

PRODUCT MONOGRAPH
INCLUDING PATIENT MEDICATION INFORMATION

Ropivacaine Hydrochloride Injection, USP

2 mg / mL, 5 mg / mL, 7.5 mg / mL and 10 mg / mL

Local Anesthetic

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Date of Revision: October 07, 2019

Submission Control No: 228440

RECENT MAJOR LABEL CHANGES

Warnings and Precautions (6)

10/2018

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PART I: HEALTH PROFESSIONAL INFORMATION

1 INDICATIONS

Adults (> 18 years of age):

Ropivacaine Hydrochloride Injection, USP is indicated for:

Analgesia

Acute pain management in connection with:

- Continuous epidural infusion or intermittent bolus administration e.g. postoperative or labour pain;
- Field block e.g. infiltration.

Anesthesia

Surgical anesthesia in connection with:

- Epidural block for surgery, including Cesarean section;
- Major nerve block e.g. brachial plexus block;
- Field block e.g. infiltration.

1.1 Pediatrics

Pediatrics (< 18 years of age): The safety and efficacy of ropivacaine have not been investigated in children under 18 years of age. Ropivacaine Hydrochloride Injection, USP is not indicated for use in patients below the age of 18 years (see WARNINGS AND PRECAUTIONS, Special Populations).

1.2 Geriatrics

Geriatrics (> 65 years of age): Elderly patients should be given reduced doses of ropivacaine, commensurate with their age and physical condition (see WARNINGS AND PRECAUTIONS, Geriatrics and DOSAGE AND ADMINISTRATION, Special Populations).

2 CONTRAINDICATIONS

Ropivacaine Hydrochloride Injection, USP is contraindicated:

- In patients with a hypersensitivity to ropivacaine or to any ingredient in the formulation or component of the container (see DOSAGE FORMS, COMPOSITION AND PACKAGING).
- In patients with hypersensitivity to any other local anesthetic agent of the amide type.
- For intravenous regional anesthesia (Bier block).
- In obstetric paracervical block anesthesia. Use of other local anesthetics in this technique has resulted in fetal bradycardia and death.

3 DOSAGE AND ADMINISTRATION

3.1 Dosing Considerations

General

Ropivacaine Hydrochloride Injection, USP should only be used by or under the supervision of clinicians experienced in regional anesthesia.

It is recommended that hospitals using local anesthetic infusions have a treatment protocol in place for nursing to follow in order to safely monitor the level of the block and for the proper management of complications and/or toxic reactions. If toxic reactions occur, the infusion should be stopped immediately.

There have been adverse event reports of irreversible chondrolysis in patients receiving intra-articular infusions of local anesthetics following arthroscopic and other surgical procedures. Ropivacaine Hydrochloride Injection, USP is not approved for this use (see WARNINGS AND PRECAUTIONS, General).

Ropivacaine Hydrochloride Injection, USP should be administered at the smallest dose and the lowest concentration which are consistent with the necessary degree of anesthesia or analgesia. The rapid injection of a large volume of local anesthetic solution should be avoided and fractional doses should always be used. In general, surgical anesthesia, e.g. epidural administration, requires the use of higher concentrations and doses. For analgesia, e.g. epidural administration for acute pain management, lower concentrations and doses are recommended.

The dose of any local anesthetic administered varies with the anesthetic procedure, the area to be anesthetized, the vascularity of the tissues, the number of neuronal segments to be blocked, the depth of anesthesia and degree of muscle relaxation required, the duration of anesthesia desired, individual tolerance, and the physical condition of the patient. Patients in poor general condition due to advanced age or other compromising factors such as partial or complete heart conduction block, advanced liver disease or severe renal dysfunction require special attention although regional anesthesia is frequently indicated in these patients. To reduce the risk of potentially serious adverse reactions, attempts should be made to optimize the patient's condition before major blocks are performed, and the dosage should be adjusted accordingly.

Parenteral drug products should be inspected visually for particulate matter and discoloration prior to administration, whenever solution and container permit. Solutions which are discoloured or which contain particulate matter should not be administered. For specific techniques and procedures, refer to standard contemporary textbooks.

Special Populations

Local anesthetics should be used with caution in patients in poor general condition due to advanced age, debilitation, or other compromising factors such as partial or complete heart conduction block, advanced liver disease, or severe renal dysfunction.

Elderly and acutely ill patients should be given reduced doses of ropivacaine, commensurate with their age and physical condition.

3.2 Recommended Dose and Dosage Adjustment

Adults: The dosages in Table 1 are recommended as a guide for use in the average adult for the more commonly used blocks. The clinician’s experience and knowledge of the patient’s physical status are of importance in calculating the required dose.

Table 1 Adult dosage recommendations for Ropivacaine Hydrochloride Injection, USP

TYPE OF BLOCK	CONC.	VOLUME	DOSE
	(mg/mL)	(mL)	(mg)
ACUTE PAIN MANAGEMENT			
Lumbar Epidural Bolus (initial dose)	2	10 – 20	20 – 40
Intermittent injections (top-up) e.g. labour pain management	2	10 – 15 (minimum interval 30 minutes)	20 – 30
Lumbar Epidural Continuous infusion e.g. labour pain and postoperative pain management	2	6 – 14 mL/h	12 – 28 mg/h
Thoracic Epidural Continuous infusion e.g. postoperative pain management	2	6 – 14 mL/h	12 – 28 mg/h
Field Block e.g. infiltration	2 5	1 – 100 1 – 40	2 – 200 5 – 200
SURGICAL ANESTHESIA			
Lumbar Epidural Surgery	5 7.5	15 – 30 15 – 25	75 – 150 113 – 188
Cesarean Section	10 5	15 – 20 20 – 30	150 – 200 100 – 150
Thoracic Epidural To establish block for postoperative pain management	5 7.5	5 – 15 5 – 15	25 – 75 38 – 113
Major Nerve Block e.g. brachial plexus block	5 7.5	35 – 50 10 – 40	175 – 250 ¹ 75 – 300
Field Block e.g. infiltration	5	1 – 40	5 – 200

Note 1: The doses in the table are those considered to be necessary to produce a successful block and should be regarded as guidelines for use in adults. The figures reflect the expected average dose range needed. For other local anesthetic techniques standard textbooks should be consulted.

Note 2: There have been post-marketing reports of irreversible chondrolysis in patients receiving post-operative intra-articular infusion of local anesthetics. Ropivacaine Hydrochloride Injection, USP is not approved for this use (see WARNINGS AND PRECAUTIONS).

¹ The dose for a major nerve block must be adjusted according to site of administration and patient status. Interscalene and supraclavicular brachial plexus blocks may be associated with a higher frequency of serious adverse reactions, regardless of anesthetic used.

Careful aspiration before and during injection is recommended to prevent intravascular injection. When employing an epidural block, a test dose of 3 – 5 mL lidocaine (XYLOCAINE® 1 – 2%) with epinephrine is recommended. An inadvertent intravascular injection may be recognized by a temporary increase in heart rate and an accidental subarachnoid injection by signs of a spinal block. Aspiration should be repeated prior to and during administration of the main dose, which should be injected slowly or in incremental doses, at a rate of 25 – 50 mg/min, while closely observing the patient's vital functions and maintaining verbal contact. If toxic symptoms occur, the injection should be stopped immediately. The test dose should be repeated if the patient is moved in such a fashion as to have displaced the epidural catheter.

In epidural block for surgery (excluding Cesarean section), single doses of up to 250 mg ropivacaine have been used and are well tolerated.

In epidural block for Cesarean section, an initial epidural dose of up to 150 mg (25 mL Ropivacaine Hydrochloride Injection, USP 5 mg/mL) injected over 5 minutes is well tolerated (see WARNINGS AND PRECAUTIONS, Peri-Operative Considerations). For Caesarean section, neither the use of ropivacaine concentration 10 mg/mL (for epidural administration) nor intrathecal administration have been documented.

For treatment of postoperative pain, the following technique is recommended: Unless preoperatively instituted, an initial epidural block with Ropivacaine Hydrochloride Injection, USP 5 – 7.5 mg/mL is induced via an epidural catheter. Analgesia is maintained with Ropivacaine Hydrochloride Injection, USP 2 mg/mL infusion. Clinical studies have demonstrated that infusion rates of 6 – 14 mL (12 – 28 mg) per hour provide adequate analgesia with only slight and non-progressive motor block in most cases of moderate to severe postoperative pain. With this technique, a significant reduction in the need for narcotics has been observed. Clinical experience supports the use of ropivacaine hydrochloride injection epidural infusions at rates up to 28 mg/h for 72 hours.

When prolonged blocks are used, either through continuous infusion or through repeated bolus administration, the risks of reaching a toxic plasma concentration or inducing local neural injury must be considered. Clinical experience to date indicates that a cumulative dose of up to 770 mg ropivacaine administered over 24 hours and continuous epidural infusion at rates up to 28 mg/h for 72 hours have been well tolerated in adults when used for postoperative pain management (i.e., ≥ 2000 mg).

The duration and intensity of ropivacaine block are not improved by the addition of epinephrine.

Children: The safety and efficacy of ropivacaine have not been investigated in children under 18 years of age. Ropivacaine Hydrochloride Injection, USP is not indicated for use in patients below the age of 18 years.

4 OVERDOSAGE

Systemic toxic reactions primarily involve the central nervous system and cardiovascular system. Such reactions are caused by high plasma levels encountered during therapeutic use, overdose, or to unintended intravascular or subarachnoid injection (see ADVERSE REACTIONS and WARNINGS AND PRECAUTIONS). CNS reactions are similar for all amide local anesthetics, while cardiac reactions are more dependent on the drug, both quantitatively and qualitatively.

Symptoms

Accidental intravascular injections may cause immediate (within seconds to a few minutes) toxic effects. In the event of overdose,

- for single injection: systemic toxicity appears later (15 – 60 minutes after injection) due to the slower increase in local anesthetic blood concentration.
- for repeat dosing or continuous infusion: peak plasma concentrations may not be reached for 1 to 2 hours, with signs of toxicity thus being delayed.

Central nervous system toxicity is a graded response with symptoms and signs of escalating severity. First symptoms are usually light-headedness, circumoral paresthesia, numbness of the tongue, hyperacusis, tinnitus and visual disturbances. Dysarthria, muscular rigidity and muscular twitching are more serious and may precede the onset of generalized convulsions. These signs must not be mistaken for a neurotic behaviour. 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 and loss of the airway. In severe cases apnea may occur. Acidosis, hyperkalemia, hypocalcemia and hypoxia increase and extend the toxic effects of local anesthetics.

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

Cardiovascular system toxicity indicates a more severe situation and is 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. Hypotension, bradycardia, arrhythmia and cardiac arrest may occur as a result of high systemic concentrations of local anesthetic. In volunteers, the intravenous infusion of ropivacaine resulted in signs of depression of conductivity and contractility.

In children early signs of local anesthetic toxicity may be difficult to detect in cases where the block is given during general anesthesia. It should be noted that ropivacaine hydrochloride injection is not approved for use in pediatric patients.

Treatment

The first consideration is prevention, best accomplished by incremental injection of Ropivacaine Hydrochloride Injection, USP careful and constant monitoring of cardiovascular and respiratory vital signs and the patient's state of consciousness after each local anesthetic injection and during continuous infusion. At the first sign of change, oxygen should be administered. If signs of acute systemic toxicity appear, injection of the local anesthetic should be immediately stopped.

The first step in the management of systemic toxic reactions, as well as underventilation or apnea due to unintentional subarachnoid injection of drug solution, consists of immediate attention to the establishment and 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 and bag or tracheal intubation. This may prevent convulsions if they have not already occurred.

If necessary, use drugs to control the convulsions. An anticonvulsant should be given intravenous if the convulsions do not stop spontaneously in 15 – 20 seconds. Thiopental 1 – 3 mg/kg intravenous will abort the convulsions rapidly. Alternatively, diazepam 0.1 mg/kg intravenous may be used, although its action will be slow. Both these drugs, however, depress the central nervous system, respiratory and cardiac function, add to postictal depression, and may result in apnea.

Prolonged convulsions may jeopardize the patient's ventilation and oxygenation. If so, injection of a muscle relaxant such as succinylcholine (1 mg/kg) will stop the muscle convulsions rapidly, so that ventilation and oxygenation can be controlled. Endo-tracheal intubation must be considered in such situations.

If cardiovascular depression is evident (hypotension, bradycardia), it should be managed according to the patient condition and standard of anesthetic care.

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.

Should cardiac arrest occur, prolonged resuscitative efforts may be required to improve the likelihood of a successful outcome.

Clinical data from patients experiencing local anesthetic-induced convulsions demonstrated rapid development of hypoxia, hypercarbia, and acidosis within a minute of the onset of convulsions. These observations suggest that oxygen consumption and carbon dioxide production are greatly increased during local anesthetic convulsions and emphasize the importance of immediate and effective ventilation with oxygen which may avoid cardiac arrest.

The supine position is dangerous in pregnant women at term because of aorto-caval compression by the gravid uterus. Therefore, during treatment of systemic toxicity, maternal hypotension or fetal bradycardia following regional block, the parturient should be maintained in the left lateral decubitus position if possible, or manual displacement of the uterus off the great vessels should

be accomplished. Resuscitation of obstetrical patients may take longer than resuscitation of non-pregnant patients and closed-chest cardiac compression may be ineffective. Rapid delivery of the fetus may improve the response to resuscitative efforts.

In human volunteers given intravenous ropivacaine hydrochloride injection, the mean maximum tolerated total and free arterial plasma concentrations were 4.3 and 0.6 mcg/mL respectively, at which time moderate CNS symptoms (muscle twitching) were noted.

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

5 DOSAGE FORMS, STRENGTHS, COMPOSITION AND PACKAGING

Route of Administration	Dosage Form / Strength	Non-medicinal Ingredients
Parenteral	Sterile isotonic solution 2 mg / mL, 5 mg / mL, 7.5 mg / mL and 10 mg / mL ropivacaine hydrochloride	Sodium chloride, sodium hydroxide and/or hydrochloric acid, and water for injection

Packaging

Ropivacaine Hydrochloride Injection, USP 2 mg / mL for infusion (epidural) is available in 100 and 200 mL **freeflex**[®] bags. Each **freeflex**[®] bag is packed in a sterile overpouch/blister pack. Individually sealed blister packs are packaged in 5 units per carton.

Ropivacaine Hydrochloride Injection, USP (perineural and epidural) 2 mg / mL, 5 mg / mL, 7.5 mg / mL and 10 mg / mL are available in ampoules. Each ampoule is packed in a sterile blister pack. Individual sealed blister packs are packaged in 5 units per carton.

The following strength and fill volumes are available for ampoules.

Strength	Fill volume	
	10 mL	20 mL
2 mg / mL	✓	✓
5 mg / mL	✓	-
7.5 mg / mL	✓	✓
10 mg / mL	✓	✓

Ampoule is suitable for Luer lock and Luer fit syringes.

6 WARNINGS AND PRECAUTIONS

General

IN PERFORMING ROPIVACAINE HYDROCHLORIDE INJECTION, USP BLOCKS, UNINTENDED INTRAVASCULAR OR SUBARACHNOID INJECTION IS POSSIBLE AND MAY RESULT IN CARDIAC ARRHYTHMIA OR CARDIAC ARREST. THE POTENTIAL FOR SUCCESSFUL RESUSCITATION HAS NOT BEEN STUDIED IN HUMANS.

LOCAL ANESTHETICS SHOULD ONLY BE EMPLOYED BY CLINICIANS WHO ARE WELL VERSED IN THE DIAGNOSIS AND MANAGEMENT OF DOSE-RELATED TOXICITY AND OTHER ACUTE EMERGENCIES WHICH MIGHT ARISE FROM THE BLOCK TO BE EMPLOYED. FOR MANAGEMENT OF TOXIC REACTIONS AND RELATED EMERGENCIES, CARDIOPULMONARY RESUSCITATIVE EQUIPMENT, OXYGEN, RESUSCITATIVE DRUGS, AND PERSONNEL RESOURCES SHOULD BE IMMEDIATELY AVAILABLE WHEN ANY LOCAL ANESTHETIC IS USED. DELAY IN PROPER MANAGEMENT OF DOSE-RELATED TOXICITY, UNDERVENTILATION FROM ANY CAUSE AND/OR ALTERED SENSITIVITY MAY LEAD TO THE DEVELOPMENT OF ACIDOSIS, CARDIAC ARREST AND, POSSIBLY, DEATH (see ADVERSE REACTIONS and OVERDOSAGE).

PRIOR TO RECEIVING MAJOR BLOCKS THE GENERAL CONDITION OF THE PATIENT SHOULD BE OPTIMIZED AND THE PATIENT SHOULD HAVE AN INTRAVENOUS LINE INSERTED. ALL NECESSARY PRECAUTIONS SHOULD BE TAKEN TO AVOID INTRAVASCULAR INJECTION.

ROPIVACAINE HYDROCHLORIDE INJECTION, USP SHOULD BE ADMINISTERED IN INCREMENTAL DOSES. IT IS NOT RECOMMENDED FOR EMERGENCY SITUATIONS, WHERE A FAST ONSET OF SURGICAL ANESTHESIA IS NECESSARY.

IT IS ESSENTIAL THAT ASPIRATION FOR BLOOD AND CEREBROSPINAL FLUID BE DONE PRIOR TO INJECTING ANY LOCAL ANESTHETIC, BOTH FOR THE ORIGINAL DOSE AND ALL SUBSEQUENT DOSES, TO AVOID INTRAVASCULAR OR SUBARACHNOID INJECTION. HOWEVER, A NEGATIVE ASPIRATION DOES NOT ENSURE AGAINST AN INTRAVASCULAR OR SUBARACHNOID INJECTION.

SOLUTIONS OF ROPIVACAINE HYDROCHLORIDE INJECTION, USP SHOULD NOT BE USED FOR THE PRODUCTION OF RETROBULBAR BLOCK OR SPINAL ANESTHESIA (SUBARACHNOID BLOCK) DUE TO INSUFFICIENT DATA TO SUPPORT SUCH USE.

For Cesarean section, the 5 mg / mL Ropivacaine Hydrochloride Injection, USP, solution in doses up to 150 mg is recommended. The 7.5 and 10 mg /mL solution should not be used

for this indication. Historically, pregnant patients were reported to have a high risk for cardiac arrhythmias, cardiac/circulatory arrest and death when 0.75% bupivacaine (another member of the amino amide class of local anesthetics) was inadvertently rapidly injected intravenously.

Reports of Irreversible Chondrolysis with Intra-articular Infusions of Local Anesthetics Following Surgery: Intra-articular infusions of local anesthetics following arthroscopic and other surgical procedures is an unapproved use, and there have been post-marketing reports of irreversible chondrolysis in patients receiving such infusions. The majority of reported cases of irreversible chondrolysis have involved the shoulder joint; cases of gleno-humeral irreversible chondrolysis have been described in pediatric and adult patients following intra-articular infusions of local anesthetics with and without epinephrine for periods of 48 to 72 hours. The time of onset of symptoms, such as joint pain, stiffness and loss of motion can be variable, but may begin as early as the second month after surgery. Currently, there is no effective treatment for irreversible chondrolysis; patients who experienced irreversible chondrolysis have required additional diagnostic and therapeutic procedures and some required arthroplasty or shoulder replacement. **Ropivacaine Hydrochloride Injection, USP should not be used for post-operative intra-articular infusion** (see DOSAGE AND ADMINISTRATION).

Major Peripheral Nerve Blocks: Major peripheral nerve blocks may imply the administration of a large volume of local anesthetic in highly vascularized areas, often close to large vessels where there is increased risk of intravascular injection and/or rapid systemic absorption, which can lead to high plasma concentrations and serious adverse reactions (see ADVERSE REACTIONS).

Inflammation and Sepsis: Local anesthetic procedures should be performed with care in inflamed regions. Injections should not be performed through inflamed tissue nor when there is sepsis at or near the injection site.

Use with Other Local Anesthetics: Ropivacaine Hydrochloride Injection, USP should be used with caution in patients receiving other local anesthetics or agents structurally related to amide-type local anesthetics, since the toxic effects are additive (see DRUG INTERACTIONS).

Use in Patients Treated with Class III Antiarrhythmic Drugs: Patients treated with Class III antiarrhythmic drugs (e.g., amiodarone) should be under close surveillance and ECG monitoring, since cardiac effects may be additive (see DRUG INTERACTIONS).

Cardiovascular

There have been rare reports of cardiac arrest during the use of ropivacaine hydrochloride injection for epidural anesthesia or peripheral nerve blockade, especially after unintentional accidental intravascular administration in patients with concomitant heart disease (see WARNINGS AND PRECAUTIONS, High Risk Populations).

Local anesthetics should be used with caution in patients with impaired cardiovascular function who may be less able to compensate for functional changes associated with prolongation of AV

conduction produced by these drugs. Hypotension, hypovolemia, or partial or complete heart block represent risk factors.

Driving and Operating Machinery

Due caution should be exercised when driving or operating a vehicle or potentially dangerous machinery.

Ear/Nose/Throat

Small doses of local anesthetics injected into the head and neck area, including dental and stellate ganglion blocks, may produce adverse reactions as a result of inadvertent intra-arterial injection and subsequent retrograde flow to the cerebral circulation. These adverse reactions may be similar to systemic toxicity seen with unintentional intravascular injections of larger doses. Confusion, convulsions, respiratory depression, and/or respiratory arrest, and cardiovascular stimulation or depression have been reported. Patients receiving these blocks should have their circulation and respiration monitored and be constantly observed. Resuscitative equipment and personnel for treating adverse reactions should be immediately available. Dosage recommendations should not be exceeded.

Epidural Anesthesia and Analgesia

A well-known risk of epidural anesthesia is unintentional subarachnoid injection of the local anesthetic. Two clinical studies have been performed to verify the safety of ropivacaine hydrochloride injection injected into the subarachnoid space at a volume of 3 mL, selected to be representative of an incremental epidural volume that could be unintentionally injected. The 15 and 22.5 mg doses injected resulted in sensory block levels as high as T5 and T4, respectively. Sensory block started in the sacral dermatomes in 2 – 3 minutes, extended to the T10 level in 10 – 13 minutes and lasted for approximately 2 hours. The results of these two clinical studies showed that a 3 mL dose did not produce any serious adverse events when spinal anesthesia was achieved.

Epidural anesthesia or analgesia may lead to hypotension and bradycardia which should be managed according to the patient condition and standard of anesthetic care.

During epidural administration, it is recommended that a test dose of a local anesthetic with a fast onset of action be administered initially. The patient should be monitored for central nervous system and cardiovascular toxicity, as well as for signs of unintended intrathecal administration, before proceeding. When clinical conditions permit, test doses of local anesthetic solutions which contain epinephrine should be considered because circulatory changes compatible with epinephrine may also serve as a warning sign of unintended intravascular injection. If injected into a blood vessel, this amount of epinephrine is likely to produce a transient “epinephrine response” within 45 seconds, consisting of an increase in heart rate and systolic blood pressure, circumoral pallor, palpitations and nervousness in the unsedated patient. The sedated patient may exhibit only a pulse rate increase of 20 or more beats per minute for 15 or more seconds. Therefore, following the test dose, the heart rate should be continuously monitored. Patients on beta-blockers may not manifest changes in heart rate, but blood pressure monitoring can detect a rise in systolic blood pressure. A test dose of a short-acting amide anesthetic such as lidocaine (30 – 40 mg) is recommended to detect an unintentional intrathecal administration. This will be

manifested within a few minutes by signs of spinal block (e.g., decreased sensation of the buttocks, paresis of the legs, or, in the sedated patient, absent knee jerk). An intravascular or subarachnoid injection is still possible even if results of the test dose are negative. The test dose itself may produce a systemic toxic reaction, high spinal or epinephrine-induced cardiovascular effects.

During epidural administration, ropivacaine should be administered in incremental doses of 3 to 5 mL with sufficient time between doses to detect toxic manifestations of unintentional intravascular or subarachnoid injection. Frequent aspirations for blood or cerebrospinal fluid (where applicable, i.e. when using a “continuous” intermittent catheter technique) should be performed before and during each supplemental injection because plastic tubing in the epidural space can migrate into a blood vessel or through the dura. A negative aspiration, however, does not ensure against an intravascular or intrathecal injection.

Hepatic/Biliary/Pancreatic

Because amide-type local anesthetics such as ropivacaine are metabolized by the liver, these drugs, especially repeat doses, should be used cautiously in patients with hepatic disease.

Patients with severe hepatic disease, because of their inability to metabolize local anesthetics normally, are at an increased risk of developing toxic plasma concentrations (see WARNINGS AND PRECAUTIONS, High Risk Populations, and DOSAGE AND ADMINISTRATION, Special Populations).

High Risk Populations

Local anesthetics should be used with caution in patients in poor general condition due to advanced age, debilitation, or other compromising factors such as partial or complete heart conduction block, advanced liver disease, or severe renal dysfunction (see DOSAGE AND ADMINISTRATION). Patients treated with class III anti-arrhythmic drugs (e.g. amiodarone) should be under close surveillance and ECG monitoring.

There have been rare reports of cardiac arrest during the use of ropivacaine hydrochloride injection for epidural anesthesia or peripheral nerve blockade, especially after unintentional accidental intravascular administration in elderly patients or in patients with concomitant heart disease. In some instances, resuscitation has been difficult. Should cardiac arrest occur, prolonged resuscitative efforts may be required to improve the likelihood of a successful outcome.

Ropivacaine Hydrochloride Injection, USP is possibly porphyrinogenic and should only be prescribed to patients with acute porphyria when no safer alternative is available. Appropriate precautions should be taken in the case of vulnerable patients.

Neurologic

Psychomotor effects: Local anesthetics may have a dose-dependent effect on mental function and coordination, causing temporary impairment of locomotion and alertness, even in the absence of overt CNS toxicity.

Ophthalmologic

Solutions of Ropivacaine Hydrochloride Injection, USP should not be used for the production of retrobulbar block due to insufficient data to support such use.

Until appropriate experience is gained, the use of Ropivacaine Hydrochloride Injection, USP for such surgery is not recommended.

Peri-Operative Considerations

The safe and effective use of local anesthetics depends on proper dosage, correct technique, adequate precautions and readiness for emergencies. Resuscitative equipment, oxygen and resuscitative drugs should be available for immediate use (see ADVERSE REACTIONS and OVERDOSAGE). During major regional nerve blocks, the patients should be in an optimal condition and have intravenous fluids running via an indwelling catheter to assure a functioning intravenous pathway. The clinician responsible should take the necessary precautions to avoid intravascular injection (see DOSAGE AND ADMINISTRATION) and be trained, and familiar with, the diagnosis and treatment of side effects, systemic toxicity, and other complications. The lowest dosage of local anesthetics that results in effective anesthesia should be used. Injections should be made slowly and incrementally. When a continuous catheter technique is used, syringe aspirations should be performed before and during each supplemental injection.

If blood is aspirated, relocate the needle. Inadvertent intravascular injection may cause serious consequences. Absorption is more rapid when injections are made into highly vascular tissues. Administration of higher than recommended doses of ropivacaine hydrochloride injection to achieve greater motor blockade or increased duration of sensory blockade may pose a particular risk in the event that an inadvertent intravascular injection occurs. In epidural administration, the procedure should be discontinued and re-initiated if the subarachnoid space has been entered, as shown by aspiration of spinal fluid.

Careful and constant monitoring of cardiovascular and respiratory vital signs (adequacy of ventilation) and the patient's state of consciousness should be performed during the anesthetic procedure. It should be kept in mind at such times that restlessness, anxiety, incoherent speech, lightheadedness, numbness and tingling of the mouth and lips, metallic taste, tinnitus, dizziness, blurred vision, tremors, twitching, depression, or drowsiness may be early warning signs of central nervous system toxicity.

Ropivacaine plasma concentrations may approach the threshold for central nervous system toxicity after the administration of 300 mg of ropivacaine for brachial plexus block. Caution should be exercised when using the 300 mg dose.

Renal

Local anesthetics should be used with caution in patients in poor general condition due to severe renal dysfunction (see DOSAGE AND ADMINISTRATION).

Normally there is no need to modify the dose of ropivacaine hydrochloride injection when used for single dose or short term treatment in patients with impaired renal function. Acidosis and reduced plasma protein concentration, frequently seen in patients with chronic renal failure, may

increase the risk of systemic toxicity (see ACTIONS AND CLINICAL PHARMACOLOGY, Pharmacokinetics).

6.1 Special Populations

6.1.1 Pregnant Women

Reproduction studies have been performed in rats and rabbits.

No effects on fertility and general reproductive performance were seen in rats over two generations. At the highest dose level, increased pup loss was seen during the first three days post-partum, which was considered to be secondary to impaired maternal care of the newborn, due to maternal toxicity.

Teratogenicity studies in rats and rabbits did not show evidence of any adverse effects of ropivacaine on organogenesis or early fetal development. There were no treatment-related effects on late fetal development, parturition, lactation, neonatal viability or growth of the offspring in a perinatal and postnatal study in rats using the maximum tolerated dose.

An additional perinatal and postnatal study in rats, in which ropivacaine was compared with bupivacaine, showed that maternal toxicity was observed at much lower dose levels and at lower unbound plasma concentrations of bupivacaine than of ropivacaine.

There are no clinical studies in preterm pregnant women on the effects of ropivacaine on the developing fetus. Ropivacaine should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus. The use of ropivacaine at term for obstetric anesthesia or analgesia is well documented.

Labour and Delivery: Local anesthetics, including ropivacaine hydrochloride injection, rapidly cross the placenta, and when used for an epidural block, can cause varying degrees of maternal, fetal and neonatal toxicity. The incidence and degree of toxicity depend upon the procedure performed, the type and amount of drug used, and the technique of drug administration. Adverse reactions in the parturient, fetus and neonate involve alterations of the central nervous system, peripheral vascular tone and cardiac function.

Maternal hypotension has resulted from epidural analgesia with ropivacaine hydrochloride injection for obstetrical pain relief. Elevating the patient's legs and positioning her on her left side will help prevent decreases in blood pressure. The fetal heart rate also should be monitored continuously, and electronic fetal monitoring is highly advisable.

It is extremely important to avoid aorto-caval compression by the gravid uterus during administration of regional block to parturients. The patient should be maintained in the left lateral decubitus position if possible, or manual displacement of the uterus off the great vessels be accomplished.

6.1.2 Breast-feeding

The excretion of ropivacaine or its metabolites in human milk has not been studied. Based on the milk/plasma concentration ratio in rats, the estimated daily dose to a pup will be about 4% of the dose given to the mother. Caution should be exercised when Ropivacaine Hydrochloride Injection, USP is administered to a nursing woman. Assuming that the milk/plasma concentration ratio in humans is of the same order, the total ropivacaine dose to which the baby is exposed by breast-feeding is far lower than by exposure *in utero* in pregnant women at term.

6.1.3 Pediatrics

Pediatrics (< 18 years of age): The safety and efficacy of ropivacaine have not been investigated in children under 18 years of age. In children early signs of local anesthetic toxicity may be difficult to detect in cases where the block is given during general anesthesia (see OVERDOSAGE). Ropivacaine Hydrochloride Injection, USP, is not indicated for use in patients below the age of 18 years.

6.1.4 Geriatrics

Geriatrics (> 65 years of age): Elderly patients should be given reduced doses of ropivacaine, commensurate with their age and physical condition (see DOSAGE AND ADMINISTRATION, Special Populations). The risk of hypotension and bradycardia in patients receiving epidural anesthesia with ropivacaine increases in an age-dependent manner (see Table 6 in ADVERSE REACTIONS).

7 ADVERSE REACTIONS

7.1 Adverse Reaction Overview

Reactions to ropivacaine hydrochloride injection (ropivacaine hydrochloride) are characteristic of those associated with other long-acting local anesthetics of the amide type.

7.2 Clinical Trial Adverse Reactions

Because clinical trials are conducted under very specific conditions, the adverse reaction rates observed in the clinical trials may not reflect the rates observed in practice and should not be compared to the rates in the clinical trials of another drug. Adverse reaction information from clinical trials is useful for identifying drug-related adverse events and for approximating rates.

In clinical trials, the great majority of adverse events reported with ropivacaine were related to the expected effects of the block and to the clinical situation, rather than reactions to the drug. When all clinical studies were pooled (total n = 3056), hypotension and nausea were registered in 41.2% (n = 1259) and 28.4% (n = 867) of the patients, respectively. Similar incidences were reported for bupivacaine in the double-blind comparisons.

Adverse reactions to local anesthetics are very rare in the absence of overdose or inadvertent intravascular injection. The effects of systemic overdose and unintentional intravascular injections can be serious, but should be distinguished from the physiological effects of the nerve block itself e.g. a decrease in blood pressure, bradycardia, urinary retention after epidural and intrathecal block, and events caused directly by needle puncture (e.g. spinal hematoma, postdural puncture, headache), or indirectly by introduction of micro-organisms (e.g. meningitis and epidural abscess).

Acute systemic toxicity from local anesthetics is generally dose-related and due to high plasma levels which may result from overdosage (see OVERDOSAGE), rapid absorption from the injection site, diminished tolerance, or from inadvertent intravascular injection. Most commonly, the acute adverse experiences originate from the central nervous and cardiovascular systems.

Table 2 Adverse Events Reported in $\geq 1\%$ of Adult Patients Receiving Regional or Local Anesthesia (Surgery, Labour, Cesarean Section, Peripheral Nerve Block, Local Infiltration and Post-Operative Pain Management)

Adverse Reaction	Total Number of Patients = 2867							
	2 mg/mL		5 mg/mL		7.5 mg/mL		10 mg/mL	
	Total n = 1360		Total n = 740		Total n = 540		Total n = 222	
	n	%	n	%	n	%	n	%
Hypotension	641	47.1	224	30.1	174	32.2	116	52.3
Nausea	550	40.4	84	11.3	98	18.1	41	18.5
Fever	281	20.7	11	1.5	6	1.1	6	2.7
Vomiting	272	20	41	5.5	43	8	16	7.2
Postoperative complications	204	15	21	2.8	3	0.6	3	1.4
Anemia	188	13.8	4	0.5	1	0.2	1	0.5
Bradycardia	140	10.3	48	6.4	82	15.2	35	15.8
Pain	140	10.3	42	5.6	15	2.8	2	0.9
Oliguria	139	10.2						
Dizziness	136	10	20	2.7	11	2	4	1.8
Pruritus	123	9	10	1.3	16	3	2	0.9
Hypertension	113	8.3	4	0.5	3	0.6		
Unexpected therapeutic effect	108	7.9						
Paresthesia	107	7.9	51	6.8	14	2.6	3	1.4
Hypoxia	86	6.3			2	0.4		
Rigors (chills)	84	6.2	11	1.5	10	1.9	12	5.4
Hypokalemia	79	5.8	2	0.3				
Headache	74	5.4	21	2.8	30	5.6	18	8.1
Back pain	74	5.4	31	4.2	33	6.1	24	10.8
Hypoproteinemia	74	5.4						
Diarrhea	66	4.9	1	0.1	1	0.2	1	0.5
Bradycardia fetal	66	4.9	2	0.3				
Hematuria	63	4.6					2	0.9
Urinary retention	62	4.6	7	0.9	8	1.5	5	2.3

Adverse Reaction	Total Number of Patients = 2867							
	2 mg/mL		5 mg/mL		7.5 mg/mL		10 mg/mL	
	Total n = 1360		Total n = 740		Total n = 540		Total n = 222	
	n	%	n	%	n	%	n	%
Hypothermia	62	4.6	1	0.1				
Tachycardia	60	4.4	7	0.9			1	0.5
Constipation	59	4.3	1	0.1	1	0.2		
Abdominal pain	59	4.3	8	1.1				
Urinary tract infection	48	3.5	1	0.1				
Creatine phosphokinase increased	46	3.4						
Hypoesthesia	45	3.3	7	0.9	6	1.1	5	2.3
Leukocytosis	44	3.2						
Dyspepsia	42	3.1	1	0.1				
Hypocalcemia	41	3						
Urine abnormal	40	2.9						
Chest pain	39	2.9	4	0.5	3	0.6	1	0.5
Anxiety	36	2.6	7	0.9	1	0.2	1	0.5
Dyspnea	35	2.6	3	0.4	1	0.2	2	0.9
Hypotension postural	34	2.5						
Abdomen enlarged	34	2.5	1	0.1				
Edema peripheral	33	2.4			3	0.6		
Phosphatase alkaline increased	29	2.1						
Injection site reaction	28	2.1			1	0.2		
Insomnia	27	2						
Thrombocytopenia	27	2						
Infection	27	2			6	1.1	1	0.5
Pleural effusion	26	1.9						
Thrombocythemia	26	1.9						
Rash	25	1.8	4	0.5	3	0.6		
SGOT increased	25	1.8						
Pyuria	25	1.8						
Confusion	24	1.8	2	0.3	1	0.2		
Fecal incontinence	24	1.8						
Hyperglycemia	23	1.7						
Arthralgia	22	1.6	4	0.5			1	0.5
Atelectasis	22	1.6						
Bronchospasm	21	1.5	1	0.1				
Rales	21	1.5						
Albuminuria	20	1.5						
Progression of labour poor/failed	20	1.5						
BUN decreased	19	1.4						
Sweating increased	18	1.3			2	0.4	1	0.5

Adverse Reaction	Total Number of Patients = 2867							
	2 mg/mL		5 mg/mL		7.5 mg/mL		10 mg/mL	
	Total n = 1360		Total n = 740		Total n = 540		Total n = 222	
	n	%	n	%	n	%	n	%
Urinary incontinence	18	1.3	4	0.5	4	0.7	1	0.5
Agitation	18	1.3			1	0.2		
Somnolence	18	1.3			3	0.6		
SGPT increased	18	1.3			1	0.2		
Coughing	18	1.3						
Respiratory disorder	18	1.3						
Respiratory insufficiency	18	1.3						
Paresis	17	1.3	1	0.1				
Injection site inflammation	16	1.2						
Prothrombin decreased	16	1.2						
Tremor	15	1.1	5	0.7	1	0.2	2	0.9
Purpura	15	1.1	3	0.4			1	0.5
Application site reaction	14	1						
Myalgia	14	1	1	0.1				
Hepatic function abnormal	14	1						
Arrhythmia	14	1			1	0.2	1	0.5
Micturition disorder	14	1			1	0.2	1	0.5
Dysuria	8	0.6	2	0.3	2	0.4	3	1.4
Jaundice neonatal	3	0.2	9	1.2				

Table 3A Adverse Events Reported in $\geq 1\%$ of Women who Received Ropivacaine Hydrochloride Injection 5 mg/mL During Cesarean Section

Adverse Reaction	Total Number of Patients = 173*	
	n	%
Hypotension	101	58.4
Paresthesia	44	25.4
Pain	29	16.8
Nausea	27	15.6
Vomiting	10	5.8
Dizziness	7	4
Anxiety	7	4
Abdominal pain	7	4
Pruritus	5	2.9
Bradycardia	5	2.9
Back pain	5	2.9
Dyskinesia	4	2.3
Headache	4	2.3
Tachycardia	4	2.3
Hypoesthesia	3	1.7
Tremor	2	1.2

Adverse Reaction	Total Number of Patients = 173*	
	n	%
Anemia	2	1.2
Rigors (chills)	2	1.2
Postoperative complications	2	1.2
Postpartum hemorrhage	2	1.2

*some patients experienced more than one adverse event.

Table 3B Adverse Events Reported in \geq 1% of Fetuses or Neonates of Mothers who Received Ropivacaine Hydrochloride Injection 5 mg/mL During Cesarean Section

Adverse Reaction	Total Number of Patients = 173*	
	n	%
Jaundice neonatal	9	5.2
Tachypnea neonatal	6	3.5
Respiratory disorder neonatal	3	1.7
Bradycardia fetal	2	1.2

*some patients experienced more than one adverse event.

Table 3C Adverse Events Reported in \geq 1% of Women who Received Ropivacaine Hydrochloride Injection 2 mg/mL During Labour

Adverse Reaction	Total Number of Patients = 231*	
	n	%
Hypotension	35	15.2
Progression of labour poor/failed	20	8.7
Paresthesia	15	6.5
Fever	15	6.5
Back pain	13	5.6
Nausea	9	3.9
Pain	7	3
Vomiting	6	2.6
Rigors (chills)	6	2.6
Bradycardia	5	2.2
Urinary tract infection	4	1.7
Dystocia	4	1.7
Urinary retention	3	1.3
Tachycardia	3	1.3
Jaundice	3	1.3

*some patients experienced more than one adverse event.

Table 3D Adverse Events Reported in $\geq 1\%$ of Fetuses or Neonates of Mothers Who Received Ropivacaine Hydrochloride Injection 2 mg/mL During Labour

Adverse Reaction	Total Number of Patients = 231*	
	n	%
Bradycardia fetal	66	28.6
Fetal distress	10	4.3
Tachycardia fetal	7	3
Fever neonatal	6	2.6
Vomiting neonatal	4	1.7
Apgar score low	4	1.7
Jaundice neonatal	3	1.3
Hypoglycemia neonatal	3	1.3
Neonatal complication (Not Other Specified)	3	1.3
Tachypnea neonatal	3	1.3
Respiratory disorder neonatal	3	1.3

*some patients experienced more than one adverse event.

Table 4 Common Events (Epidural Administration)

Adverse Reaction	Ropivacaine Hydrochloride Injection					
	5 mg/mL Total n = 256		7.5 mg/mL Total n = 297		10 mg/mL Total n = 207	
	n	(%)	n	(%)	n	(%)
Hypotension	99	(38.7)	146	(49.2)	113	(54.6)
Nausea	34	(13.3)	68	(22.9)	-	-
Bradycardia	29	(11.3)	58	(19.5)	40	(19.3)
Back pain	18	(7)	23	(7.7)	34	(16.4)
Vomiting	18	(7)	33	(11.1)	23	(11.1)
Headache	12	(4.7)	20	(6.7)	16	(7.7)
Fever	8	(3.1)	5	(1.7)	18	(8.7)

**Table 5 Most Common Adverse Events by Gender (Epidural Administration)
Total n: female = 405, males = 355**

Adverse Reaction	Female		Male	
	n	(%)	n	(%)
Hypotension	220	(54.3)	138	(38.9)
Nausea	119	(29.4)	23	(6.5)
Bradycardia	65	(16)	56	(15.8)
Vomiting	59	(14.6)	8	(2.3)
Back pain	41	(10.1)	23	(6.5)
Headache	33	(8.1)	17	(4.8)
Chills	18	(4.4)	5	(1.4)
Fever	16	(4)	3	(0.8)
Pruritus	16	(4)	1	(0.3)

Table 6 Incidence of Hypotension in Relation to Age (Epidural Administration)
Total n = 760

Age	Ropivacaine Hydrochloride Injection					
	5 mg/mL		7.5 mg/mL		10 mg/mL	
	n	(%)	n	(%)	n	(%)
< 65	68	(32.2)	99	(43.2)	87	(51.5)
≥ 65	31	(68.9)	47	(69.1)	26	(68.4)

Central Nervous System: These are characterized by excitation and/or depression. Restlessness, anxiety, dizziness, tinnitus, blurred vision or tremors may occur, possibly proceeding to convulsions. However, excitement may be transient or absent, with depression being the first manifestation of an adverse reaction. This may quickly be followed by drowsiness merging into unconsciousness and respiratory arrest. Other central nervous system effects may be nausea, vomiting, chills, and constriction of the pupils.

The incidence of convulsions associated with the use of local anesthetics varies with the procedure used and the total dose administered.

For a detailed description of Central Nervous System toxicity, please refer to ‘OVERDOSAGE’.

Cardiovascular System: High doses or unintentional intravascular injection may lead to high plasma levels and related depression of the myocardium, decreased cardiac output, heart block, hypotension, bradycardia, ventricular arrhythmias, including ventricular tachycardia and ventricular fibrillation, and cardiac arrest. Reactions due to systemic absorption may be either slow or rapid in onset. Cardiovascular collapse and cardiac arrest can occur rapidly (see WARNINGS AND PRECAUTIONS, General and OVERDOSAGE).

Allergic: Allergic type reactions are rare and may occur as a result of sensitivity to local anesthetics of the amide-type. These reactions are characterized by signs such as urticaria, pruritus, erythema, angioneurotic edema (including laryngeal edema), tachycardia, sneezing, nausea, vomiting, dizziness, syncope, excessive sweating, elevated temperature, and in the most severe instances, anaphylactic shock.

Neurologic: The incidence of adverse neurologic reactions may be related to the total dose of local anesthetic administered but is also dependent upon the particular drug used, the route of administration and the physical status of the patient. Neuropathy and spinal cord dysfunction (e.g. anterior spinal artery syndrome, arachnoiditis, cauda equina syndrome), have been associated with regional anesthesia. Neurological effects may be related to local anesthetic techniques, with or without a contribution from the drug.

During epidural block, occasional unintentional penetration of the subarachnoid space by the catheter or needle may occur. Neurologic effects following unintentional subarachnoid administration during epidural anesthesia may include spinal block of varying magnitude (including total or high spinal block) and hypotension secondary to spinal block. A high spinal

block is characterized by limb paralysis, loss of consciousness, respiratory paralysis and bradycardia.

Other neurological effects following unintentional subarachnoid administration during epidural anesthesia may include persistent anesthesia, paresthesia, weakness, paralysis of the extremities and loss of sphincter control, all of which may have slow, incomplete or no recovery. Urinary retention, loss of bladder and bowel control (fecal and urinary incontinence), and loss of perineal sensation and sexual functions are extremely rare but possible neurotoxic complications. Headache, septic meningitis, meningismus, slowing of labour, increased incidence of forceps delivery, or cranial nerve palsies due to traction on nerves from loss of cerebrospinal fluid have been reported.

Elevation of Body Temperature: Epidural infusion of ropivacaine hydrochloride injection has, in some cases, been associated with transient elevations in body temperature to > 38.5 °C. This has occurred more frequently at doses greater than 16 mg/hour. The pyrexia seen in connection with postoperative epidural infusion of ropivacaine is similar to that seen with bupivacaine. Body temperature is not affected by systemic concentrations of ropivacaine.

8 DRUG INTERACTIONS

8.1 Drug-Drug Interactions

The drugs listed are based on either drug interaction case reports or studies, or potential interactions due to the expected magnitude and seriousness of the interaction (i.e., those identified as contraindicated).

Local anesthetics and agents structurally related to amide-type local anesthetics

Ropivacaine Hydrochloride Injection, USP should be used with caution in patients receiving other amide-type local anesthetics such as lidocaine, bupivacaine, mepivacaine and prilocaine since toxic effects are additive.

Antiarrhythmic Drugs

Ropivacaine Hydrochloride Injection, USP should also be used with caution with structurally related agents such as the antiarrhythmics procainamide, disopyramide, tocainide, mexiletine and flecainide.

Class III Antiarrhythmic drugs

Specific interactions studies with ropivacaine and class III anti-arrhythmic drugs (e.g. amiodarone) have not been performed. Caution is advised when using Class III antiarrhythmic drugs concomitantly with ropivacaine due to potential pharmacodynamic or pharmacokinetic interactions, or both (see WARNINGS AND PRECAUTIONS, High Risk Populations). Patients treated with Class III antiarrhythmic drugs should be under close surveillance and ECG monitoring, since cardiac effects may be additive.

Sedatives

If sedatives are employed to reduce patient apprehension, they should be used in reduced doses, since local anesthetic agents, like sedatives, are central nervous system depressants which in combination may have an additive effect.

Strong Inhibitors of P4501A2

In vitro studies indicate that the cytochrome P4501A2 is involved in the formation of 3-hydroxy ropivacaine, the major metabolite.

Fluvoxamine and Enoxacin: In healthy volunteers, the plasma clearance of ropivacaine was reduced by up to 77% during co-administration of fluvoxamine, a selective and potent P4501A2 inhibitor. Thus strong inhibitors of cytochrome P4501A2, such as fluvoxamine, and enoxacin, given concomitantly during repeated administration of ropivacaine hydrochloride injection, can interact with ropivacaine hydrochloride injection. Prolonged administration should be avoided in patients treated with such strong inhibitors of P4501A2.

Theophylline and Imipramine: Interactions with drugs known to be metabolized by P4501A2 via competitive inhibition, such as theophylline and imipramine may occur, but should be of less importance.

8.2 Drug - Food Interactions

Interactions of ropivacaine with food have not been established.

8.3 Drug – Herb Interactions

Interactions of ropivacaine with herbal products have not been established.

8.4 Drug – Laboratory Test Interactions

Interactions of ropivacaine with laboratory tests have not been established.

8.5 Drug – Lifestyle Interactions

Driving and Operating Machinery: Besides the direct anesthetic effect, local anesthetics may have a very mild effect on mental function and coordination even in the absence of overt CNS toxicity and may temporarily impair locomotion and alertness. Patients should be cautioned about driving a vehicle or operating potentially hazardous machinery on the day they receive local anesthetic treatment.

9 ACTION AND CLINICAL PHARMACOLOGY

Ropivacaine hydrochloride injection, a local anesthetic of the amino amide class, is supplied as the pure S-(-)-enantiomer.

Ropivacaine hydrochloride injection has both local anesthetic and analgesic effects. At high doses, surgical anesthesia is achieved. At lower doses, ropivacaine hydrochloride injection produces sensory block (analgesia) with limited and non-progressive motor block.

9.1 Mechanism of Action

Ropivacaine hydrochloride injection, like other local anesthetics, causes reversible blockade of impulse propagation along nerve fibres by preventing the inward movement of sodium ions through the cell membrane of the nerve fibres.

Onset and Duration of Action

The duration of action of local anesthetics depends on the injection site, the route of administration, and the concentration and volume of the drug. The duration and intensity of ropivacaine block are not improved by the addition of epinephrine.

After epidural infusion of ropivacaine, the spread of sensory block and the degree of motor block, as well as their subsequent regression, are dose-dependent.

9.2 Pharmacodynamics

Ropivacaine, like other local anesthetics, can also have effects on the central nervous and cardiovascular systems. If excessive amounts of drug reach the systemic circulation, symptoms and signs of central nervous system toxicity and cardiotoxicity may appear.

Signs and symptoms of central nervous system toxicity (see OVERDOSAGE) generally occur at lower plasma concentrations than do those of cardiotoxicity. Following systemic absorption, local anesthetics can produce central nervous system stimulation, depression or both. Apparent central stimulation is usually manifested as restlessness, tremors, and shivering, progressing to convulsions, followed by depression and coma, leading ultimately to respiratory arrest. However, the local anesthetics have a primary depressant effect on the medulla and on higher centers. The depressed stage may occur without a prior excited stage. High blood concentrations of local anesthetics resulting from systemic absorption or intravascular injection can depress cardiac conduction and excitability. At toxic levels, atrioventricular block, ventricular arrhythmias, cardiac arrest, and death are possibilities.

Indirect cardiovascular effects (hypotension, bradycardia) may occur after epidural administration, depending on the extent of the concomitant sympathetic block.

In two clinical pharmacology studies (total n = 24) ropivacaine and bupivacaine were infused (10 mg/min) in human volunteers until the appearance of CNS symptoms, e.g., visual or hearing disturbances, perioral numbness, tingling and others. Similar symptoms were seen with both drugs. In one study, the mean \pm SD maximum tolerated intravenous dose of ropivacaine infused (124 ± 38 mg) was significantly higher than that of bupivacaine (99 ± 30 mg), while in the other study the doses were not different (115 ± 29 mg of ropivacaine and 103 ± 30 mg of bupivacaine). In the latter study, the number of subjects reporting each symptom was similar for both drugs with the exception of muscle twitching, which was reported by more subjects with bupivacaine than ropivacaine at comparable intravenous doses. At the end of the infusion, ropivacaine in both

studies caused significantly less depression of cardiac conductivity (less QRS widening) than bupivacaine. Ropivacaine and bupivacaine caused evidence of depression of cardiac contractility, but there were no changes in cardiac output.

Animal

Ropivacaine has been demonstrated to produce topical, infiltration, epidural, and brachial plexus anesthesia in a range of animal models with potency and pharmacodynamic characteristics similar to those of bupivacaine. Like bupivacaine, ropivacaine is also capable of inducing convulsions and hemodynamic changes when administered intravenously in large doses.

The convulsant doses of intravenously administered ropivacaine and bupivacaine were similar in mice, rats, and dogs. In sheep, ropivacaine was less proconvulsant than was bupivacaine when the drugs were administered by intravenous infusion. Both ropivacaine and bupivacaine exhibited considerably more proconvulsant activity than did lidocaine.

The cardiovascular effects of convulsant and superconvulsant doses of ropivacaine and bupivacaine have been assessed in unanesthetized and anesthetized animals. In unanesthetized rats, convulsant doses of intravenous ropivacaine caused a 50% increase in QRS duration while bupivacaine resulted in a 100% increase. In unanesthetized dogs, 2/6 animals which received intravenous ropivacaine at two times the convulsant dose experienced ventricular arrhythmias, while the incidence for bupivacaine was 5/6 animals.

Cardiovascular changes were similar for both drugs in pentobarbital anesthetized pigs administered maximum intravenous doses of ropivacaine (4 mg/kg) and bupivacaine (3 mg/kg).

In a blinded study of sheep, the dose of ropivacaine required to produce cardiotoxicity (circulatory collapse) was consistently greater than that for bupivacaine (Table 7). Ropivacaine and other class-related local anesthetics caused convulsions at lower doses in pregnant ewes compared to non-pregnant ewes, but pregnancy did not increase the sensitivity of ewes to other serious manifestations of systemic toxicity (e.g. hypotension, apnea and circulatory collapse).

Table 7 Dose Required to Produce Convulsions (CNS) and Circulatory Collapse (CC) in Pregnant Sheep

	Intravenous Dose (mg/kg)			
	CNS		CC	
	Non-Pregnant	Pregnant	Non-Pregnant	Pregnant
Ropivacaine	6.1	7.5	11.6	12.9
Bupivacaine	4.6	5	8.9	8.5

9.3 Pharmacokinetics

Absorption: The systemic concentration of local anesthetics is dependent upon the total dose and the concentration administered, the route of administration, the patient's hemodynamic / circulatory condition, and the vascularity of the injection site. Ropivacaine follows linear pharmacokinetics and the maximum plasma concentration is proportional to the dose.

Ropivacaine shows complete and biphasic absorption from the epidural space. The mean half-lives of the two phases are in the order of 14 minutes and 4 hours. The slow absorption is the rate-limiting factor in the elimination of ropivacaine, which explains why the apparent elimination half-life is longer after epidural than after intravenous administration. Ropivacaine shows dose proportionality at epidural doses up to 250 mg and intravenous doses up to 80 mg.

Distribution: Following intravenous administration, the volume of distribution of ropivacaine hydrochloride injection is approximately 40 liters. Ropivacaine hydrochloride injection is extensively bound to alpha1-acid glycoprotein in plasma with an unbound, i.e. pharmacologically active, fraction of about 6%. An increase in total plasma concentration during continuous epidural infusion has been observed in postoperative patients and is related to the postoperative increase of alpha1-acid glycoprotein. Variations in unbound concentration have been much less than in total plasma concentration.

Ropivacaine readily crosses the placenta and equilibrium, in regard to unbound concentration, is rapidly reached. The degree of plasma protein binding in the fetus is less than in the mother, which results in lower total plasma concentrations in the fetus than in the mother. The ratios of umbilical vein to maternal vein total and free concentrations are 0.31 and 0.74, respectively.

Metabolism: There is no evidence of *in vivo* racemization of ropivacaine. Ropivacaine is extensively metabolized in the liver predominantly to 3-hydroxy-ropivacaine by an aromatic hydroxylation process mediated by cytochrome P4501A2 and N-dealkylation to S-PPX mediated by CYP3A4. Conjugated and unconjugated 3-hydroxy-ropivacaine represent the major urinary metabolites. Urinary excretion of 4-hydroxy ropivacaine, N-dealkylated pipecoloxylidide (S-PPX) and both the 3-hydroxy and 4-hydroxy N-dealkylated metabolites account for less than 3% of the dose. An additional metabolite, 2-hydroxy-methyl-ropivacaine has been identified, but not quantified in urine. S-PPX and 3-hydroxy ropivacaine are the major metabolites excreted in the urine during epidural infusion. A total S-PPX concentration in the plasma was about half that of total ropivacaine however, mean unbound concentrations of S-PPX were about 7 – 9 times higher than that of unbound ropivacaine following continuous epidural infusion up to 72 hours. The threshold for CNS toxicity in rats due to unbound plasma concentrations of S-PPX is approximately 12 times higher than that of unbound ropivacaine. S-PPX, 3-hydroxy ropivacaine, and 4-hydroxy ropivacaine have a pharmacological activity in animal models less than that of ropivacaine.

Impaired renal function has little or no influence on unchanged ropivacaine pharmacokinetics. The renal clearance of S-PPX is significantly correlated with creatinine clearance. A lack of correlation between total exposure, expressed as AUC, with creatinine clearance indicates that the total clearance of S-PPX includes a non-renal elimination in addition to renal excretion. Some patients with impaired renal function may show an increased exposure to S-PPX resulting from a low non-renal clearance. The relevance to humans of this increased exposure to S-PPX is unknown at this time.

Elimination: After intravascular administration, 86% of the total dose of ropivacaine is excreted in the urine of which approximately 1% is the parent compound and 36% is 3-hydroxy-ropivacaine. Ropivacaine has a mean total plasma clearance in the order of 440 mL/min, an

unbound plasma clearance of 8 L/min, a renal clearance of 1 mL/min, and a volume of distribution at steady state of 47 litres. Ropivacaine has an intermediate hepatic extraction ratio of about 0.4. The terminal elimination half-life is 1.6 to 1.8 hours after intravenous administration, 4.1 – 6.5 hours after epidural administration, and 5.7 – 8 hours after brachial plexus block. The total and unbound clearance of epidural ropivacaine at term in pregnancy (223 – 256 mL/min and 2.8 – 3.3 L/min, respectively), are lower than that observed in non-pregnant patients.

10 STORAGE, STABILITY AND DISPOSAL

Stability and Storage Recommendations

Store at 15 °C to 30 °C. Do not freeze. Do not autoclave.

11 SPECIAL HANDLING INSTRUCTIONS

Before administering the product in *freeflex*[®] bags, review these directions:



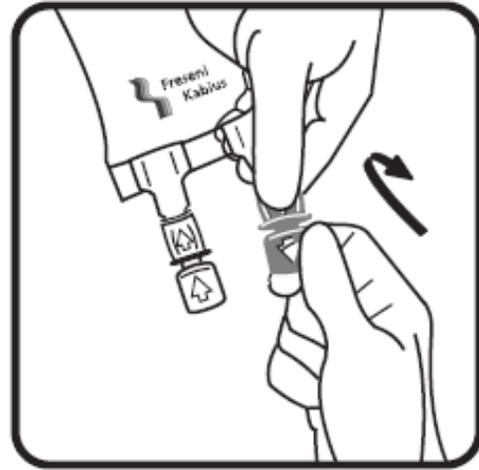
1. Check the solution composition, lot number and expiry date. Inspect the container for damage or leakage. If damaged, do not use.



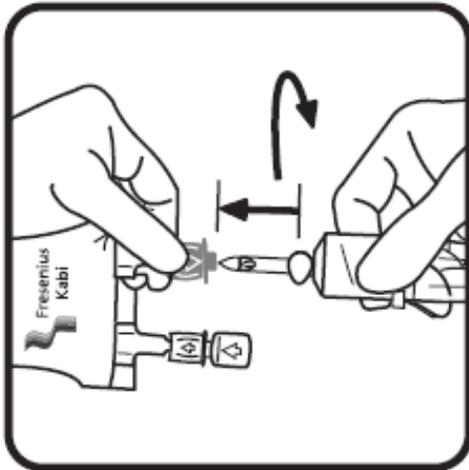
2. Place the bag on a clean, flat surface. Peel open over-wrap.



3. Identify the blue infusion port (encircled on the right side). This is the administration port. The white port (on the left side) is the medication port where medication is to be injected.



4. Place and keep the bag on a clean, flat surface. Break off the blue tamper-evident cover from the **freeflex**[®] infusion port.



5. Close roller clamp of the administration set. Insert the spike until the clear plastic collar of the port meets the shoulder of the spike.
6. Use a non-vented standard infusion set or if using a vented set, close air inlet.
7. Hang the bag on the infusion stand. Press drip chamber to get fluid level. Prime infusion set. Connect and adjust the flow rate.

Do not freeze. Do not re-autoclave **freeflex**[®] bags or ampoules.

Ropivacaine Hydrochloride Injection, USP solutions are sterile, without preservative and are for single use only. Discard unused portion.

Drug Compatibilities

Ropivacaine Hydrochloride Injection, USP for Epidural infusion in **freeflex**[®] bags is chemically and physically compatible with the following drugs:

Concentration of Ropivacaine Hydrochloride Injection, USP: 1 – 2 mg / mL	
Drug solution	Concentration
Fentanyl citrate	1 – 10 mcg / mL
Sufentanil citrate	0.4 – 4 mcg / mL
Morphine sulphate	20 – 100 mcg / mL
Clonidine hydrochloride	5 – 50 mcg / mL

The mixtures should be used immediately. As with all parenteral products, intravenous admixtures should be visually inspected for clarity, particulate matter, precipitate, discoloration and leakage prior to administration, whenever solution and container permit. Solutions showing haziness, particulate matter, precipitate, discoloration or leakage should be discarded.

Incompatibility

Alkalinization may lead to precipitation since ropivacaine is poorly soluble above pH 6.

PART II: SCIENTIFIC INFORMATION

12 PHARMACEUTICAL INFORMATION

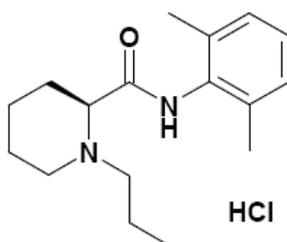
Drug Substance

Proper name: ropivacaine hydrochloride

Chemical name: (S)-(-)-1-propyl-2',6'-dimethyl-2-pipecoloxylidine hydrochloride

Molecular formula and Molecular mass: C₁₇H₂₇ClN₂O, 310.87 g/ mol

Structural formula:



Physicochemical properties: Ropivacaine is a pure enantiomer. A white crystalline powder with a pKa of 8.1, solubility in water and a distribution ratio of 14:1 (n-octanol/phosphate buffer pH 7.4).

13 CLINICAL TRIALS

Epidural Administration in Surgery

The use of ropivacaine hydrochloride injection for epidural anesthesia in general surgery was investigated in 25 clinical studies performed in 942 patients. Ropivacaine hydrochloride injection was administered in doses ranging from 75 to 250 mg. The intensity and duration of sensory and motor block were dose-dependent. At doses ranging from 100 – 200 mg, the median time to achieve a T10 sensory block was 10 (5 – 13) minutes, while the median duration of anesthesia at this dermatome was 4 (3 – 5) hours. The median duration of motor block for 20 mL of a 5 mg/mL solution was 3 hours; 7.5 mg/mL, 4 hours; and 10 mg/mL, 5 hours.

Epidural Administration in Cesarean Section

Seven studies of epidural anesthesia with ropivacaine hydrochloride injection have been performed in a total of 173 women undergoing cesarean section. Ropivacaine hydrochloride injection 5 mg/mL was administered at mean total doses ranging from 110 to 150 mg. The median onset of sensory block at T6 ranged from 11 to 26 minutes, while the median duration of sensory block at this dermatome ranged from 1.7 to 3.2 hours. The duration of motor block ranged from 1.4 to 2.9 hours. The quality of analgesia was considered to be satisfactory in 73 – 100% of patients, while the quality of muscle relaxation was rated as satisfactory in 100% of patients.

Major Nerve Block

Twelve studies (n = 363) have been performed to investigate the efficacy of ropivacaine hydrochloride injection in a single instance of major nerve block, brachial plexus block. In studies in which the 5 mg/mL solution (total doses of 175 – 190 mg) was administered by the supraclavicular approach, anesthesia at dermatomes T1 to C5 was achieved in 83 – 100% of patients. Following median onset times ranging from 10 to 25 minutes, the median duration of anesthesia at these dermatomes ranged from 8 to 12 hours. The quality of brachial plexus block was rated as satisfactory in 91 – 100% of these patients.

Success rates were lower with axillary blocks than with supraclavicular blocks. In patients receiving 175 – 275 mg of ropivacaine hydrochloride injection 5 mg/mL by the axillary approach, satisfactory analgesia was achieved in 62 – 72% of patients. The frequency of anesthesia at the nerves studied ranged from 52 – 90%. The median onset time ranged from 10 – 45 min with a median duration of anesthesia in the range of 3.7 to 8.7 hours.

In studies in which ropivacaine hydrochloride injection 7.5 mg/mL was administered for the production of supraclavicular brachial plexus block (total dose 225 mg) analgesia was achieved in the nerves studied in 82 – 96% of patients and anesthesia was achieved in 51 – 63% of patients. The median onset time of analgesia was 5 to 7 minutes, with a median duration of 11.4 to 14.4 hours. The median onset time of anesthesia was 15 to 19 minutes, with a median duration of 8.5 to 11.1 hours. The quality of brachial plexus block (i.e., analgesia and muscle relaxation) was rated as satisfactory/excellent in 69 – 77% of patients.

In patients receiving ropivacaine hydrochloride injection 7.5 mg/mL (total dose 300 mg) by the axillary approach, analgesia was achieved in the nerves studied in 64 – 100% of patients and anesthesia was achieved in 65 – 81% of patients (excluding the axillary nerve in which anesthesia was achieved in 14% of patients). The median onset time of analgesia varied from 5 to 20 minutes, with a median duration of 11.4 to 13.2 hours (excluding the axillary nerve which had a duration of 5 to 6 hours). The median onset time of anesthesia was 20 to 30 minutes, with a median duration of 8.4 to 10.8 hours (excluding the axillary nerve which had a duration of 2.4 hours). The quality of brachial plexus block was rated as satisfactory/ excellent in 96 – 100% of patients.

Epidural Administration in Labour and Delivery

Nine studies have been performed to investigate the use of epidural ropivacaine hydrochloride injection for pain relief during labour in pregnant females with full term singleton fetuses in the vertex presentation. Loading doses of approximately 25 mg were administered as fractionated

doses. In four clinical trials in which continuous infusions were administered, the total infusion dose ranged from 3 – 30 mg/h with median values of 22 – 25 mg/h. Infusion times up to 13 hours have been studied. In the remaining studies, supplementary analgesia was provided by up to 8 top up doses of ropivacaine hydrochloride injection at median doses ranging from 14 – 18 mg/h. In these studies, the median values for the onset of pain relief after the main dose ranged from 9 – 18 min. Median upper spread of sensory block ranged from T5 to T10.

Epidural Administration in Postoperative Pain Management

Sixteen clinical trials (n = 1049) have been performed to investigate the lumbar-thoracic epidural use of ropivacaine hydrochloride injection 2 mg/mL in postoperative pain management following orthopedic or upper or lower abdominal surgery. All patients received epidural anesthesia with ropivacaine hydrochloride injection 5, 7.5 or 10 mg/mL or general anesthesia intraoperatively prior to the initiation of postoperative epidural infusion.

In studies investigating infusion times up to 21 hours, the infusion of ropivacaine hydrochloride injection at doses ranging from 10 – 30 mg/h was associated with decreases in pain scores and narcotic requirement. The frequency and intensity of motor block tended to decrease during the 21-hour period. Motor block was dose rate-dependent. In two dose-controlled studies, infusion rates of 12 – 28 mg/h provided satisfactory analgesia (85 – 100% rated good or excellent) with relatively slight motor block. Sensory block was also dose rate-dependent and a decrease in spread was observed during the infusion period.

Two clinical studies have investigated the epidural infusion of ropivacaine hydrochloride injection 2 mg/mL (6 – 14 mL/h) for up to 72 hours of postoperative pain management following major abdominal surgery. Also included in this series, were study groups receiving epidural infusion of ropivacaine hydrochloride injection 2 mg/mL mixed with fentanyl 1 – 4 mcg/mL at rates up to 28 mg/hour. Ropivacaine hydrochloride injection admixed with or without fentanyl, provided good/excellent pain relief for 87 – 100% of patients treated for up to 72 hours. In both studies, after 24 hours, 87 – 92% of the patients were without measurable motor block. No motor block was reported thereafter in 97 – 100% of patients. Although the combination of ropivacaine hydrochloride injection and fentanyl provided improved pain relief, there were narcotic side effects and hospitalization was prolonged.

Infiltration

Pre- and postoperative wound infiltrations with ropivacaine hydrochloride injection for postoperative pain relief have been studied in six clinical trials. An additional study examined local infiltration with ropivacaine for operation upon benign nevi. In total, 308 patients were studied. In the wound infiltration studies, ropivacaine at doses of 100 – 200 mg resulted in lower pain scores and/or a decreased analgesia requirement in the immediate post-operative period in 3 of 4 studies which contained inactive control groups. In the study of nevus excision, doses of 5 – 20 mg were considered to provide adequate analgesia in the 30 patients studied.

14 NON-CLINICAL TOXICOLOGY

Single Dose Studies

Acute toxicity has been studied in mice and rats and besides death, the main signs observed were decreased motor activity, dyspnea, piloerection, tremor, ataxia and clonic convulsions. These were all expected signs after administration of high doses of a local anesthetic agent.

Table 8 Toxicity After Single Administration of Ropivacaine to Mice and Rats

Species/ Strain	Body Wt. (g)	No. Dose Groups	No. Animals/ Group	Route of Administration	Estimated LD₅₀ (mg/kg)
Mouse/NMRI	17 – 25	7	2 – 5	subcutaneous	> 120
	15 – 21	5	2 – 5	subcutaneous	100
Mouse/NMRI	16 – 20	4	5	intravenous	14 – 20
	15 – 19	4	5	intravenous	28
Rat/Sprague Dawley	270 – 340	4	5	subcutaneous	58 – 69
	180 – 220	4	2 – 5	subcutaneous	76
Rat/Sprague Dawley	180 – 210	4	2 – 5	intravenous	9.9
	150 – 180	4	2 – 5	intravenous	12

Long-Term Multidose Studies

In a two-week dose finding study in rats, the maximum tolerated subcutaneous dose of ropivacaine was determined to be below 30 mg/kg when 7 of 12 animals at this dose experienced convulsions which were fatal in 3 cases. In the main study, rats were treated subcutaneously with 3.3, 9.9 or 26 mg/kg ropivacaine for 1 month. A single male at the highest dose level showed convulsions and cyanosis on one occasion. The clinical chemistry investigation showed a slight, but dose dependent, decrease in serum potassium concentration. However, all values were within the laboratory reference limits. The pathological investigation did not disclose any changes that were caused by treatment with ropivacaine.

In dogs, the maximum tolerated subcutaneous dose of ropivacaine was reported to be below 16 mg/kg after convulsions were observed in one of six animals at this dose level. In a later study, also performed in dogs, repeated daily administration of ropivacaine for 1 month at 3.3, 6.6 and 13 mg/kg, caused vomiting and tremor in all drug treated groups with females at the highest dose level being most affected. These signs are comparable with known actions of other local anesthetics on the CNS at this dosage range. No clinical, chemical or pathologic changes that could be attributed to treatment were seen.

Local Tolerance

Single perineural or intraneural (intrafascicular) injection of ropivacaine 7.9 mg/mL in rats produced no evidence of neurotoxicity in any of the treated nerves. Neither was there any indication of a neurotoxic effect in dogs after single epidural or intrathecal injection of ropivacaine 7.9 – 10.6 mg/mL, or after continuous epidural infusion of ropivacaine 6 mg/mL for 5 days. The effects of ropivacaine on the spinal cord were also evaluated in rats after twice daily intrathecal injections of 2.6, 5.3 or 11 mg/mL ropivacaine for two weeks. Assessment of the dose required to produce spinal anesthesia did not change with time and, again, there was no evidence of neurotoxicity.

Continuous epidural infusion (up to 0.34 mg/kg) for 4 consecutive weeks of ropivacaine 4 mg/mL with or without fentanyl in Beagles produced no treatment-related neurological signs, other than paresis and paralysis which were considered to be consistent with the pharmacological actions of an epidurally administered local anesthetic agent. Generally, these responses decreased during the latter half of the 4 week infusion period and disappeared on discontinuation of the infusion. The presence of fentanyl necessitated a step-up dosing procedure, but once the highest dose of ropivacaine had been achieved fentanyl did not change the response to the drug.

Reproduction Studies

Ropivacaine did not affect fertility or general reproductive performance over two generations in rats at dose levels up to 23 mg/kg when administered subcutaneous to males for 9 weeks up until mating, and in females, for two weeks prior to mating and up to 42 days post coitus. An increased pup loss was observed during the first few days post parturition in the 23 mg/kg dose group, but this was considered secondary to impaired maternal care of the newborn. Pregnant rats given up to 26 mg/kg ropivacaine subcutaneously on days 6 – 15 of pregnancy showed no signs of adverse effects on organogenesis and early fetal development.

In a dose finding study, pregnant rabbits administered 16 or 21 mg/kg ropivacaine subcutaneously on days 6 – 18 of pregnancy experienced a reduction in motor activity, reduction in body weight gain and convulsions. The convulsions resulted in the death of 2 of 4 animals. Fetal weight gain was decreased. Thus, the highest dose level was reduced in the main teratology study. In this study, ropivacaine at doses of up to 13 mg/kg subcutaneously did not affect organogenesis and early fetal development.

Mutagenicity

Weak mutagenic activity was found in the two mouse lymphoma tests performed. In the first test, weakly positive results were observed at the highest concentration of ropivacaine (890 mg/L) without metabolic activation and with metabolic activation in the 49 – 160 mg/L range. In the repeat test, in which a physiological medium was used, ropivacaine showed no mutagenic activity in the absence of activation despite achieving a two-fold increase in test compound concentration. With metabolic activation, a lower magnitude of mutagenic activity than in the first study was seen at concentrations of 70 – 210 mg/mL. No mutagenic activity was noted in any of the other *in vitro* systems or *in vivo* systems studied.

15 SUPPORTING PRODUCT MONOGRAPHS

1. NAROPIN[®] (Ropivacaine Hydrochloride Injection for Epidural Infusion 2 mg / mL, Ropivacaine Hydrochloride Injection 5 and 10 mg / mL), submission control 222913, Product Monograph, AstraZeneca Canada Inc., March 25, 2019.

**READ THIS FOR SAFE AND EFFECTIVE USE OF YOUR MEDICINE
PATIENT MEDICATION INFORMATION**

ROPIVACAINE HYDROCHLORIDE INJECTION, USP

Read this carefully before you start taking **Ropivacaine Hydrochloride Injection, USP** and each time you get a refill. This leaflet is a summary and will not tell you everything about this drug. Talk to your healthcare professional about your medical condition and treatment and ask if there is any new information about **Ropivacaine Hydrochloride Injection, USP**.

What is Ropivacaine Hydrochloride Injection, USP used for?

Ropivacaine Hydrochloride Injection, USP is used as an anesthetic and for pain relief. It can be used:

- to anesthetize the area of the body where surgery is performed;
- to provide pain relief in labour and after surgery or acute injury.

Ropivacaine Hydrochloride Injection, USP is not for use in children under 18 years of age.

How does Ropivacaine Hydrochloride Injection, USP work?

Ropivacaine Hydrochloride Injection, USP temporarily prevents the nerves in the injected area from transmitting feelings of pain, heat or cold. You may still feel pressure and touch. In many cases the nerves to the muscles in the area will also be blocked. This may cause temporary weakness or paralysis.

The duration of pain relief depends on the dose and how it is given.

What are the ingredients in Ropivacaine Hydrochloride Injection, USP?

Medicinal ingredient: Ropivacaine hydrochloride 2 mg / mL, 5 mg / mL, 7.5 mg / mL and 10 mg / mL.

Non-medicinal ingredients: sodium chloride, hydrochloric acid and/or sodium hydroxide and water for injection.

Ropivacaine Hydrochloride Injection, USP comes in the following dosage forms:

Ropivacaine Hydrochloride Injection, USP 2 mg / mL for epidural infusion is available in 100 and 200 mL **freeflex**[®] infusion bags.

Ropivacaine Hydrochloride Injection, USP 2 mg / mL, 7.5 mg / mL and 10 mg / mL are available in 10 mL and 20 mL ampoules. The 5 mg/mL is available in 10 mL ampoules only.

Do not use Ropivacaine Hydrochloride Injection, USP if:

Ropivacaine Hydrochloride Injection, USP should not be used in patients who:

- are allergic to ropivacaine, any other “-caine” type anesthetics, or any of the non-medicinal ingredients in the product

To help avoid side effects and ensure proper use, talk to your healthcare professional before you take Ropivacaine Hydrochloride Injection, USP. Talk about any health conditions or problems you may have, including:

- about all health problems you have now or have had in the past;
- about other medicines you take, including ones you can buy without a prescription;
- if you are taking drugs used to treat irregular heart activity (anti-arrhythmics, such as amiodarone);
- if you have ever had a bad, unusual allergic reaction to ropivacaine or any other medicines ending with “-caine”;
- if you have a heart, liver or kidney disease, since the dose of Ropivacaine Hydrochloride Injection, USP may have to be adjusted;
- if you are pregnant, plan to become pregnant or are breastfeeding;
- if you have been diagnosed with porphyria, a rare hereditary disorder.

Other warnings you should know about:

- Ropivacaine Hydrochloride Injection, USP could cause irreversible joint damage if it is used to manage your pain after joint surgery.
- Ropivacaine Hydrochloride Injection, USP may temporarily interfere with your ability to drive or operate tools or machinery.

Tell your healthcare professional about all the medicines you take, including any drugs, vitamins, minerals, natural supplements or alternative medicines.

The following may interact with Ropivacaine Hydrochloride Injection, USP:

- drugs that treat heart rhythm problems (e.g. mexiletine, amiodarone);
- other local anesthetics;
- sedative drugs;
- if using Ropivacaine Hydrochloride Injection, USP for a long time:
 - fluvoxamine or imipramine, used to treat depression
 - enoxacin, an antibiotic
 - theophylline, used to treat lung diseases

Usage of some medicines at the same time as Ropivacaine Hydrochloride Injection, USP may increase the risk of serious side effects.

How to take Ropivacaine Hydrochloride Injection, USP:**Usual dose:**

Ropivacaine Hydrochloride Injection, USP should be administered by a doctor. It can be administered by an anesthesia professional under the supervision of a doctor.

The dose to be given is decided by the doctor, based on the clinical need and your physical condition.

Overdose:

You can have serious side effects from getting too much Ropivacaine Hydrochloride Injection, USP. You may need treatment to deal with the side effects from the overdose. The doctor treating you is trained to deal with these situations. The first signs of being given too much ropivacaine hydrochloride injection are usually as follows:

- Feeling dizzy or light-headed.
- Numbness of the lips and around the mouth.
- Numbness of the tongue.
- Hearing problems.
- Tingling in the ears.
- Problems with your sight (vision).

More serious side effects from being given too much Ropivacaine Hydrochloride Injection, USP include:

- problems with speech
- twitching muscles
- tremors
- trembling
- seizures
- loss of consciousness
- change in heart rhythm
- heart attack
- decrease in blood pressure

To reduce the risk of serious side effects, your doctor will stop giving you Ropivacaine Hydrochloride Injection, USP as soon as these signs appear.

If you think you have taken too much ROPIVACAINE HYDROCHLORIDE INJECTION, USP, contact your healthcare professional, hospital emergency department or regional Poison Control Centre immediately, even if there are no symptoms.

What are possible side effects from using Ropivacaine Hydrochloride Injection, USP?

These are not all the possible side effects you may feel when taking Ropivacaine Hydrochloride Injection, USP. If you experience any side effects not listed here, contact your healthcare professional.

Medicines affect different people in different ways. Just because side effects have occurred in some patients, does not mean that you will get them.

Tell your doctor as soon as possible if you do not feel well during treatment with Ropivacaine Hydrochloride Injection, USP.

Possible side effects include:

Numbness, due to nerve irritation caused by the needle or the injection. This does not usually last for long.

Possible side effects seen with other local anesthetics which might also be caused by Ropivacaine Hydrochloride Injection, USP include:

Damaged nerves. Rarely (affecting less than 1 in 1000 people), this may cause permanent problems.

If too much Ropivacaine Hydrochloride Injection, USP is given into the spinal fluid, the whole body may become numbed (anesthetized).

Serious side effects and what to do about them			
Symptom / effect	Talk to your healthcare professional		Stop taking drug and get immediate medical help
	Only if severe	In all cases	
VERY COMMON			
Low blood pressure: feeling dizzy or light-headed		√	
Nausea	√		
COMMON			
Pins and needles		√	
Feeling dizzy		√	
Headache	√		
Slow or fast heart beat			√
High blood pressure		√	
Vomiting	√		
Difficulty in passing urine		√	
High temperature (fever) or stiffness (rigor)		√	
Back Pain	√		
UNCOMMON			
Anxiety	√		
Decreased sensitivity or feeling in the skin		√	
Fainting		√	
Difficulty breathing			√
Low body temperature		√	

Serious side effects and what to do about them		
Symptom / effect	Talk to your healthcare professional	Stop taking drug and get immediate medical help
Some symptoms can happen if the injection was given into a blood vessel by mistake, or if you have been given too much Ropivacaine Hydrochloride Injection, USP: seizures, feeling dizzy or light-headed, numbness of the lips and around the mouth, numbness of the tongue, hearing problems, problems with sight, problems with speech, stiff muscles, and trembling		√
Numbness		√
Nerve Damage		√
RARE Heart attack		√
Severe allergic reaction (anaphylaxis): sudden onset of rash, itching or lumpy rash (hives); swelling of the face, lips, tongue or other parts of the body; and shortness of breath, wheezing or difficulty breathing.		√
Uneven heart beat		√

If you have a troublesome symptom or side effect that is not listed here or becomes bad enough to interfere with your daily activities, talk to your healthcare professional.

Reporting Side Effects
<p>You can report any suspected side effects associated with the use of health products to Health Canada by:</p> <ul style="list-style-type: none"> • Visiting the Web page on Adverse Reaction Reporting (https://www.canada.ca/en/health-canada/services/drugs-health-products/medeffect-canada/adverse-reaction-reporting.html) for information on how to report online, by mail or by fax; or • Calling toll-free at 1-866-234-2345. <p><i>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.</i></p>

Storage:

Your doctor or the hospital will normally store Ropivacaine Hydrochloride Injection, USP. The staff is responsible for storing, dispensing and disposing of Ropivacaine Hydrochloride Injection, USP in the correct way.

Store at 15 °C to 30 °C. Do not freeze. Do not autoclave.

Ropivacaine Hydrochloride Injection, USP will be kept out of reach and sight of children.

If you want more information about Ropivacaine Hydrochloride Injection, USP:

- Talk to your healthcare professional
- Find the full product monograph that is prepared for healthcare professionals and includes this Patient Medication Information by visiting the Health Canada website (<https://health-products.canada.ca/dpd-bdpp/index-eng.jsp>); Fresenius Kabi Canada’s website (<http://www.fresenius-kabi.com/en-ca/>), or by calling 1-877-821-7724.

This leaflet was prepared by:

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Last revised: October 07, 2019