hepatic necrosis, hepatitis, cholestatic jaundice, elevated liver function tests.

Parenteral drug products should be administered parenterally and never orally. The blood pressure should be monitored during and after administration. Hypotension may occur. (See side effects).

Since the half-life of labetalol is 5 to 8 hours, steady-state blood levels (in the face of a rapid bolus or slow continuous infusion) may be achieved or a total of 300 mg labetalol HCl has been injected. The maximum effect usually occurs in these patients. The patient’s ability to tolerate an upright position should also be considered. The patient during dosing.

MUST BE INDIVIDUALIZED depending upon the severity of hypertension and the response of the patient during dosing. Patients should always be kept in a supine position during the period of intravenous drug administration. A substantial fall in blood pressure on standing should be expected in these patients. The patient’s ability to tolerate an upright position should be established before permitting any ambulation, such as using toilet facilities. Either of two methods of administration of labetalol HCI injection may be used: a) repeated intravenous injections, b) slow continuous infusion. Estimated Total IV Dose: The effective intravenous dose is usually in the range of 50 to 200 mg. A total dose of up to 300 mg may be required in some patients. Blood Pressure Monitoring: The blood pressure should be monitored during and after completion of the infusion or intravenous injections. Rapid or excessive falls in either systolic or diastolic blood pressure during intravenous treatment should be avoided. In patients with excessive systolic hypertension, the decrease in systolic pressure should be used as indicator of effectiveness in addition to the response of the diastolic pressure.

Initiation of Dosing with Labetalol HCI Tablets: Subsequent oral dosing with labetalol HCI tablets should begin when it has been established that the supine diastolic blood pressure has begun to rise. The recommended initial dose is 200 mg, followed in 6 - 12 hours by an additional dose of 200 or 400 mg, depending on the blood pressure response. Thereafter, inpatient titration with Labetalol HCI Tablets may proceed as follows:

<table>
<thead>
<tr>
<th>Inpatient Titration Instructions</th>
<th>Regimen</th>
<th>Daily Dose*</th>
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<tbody>
<tr>
<td></td>
<td>200 mg b.i.d.</td>
<td>400 mg</td>
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<td>400 mg b.i.d.</td>
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<td>1600 mg</td>
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<tr>
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<td>1200 mg b.i.d.</td>
<td>2400 mg</td>
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*If needed, the total daily dose may be given in three divided doses.

While in the hospital, the dosage of labetalol HCI tablets may be increased at 1-day intervals to achieve the desired blood pressure reduction. For subsequent outpatient titration or maintenance dosing see DOSAGE AND ADMINISTRATION in the labetalol HCI tablets product information for additional recommendations.

Compatibility with commonly used intravenous fluids: Parenteral drug products should be inspected visually for particulate matter and discoloration prior to administration, whenever solution and container permit.

Labetalol HCI Injection was tested for compatibility with commonly used intravenous fluids at final concentrations of 1.25 mg to 3.75 mg labetalol HCI per mL of the mixture. Labetalol HCI Injection was found to be compatible with and stable (for 24 hours refrigerated or at room temperature) in mixtures with the following solutions: Ringers Injection, USP Lactated Ringers Injection, USP 5% Dextrose and Ringers Injection 5% Lactated Ringers and 5% Dextrose Injection 5% Dextrose Injection, USP 0.9% Sodium Chloride Injection, USP 5% Dextrose and 0.2% Sodium Chloride Injection, USP 2.5% Dextrose and 0.45% Sodium Chloride Injection, USP 5% Dextrose and 0.9% Sodium Chloride Injection, USP 5% Dextrose and 0.33% Sodium Chloride Injection, USP Labetalol HCI Injection was NOT compatible with 5% Sodium Bicarbonate Injection, USP.

HOW SUPPLIED

Labetalol HCI Injection, 5 mg/mL, is supplied in: 20 mL (100 mg) (NDC 17478-420-20) multi-dose vial, box of 1 40 mL (200 mg) (NDC 17478-420-40) multi-dose vial, box of 1 Storage: Store at 20° to 25°C (68° to 77°F) [see USP Controlled Room Temperature]. Protect from freezing. PROTECT FROM LIGHT.

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