

Ethiqa XR®

(buprenorphine extended-release injectable suspension)

1.3 mg/mL

Opioid Analgesic

For subcutaneous use only in mice, rats, and ferrets, and non-human primates.

CAUTION: Federal law restricts this drug to use by or on the order of a licensed veterinarian.

LEGAL STATUS—In order to be legally marketed, a new animal drug intended for a minor species must be Approved, Conditionally Approved, or Indexed by the Food and Drug Administration. **THIS PRODUCT IS INDEXED—MIF 900-014. Extra-label use is prohibited.**

This product is not to be used in animals intended for use as food for humans or food-producing animals.

HUMAN SAFETY WARNING

Abuse Potential

ETHIQA XR contains buprenorphine, an opioid that exposes humans to risks of misuse, abuse, and addiction, which can lead to overdose and death. Use of buprenorphine may lead to physical dependence. The risk of abuse by humans should be considered when storing, administering, and disposing of ETHIQA XR. Persons at increased risk for opioid abuse include those with a personal or family history of substance abuse (including drugs or alcohol) or mental illness (e.g., depression).

Life-Threatening Respiratory Depression

Serious, life-threatening, or fatal respiratory depression may occur with accidental exposure to or with misuse or abuse of ETHIQA XR. Monitor for respiratory depression if human exposure to buprenorphine occurs. Misuse or abuse of buprenorphine by swallowing, snorting, or injecting poses a significant risk of overdose and death.

Accidental Exposure

Because of the potential for adverse reactions associated with accidental exposure, ETHIQA XR should only be administered by veterinarians, veterinary technicians, or laboratory staff who are trained in the handling of potent opioids. Accidental exposure to ETHIQA XR, especially in children, can result in a fatal overdose of buprenorphine.

Risks From Concurrent Misuse or Abuse with Benzodiazepines or Other CNS Depressants

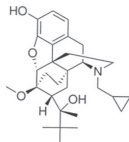
Concurrent misuse or abuse of opioids with benzodiazepines or other central nervous system (CNS) depressants, including alcohol, may result in profound sedation, respiratory depression, coma, and death.

See HUMAN SAFETY WARNINGS for detailed information.

DESCRIPTION

Ethiqa XR is an injectable suspension of extended-release buprenorphine. Buprenorphine hydrochloride, an opioid analgesic, is the active ingredient in Ethiqa XR. Lipid-bound buprenorphine hydrochloride is suspended in medium chain fatty acid triglyceride (MCT) oil. Lipids encapsulate the buprenorphine limiting diffusion which provides for larger doses and prolonged action.^{1,2} Ethiqa XR has a slightly yellow to white opaque appearance. Each mL contains approximately 1.3 mg buprenorphine hydrochloride. The sterile product contains cholesterol, benzyl alcohol, glyceryl tristearate, and buprenorphine hydrochloride suspended in MCT oil. Buprenorphine belongs to the opioid class of drugs and is a narcotic under the Controlled Substances Act due to its chemical derivation from thebaine.

Buprenorphine Formula C₂₉H₄₁NO₄



INDICATIONS

Ethiqa XR is indicated for the control of post-procedural pain in mice, rats, ferrets, and non-human primates.

DOSAGE AND ADMINISTRATION

Wear protective clothing when administering Ethiqa XR.

Do not dispense Ethiqa XR for administration at home by the pet owner (see HUMAN SAFETY WARNINGS).

Dosing

At the doses stated in the table below, therapeutic blood levels are maintained for 72 hours after the initial dose. If needed, a single repeat dose may be administered 72 hours after the initial dose.

Administer Ethiqa XR subcutaneously according to the dosage for the appropriate species listed in the Dosing Chart below.

DOSING TABLE FOR SUBCUTANEOUS INJECTION OF ETHIQA XR

Species	Dose mg/Kg Body Weight	Time to Reach Therapeutic Blood Levels after Administration	Comments
Mice	3.25 mg/Kg	30 minutes ¹⁰	Ethiqa XR can be administered 30 minutes prior to painful stimulus ¹⁰
Rats	0.65 mg/Kg	6 hours ⁴	
Ferrets	0.6 mg/Kg	30 minutes ¹³	
Non-human primates	0.2 mg/Kg	15 minutes ⁶	Ethiqa XR can be administered 15 minutes prior to painful stimulus ⁶

Administration

Shake the vial well before each use to ensure uniform suspension. If stored refrigerated, bring to room temperature before use.

Use aseptic technique to subcutaneously administer Ethiqa XR by utilizing minimally stressful restraint techniques or sedation.

An oily sheen may be observed in the fur after injection due to leakage of Ethiqa XR, which is an oil-based drug suspension, from the injection site. The oily sheen may last for 4 to 5 days post-injection. Leakage from the injection site can be minimized by slowly injecting Ethiqa XR into the subcutaneous space.

Do not return any unused drug suspension from the syringe back into the vial.

The animal can be returned to its cage immediately after receiving Ethiqa XR. (See **CONTRAINDICATIONS**, **PRECAUTIONS**, and **ADVERSE REACTIONS** for additional information on bedding.)

CONTRAINDICATIONS

Only administer Ethiqa XR by subcutaneous injection. Ethiqa XR is not intended for intravenous, intra-arterial, intrathecal, intramuscular, or intra-peritoneal injection.

Do not use in animals with pre-existing respiratory compromise.

Do not house rats on wood chip-type bedding after administration of Ethiqa XR. Signs of nausea, including pica, have been observed in rats for up to 3 days post-treatment with Ethiqa XR. **Pica involving wood chip type bedding can be lethal (see ADVERSE REACTIONS).**

HUMAN SAFETY WARNINGS

Not for use in humans. Keep this and all medications out of reach of children and pets.

Human User Safety While Handling Ethiqa XR in the Hospital:

Ethiqa XR should only be handled and administered by a veterinarian, veterinary technician, or laboratory staff trained in the handling of potent opioids.

To prevent human adverse reactions or abuse, at least 2 trained administrators should be present during injection of Ethiqa XR.

Wear protective clothing when administering Ethiqa XR.

Mucous Membrane or Eye Contact During Application:

Direct contact of Ethiqa XR with the eyes, oral, or other mucous membranes could result in absorption of buprenorphine and the potential for adverse reactions. If accidental eye, oral, or other mucous membrane contact is made during application, flush the area with water and contact a physician immediately. If wearing contact lenses, flush the eye first and then remove the contact lens.

Skin Contact During Application:

If human skin is accidentally exposed to ETHIQA XR, wash the exposed area immediately with soap and water and contact a physician. Accidental exposure could result in absorption of buprenorphine and the potential for adverse reactions.

Drug Abuse, Addiction, and Diversion of Opioids:

Controlled Substance:

Ethiqa XR contains buprenorphine, a Schedule III controlled substance with an abuse potential similar to other Schedule III opioids.

Abuse:

Ethiqa XR contains buprenorphine, an opioid substance, that can be abused and is subject to misuse, abuse, and addiction, which may lead to overdose and death. This risk is increased with concurrent use of alcohol and other central nervous system depressants, including other opioids and benzodiazepines.

Ethiqa XR should be handled appropriately to minimize the risk of diversion, including restriction of access, the use of accounting procedures, and proper disposal methods, as appropriate to the clinical setting and as required by law.

Prescription drug abuse is the intentional, non-therapeutic use of a prescription drug, even once, for its rewarding psychological or physiological effects. Buprenorphine has been diverted for non-medical use into illicit channels of distribution. All people handling opioids require careful monitoring for signs of abuse.

Storage and Disposal:

Ethiqa XR is a Schedule III opioid. Store in a locked cabinet according to federal and state controlled substance requirements/guidelines. Discard any broached vials after 90 days. Any unused or expired vials must be destroyed by a reverse distributor; for further information, contact your local DEA field office or call Fidelity Animal Health at 1-833-384-4729.

Information for Physician:

Ethiqa XR contains a mu opioid partial agonist (1.3 mg buprenorphine/mL). In the case of an emergency, provide the physician with this package insert. Naloxone may not be effective in reversing respiratory depression produced by buprenorphine. The onset of naloxone effect may be delayed by 30 minutes or more. Doxapram hydrochloride has also been used as a respiratory stimulant.

PRECAUTIONS

Death has been reported when non-steroidal anti-inflammatory drugs (NSAIDs such as meloxicam and carprofen) and Ethiqa XR have been administered concomitantly in mice.⁵

The use of paper or soft bedding for up to 3 days following administration of Ethiqa XR should be considered (see **CONTRAINDICATIONS** and **ADVERSE REACTIONS**).

Buprenorphine is excreted in the feces (see **CLINICAL PHARMACOLOGY**). Coprophagy may lead to ingestion of buprenorphine or its metabolites by animals treated with Ethiqa XR and untreated cage mates.

Ethiqa XR forms a depot near the injection site. Granulomatous inflammatory nodules have been observed in naked-skinned mice and rats administered Ethiqa XR.^{4,5} Injection site reactions including inflammation and necrosis have been observed in common marmosets.⁶

Animals may exhibit an obtunded response to stimuli up to 4 hours after receiving Ethiq XR.

When using Ethiq XR, an opiate antagonist such as naloxone, should be available in case reversal is required.

Ethiq XR may cause sedation, decreased blood pressure, decreased heart rate, decreased gastrointestinal mobility, and respiratory depression. Use caution with concomitant administration of Ethiq XR with drugs that cause respiratory depression.

Animals should be monitored for signs of decreased cardiovascular and respiratory function when receiving Ethiq XR.

The safety of Ethiq XR has not been evaluated in pregnant, lactating, neonatal, or immune-compromised animals.

ADVERSE REACTIONS

Two Laboratory Studies in Mice

No adverse reactions were observed in sixteen of 20-to-25-gram young adult mice (8 males, 8 females) after a single subcutaneous injection of 16.25 mg/kg Ethiq XR (5X). Laboratory parameters evaluated in the study included hematology and clinical chemistry; histopathology was also performed.¹¹

In a second study, 16 adult mice (8 males, 8 females) received 16.25 mg/kg (5X) Ethiq XR subcutaneous for three doses at four-day intervals. A surgical procedure was performed on the mice prior to receiving each of the three doses of Ethiq XR. Mortality was seen in two male mice after the third surgical procedure and third dose of Ethiq XR (total dose of 49 mg buprenorphine/Kg body weight in 8 days). Weight loss was observed postprocedurally in mice administered Ethiq XR.¹¹

Two Laboratory Studies in Rats

Adverse reactions were evaluated in twenty-four 180-to-200-gram young adult rats (12 male, 12 female) after a single subcutaneous injection of Ethiq XR. A surgical procedure was performed on the rats prior to receiving a single dose of Ethiq XR of 0.65 (1X), 1.3 (2X), 3.9 (6X), or 6.5 mg/Kg (10X); Six in each group (3 male and 3 females).¹²

Adverse reactions also were evaluated in 24 young adult rats (8-weeks at start). There were 12 male and 12 females. The female rats weighed between 128-164 grams and males weighed between 169-219 grams. Each rat received a subcutaneous injection of 1.3 (2X), 3.9 (6X), or 6.5 mg/Kg (10X) Ethiq XR for three doses at four-day intervals (8 rats per group; 4 males, 4 females). A surgical procedure was performed on the rats prior to receiving each of the three doses of Ethiq XR. Laboratory parameters evaluated in the study included hematology, clinical chemistry, urinalysis, histopathology, and bodyweight.^{3,12}

Signs of nausea were observed at all dose levels (1 rat at 1.3 mg/Kg, 3 rats at 3.9 mg/Kg, 2 rats at 6.5 mg/Kg) within 24 hours of the dose. Signs included self-licking, self-gnawing and efforts to eat wood-chip bedding. Mortality was seen in 1 of 36 rats exposed to wood chip bedding. Necropsy revealed the stomach and esophagus were compacted with bedding, the bladder was abnormally distended, and the urine contained blood.^{3,12}

3 out of 222 rats (the 222 rats are from five (5) pharmacokinetic and safety studies) were observed to bleed profusely from the jugular vein, which was used for obtaining blood samples, and subsequently died.

Two Laboratory Studies in Ferrets

No studies have been published administering Ethiq XR to ferrets. One unpublished study reports that no adverse reactions were observed after 4 adult female ferrets received a single subcutaneous injection of 0.6 mg/Kg of Ethiq XR.¹³

In a pharmacokinetic single-dose study, no adverse reactions were observed in 6 male, approximately 1-year old, ferrets after receiving 0.04 mg/Kg buprenorphine immediate-release.⁹

Two Laboratory Studies in Non-Human Primates

In a pharmacokinetic study, 25 adult common marmosets received a single SQ dose of Buprenorphine SR (0.15 mg/kg, N=8) or Ethiq XR (0.1 mg/kg, N=6, 0.15 mg/kg, N=3, and 0.2 mg/kg, N=8). Injection site reactions were scored based on gross examination of erythema and swelling. Mild sedation was noted at 8- and 24-hours post-dose in all groups. Body weights decreased relative to baseline in all groups except Ethiq XR 0.15 mg/Kg; however, these decreases were not clinically significant (<10% of body weight). Buprenorphine injections of either formulation resulted in increased cage movement that was dose dependent. Both Buprenorphine SR and Ethiq XR acute injection sites exhibited acute necrosis and inflammation. The degree of inflammation was overall similar for chronic both drugs; however, qualitatively different. The Buprenorphine SR injection sites were associated with mainly macrophages and neutrophils, while the Ethiq XR sites were associated with macrophages and multinucleated giant cells and cholesterol clefts in response to the vehicular medium.⁹

In a pharmacokinetic study, four adult male cynomolgus monkeys were administered a single dose of Ethiq XR (0.2 mg/Kg) SQ. No abnormal behaviors or clinical signs were observed up to 120-hours post injection.⁷

CONTACT INFORMATION

Contact Fidelis Animal Health at 1-833-384-4729 or www.ethiqxr.com. To report suspected adverse drug experiences, contact Fidelis Animal Health at 1-833-384-4729.

For additional information about reporting adverse drug experiences for animal drugs, contact FDA at 1-888-FDA-VETS or <http://www.fda.gov/reportanimalae>.

CLINICAL PHARMACOLOGY³

Mechanism of Action: Buprenorphine exerts its analgesic effect via high affinity binding to various subclasses of opiate receptors particularly mu, in the central nervous system. Buprenorphine analgesic and adverse reactions are mediated by mu opioid receptor agonism. Due to its partial agonist activity, buprenorphine exhibits a ceiling affect to its actions and thus has a greater therapeutic index compared to full mu opioid receptor agonists such as morphine. Buprenorphine binds tightly to and dissociates slowly from the opioid receptor. Therefore, the pharmacological effects of buprenorphine are not directly related to plasma concentrations.

Buprenorphine can act as an agonist and antagonist at different classes of opioid receptors. Agonism at the mu opioid receptor and, in some cases, antagonism at the kappa or delta opioid receptors are possible underlying mechanisms for the ceiling effect and bell-shaped dose-response curve of buprenorphine. Studies with knockout mice have shown that the antinociceptive effect of buprenorphine, which is mediated primarily by the mu opioid receptor, is attenuated by the ability of the drug to activate the opioid receptor like (ORL-1) receptor. The drug can be described as a 'full' and a 'partial' agonist at the same receptor depending on the specific assay. There appears to be no ceiling effect for analgesia, but there is a ceiling effect for respiratory depression.

Pharmacokinetic studies with bolus injections of buprenorphine in mice and rats provide similar models. After bolus intravenous administration, plasma levels decline tri-exponentially. The drug is n-dealkylated in the liver to norbuprenorphine (NBN), an active metabolite. Studies have shown that glucuronide metabolites

of buprenorphine and NBN are also metabolically active, and can approximate or exceed the concentration of the parent drug. Un-metabolized drug excreted in the urine and feces one week after injection was 1.9 and 22.4% of the dose, respectively, and 92% of the dose was accounted for in one week.³

Mice

Pharmacokinetic parameters of Ethiq XR were studied in 6-8 week old male and female Balb/c mice following a single subcutaneous injection of 3.25 mg/kg bodyweight. Therapeutic blood levels were observed up to 72 hours after subcutaneous injection.

Rats

Pharmacokinetic parameters of Ethiq XR were studied in 8 week old male and female Fischer rats following a single subcutaneous injection of 0.65 mg/kg bodyweight. Therapeutic blood levels were observed up to 72 hours after subcutaneous injection.

Ferrets

Pharmacokinetic parameters of Ethiq XR were studied in 4 adult female ferrets following a single subcutaneous injection of 0.6 mg/Kg body weight. Therapeutic significant blood levels were observed within 30 minutes up to 72 hours after administration.¹³

Non-Human Primates

In a pharmacokinetic study, 25 adult common marmosets were evaluated after receiving a single SQ dose of Buprenorphine SR (0.15 mg/Kg, N=8) or Ethiq XR (0.1 mg/kg, N=6, 0.15 mg/Kg, N=3, and 0.2 mg/kg, N=8). Therapeutic blood levels were observed within 30 minutes to 72 hours after subcutaneous injection.⁹

In a pharmacokinetic study, four adult male cynomolgus monkeys (6.41-9.58 Kg) were administered a single dose of Ethiq XR (0.2 mg/Kg) SQ. Therapeutic blood levels peaked above 0.5 ng/mL for at least 96-hours and remained in the significant range.⁷

In adult baboons (5 male and 5 females), onset of concentrations of buprenorphine hypothesized to produce analgesia (0.1 ng/mL) occurred within 30 minutes of SQ administration of Buprenorphine SR (0.2 mg/Kg) and remained there for at least 120-hours.⁹

HOW SUPPLIED

Ethiq XR is supplied in a 5 mL glass vial containing 3 mL of injectable drug suspension.

STORAGE INFORMATION

Store between 15° and 25°C +/- 2°C (59° and 77°F) or refrigerated. DO NOT FREEZE. If stored refrigerated, bring to room temperature before use. Once broached, the multi-dose vial should be discarded after 90 days.

Product could change its physical properties if not stored within the specified storage conditions and original vial container.

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