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2 **Xylocaine[®] (lidocaine HCl Injection, USP)**

3 **Xylocaine[®] (lidocaine HCl and epinephrine Injection, USP)**

4 For Infiltration and Nerve Block

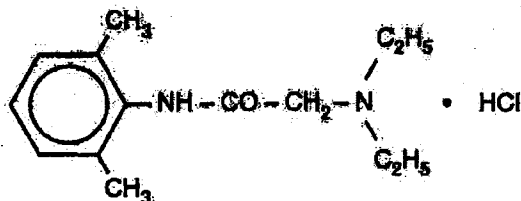
5 Rx only

6 **DESCRIPTION :**

7 Xylocaine (lidocaine HCl) Injections are sterile, nonpyrogenic, aqueous solutions that contain a
8 local anesthetic agent with or without epinephrine and are administered parenterally by injection.

9 See **INDICATIONS** for **specific uses**.

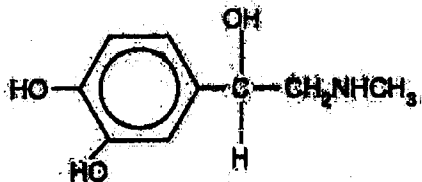
10 Xylocaine solutions contain lidocaine HCl, which is chemically designated as acetamide,
11 2-(diethylamino)-N-(2,6-dimethylphenyl)-, monohydrochloride and has the molecular wt. 270.8.
12 Lidocaine HCl (C₁₄H₂₂N₂O • HCl) has the following structural formula:



13

14

15 Epinephrine is (-) -3, 4-Dihydroxy- α -[(methylamino) methyl] benzyl alcohol and has the
16 molecular wt. 183.21. Epinephrine (C₉H₁₃NO₃) has the following structural formula:



17

18 **Dosage forms listed as Xylocaine-MPF indicate single dose solutions that are Methyl**
19 **Paraben Free (MPF).**

20 **Xylocaine MPF** is a sterile, nonpyrogenic, isotonic solution containing sodium chloride.

21 **Xylocaine** in multiple dose vials: Each mL also contains 1 mg methylparaben as antiseptic
22 preservative. The pH of these solutions is adjusted to approximately 6.5 (5.0–7.0) with sodium
23 hydroxide and/or hydrochloric acid.

1 Xylocaine MPF with Epinephrine is a sterile, nonpyrogenic, isotonic solution containing
2 sodium chloride. Each mL contains lidocaine hydrochloride and epinephrine, with 0.5 mg
3 sodium metabisulfite as an antioxidant and 0.2 mg citric acid as a stabilizer. Xylocaine with
4 Epinephrine in multiple dose vials: Each mL also contains 1 mg methylparaben as antiseptic
5 preservative. The pH of these solutions is adjusted to approximately 4.5 (3.3–5.5) with sodium
6 hydroxide and/or hydrochloric acid. Filled under nitrogen.

7 **CLINICAL PHARMACOLOGY:**

8 **Mechanism of Action:**

9 Lidocaine HCl stabilizes the neuronal membrane by inhibiting the ionic fluxes required for the
10 initiation and conduction of impulses thereby effecting local anesthetic action.

11 **Hemodynamics:**

12 Excessive blood levels may cause changes in cardiac output, total peripheral resistance, and
13 mean arterial pressure. With central neural blockade these changes may be attributable to block
14 of autonomic fibers, a direct depressant effect of the local anesthetic agent on various
15 components of the cardiovascular system, and/or the beta-adrenergic receptor stimulating action
16 of epinephrine when present. The net effect is normally a modest hypotension when the
17 recommended dosages are not exceeded.

18 **Pharmacokinetics and Metabolism:**

19 Information derived from diverse formulations, concentrations and usages reveals that lidocaine
20 HCl is completely absorbed following parenteral administration, its rate of absorption depending,
21 for example, upon various factors such as the site of administration and the presence or absence
22 of a vasoconstrictor agent. Except for intravascular administration, the highest blood levels are
23 obtained following intercostal nerve block and the lowest after subcutaneous administration.

24 The plasma binding of lidocaine HCl is dependent on drug concentration, and the fraction
25 bound decreases with increasing concentration. At concentrations of 1 to 4 mcg of free base per
26 mL 60 to 80 percent of lidocaine HCl is protein bound. Binding is also dependent on the plasma
27 concentration of the alpha-1-acid glycoprotein.

28 Lidocaine HCl crosses the blood-brain and placental barriers, presumably by passive
29 diffusion.

30 Lidocaine HCl is metabolized rapidly by the liver, and metabolites and unchanged drug

1 are excreted by the kidneys. Biotransformation includes oxidative N-dealkylation, ring
2 hydroxylation, cleavage of the amide linkage, and conjugation. N-dealkylation, a major pathway
3 of biotransformation, yields the metabolites monoethylglycinexylidide and glycinexylidide. The
4 pharmacological/toxicological actions of these metabolites are similar to, but less potent than,
5 those of lidocaine HCl. Approximately 90% of lidocaine HCl administered is excreted in the
6 form of various metabolites, and less than 10% is excreted unchanged. The primary metabolite
7 in urine is a conjugate of 4-hydroxy-2,6-dimethylaniline.

8 The elimination half-life of lidocaine HCl following an intravenous bolus injection is
9 typically 1.5 to 2.0 hours. Because of the rapid rate at which lidocaine HCl is metabolized, any
10 condition that affects liver function may alter lidocaine HCl kinetics. The half-life may be
11 prolonged two-fold or more in patients with liver dysfunction. Renal dysfunction does not affect
12 lidocaine HCl kinetics but may increase the accumulation of metabolites.

13 Factors such as acidosis and the use of CNS stimulants and depressants affect the CNS
14 levels of lidocaine HCl required to produce overt systemic effects. Objective adverse
15 manifestations become increasingly apparent with increasing venous plasma levels above 6.0 µg
16 free base per mL. In the rhesus monkey arterial blood levels of 18–21 µg/mL have been shown
17 to be threshold for convulsive activity.

18 **INDICATIONS AND USAGE:**

19 Xylocaine (lidocaine HCl) Injections are indicated for production of local or regional anesthesia
20 by infiltration techniques such as percutaneous injection and intravenous regional anesthesia by
21 peripheral nerve block techniques such as brachial plexus and intercostal and by central neural
22 techniques such as lumbar and caudal epidural blocks, when the accepted procedures for these
23 techniques as described in standard textbooks are observed.

24 **CONTRAINDICATIONS :**

25 Lidocaine HCl is contraindicated in patients with a known history of hypersensitivity to local
26 anesthetics of the amide type.

27 **WARNINGS:**

28 **XYLOCAINE INJECTIONS FOR INFILTRATION AND NERVE BLOCK SHOULD BE**
29 **EMPLOYED ONLY BY CLINICIANS WHO ARE WELL VERSED IN DIAGNOSIS AND**
30 **MANAGEMENT OF DOSE-RELATED TOXICITY AND OTHER ACUTE EMERGENCIES**
31 **THAT MIGHT ARISE FROM THE BLOCK TO BE EMPLOYED AND THEN ONLY AFTER**

1 ENSURING THE *IMMEDIATE* AVAILABILITY OF OXYGEN, OTHER RESUSCITATIVE
2 DRUGS, CARDIOPULMONARY EQUIPMENT AND THE PERSONNEL NEEDED FOR
3 PROPER MANAGEMENT OF TOXIC REACTIONS AND RELATED EMERGENCIES. (See
4 also **ADVERSE REACTIONS** and **PRECAUTIONS**.) DELAY IN PROPER
5 MANAGEMENT OF DOSE-RELATED TOXICITY, UNDERVENTILATION FROM ANY
6 CAUSE AND/OR ALTERED SENSITIVITY MAY LEAD TO THE DEVELOPMENT OF
7 ACIDOSIS, CARDIAC ARREST AND, POSSIBLY, DEATH.

8 Intra-articular infusions of local anesthetics following arthroscopic and other surgical
9 procedures is an unapproved use, and there have been post-marketing reports of chondrolysis in
10 patients receiving such infusions. The majority of reported cases of chondrolysis have involved
11 the shoulder joint; cases of gleno-humeral chondrolysis have been described in pediatric and
12 adult patients following intra-articular infusions of local anesthetics with and without
13 epinephrine for periods of 48 to 72 hours. There is insufficient information to determine whether
14 shorter infusion periods are not associated with these findings. The time of onset of symptoms,
15 such as joint pain, stiffness and loss of motion can be variable, but may begin as early as the 2nd
16 month after surgery. Currently, there is no effective treatment for chondrolysis; patients who
17 experienced chondrolysis have required additional diagnostic and therapeutic procedures and
18 some required arthroplasty or shoulder replacement.

19 To avoid intravascular injection, aspiration should be performed before the local
20 anesthetic solution is injected. The needle must be repositioned until no return of blood can be
21 elicited by aspiration. Note, however, that the absence of blood in the syringe does not guarantee
22 that intravascular injection has been avoided.

23 Local anesthetic solutions containing antimicrobial preservatives (eg, methylparaben)
24 should not be used for epidural or spinal anesthesia because the safety of these agents has not
25 been established with regard to intrathecal injection, either intentional or accidental.

26 Xylocaine with epinephrine solutions contain sodium metabisulfite, a sulfite that may
27 cause allergic-type reactions including anaphylactic symptoms and life-threatening or less severe
28 asthmatic episodes in certain susceptible people. The overall prevalence of sulfite sensitivity in
29 the general population is unknown and probably low. Sulfite sensitivity is seen more frequently
30 in asthmatic than in non-asthmatic people.

31

1 **PRECAUTIONS:**

2 **General**

3 The safety and effectiveness of lidocaine HCl depend on proper dosage, correct technique,
4 adequate precautions, and readiness for emergencies. Standard textbooks should be consulted
5 for specific techniques and precautions for various regional anesthetic procedures.

6 Resuscitative equipment, oxygen, and other resuscitative drugs should be available for
7 immediate use. (See **WARNINGS** and **ADVERSE REACTIONS**.) The lowest dosage that
8 results in effective anesthesia should be used to avoid high plasma levels and serious adverse
9 effects. Syringe aspirations should also be performed before and during each supplemental
10 injection when using indwelling catheter techniques. During the administration of epidural
11 anesthesia, it is recommended that a test dose be administered initially and that the patient be
12 monitored for central nervous system toxicity and cardiovascular toxicity, as well as for signs of
13 unintended intrathecal administration, before proceeding. When clinical conditions permit,
14 consideration should be given to employing local anesthetic solutions that contain epinephrine
15 for the test dose because circulatory changes compatible with epinephrine may also serve as a
16 warning sign of unintended intravascular injection. An intravascular injection is still possible
17 even if aspirations for blood are negative. Repeated doses of lidocaine HCl may cause
18 significant increases in blood levels with each repeated dose because of slow accumulation of the
19 drug or its metabolites. Tolerance to elevated blood levels varies with the status of the patient.
20 Debilitated, elderly patients, acutely ill patients, and children should be given reduced doses
21 commensurate with their age and physical condition. Lidocaine HCl should also be used with
22 caution in patients with severe shock or heart block.

23 Lumbar and caudal epidural anesthesia should be used with extreme caution in persons
24 with the following conditions: existing neurological disease, spinal deformities, septicemia, and
25 severe hypertension.

26 Local anesthetic solutions containing a vasoconstrictor should be used cautiously and in
27 carefully circumscribed quantities in areas of the body supplied by end arteries or having
28 otherwise compromised blood supply. Patients with peripheral vascular disease and those with
29 hypertensive vascular disease may exhibit exaggerated vasoconstrictor response. Ischemic
30 injury or necrosis may result. Preparations containing a vasoconstrictor should be used with
31 caution in patients during or following the administration of potent general anesthetic agents,
32 since cardiac arrhythmias may occur under such conditions.

1 Careful and constant monitoring of cardiovascular and respiratory (adequacy of
2 ventilation) vital signs and the patient's state of consciousness should be accomplished after each
3 local anesthetic injection. It should be kept in mind at such times that restlessness, anxiety,
4 tinnitus, dizziness, blurred vision, tremors, depression or drowsiness may be early warning signs
5 of central nervous system toxicity.

6 Since amide-type local anesthetics are metabolized by the liver, Xylocaine Injection
7 should be used with caution in patients with hepatic disease. Patients with severe hepatic
8 disease, because of their inability to metabolize local anesthetics normally, are at greater risk of
9 developing toxic plasma concentrations. Xylocaine Injection should also be used with caution in
10 patients with impaired cardiovascular function since they may be less able to compensate for
11 functional changes associated with the prolongation of A-V conduction produced by these drugs.

12 Many drugs used during the conduct of anesthesia are considered potential triggering
13 agents for familial malignant hyperthermia. Since it is not known whether amide-type local
14 anesthetics may trigger this reaction and since the need for supplemental general anesthesia
15 cannot be predicted in advance, it is suggested that a standard protocol for the management of
16 malignant hyperthermia should be available. Early unexplained signs of tachycardia, tachypnea,
17 labile blood pressure and metabolic acidosis may precede temperature elevation. Successful
18 outcome is dependent on early diagnosis, prompt discontinuance of the suspect triggering
19 agent(s) and institution of treatment, including oxygen therapy, indicated supportive measures
20 and dantrolene (consult dantrolene sodium intravenous package insert before using).

21 Proper tourniquet technique, as described in publications and standard textbooks, is
22 essential in the performance of intravenous regional anesthesia. Solutions containing
23 epinephrine or other vasoconstrictors should not be used for this technique.

24 Lidocaine HCl should be used with caution in persons with known drug sensitivities.
25 Patients allergic to para-aminobenzoic acid derivatives (procaine, tetracaine, benzocaine, etc)
26 have not shown cross-sensitivity to lidocaine HCl.

27 Use in the Head and Neck Area

28 Small doses of local anesthetics injected into the head and neck area, including retrobulbar,
29 dental and stellate ganglion blocks, may produce adverse reactions similar to systemic toxicity
30 seen with unintentional intravascular injections of larger doses. Confusion, convulsions,
31 respiratory depression and/or respiratory arrest, and cardiovascular stimulation or depression

1 have been reported. These reactions may be due to intra-arterial injection of the local anesthetic
2 with retrograde flow to the cerebral circulation. Patients receiving these blocks should have their
3 circulation and respiration monitored and be constantly observed. Resuscitative equipment and
4 personnel for treating adverse reactions should be immediately available. Dosage
5 recommendations should not be exceeded. (See **DOSAGE AND ADMINISTRATION.**)

6 **Information for Patients**

7 When appropriate, patients should be informed in advance that they may experience temporary
8 loss of sensation and motor activity, usually in the lower half of the body, following proper
9 administration of epidural anesthesia.

10

11 **Clinically Significant Drug Interactions**

12 The administration of local anesthetic solutions containing epinephrine or norepinephrine to
13 patients receiving monoamine oxidase inhibitors or tricyclic antidepressants may produce severe,
14 prolonged hypertension.

15 Phenothiazines and butyrophenones may reduce or reverse the pressor effect of
16 epinephrine.

17 Concurrent use of these agents should generally be avoided. In situations when
18 concurrent therapy is necessary, careful patient monitoring is essential.

19 Concurrent administration of vasopressor drugs (for the treatment of hypotension related
20 to obstetric blocks) and ergot-type oxytocic drugs may cause severe, persistent hypertension or
21 cerebrovascular accidents.

22 **Drug/Laboratory Test Interactions**

23 The intramuscular injection of lidocaine HCl may result in an increase in creatine
24 phosphokinase levels. Thus, the use of this enzyme determination, without isoenzyme
25 separation, as a diagnostic test for the presence of acute myocardial infarction may be
26 compromised by the intramuscular injection of lidocaine HCl.

27 **Carcinogenesis, Mutagenesis, Impairment of Fertility**

28 Studies of lidocaine HCl in animals to evaluate the carcinogenic and mutagenic potential or the

1 effect on fertility have not been conducted.

2 **Pregnancy**

3 *Teratogenic Effects:* Pregnancy Category B. Reproduction studies have been performed in rats
4 at doses up to 6.6 times the human dose and have revealed no evidence of harm to the fetus
5 caused by lidocaine HCl. There are, however, no adequate and well-controlled studies in
6 pregnant women. Animal reproduction studies are not always predictive of human response.
7 General consideration should be given to this fact before administering lidocaine HCl to women
8 of childbearing potential, especially during early pregnancy when maximum organogenesis takes
9 place.

10

11 **Labor and Delivery**

12 Local anesthetics rapidly cross the placenta and when used for epidural, paracervical, pudendal
13 or caudal block anesthesia, can cause varying degrees of maternal, fetal and neonatal toxicity.
14 (See CLINICAL PHARMACOLOGY, Pharmacokinetics.) The potential for toxicity
15 depends upon the procedure performed, the type and amount of drug used, and the technique of
16 drug administration. Adverse reactions in the parturient, fetus and neonate involve alterations of
17 the central nervous system, peripheral vascular tone and cardiac function.

18 Maternal hypotension has resulted from regional anesthesia. Local anesthetics produce
19 vasodilation by blocking sympathetic nerves. Elevating the patient's legs and positioning her on
20 her left side will help prevent decreases in blood pressure.

21 The fetal heart rate also should be monitored continuously, and electronic fetal
22 monitoring is highly advisable.

23 Epidural, spinal, paracervical, or pudendal anesthesia may alter the forces of parturition
24 through changes in uterine contractility or maternal expulsive efforts. In one study, paracervical
25 block anesthesia was associated with a decrease in the mean duration of first stage labor and
26 facilitation of cervical dilation. However, spinal and epidural anesthesia have also been reported
27 to prolong the second stage of labor by removing the parturient's reflex urge to bear down or by
28 interfering with motor function. The use of obstetrical anesthesia may increase the need for
29 forceps assistance.

1 The use of some local anesthetic drug products during labor and delivery may be
2 followed by diminished muscle strength and tone for the first day or two of life. The long-term
3 significance of these observations is unknown. Fetal bradycardia may occur in 20 to 30 percent
4 of patients receiving paracervical nerve block anesthesia with the amide-type local anesthetics
5 and may be associated with fetal acidosis. Fetal heart rate should always be monitored during
6 paracervical anesthesia. The physician should weigh the possible advantages against risks when
7 considering a paracervical block in prematurity, toxemia of pregnancy, and fetal distress.
8 Careful adherence to recommended dosage is of the utmost importance in obstetrical
9 paracervical block. Failure to achieve adequate analgesia with recommended doses should
10 arouse suspicion of intravascular or fetal intracranial injection. Cases compatible with
11 unintended fetal intracranial injection of local anesthetic solution have been reported following
12 intended paracervical or pudendal block or both. Babies so affected present with unexplained
13 neonatal depression at birth, which correlates with high local anesthetic serum levels, and often
14 manifest seizures within six hours. Prompt use of supportive measures combined with forced
15 urinary excretion of the local anesthetic has been used successfully to manage this complication.

16 Case reports of maternal convulsions and cardiovascular collapse following use of some
17 local anesthetics for paracervical block in early pregnancy (as anesthesia for elective abortion)
18 suggest that systemic absorption under these circumstances may be rapid. The recommended
19 maximum dose of each drug should not be exceeded. Injection should be made slowly and with
20 frequent aspiration. Allow a 5-minute interval between sides.

21 *Nursing Mothers*

22 It is not known whether this drug is excreted in human milk. Because many drugs are excreted
23 in human milk, caution should be exercised when lidocaine HCl is administered to a nursing
24 woman.

25 *Pediatric Use*

26 Dosages in children should be reduced, commensurate with age, body weight and physical
27 condition. See **DOSAGE AND ADMINISTRATION**.

28

29

1 **ADVERSE REACTIONS**

2 *Systemic*

3 Adverse experiences following the administration of lidocaine HCl are similar in nature to those
4 observed with other amide local anesthetic agents. These adverse experiences are, in general,
5 dose-related and may result from high plasma levels caused by excessive dosage, rapid
6 absorption or inadvertent intravascular injection, or may result from a hypersensitivity,
7 idiosyncrasy or diminished tolerance on the part of the patient. Serious adverse experiences are
8 generally systemic in nature. The following types are those most commonly reported:

9 *Central Nervous System*

10 CNS manifestations are excitatory and/or depressant and may be characterized by
11 lightheadedness, nervousness, apprehension, euphoria, confusion, dizziness, drowsiness, tinnitus,
12 blurred or double vision, vomiting, sensations of heat, cold or numbness, twitching, tremors,
13 convulsions, unconsciousness, respiratory depression and arrest. The excitatory manifestations
14 may be very brief or may not occur at all, in which case the first manifestation of toxicity may be
15 drowsiness merging into unconsciousness and respiratory arrest.

16 Drowsiness following the administration of lidocaine HCl is usually an early sign of a
17 high blood level of the drug and may occur as a consequence of rapid absorption.

18 *Cardiovascular System*

19 Cardiovascular manifestations are usually depressant and are characterized by bradycardia,
20 hypotension, and cardiovascular collapse, which may lead to cardiac arrest.

21 *Allergic*

22 Allergic reactions are characterized by cutaneous lesions, urticaria, edema or anaphylactoid
23 reactions. Allergic reactions may occur as a result of sensitivity either to local anesthetic agents
24 or to the methylparaben used as a preservative in the multiple dose vials. Allergic reactions as
25 result of sensitivity to lidocaine HCl are extremely rare and, if they occur, should be managed by
26 conventional means. The detection of sensitivity by skin testing is of doubtful value.

27 *Neurologic*

28 The incidences of adverse reactions associated with the use of local anesthetics may be related to
29 the total dose of local anesthetic administered and are also dependent upon the particular drug
30 used, the route of administration and the physical status of the patient. In a prospective review of

1 10,440 patients who received lidocaine HCl for spinal anesthesia, the incidences of adverse
2 reactions were reported to be about 3 percent each for positional headaches, hypotension and
3 backache; 2 percent for shivering; and less than 1 percent each for peripheral nerve symptoms,
4 nausea, respiratory inadequacy and double vision. Many of these observations may be related to
5 local anesthetic techniques, with or without a contribution from the local anesthetic.

6 In the practice of caudal or lumbar epidural block, occasional unintentional penetration of
7 the subarachnoid space by the catheter may occur. Subsequent adverse effects may depend
8 partially on the amount of drug administered subdurally. These may include spinal block of
9 varying magnitude (including total spinal block), hypotension secondary to spinal block, loss of
10 bladder and bowel control, and loss of perineal sensation and sexual function. Persistent motor,
11 sensory and/or autonomic (sphincter control) deficit of some lower spinal segments with slow
12 recovery (several months) or incomplete recovery have been reported in rare instances when
13 caudal or lumbar epidural block has been attempted. Backache and headache have also been
14 noted following use of these anesthetic procedures.

15 There have been reported cases of permanent injury to extraocular muscles requiring
16 surgical repair following retrobulbar administration.

17 **OVERDOSAGE:**

18 Acute emergencies from local anesthetics are generally related to high plasma levels encountered
19 during therapeutic use of local anesthetics or to unintended subarachnoid injection of local
20 anesthetic solution (see **ADVERSE REACTIONS, WARNINGS, and PRECAUTIONS**)

21 *Management of Local Anesthetic Emergencies*

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

25 The first step in the management of convulsions, as well as underventilation or apnea due
26 to unintended subarachnoid injection of drug solution, consists of immediate attention to the
27 maintenance of a patent airway and assisted or controlled ventilation with oxygen and a delivery
28 system capable of permitting immediate positive airway pressure by mask. Immediately after the
29 institution of these ventilatory measures, the adequacy of the circulation should be evaluated,
30 keeping in mind that drugs used to treat convulsions sometimes depress the circulation when
31 administered intravenously. Should convulsions persist despite adequate respiratory support, and

1 if the status of the circulation permits, small increments of an ultra-short acting barbiturate (such
2 as thiopental or thiamylal) or a benzodiazepine (such as diazepam) may be administered
3 intravenously. The clinician should be familiar, prior to the use of local anesthetics, with these
4 anticonvulsant drugs. Supportive treatment of circulatory depression may require administration
5 of intravenous fluids and, when appropriate, a vasopressor as directed by the clinical situation
6 (eg, ephedrine).

7 If not treated immediately, both convulsions and cardiovascular depression can result in
8 hypoxia, acidosis, bradycardia, arrhythmias and cardiac arrest. Underventilation or apnea due to
9 unintentional subarachnoid injection of local anesthetic solution may produce these same signs
10 and also lead to cardiac arrest if ventilatory support is not instituted. If cardiac arrest should
11 occur, standard cardiopulmonary resuscitative measures should be instituted.

12 Endotracheal intubation, employing drugs and techniques familiar to the clinician, may
13 be indicated, after initial administration of oxygen by mask, if difficulty is encountered in the
14 maintenance of a patent airway or if prolonged ventilatory support (assisted or controlled) is
15 indicated.

16 Dialysis is of negligible value in the treatment of acute overdosage with lidocaine HCl.
17 The oral LD50 of lidocaine HCl in non-fasted female rats is 459 (346-773) mg/kg (as the salt)
18 and 214 (159-324) mg/kg (as the salt) in fasted female rats.

19 **DOSAGE AND ADMINISTRATION:**

20 Table 1 (Recommended Dosages) summarizes the recommended volumes and concentrations of
21 Xylocaine Injection for various types of anesthetic procedures. The dosages suggested in this
22 table are for normal healthy adults and refer to the use of epinephrine-free solutions. When larger
23 volumes are required, only solutions containing epinephrine should be used except in those cases
24 where vasopressor drugs may be contraindicated.

25 There have been adverse event reports of chondrolysis in patients receiving intra-articular
26 infusions of local anesthetics following arthroscopic and other surgical procedures. Xylocaine is
27 not approved for this use (see **WARNINGS** and **DOSAGE and ADMINISTRATION**).

28 These recommended doses serve only as a guide to the amount of anesthetic required for
29 most routine procedures. The actual volumes and concentrations to be used depend on a number
30 of factors such as type and extent of surgical procedure, depth of anesthesia and degree of
31 muscular relaxation required, duration of anesthesia required, and the physical condition of the

1 patient. In all cases the lowest concentration and smallest dose that will produce the desired
2 result should be given. Dosages should be reduced for children and for the elderly and debilitated
3 patients and patients with cardiac and/or liver disease.

4 The onset of anesthesia, the duration of anesthesia and the degree of muscular relaxation
5 are proportional to the volume and concentration (ie, total dose) of local anesthetic used. Thus,
6 an increase in volume and concentration of Xylocaine Injection will decrease the onset of
7 anesthesia, prolong the duration of anesthesia, provide a greater degree of muscular relaxation
8 and increase the segmental spread of anesthesia. However, increasing the volume and
9 concentration of Xylocaine Injection may result in a more profound fall in blood pressure when
10 used in epidural anesthesia. Although the incidence of side effects with lidocaine HCl is quite
11 low, caution should be exercised when employing large volumes and concentrations, since the
12 incidence of side effects is directly proportional to the total dose of local anesthetic agent
13 injected.

14 For intravenous regional anesthesia, only the 50 mL single dose vial containing
15 Xylocaine (lidocaine HCl) 0.5% Injection should be used.

16 ***Epidural Anesthesia***

17 For epidural anesthesia, only the following dosage forms Xylocaine Injection are recommended:

18 1% without epinephrine	10 mL Polyamp DuoFit™
19 1% without epinephrine	30 mL single dose solutions
20 1% with epinephrine	30 mL single dose solutions
21 1:200,000	
22 1.5% without epinephrine	10 mL Polyamp DuoFit™
23 1.5% without epinephrine	20 mL Polyamp DuoFit™
24 1.5% with epinephrine	30 mL ampules, 30 mL single dose solutions
25 1:200,000	
26 2% without epinephrine	10 mL Polyamp DuoFit™
27 2% with epinephrine	20 mL ampules, 20 mL single dose solutions
28 1:200,000	

29 Although these solutions are intended specifically for epidural anesthesia, they may also be
30 used for infiltration and peripheral nerve block, provided they are employed as single dose units.

1 These solutions contain no bacteriostatic agent.

2 In epidural anesthesia, the dosage varies with the number of dermatomes to be anesthetized
3 (generally 2-3 mL of the indicated concentration per dermatome).

4 *Caudal and Lumbar Epidural Block*

5 As a precaution against the adverse experience sometimes observed following unintentional
6 penetration of the subarachnoid space, a test dose such as 2 to 3 mL of 1.5% lidocaine HCl
7 should be administered at least 5 minutes prior to injecting the total volume required for a lumbar
8 or caudal epidural block. The test dose should be repeated if the patient is moved in a manner
9 that may have displaced the catheter. Epinephrine, if contained in the test dose (10 to 15 mcg
10 have been suggested), may serve as a warning of unintentional intravascular injection. If
11 injected into a blood vessel, this amount of epinephrine is likely to produce a transient
12 "epinephrine response" within 45 seconds, consisting of an increase in heart rate and systolic
13 blood pressure, circumoral pallor, palpitations and nervousness in the unsedated patient. The
14 sedated patient may exhibit only a pulse rate increase of 20 or more beats per minute for 15 or
15 more seconds. Patients on beta blockers may not manifest changes in heart rate, but blood
16 pressure monitoring can detect an evanescent rise in systolic blood pressure. Adequate time
17 should be allowed for onset of anesthesia after administration of each test dose. The rapid
18 injection of a large volume of Xylocaine Injection through the catheter should be avoided, and,
19 when feasible, fractional doses should be administered.

20 In the event of the known injection of a large volume of local anesthetic solution into the
21 subarachnoid space, after suitable resuscitation and if the catheter is in place, consider attempting
22 the recovery of drug by draining a moderate amount of cerebrospinal fluid (such as 10 mL)
23 through the epidural catheter.

24 **MAXIMUM RECOMMENDED DOSAGES:**

25 *Adults*

26 For normal healthy adults, the individual maximum recommended dose of lidocaine HCl with
27 epinephrine should not exceed 7 mg/kg (3.5 mg/lb) of body weight, and in general it is
28 recommended that the maximum total dose not exceed 500 mg. When used without epinephrine
29 the maximum individual dose should not exceed 4.5 mg/kg (2 mg/lb) of body weight, and in
30 general it is recommended that the maximum total dose does not exceed 300 mg. For continuous
31 epidural or caudal anesthesia, the maximum recommended dosage should not be administered at

1 intervals of less than 90 minutes. When continuous lumbar or caudal epidural anesthesia is used
2 for non-obstetrical procedures, more drug may be administered if required to produce adequate
3 anesthesia.

4 The maximum recommended dose per 90 minute period of lidocaine hydrochloride for
5 paracervical block in obstetrical patients and non-obstetrical patients is 200 mg total. One half of
6 the total dose is usually administered to each side. Inject slowly, five minutes between sides.
7 (See also discussion of paracervical block in **PRECAUTIONS.**)

8 For intravenous regional anesthesia, the dose administered should not exceed 4mg/kg in
9 adults.

11 **Children**

12 It is difficult to recommend a maximum dose of any drug for children, since this varies as a
13 function of age and weight. For children over 3 years of age who have a normal lean body mass
14 and normal body development, the maximum dose is determined by the child's age and weight.
15 For example, in a child of 5 years weighing 50 lbs the dose of lidocaine HCl should not exceed
16 75-100 mg (1.5 to 2 mg/lb). The use of even more dilute solutions (ie, 0.25 to 0.5%) and total
17 dosages not to exceed 3 mg/kg (1.4 mg/lb) are recommended for induction of intravenous
18 regional anesthesia in children.

19 In order to guard against systemic toxicity, the lowest effective concentration and lowest
20 effective dose should be used at all times. In some cases it will be necessary to dilute available
21 concentrations with 0.9% sodium chloride injection in order to obtain the required final
22 concentration.

23 NOTE: Parenteral drug products should be inspected visually for particulate matter and
24 discoloration prior to administration whenever the solution and container permit. The Injection
25 is not to be used if its color is pinkish or darker than slightly yellow or if it contains a precipitate.

1 **Table 1. Recommended Dosages**

Procedure	Xylocaine (lidocaine hydrochloride) Injection (without epinephrine)		
	Conc (%)	Vol (mL)	Total Dose (mg)
Infiltration			
Percutaneous	0.5 or 1	1-60	5-300
Intravenous regional	0.5	10-60	50-300
Peripheral Nerve Blocks, eg			
Brachial	1.5	15-20	225-300
Dental	2	1-5	20-100
Intercostal	1	3	30
Paravertebral	1	3-5	30-50
Pudendal (each side)	1	10	100
Paracervical			
Obstetrical analgesia (each side)	1	10	100
Sympathetic Nerve Blocks, eg,			
Cervical (stellate ganglion)	1	5	50
Lumbar	1	5-10	50-100
Central Neural Blocks			
Epidural*			
Thoracic	1	20-30	200-300
Lumbar			
Analgesia	1	25-30	250-300
Anesthesia	1.5	15-20	225-300
	2	10-15	200-300
Caudal			
Obstetrical analgesia	1	20-30	200-300
Surgical anesthesia	1.5	15-20	225-300

2 *Dose determined by number of dermatomes to be anesthetized (2-3 mL/dermatome).

3 THE ABOVE SUGGESTED CONCENTRATIONS AND VOLUMES SERVE ONLY AS A
4 GUIDE. OTHER VOLUMES AND CONCENTRATIONS MAY BE USED PROVIDED THE
5 TOTAL MAXIMUM RECOMMENDED DOSE IS NOT EXCEEDED.

6 **STERILIZATION, STORAGE AND TECHNICAL PROCEDURES:**

7 Disinfecting agents containing heavy metals, which cause release of respective ions (mercury,
8 zinc, copper, etc) should not be used for skin or mucous membrane disinfection as they have
9 been related to incidents of swelling and edema. When chemical disinfection of multi-dose vials
10 is desired, either isopropyl alcohol (91%) or ethyl alcohol (70%) is recommended. Many
11 commercially available brands of rubbing alcohol, as well as solutions of ethyl alcohol not of

1 USP grade, contain denaturants which are injurious to rubber and therefore are not to be used.

2 Dosage forms listed as Xylocaine-MPF indicate single dose solutions that are Methyl

3 Paraben Free (MPF).

4 **HOW SUPPLIED:**

Xylocaine Epinephrine (lidocaine HCl) Dilution Concentration (if present)	Xylocaine-MPF										Xylocaine					
	Ampules (mL)					Polyamp DuoPF [®] (mL)	Single Dose Vials (mL)					Multiple Dose Vials (mL)				
	2	5	10	20	30	10	20	2	5	10	20	30	50	10	20	50
0.5%													X			X
0.5% 1:200,000																X
1%	X	X				X	X	X	X			X	X	X	X	
1% 1:100,000													X	X	X	
1% 1:200,000					X					X	X					
1.5%						X	X	X								
1.5% 1:200,000	X				X			X	X			X				
2%	X					X		X	X				X	X	X	
2% 1:100,000													X	X		
2% 1:200,000				X					X	X						

5

6 All solutions should be stored at room temperature, approximately 25°C (77°F). Protect from
7 light.

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9 Manufactured for:



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12 Revised: February 2010