

**PRODUCT MONOGRAPH**

**LIDOCAINE HYDROCHLORIDE 0.4% AND 5% DEXTROSE INJECTION**

**(Lidocaine Hydrochloride and Dextrose Injection USP)**

Antiarrhythmic

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## **ACTIONS AND CLINICAL PHARMACOLOGY**

### **Mechanism of Action**

The mode of action of the antiarrhythmic effect of lidocaine hydrochloride appears to be similar to that of procaine, procainamide and quinidine. Ventricular excitability is depressed and the stimulation threshold of the ventricle is increased during diastole. The sinoatrial node is, however, unaffected. In contrast to the latter three drugs, lidocaine hydrochloride in therapeutic doses does not produce a significant decrease in arterial pressure or in cardiac contractile force. In larger doses, lidocaine hydrochloride may produce circulatory depression, but the magnitude of the change is less than that found with comparable doses of procainamide. Neither drug appreciably affects the duration of the absolute refractory period.

### **Onset of Action**

The onset of action of lidocaine hydrochloride after a single intravenous injection varies from 45 to 90 seconds. Duration of action is 10 to 20 minutes.

## **INDICATIONS AND CLINICAL USE**

The intravenous administration of Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection (lidocaine hydrochloride and dextrose injection, USP) is indicated in the treatment of ventricular tachycardia and premature ventricular beats of a life-threatening nature which may occur during cardiac manipulation such as surgery or catheterization or during acute myocardial infarction, digitalis toxicity or other cardiac diseases.

Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection is indicated when fluid restriction is desirable.

## **CONTRAINDICATIONS**

Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection (lidocaine hydrochloride and dextrose injection, USP) is contraindicated in patients with:

1. Known hypersensitivity to local anesthetics of the amide type, such as prilocaine, mepivacaine or bupivacaine, or to other components of the solution;
2. Adams-Stokes syndrome, or severe degrees of sinoatrial, atrioventricular or intraventricular block.

Solutions containing dextrose may be contraindicated in patients with known allergy to corn or corn products.

The safety of Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection in the treatment of arrhythmias in children has not been established.

## **WARNINGS**

Constant ECG monitoring is essential for the proper administration of Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection (lidocaine hydrochloride and dextrose injection, USP) intravenously. Signs of excessive depression of cardiac conductivity, such as prolongation of PR interval and QRS complex, and the appearance of aggravation of arrhythmias, should be followed by prompt cessation of the intravenous infusion.

It is mandatory to have emergency resuscitative equipment and drugs immediately available to manage possible adverse reactions involving the cardiovascular, respiratory, or central nervous systems.

Anaphylactic reactions may occur following administration of lidocaine hydrochloride. In emergency situations, when a ventricular rhythm disorder is suspected, and ECG equipment is not available, a single dose may be administered when the physician in attendance has determined that the potential benefits outweigh the possible risks. If possible, emergency resuscitative equipment and drugs should be available.

## **PRECAUTIONS**

Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection (lidocaine hydrochloride and dextrose injection, USP) should be used with caution in patients with bradycardia, severe digitalis intoxication, first or second degree heart block in the absence of a pacemaker, or hypokalaemia (See **CONTRAINDICATIONS** and **WARNINGS**).

In unconscious patients circulatory collapse should be watched for, since CNS effects may not be apparent as an initial manifestation of toxicity.

Caution should be observed in patients with cardiac decompensation and hypotension or posterior diaphragmal infarction with a tendency towards development of heart block.

Intravenous administration of lidocaine hydrochloride is sometimes accompanied by a hypotensive response, and, in overdosage, this may be precipitous. For this reason the

intravenous dose should not exceed 100 mg in a single injection and no more than 200 – 300 mg in a one hour period (See **DOSAGE and ADMINISTRATION**).

When high doses are used and the patient's myocardial function is impaired, combination with other drugs which reduce the excitability of cardiac muscle requires caution.

Repeated doses of Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection may cause significant increases in blood levels with each repeated dose because of slow accumulation of the drug or its metabolites. Tolerance to elevated blood levels varies with the status of the patient. Debilitated, elderly patients and acutely ill patients should be given reduced doses commensurate with their age and physical condition. Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection should also be used with caution in patients with epilepsy, impaired cardiac conduction, bradycardia, impaired hepatic function or renal function and in severe shock.

### **Use in the Elderly**

A reduction in dosage may be necessary for elderly patients, particularly those with compromised cardiovascular and/or hepatic function and/or prolonged infusion. Elderly patients should be given reduced doses corresponding to their age and physical status.

### **Impaired Renal Function**

Caution should be employed in the repeated use of Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection in patients with severe renal disease, since possible accumulation of lidocaine or its metabolites may lead to toxic phenomena.

### **Impaired Hepatic Function**

Caution should be employed in the repeated use of Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection in patients with severe liver disease, since possible accumulation of lidocaine or its metabolites may lead to toxic phenomena.

### **Use in Pregnancy**

It is reasonable to assume that lidocaine has been used, mainly as a local anesthetic, by a large number of pregnant women and women of child-bearing age. No specific disturbances to the reproductive process have so far been reported, e.g., no increased incidence of malformations. However, care should be taken during early pregnancy when maximum organogenesis takes place.

There are no adequate and well-controlled studies with intravenous administration of lidocaine in pregnant women.

### **Use in Nursing Mothers**

Lidocaine is excreted in the breast milk, but in such small quantities that there is generally no risk of affecting the infant at therapeutic dose levels.

### Use in Neonates

Through their lower enzyme capacity, *very rarely*, neonates are at risk of methaemoglobinaemia. Methaemoglobinaemia can become clinically overt (cyanosis), and treatment with methylene blue may be considered necessary.

### Use in Patients with Acute Porphyria

Theoretical evidence suggests that lidocaine may have porphyrogenic properties. The clinical significance of this is unknown. Caution should be exercised if intravenous Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection is administered to patients with acute porphyria.

### Drug Interactions

Lidocaine is mainly metabolized in the liver by CYP1A2 and CYP3A4 to its two major metabolites, monoethylglycinexylidide (MEGX) and glycinexylidide (GX), both of which are pharmacologically active. Lidocaine has a high hepatic extraction ratio. Only a small fraction (3%) of lidocaine is excreted unchanged in the urine. The hepatic clearance of lidocaine is expected to depend largely on blood flow.

Since the affinity of lidocaine to CYP1A2 and CYP3A4 is very low compared to therapeutic plasma concentrations, it is less likely that the metabolism of substrates for these enzymes will be inhibited when coadministered with lidocaine. However, there is a potential for influence of other drugs on the plasma levels/effect of lidocaine, e.g. strong inhibitors or inducers of CYP1A2 and/or CYP3A4 and drugs that affect liver blood flow (see Table 1).

**Table 1**      **Established or Potential Drug-Drug Interactions**

<b>Name</b>	<b>Reference</b>	<b>Effect</b>	<b>Clinical comment</b>
Strong inhibitors of CYP1A2 (fluvoxamine)	CT	Coadministration of fluvoxamine, reduced [41%] the elimination of lidocaine in healthy subjects.  Given concomitantly with lidocaine, strong inhibitors of CYP1A2 can cause a metabolic interaction leading to increased lidocaine plasma concentrations.	Therefore, coadministration of lidocaine should be avoided in patients treated with strong inhibitors of CYP1A2, such as fluvoxamine.

CYP1A2 inducers (Phenytoin)	T	During concomitant administration of lidocaine and CYP1A2 inducers, plasma levels/effect of lidocaine may decrease.	Higher dose of lidocaine may be required.
Strong inhibitors of CYP3A4 (erythromycin, itraconazole)	CT	Erythromycin and itraconazole have each been shown to have a <b>modest</b> or no effect on the pharmacokinetics of intravenous lidocaine (0-18% decreased elimination with erythromycin but no effect with itraconazole).	No dose adjustment seems required.
CYP3A4 inducers (carbamazepine, phenobarbital, phenytoin, primidone)	CT	Concomitant administration with carbamazepine, phenobarbital, phenytoin, and primidone, may slightly decrease plasma levels of lidocaine (<10%).	No dose adjustment seems required.
Beta-blockers (propranolol, metoprolol, nadolol)	CT	Propranolol, metoprolol, and nadolol have been reported to reduce intravenous lidocaine clearance, probably through effects on hepatic blood flow and/or metabolism, and may increase the plasma concentration of lidocaine by about 30%, less with metoprolol.	Therefore, concomitant administration of beta-blockers with lidocaine should be avoided. If not possible, close monitoring and dose adjustment may be required.

Cimetidine	CT	<p>Cimetidine has an unspecific inhibitory effect on CYP (including CYP1A2 and CYP 3A4) mediated metabolism and reduces hepatic blood flow.</p> <p>Clinical experiments showed that the concomitant administration of cimetidine reduces the systemic clearance of lidocaine and increases lidocaine serum concentration by as much as 50%. Thus, therapeutic serum levels of lidocaine may rise to toxic levels when cimetidine is used concomitantly. Ranitidine has not displayed this effect.</p>	<p>Therefore, concomitant administration with lidocaine should be avoided. If not possible, close monitoring and dose adjustment of lidocaine and/or cimetidine may be required.</p>
Amiodarone	CT, C	<p>Like cimetidine, amiodarone has an unspecific inhibitory effect on CYP mediated metabolism. Concomitant administration has resulted in increased plasma levels of lidocaine and may result in toxic effects.</p>	<p>Therefore, concomitant administration with lidocaine should be avoided. If not possible, close monitoring and dose adjustment of lidocaine and/or amiodarone may be required.</p>

### **Carcinogenesis, Mutagenesis, Impairment of Fertility**

Studies of lidocaine in animals to evaluate the carcinogenic and mutagenic potential or the effect on fertility have not been conducted.

## **ADVERSE REACTIONS**

Adverse experiences following the administration of lidocaine are similar in nature to those observed with other amide type agents. These adverse experiences are, in general, dose related and may result from high plasma levels caused by excessive dosage or rapid absorption, or may result from a hypersensitivity, idiosyncrasy or diminished tolerance on the part of the patient.

Common adverse reactions are those from the central and peripheral nervous system. They occur in 5-10% of the patients and are mostly dose-related. The following definitions of frequencies are used: Very common ( $\geq 10\%$ ), common (1 – 9.9%), uncommon (0.1 – 0.9%), rare (0.01 – 0.09%) and very rare ( $< 0.01\%$ ).

Systemic reactions of the following types have been reported:

### **Central Nervous System**

CNS manifestations are excitatory and/or depressant. Common adverse reactions are circumoral paresthesia, dizziness and drowsiness. Rare adverse reactions would include persistent dizziness, lightheadedness, nervousness, apprehension, euphoria, confusion, hyperacusis, tinnitus, blurred vision, vomiting, sensations of heat, cold or numbness, twitching, tremors, convulsions, unconsciousness, apnea, respiratory depression and arrest. The excitatory manifestations may be very brief or may not occur at all, in which case the first manifestation of toxicity may be drowsiness merging into unconsciousness and respiratory arrest.

Drowsiness following the administration of lidocaine is usually an early sign of a high lidocaine plasma level and may occur as a consequence of rapid absorption.

### **Cardiovascular System**

Rare cardiovascular manifestations are usually depressant and are characterized by bradycardia, hypotension, asystole and cardiovascular collapse which may lead to cardiac arrest. Arrhythmias, including ventricular tachycardia /ventricular fibrillation have also been reported.

### **Hematologic System**

Very rarely, neonatal methaemoglobinaemia can occur (see Precautions).

Methemoglobinemia was also reported in adults.

### **Immune System**

Allergic reactions, including anaphylactic reactions, are characterized by cutaneous lesions, urticaria, edema, or in the most severe and very rare instances, hypersensitivity including anaphylactic shock. Allergic reactions of the amide type are rare and may occur as a result of sensitivity either to the drug itself, or to other components of the formulation.

Idiosyncratic reactions have been reported at low doses in some patients. Cross-sensitivity between Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection (lidocaine hydrochloride and dextrose injection, USP) and procainamide or Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection and quinidine have not been reported.



## **SYMPTOMS AND TREATMENT OF OVERDOSAGE**

Symptoms of idiosyncratic reactions are described under **ADVERSE REACTIONS**.

### **Symptoms**

Lidocaine toxicity may appear at serum concentrations greater than 8 mg/L. The most serious effects of lidocaine intoxication are on the central nervous system and cardiovascular system and overdose can result in dizziness, delirium, severe hypotension, conduction defects, bradycardia, asystole, arrhythmias, including ventricular tachycardia/fibrillation, cardiovascular collapse which may lead to cardiac arrest, apnea, seizures, coma, respiratory arrest and death.

*Central nervous system* toxicity is a graded response, with symptoms and signs of escalating severity. The first symptoms are circumoral paresthesia, numbness of the tongue, lightheadedness, hyperacusis and tinnitus. Visual disturbance and muscular tremors are more serious and precede the onset of generalized convulsions. Unconsciousness and grand mal convulsions may follow, which may last from a few seconds to several minutes. Hypoxia and hypercarbia occur rapidly following convulsions due to the increased muscular activity, together with the interference with normal respiration. In severe cases apnea may occur. Acidosis increases the toxic effects.

Recovery is due to redistribution and metabolism of the drug. Recovery may be rapid unless large amounts of the drug have been administered.

*Cardiovascular effects* may be seen in cases with high systemic concentrations. Severe hypotension, bradycardia, arrhythmia and cardiovascular collapse may be the result in such cases.

Cardiovascular toxic effects are generally preceded by signs of toxicity in the central nervous system, unless the patient is receiving a general anesthetic or is heavily sedated with drugs such as a benzodiazepine or barbiturate.

### **Treatment**

The first consideration is prevention, best accomplished by careful and constant monitoring of cardiovascular and respiratory vital signs and the patient's state of consciousness. At the first sign of change, oxygen should be administered.

The first step in the management of convulsions consists of immediate attention to the maintenance of a patent airway and assisted or controlled ventilation with oxygen and a delivery system capable of permitting immediate positive airway pressure by mask. Immediately after the institution of these ventilatory measures, the adequacy of the circulation should be evaluated, keeping in mind that drugs used to treat convulsions sometimes depress the circulation when administered intravenously.

An anticonvulsant should be given i.v. if the convulsions do not stop spontaneously in 15-20 seconds. Thiopental 100-150 mg i.v. will abort the convulsions rapidly. Alternatively, diazepam 5-10 mg i.v. may be used, although its action is slower. Succinylcholine will stop the muscle convulsions rapidly, but will require tracheal intubation and controlled ventilation, and should only be used by those familiar with these procedures.

Hypotension may be counteracted by giving sympathicomimetic drugs (e.g., adrenaline). Adrenergic agents of both  $\alpha$ -adrenoceptor stimulating (e.g., metaraminol) and  $\beta$ -adrenoceptor stimulating type (e.g., isoprenaline) are generally effective. The bradycardia may be treated with parasympatholytic agents (e.g., atropine).

Should circulatory arrest occur, immediate cardiopulmonary resuscitation should be instituted. Optimal oxygenation and ventilation and circulatory support as well as treatment of acidosis are of vital importance, since hypoxia and acidosis will increase the systemic toxicity of local anesthetics. Epinephrine (0.1-0.2 mg as intravenous or intracardial injections) should be given as soon as possible and repeated, if necessary.

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

## **DOSAGE AND ADMINISTRATION**

### **Single Intravenous Injection**

The usual dose is 50 to 100 mg Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection (lidocaine hydrochloride and dextrose injection, USP) administered under ECG and blood pressure monitoring. This dose may be administered at the rate of approximately 25 to 50 mg/min. Sufficient time should be allowed to enable a slow circulation to carry the drug to the site of action. If the initial injection of 50 to 100 mg does not produce a desired response, a second dose may be repeated after 10 minutes. **NO MORE THAN 200 TO 300 MG OF LIDOCAINE HYDROCHLORIDE 0.4% AND 5% DEXTROSE INJECTION SHOULD BE ADMINISTERED DURING A ONE HOUR PERIOD.**

### **Continuous Intravenous Infusion**

Following intravenous injection, Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection may be administered by intravenous infusion at a rate of 1-2 mg/min (approximately 15-30 $\mu$ g/kg/min in the average 70 kg patient) in those patients in whom the arrhythmia tends to recur, and who are incapable of receiving oral antiarrhythmic therapy.

Intravenous infusions of Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection must be administered under constant ECG and blood pressure monitoring and with meticulous regulation of infusion rate, in order to avoid potential overdosage and toxicity.

Intravenous infusions should be terminated as soon as the patient's basic cardiac rhythm appears to be stable or at the earliest signs of toxicity. It should rarely be necessary to continue

intravenous infusion beyond 24 hours. As soon as possible, and when indicated, patients should be changed to an oral antiarrhythmic agent for maintenance therapy.

Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection should be used only when fluid restriction is desirable.

When administering Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection by continuous intravenous infusion, it is necessary to use an infusion pump or a precision volume control I.V. set.

It is recommended that the administration set be replaced at least once every 24 hours.

Directions for use of VIAFLEX plastic containers:

Do not remove unit from overwrap until ready for use. The overwrap is a moisture barrier. The inner bag maintains the sterility of the product. After removing overwrap, check for leaks by firmly squeezing the inner bag. If leaks are found, discard solution as sterility may be impaired.

Visually inspect the container. If the administration port protector is damaged, detached, or not present, discard container as solution path sterility may be impaired.

**Warning:** Do not use plastic containers in series connections. Such use could result in air embolism due to residual air (approximately 15 mL) being drawn from the primary container before administration of the fluid from the secondary container is completed.

To Open

Tear overwrap down the side at the slit and remove solution container. Do not add supplementary medication.

Preparation for Administration

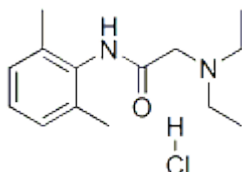
1. Suspend container from eyelet support.
2. Remove plastic protector from outlet port at bottom of container.
3. Attach administration set. Refer to complete directions accompanying set.

## PHARMACEUTICAL INFORMATION

### Drug Substance

**Proper name: Lidocaine hydrochloride**

### Structural Formula:



**Molecular Formula:**  $C_{14}H_{22}N_2O \cdot HCl$

**Molecular Weight:** 270.82 g/mol

**Chemical Name:** 2-(Diethylamino) -2', 6' - acetoxylidide monohydrochloride anhydrous

**Description:** Lidocaine hydrochloride is a white, odorless, crystalline powder which has a slightly bitter taste. It is very soluble in water and in alcohol, soluble in chloroform, and insoluble in ether.

### Composition

Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection (lidocaine hydrochloride and dextrose injection, USP) is a sterile, nonpyrogenic solution prepared from Lidocaine Hydrochloride 0.4% and Dextrose in Water for Injection. The solution serves as a cardiac antiarrhythmic agent intended for intravenous use. The pH range is 3.5 to 6.0. The pH is adjusted with sodium hydroxide.

### Stability and Storage Recommendations

Store at 15°C to 25°C.

For single use only. Discard unused portion.

## AVAILABILITY OF DOSAGE FORMS

Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection (lidocaine hydrochloride and dextrose injection, USP) is supplied in VIAFLEX plastic containers, in the following sizes and concentrations:

	250 mL	500 mL
<b>Lidocaine Hydrochloride 0.4% and 5% Dextrose solution</b>	√	√

0.4% lidocaine hydrochloride provides 4 mg of lidocaine hydrochloride per mL.

## PHARMACOLOGY

Lidocaine hydrochloride is a well known anesthetic agent which has been used for many years for regional and topical anesthesia. However, it has been demonstrated to exert an antiarrhythmic effect by increasing the electrical stimulation threshold of the ventricle during diastole.

In decerebrated, vagotomized cats with stellate ganglia destroyed, lidocaine hydrochloride intravenous suppressed cardiac arrhythmias induced by faradic stimulation, barium chloride and epinephrine. The minimal effective dose was 0.5 mg per kg. This was 4 and 5 times less than the minimal doses of procaine and procainamide respectively.

In anesthetized open-chest dogs, lidocaine hydrochloride 5 mg per kg intravenously reduced the duration of methacholine-induced auricular arrhythmias by 55.5%. The effect of quinidine sulphate at the same dose was a reduction 46.5%. Ventricular arrhythmias induced by coronary ligation were controlled by total intravenous doses of 50 mg/kg. Convulsions and vomiting were produced and death occurred in 1 of 6 dogs at 75.5 mg/kg. In the same preparation, interruption of the arrhythmia was obtained by an injection of 15 mg/kg directly into the ventricle. In normothermic or hypothermic dogs the same effect was obtained in ventricular fibrillation induced by mechanical stimulation.

In anesthetized dogs, intravenous infusions of 40-80 mg converted digitalis-induced ventricular arrhythmia to sinus rhythm. Also, acetylstrophanthidin-induced ventricular tachycardia was suppressed at a minimal effective dose of lidocaine hydrochloride of 1 mg/kg intravenously. Digitalis-induced ventricular tachycardia, which failed to respond to electroshock was converted to normal sinus rhythm by intravenous injection of lidocaine hydrochloride 100 mg and ventricular tachycardia, induced by ouabain, was converted to supraventricular tachycardia by intravenous injection of 1-2 mg/kg.

In unanesthetized dogs with ventricular arrhythmia induced by coronary occlusion, intravenous injections of 5-10 mg/kg suppressed the arrhythmia. This effect could be maintained by intravenous infusion with calculated lidocaine hydrochloride blood levels of 1-3 µg/mL.

Other effects in anesthetized intact dogs were depression of myocardial contractile force, heart rate and femoral arterial pressure with lidocaine hydrochloride 0.5 to 6 mg/kg intravenously. At

2.0 mg/kg intra-arterially the same effects were obtained but there was less diminution of contractile force. In both anesthetized and conscious dogs, lidocaine hydrochloride in rapid intravenous injection of 2, 4 and 8 mg/kg caused transient decrease of systolic arterial pressure, venous pressure, cardiac output, mean ejection rate, rate of development of arterial pressure, stroke work and calculated peripheral resistance. Heart rate was slightly increased. Effects were greatest at 8 mg/kg and were more pronounced and of longer duration in anesthetized dogs. There was return to basal levels in 3-5 minutes.

### **Absorption, Distribution and Excretion**

In rats which received <sup>14</sup>C-labelled lidocaine hydrochloride by intravenous injection, rapid uptake by all tissues was noted. Tissue distribution studies in monkeys have indicated: high affinity for lung, spleen, kidney, stomach and adipose tissue; moderate affinity for brain and most gastrointestinal organs; and low affinity for musculoskeletal tissue and skin. Similar distribution has been observed in the dog.

Studies on plasma binding in monkey and man have indicated approximately 60% plasma binding within the plasma concentration range usually seen in clinical use. However, plasma binding was markedly reduced at concentrations of lidocaine hydrochloride exceeding 10 µg/mL, presumably due to saturation of the binding sites.

Studies in rabbit and rat have demonstrated that the liver is the principal site of metabolism. In man, hepatic clearance studies have shown that approximately 70% of the lidocaine hydrochloride passing through the liver was extracted. Microsomal enzyme systems are primarily responsible for hepatic metabolism. The major degradative pathway appears to be by conversion to monoethylglycinexylidide, followed by hydrolysis to 2,6,-xylidine; further conversion to 4-hydroxy-2,6-xylidine appears to occur in man.

Up to 10% of administered lidocaine hydrochloride may be excreted in the urine as unchanged drug. Although biliary secretion and intestinal absorption of lidocaine hydrochloride metabolites have been reported in rats, there is no evidence of biliary secretion in man.

The pharmacokinetics of lidocaine hydrochloride has been studied in normal subjects and in patients.

Following a single intravenous injection, or termination of a continuous intravenous infusion, declining plasma concentration follows a biphasic curve. Plasma half-lives of 8 to 15 minutes have been reported for the initial phase. Various studies have reported the mean half-life at the terminal phase to be in the range 1.2 to 1.9 hours. The minimum effective antiarrhythmic plasma concentration of lidocaine hydrochloride has been reported to be in the range of 1.0 to 1.2 µg/mL; concentrations higher than 5-6 µg/mL are associated with an increased risk of toxicity.

## TOXICOLOGY

### Acute Toxicity

SPECIES	SEX	ROUTE	LD <sub>50</sub> (mg/kg)
mice	F	i.v.	17.9
mice	F	i.p.	164
mice	F	i.m.	200
mice	M	i.m.	154
rat	F	i.v.	19.7
rat	M	i.v.	21.4
dog	M & F	i.m.	100
guinea pig	F	i.m.	73
guinea pig	M	i.m.	67
rabbit	M	i.m.	450

Acute intravenous studies were performed in rabbits which received six serial injections of 1, 2, 3, 4 or 5 mg/kg at 15 minute intervals. At the 2 mg/kg dose level, slight depression was seen, beginning with the third injection. At 3 mg/kg there was depression and rigid extension of limbs after the last 5 injections. At 5 mg/kg there was severe depression and rigid limb extension after each injection; loss of righting reflex and convulsions began with the second injection and there was gasping for breath after each of the last injections.

Dogs were given intravenous incremental doses at 30 minute intervals until death occurred. Doses of 0.1 to 3.0 mg/kg were tolerated with minimal CNS or cardiovascular effects. Convulsions, mydriasis, salivation, urination and defecation were observed after 10 mg/kg. Respiratory arrest and death occurred in one dog after 30 mg/kg; cardiovascular collapse, respiratory arrest and death occurred in remaining animals after 100 mg/kg. Mean arterial blood pressure and heart rate increased briefly, beginning at 3.0 mg/kg, and decreased after 100 mg/kg. Myocardial conduction time was not significantly changed prior to 100 mg/kg administration.

Acute local responses were studied in rats and rabbits following single intramuscular injections of 2%, 4%, 6%, 8% and 10% solutions of lidocaine hydrochloride. Microscopic examination revealed inflammatory changes with all solutions. In general, reactions produced by 2% solutions were least, although lesions seen with all other concentrations were of similar degree.

In rabbits sacrificed seven days after intramuscular administration, there was evidence of marked muscle fiber regeneration; after 30 days there was virtually complete resolution of inflammatory changes at the site of injection.

### **Subacute Toxicity**

In one study, dogs received daily intravenous injections according to the following schedule: 0.1 mg/kg for 7 days, 0.3 mg/kg for 7 days, 1 mg/kg for 7 days and 3 mg/kg for 21 days. Mild transient convulsions were seen in one dog at the high dose level. No other signs of toxicity were observed. Gross and microscopic examination at autopsy did not reveal any drug related effects.

In a second study, dogs received daily intravenous injections of 2.5, 5 or 10 mg/kg for 28 days. No overt symptoms were observed at the low dose level. At the 5 mg/kg level there was transient sedation, ataxia, head tremor, prostration and emesis. At the 10 mg/kg level there were severe tremors, muscular weakness, ataxia, prostration, and convulsions, although animals recovered within 5-10 minutes. No ECG or hemochemistry changes were seen. No evidence of drug-related pathology was seen at autopsy. Injection sites showed inflammatory changes in drug and saline-treated animals.

In rats which received daily intravenous doses of 1.5, 4.5 or 15.0 mg/kg for 14 days, overt effects were observed only at the 15.0 mg/kg level, at which convulsions and death occurred. Increased blood glucose levels were seen in male rats at all dose levels. At autopsy, no changes were attributed to drug treatment. Mild inflammatory changes were seen at injection sites.



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**PART III: CONSUMER INFORMATION**

**LIDOCAINE HYDROCHLORIDE 0.4% AND 5% DEXTROSE INJECTION**

(Lidocaine Hydrochloride and Dextrose Injection USP)

Read this carefully before you undergo therapy with Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection. This leaflet is a summary and will not tell you everything about Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection. Talk to your doctor, nurse, or pharmacist about your medical condition and treatment and ask if there is any new information about Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection.

**ABOUT THIS MEDICATION**

**What the medication is used for:**

**Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection** is used to treat abnormal heart rhythms that may occur during heart surgery or other procedures, heart attacks or due to other heart conditions.

**What it does:**

**Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection** belongs to a class of drugs called antiarrhythmic drugs. It works by reducing the excitability of the heart which helps return the heartbeat to normal.

**When it should not be used:**

Do not use **Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection** if you:

- are allergic or sensitive to lidocaine hydrochloride, to any of the nonmedicinal ingredients in Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection or other local anaesthetics (e.g. prilocaine, mepivacaine or bupivacaine).
- have Adams-Stokes syndrome, or severe degrees of sinoatrial, atrioventricular or intraventricular block.

**What the medicinal ingredient is:**

Lidocaine Hydrochloride 0.4% and 5% Dextrose solution

**What the nonmedicinal ingredients are:**

Sodium hydroxide and water for injection

**What dosage forms it comes in:**

- Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection -250mL and 500mL

**WARNINGS AND PRECAUTIONS**

**BEFORE you use Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection talk to your doctor, nurse or pharmacist if you:**

- have a slow heartbeat.
- have low levels of potassium in your blood.
- have epilepsy.
- have low blood pressure.
- have problems with your heart, liver or kidneys.
- have been diagnosed with acute porphyria.
- are experiencing severe shock.
- are pregnant or plan to become pregnant.
- are breastfeeding or planning to breastfeed.

**INTERACTIONS WITH THIS MEDICATION**

As with most medicines, interactions with other drugs are possible. Tell your doctor, nurse, or pharmacist about all the medicines you take, including drugs prescribed by other doctors, vitamins, minerals, natural supplements, or alternative medicines.

The following may interact with Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection:

- Antiarrhythmic drugs used to treat heart problems such as; mexiletine, amiodarone.
- Other anesthetics such as; lidocaine.
- Cimetidine used for stomach problems.
- Fluvoxamine used to treat depression.
- Drugs used to treat migraines.
- Antipsychotic drugs.
- Beta-blockers, used to treat heart problems, such as; metoprolol, nadolol, propranolol.
- Drugs used to treat epilepsy and seizures such as; carbamazepine, phenobarbital, phenytoin, primidone.

**PROPER USE OF THIS MEDICATION**

**Usual dose:**

Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection must be administered by a doctor. The doctor will decide on the dose you will be given based on your individual needs.

**Overdose:**

Serious side effects can occur if you are given too much Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection. Early signs that too much Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection has been given include:

- numbness of the lips and around the mouth,
- lightheadedness or dizziness,
- blurred vision,

- hearing problems and/or ringing in the ears.

In the event of a serious overdose, trembling, seizures or unconsciousness may occur.

If you think you have been given too much Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection, contact your doctor, nurse, hospital emergency department or regional Poison Control Centre immediately, even if there are no symptoms.

### SIDE EFFECTS AND WHAT TO DO ABOUT THEM

Side effects may include:

- nausea, vomiting
- dizziness, lightheadedness
- drowsiness
- sensations of heat, cold or numbness
- sensitivity to sounds, ringing in the ears

If any of these affects you severely, tell your doctor, nurse or pharmacist.

SERIOUS SIDE EFFECTS, HOW OFTEN THEY HAPPEN AND WHAT TO DO ABOUT THEM				
Symptom/ effect		Talk with your doctor, nurse or pharmacist		Stop taking drug and seek immediate medical help
		Only if severe	In all Cases	
<b>Com mon</b>	<b>Abnormal sensations:</b> pins and needles, numbness around the mouth and/or of the tongue		√	
	<b>Slow or irregular heartbeat</b>		√	
	<b>High blood pressure:</b> headache, dizziness, shortness of breath, vision problems		√	
	<b>Low blood pressure:</b> dizziness, fainting, lightheadedness.  May occur when you go from lying or sitting to standing up.		√	
<b>Rare</b>	<b>Prolonged dizziness</b>		√	
	<b>Heart attack:</b> Severe crushing chest pain, irregular heartbeat, shortness of breath			√
	<b>Allergic reaction:</b> rash, hives, swelling of the face, lips, tongue or throat, difficulty swallowing or breathing			√

**SERIOUS SIDE EFFECTS, HOW OFTEN THEY HAPPEN AND WHAT TO DO ABOUT THEM**

Symptom/ effect	Talk with your doctor, nurse or pharmacist		Stop taking drug and seek immediate medical help
	Only if severe	In all Cases	
<b>Nerve Injury:</b> paralysis or tingling of the arms and legs		√	
<b>Vision problems:</b> Blurred vision		√	
<b>Nervous system disorders:</b> nervousness, apprehension, euphoria, confusion, twitching, tremors, convulsions, unconsciousness			√
<b>Respiratory arrest:</b> severe trouble breathing, unconsciousness			√

*This is not a complete list of side effects. For any unexpected effects while taking Lidocaine Hydrochloride 0.4% and 5% Dextrose Injection, contact your doctor, nurse or pharmacist.*

**HOW TO STORE IT**

Store at room temperature (15-25°C).  
Keep out of reach and sight of children.

**REPORTING SIDE EFFECTS**

You can help improve the safe use of health products for Canadians by reporting serious and unexpected side effects to Health Canada. Your report may help to identify new side effects and change the product safety information.

**3 ways to report:**

- Online at MedEffect (<http://hc-sc.gc.ca/dhp-mps/medeff/index-eng.php>);
- By calling 1-866-234-2345 (toll-free);
- By completing a Consumer Side Effect Reporting Form and sending it by:
  - Fax to 1-866-678-6789 (toll-free), or
  - Mail to: Canada Vigilance Program  
Health Canada, Postal Locator  
0701E Ottawa, Ontario  
K1A 0K9

Postage paid labels and the Consumer Side Effect Reporting Form are available at MedEffect (<http://hc-sc.gc.ca/dhp-mps/medeff/index-eng.php>).

*NOTE: Contact your health professional if you need information about how to manage your side effects. The Canada Vigilance Program does not provide medical advice.*

**MORE INFORMATION**

NOTE: This CONSUMER INFORMATION leaflet provides you with the most current information at the time of printing.

This document plus the full product monograph, prepared for health professionals can be obtained by contacting the sponsor, Baxter Corporation, at 1-888-719-9955.

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