

## HIGHLIGHTS OF PRESCRIBING INFORMATION

These highlights do not include all the information needed to use EXALGO® safely and effectively. See full prescribing information for EXALGO.

EXALGO (hydromorphone HCl) Extended-Release Tablets, for oral use, CII  
Initial U.S. Approval: 1984

**WARNING: ABUSE POTENTIAL, LIFE-THREATENING RESPIRATORY DEPRESSION, and ACCIDENTAL EXPOSURE**  
See full prescribing information for complete boxed warning.

- EXALGO contains hydromorphone, a Schedule II controlled substance. Monitor for signs of misuse, abuse, and addiction during EXALGO therapy. (5.1, 9)
- Fatal respiratory depression may occur, with highest risk at initiation and with dose increases; instruct patients on proper administration of EXALGO tablets to reduce risk. EXALGO is for use in opioid-tolerant patients only. Crushing, dissolving, or chewing the tablet can cause rapid release and absorption of a potentially fatal dose of hydromorphone. (5.2)
- Accidental ingestion of EXALGO can result in fatal overdose of hydromorphone, especially in children. (5.3)

## RECENT MAJOR CHANGES

Boxed Warning	08/2012
Indications and Usage (1)	08/2012
Dosage and Administration (2)	08/2012
Contraindications (4)	08/2012
Warnings and Precautions (5)	08/2012

## INDICATIONS AND USAGE

EXALGO is an opioid agonist indicated for the management of moderate to severe pain in opioid tolerant patients requiring continuous, around-the-clock opioid analgesia for an extended period of time (1).

### Limitations of Use

- EXALGO is not for use:
  - As an as-needed (prn) analgesic (1)
  - For pain that is mild or not expected to persist for an extended period of time (1)
  - For acute pain (1)
  - For postoperative pain, unless the patient is already receiving chronic opioid therapy prior to surgery, or if the postoperative pain is expected to be moderate to severe and persist for an extended period of time (1)

EXALGO is only for patients in whom tolerance to an opioid of comparable potency is established. (1)

## DOSAGE AND ADMINISTRATION

- Individualize dosing based on patient's prior analgesic treatment experience, and titrate as needed to provide adequate analgesia and minimize adverse reactions. (2.1, 2.2, 2.3)
- For once daily administration (2.1)
- Instruct patients to swallow EXALGO tablets intact. (2.6)
- Do not abruptly discontinue EXALGO. (2.3, 5.12)

## DOSAGE FORMS AND STRENGTHS

- Tablets (hydromorphone): 8 mg, 12 mg, 16 mg, 32 mg (3)

## CONTRAINDICATIONS

- Opioid non-tolerant patients (4)
- Significant respiratory depression (4)
- Acute or severe bronchial asthma (4)
- Known or suspected paralytic ileus (4)
- Narrowed or obstructed gastrointestinal tract (4)
- Known hypersensitivity to any components including hydromorphone hydrochloride and sulfites (4, 5.10)

## WARNINGS AND PRECAUTIONS

- Elderly, cachectic, and debilitated patients, and patients with chronic pulmonary disease: Monitor closely because of increased risk of respiratory depression. (5.4, 5.5)
- Interaction with CNS depressants: Consider dose reduction of one or both drugs because of additive effects. (5.6, 7.1)
- Hypotensive effect: Monitor during dose initiation and titration (5.7)
- Patients with head injury or increased intracranial pressure: Monitor for sedation and respiratory depression. Avoid use of EXALGO in patients with impaired consciousness or coma susceptible to intracranial effects of CO<sub>2</sub> retention. (5.8)

## ADVERSE REACTIONS

Most common adverse reactions (>10%) are: constipation, nausea, vomiting, somnolence, headache, and dizziness (6.1).

To report SUSPECTED ADVERSE REACTIONS, contact Mallinckrodt at 1-800-778-7898 or FDA at 1-800-FDA-1088 or [www.fda.gov/medwatch](http://www.fda.gov/medwatch).

## DRUG INTERACTIONS

- Mixed agonist/antagonist opioid analgesics: Avoid use with EXALGO because they may reduce analgesic effect of EXALGO or precipitate withdrawal symptoms. (5.12, 7.2)
- CNS depressants: Avoid use of EXALGO with other drugs or substances having increased risk of respiratory depression. (7.1)
- Monoamine oxidase inhibitors (MAOIs): Avoid EXALGO in patients taking MAOIs or within 14 days of stopping such treatment. (7.3)

## USE IN SPECIFIC POPULATIONS

- Pregnancy: EXALGO is not recommended. Based on animal data, may cause fetal harm. (8.1)
- Nursing mothers: EXALGO is not recommended. Hydromorphone has been detected in human milk. Closely monitor infants of nursing women receiving EXALGO. (8.3)
- Hepatic or renal impairment: Administer a reduced dose of EXALGO in patients with moderate hepatic (8.7) and moderate renal impairment (8.8). Consider use of an alternate analgesic in patients with severe hepatic (8.7) and renal impairment. (8.8)

See 17 for PATIENT COUNSELING INFORMATION and Medication Guide

Revised: 08/2012

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## FULL PRESCRIBING INFORMATION

### WARNING: ABUSE POTENTIAL, LIFE-THREATENING RESPIRATORY DEPRESSION, and ACCIDENTAL EXPOSURE

#### **Abuse Potential**

EXALGO contains hydromorphone, an opioid agonist and a Schedule II controlled substance with an abuse liability similar to other opioid agonists, legal or illicit [see *Warnings and Precautions (5.1)*]. Assess each patient's risk for opioid abuse or addiction prior to prescribing EXALGO. The risk for opioid abuse is increased in patients with a personal or family history of substance abuse (including drug or alcohol abuse or addiction) or mental illness (e.g., major depressive disorder). Routinely monitor all patients receiving EXALGO for signs of misuse, abuse, and addiction during treatment [see *Drug Abuse and Dependence (9)*].

#### **Life-threatening Respiratory Depression**

Respiratory depression, including fatal cases, may occur with use of EXALGO, even when the drug has been used as recommended and not misused or abused [see *Warnings and Precautions (5.2)*]. EXALGO is for use in opioid tolerant patients only. Proper dosing and titration are essential and EXALGO should be prescribed only by healthcare professionals who are knowledgeable in the use of potent opioids for the management of chronic pain. Monitor for respiratory depression, especially during initiation of EXALGO or following a dose increase. Crushing, dissolving, or chewing the tablet can cause rapid release and absorption of a potentially fatal dose of hydromorphone.

#### **Accidental Exposure**

Accidental ingestion of EXALGO, especially in children, can result in a fatal overdose of hydromorphone [see *Warnings and Precautions (5.3)*].

## 1 INDICATIONS AND USAGE

EXALGO is indicated for the management of moderate to severe pain in opioid tolerant patients requiring continuous, around-the-clock opioid analgesia for an extended period of time.

Patients considered opioid tolerant are those who are taking at least 60 mg oral morphine per day, 25 mcg transdermal fentanyl/hour, 30 mg oral oxycodone/day, 8 mg oral hydromorphone/day, 25 mg oral oxymorphone/day or an equianalgesic dose of another opioid, for a week or longer.

#### **Limitations of Use**

EXALGO is not for use:

- As an as-needed (prn) analgesic
- For pain that is mild or not expected to persist for an extended period of time
- For acute pain
- For postoperative pain.

## 2 DOSAGE AND ADMINISTRATION

### 2.1 Initial Dosing

Initiate the dosing regimen for each patient individually, taking into account the patient's prior analgesic treatment experience. Overestimating the EXALGO dose when converting patients from another opioid medication can result in fatal overdose with the first dose. Monitor patients closely for respiratory depression, especially within the first 24 to 72 hours of initiating therapy with EXALGO [see *Warnings and Precautions (5.2)*].

Consider the following factors when selecting an initial dose of EXALGO:

- Total daily dose and potency of the opioid the patient has been taking previously;
- Reliability of the relative potency estimate used to calculate the equivalent dose of hydromorphone needed (Note: potency estimates may vary with the route of administration);
- Patient's degree of opioid experience and opioid tolerance;
- General condition and medical status of the patient;
- Concurrent medication;
- Type and severity of the patient's pain.

EXALGO is administered at a frequency of once daily (every 24 hours), approximately the same time every day, with or without food.

To avoid medication errors, prescribers and pharmacists must be aware that hydromorphone is available as both immediate-release 8 mg tablets and extended-release 8 mg tablets.

Discontinue or taper all other extended-release opioids when beginning EXALGO therapy. As EXALGO is only for use in opioid-tolerant patients, do not begin any patient on EXALGO as the first opioid.

#### Conversion from Other Oral Hydromorphone Formulations to EXALGO

Patients receiving oral immediate-release hydromorphone may be converted to EXALGO by administering a starting dose equivalent to the patient's total daily oral hydromorphone dose, taken once daily.

#### Conversion from Oral Opioids to EXALGO

While there are useful tables of oral and parenteral equivalents, there is substantial inter-patient variation in the relative potency of different opioid drugs and formulations. Specific recommendations of equianalgesic doses are not available because of a lack of systematic evidence for these types of analgesic substitutions. Published relative potency data are available, but such ratios are approximations. As such, it is safer to underestimate a patient's 24-hour oral hydromorphone requirement and provide rescue medication (e.g. immediate-release hydromorphone) than to overestimate and manage an adverse reaction.

The following table was used in a clinical trial of EXALGO. The recommended starting dose of EXALGO is 50% of the calculated estimate of daily hydromorphone requirement. Calculate the estimated daily hydromorphone requirement using **Table 1**.

- **The conversion ratios in this Table 1 are only to be used for the conversion from current oral opioid therapy to EXALGO. Do not use this table to convert patients from EXALGO to another opioid. Doing so may result in fatal overdose.**
- For patients on a single opioid, sum the total daily dose of the opioid and then multiply the total daily dose by the conversion ratio to calculate the approximate oral hydromorphone equivalent.
- For patients on a regimen of mixed opioids, calculate the approximate oral hydromorphone dose for each opioid and sum the totals.
- For patients on a regimen of fixed-ratio opioid/non-opioid analgesic medications, only the opioid component of these medications should be used in the conversion.
- It is extremely important to monitor all patients closely when converting from methadone to other opioid agonists. The ratio between methadone and other opioid agonists may vary widely as a function of previous dose exposure. Methadone has a long half-life and tends to accumulate in the plasma.
- Monitor patients for signs or symptoms of opioid withdrawal when converting patients to EXALGO.

Example conversion from a single opioid to EXALGO:

Step 1: Sum the total daily dose of the opioid

- 30 mg of oxycodone twice daily equals a total daily dose of 60 mg of oxycodone

Step 2: Calculate the approximately equivalent dose of oral hydromorphone based on the total daily dose of the opioid

- Multiply the 60 mg total daily dose of oxycodone by the conversion factor of 0.4 for a result of 24 mg of oral hydromorphone

Step 3: Calculate the starting dose of EXALGO, which is 50% of the calculated oral hydromorphone dose

- 50% of 24 mg results in an initial dose of 12 mg of EXALGO once daily
- Adjust individually for each patient

**Table 1.  
Conversion Ratios to EXALGO\***

<b>Previous Opioid</b>	<b>Approximate Equivalent Oral Dose</b>	<b>Approximate Oral Conversion Ratio</b>
<b>Hydromorphone</b>	12 mg	1
<b>Codeine</b>	200 mg	0.06
<b>Hydrocodone</b>	30 mg	0.4
<b>Methadone<sup>†</sup></b>	20 mg	0.6
<b>Morphine</b>	60 mg	0.2
<b>Oxycodone</b>	30 mg	0.4
<b>Oxymorphone</b>	20 mg	0.6

\* **The conversion ratios and approximate equivalent doses in this conversion table are only to be used for the conversion from current opioid therapy to EXALGO.**

<sup>†</sup> It is extremely important to monitor all patients closely when converting from methadone to other opioid agonists. The ratio between methadone and other opioid agonists may vary widely as a function of previous dose exposure. Methadone has a long half-life and tends to accumulate in the plasma.

#### Conversion from Transdermal Fentanyl to EXALGO

Eighteen hours following the removal of the transdermal fentanyl patch, EXALGO treatment can be initiated. For each 25 mcg/hr fentanyl transdermal dose, the equianalgesic dose of EXALGO is 12 mg every 24 hours. An appropriate starting dose of EXALGO is 50% of the calculated total daily dose every 24 hours.

## **2.2 Titration and Maintenance of Therapy**

Individually titrate EXALGO to a dose that provides adequate analgesia and minimizes adverse reactions. Continually reevaluate patients receiving EXALGO to assess the maintenance of pain control and the relative incidence of adverse reactions. During chronic therapy, especially for non-cancer-related pain (or pain associated with other terminal illnesses), periodically reassess the continued need for the use of opioid analgesics.

If the level of pain increases, attempt to identify the source of increased pain, while adjusting the EXALGO dose to decrease the level of pain. Plasma levels of EXALGO are sustained for 18 to 24 hours. Dosage adjustments may be made every 3 to 4 days. Patients who experience breakthrough pain may require dosage adjustment or rescue medication.

If signs of excessive opioid-related adverse reactions are observed, the next dose may be reduced. Adjust the dose to obtain an appropriate balance between management of pain and opioid-related adverse reactions.

### 2.3 Discontinuation of EXALGO

When a patient no longer requires therapy with EXALGO, taper doses gradually, by 25% to 50% every 2 or 3 days down to a dose of 8 mg before discontinuation of therapy, to prevent signs and symptoms of withdrawal in the opioid-tolerant patient.

To dispose of unused EXALGO flush all remaining tablets down the toilet or remit to authorities at a certified drug take-back program.

### 2.4 Hepatic Impairment

Start patients with moderate hepatic impairment on 25% of the EXALGO dose that would be prescribed for patients with normal hepatic function. Closely monitor patients with moderate hepatic impairment for respiratory and central nervous system depression during initiation of therapy with EXALGO and during dose titration. Use of alternate analgesics is recommended for patients with severe hepatic impairment [see *Use in Specific Populations (8.7)*].

### 2.5 Renal Impairment

Start patients with moderate renal impairment on 50% and patients with severe renal impairment on 25% of the EXALGO dose that would be prescribed for patients with normal renal function. Closely monitor patients with renal impairment for respiratory and central nervous system depression during initiation of therapy with EXALGO and during dose titration. As EXALGO is only intended for once daily administration, consider use of an alternate analgesic that may permit more flexibility with the dosing interval in patients with severe renal impairment [see *Use in Specific Populations (8.8)*].

### 2.6 Administration of EXALGO

Instruct patients to swallow EXALGO tablets intact. The tablets are not to be crushed, dissolved, or chewed due to the risk of rapid release and absorption of a potentially fatal dose of hydromorphone [see *Warnings and Precautions (5.2)*].

## 3 DOSAGE FORMS AND STRENGTHS

EXALGO is available in 8 mg, 12 mg, 16 mg or 32 mg dosage strengths. The 8 mg tablets are round, biconvex, red tablets imprinted with "EXH 8" on one side. The 12 mg tablets are round, biconvex, dark yellow tablets imprinted with "EXH 12" on one side. The 16 mg tablets are round, biconvex, yellow tablets imprinted with "EXH 16" on one side. The 32 mg tablets are round, biconvex, white tablets imprinted with "EXH 32" on one side.

## 4 CONTRAINDICATIONS

EXALGO is contraindicated in:

- Opioid non-tolerant patients. Fatal respiratory depression could occur in patients who are not opioid tolerant.
- Patients with significant respiratory depression
- Patients with acute or severe bronchial asthma in an unmonitored setting or in the absence of resuscitative equipment
- Patients with known or suspected paralytic ileus
- Patients who have had surgical procedures and/or underlying disease resulting in narrowing of the gastrointestinal tract, or have "blind loops" of the gastrointestinal tract or gastrointestinal obstruction.

- Patients with hypersensitivity (e.g., anaphylaxis) to hydromorphone or sulfite-containing medications [see *Warnings and Precautions (5.10)*]

## 5 WARNINGS AND PRECAUTIONS

### 5.1 Abuse Potential

EXALGO contains hydromorphone, an opioid agonist and a Schedule II controlled substance. Hydromorphone can be abused in a manner similar to other opioid agonists, legal or illicit. Opioid agonists are sought by drug abusers and people with addiction disorders and are subject to criminal diversion. Consider these risks when prescribing or dispensing EXALGO in situations where there is concern about increased risks of misuse, abuse, or diversion. Concerns about abuse, addiction, and diversion should not, however, prevent the proper management of pain.

Assess each patient's risk for opioid abuse or addiction prior to prescribing EXALGO. The risk for opioid abuse is increased in patients with a personal or family history of substance abuse (including drug or alcohol abuse or addiction) or mental illness (e.g., major depression). Patients at increased risk may still be appropriately treated with modified-release opioid formulations; however these patients will require intensive monitoring for signs of misuse, abuse, or addiction. Routinely monitor all patients receiving opioids for signs of misuse, abuse, and addiction because these drugs carry a risk for addiction even under appropriate medical use.

Misuse or abuse of EXALGO by crushing, chewing, snorting, or injecting the dissolved product will result in the uncontrolled delivery of the opioid and pose a significant risk that could result in overdose and death [see *Overdosage (10)*].

Contact local state professional licensing board or state controlled substances authority for information on how to prevent and detect abuse or diversion of this product.

### 5.2 Life-threatening Respiratory Depression

Respiratory depression is the primary risk of EXALGO. Respiratory depression, if not immediately recognized and treated, may lead to respiratory arrest and death. Respiratory depression from opioids is manifested by a reduced urge to breathe and a decreased rate of respiration, often associated with a "sighing" pattern of breathing (deep breaths separated by abnormally long pauses). Carbon dioxide (CO<sub>2</sub>) retention from opioid-induced respiratory depression can exacerbate the sedating effects of opioids. Management of respiratory depression may include close observation, supportive measures, and use of opioid antagonists, depending on the patient's clinical status [see *Overdosage (10)*].

While serious, life-threatening, or fatal respiratory depression can occur at any time during the use of EXALGO, the risk is greatest during the initiation of therapy or following a dose increase. Closely monitor patients for respiratory depression when initiating therapy with EXALGO and following dose increases. Instruct patients against use by individuals other than the patient for whom EXALGO was prescribed and to keep EXALGO out of the reach of children, as such inappropriate use may result in fatal respiratory depression.

To reduce the risk of respiratory depression, proper dosing and titration of EXALGO are essential [see *Dosage and Administration (2.1, 2.2)*]. Overestimating the EXALGO dose when converting patients from another opioid product can result in fatal overdose with the first dose. Respiratory depression has also been reported with use of modified-release opioids when used as recommended and not misused or abused.

To further reduce the risk of respiratory depression, consider the following:

- Proper dosing and titration are essential and EXALGO should be prescribed only by healthcare professionals who are knowledgeable in the use of potent opioids for the management of chronic pain.

- EXALGO is for use in opioid-tolerant patients only. Ingestion of EXALGO may cause fatal respiratory depression when administered to patients not already tolerant to opioids.
- Instruct patients to swallow EXALGO tablets intact. The tablets are not to be crushed, dissolved, or chewed. The resulting hydromorphone dose may be fatal.
- EXALGO is contraindicated in patients with respiratory depression and in patients with conditions that increase the risk of life-threatening respiratory depression [see *Contraindications (4)*].

### 5.3 Accidental Exposure

Accidental ingestion of EXALGO, especially in children, can result in a fatal overdose of hydromorphone.

### 5.4 Elderly, Cachectic, and Debilitated Patients

Respiratory depression is more likely to occur in elderly, cachectic, or debilitated patients as they may have altered pharmacokinetics due to poor fat stores, muscle wasting, or altered clearance compared to younger, healthier patients. Therefore, monitor such patients closely, particularly when initiating and titrating EXALGO and when EXALGO is given concomitantly with other drugs that depress respiration [see *Warnings and Precautions (5.2, 5.6)*].

### 5.5 Use in Patients with Chronic Pulmonary Disease

Monitor patients with significant chronic obstructive pulmonary disease or cor pulmonale, and patients having a substantially decreased respiratory reserve, hypoxia, hypercapnia, or pre-existing respiratory depression for respiratory depression, particularly when initiating therapy and titrating with EXALGO, as in these patients, even usual therapeutic doses of EXALGO may decrease respiratory drive to the point of apnea [see *Warnings and Precautions (5.2)*]. Consider the use of alternative non-opioid analgesics in these patients if possible.

### 5.6 Interactions with Alcohol, Other CNS Depressants, and Illicit Drugs

Hypotension, profound sedation, coma, or respiratory depression may result if EXALGO is used concomitantly with other CNS depressants (e.g., sedatives, anxiolytics, hypnotics, neuroleptics, other opioids). When considering the use of EXALGO in a patient taking a CNS depressant, assess the duration of use of the CNS depressant and the patient's response, including the degree of tolerance that has developed to CNS depression. Additionally, consider the patient's use, if any, of alcohol or illicit drugs that cause CNS depression. If EXALGO therapy is to be initiated in a patient taking a CNS depressant, start with a lower EXALGO dose than usual and monitor patients for signs of sedation and respiratory depression and consider using a lower dose of the concomitant CNS depressant [see *Drug Interactions (7.1)*].

### 5.7 Hypotensive Effect

EXALGO may cause severe hypotension including orthostatic hypotension and syncope in ambulatory patients. There is an increased risk in patients whose ability to maintain blood pressure has already been compromised by a reduced blood volume or concurrent administration of certain CNS depressant drugs (e.g. phenothiazines or general anesthetics) [see *Drug Interactions (7.1)*]. Monitor these patients for signs of hypotension after initiating or titrating the dose of EXALGO.

### 5.8 Use in Patients with Head Injury or Increased Intracranial Pressure

Monitor patients taking EXALGO who may be susceptible to the intracranial effects of CO<sub>2</sub> retention (e.g., those with evidence of increased intracranial pressure or brain tumors) for signs of sedation and respiratory depression, particularly when initiating therapy with EXALGO. EXALGO may reduce respiratory drive, and the resultant CO<sub>2</sub> retention can further increase intracranial pressure. Opioids may

also obscure the clinical course in a patient with a head injury. Avoid the use of EXALGO in patients with impaired consciousness or coma.

### **5.9 Use in Patients with Gastrointestinal Conditions**

EXALGO is contraindicated in patients with paralytic ileus. Avoid the use of EXALGO in patients with other GI obstruction.

Because the EXALGO tablet is nondeformable and does not appreciably change in shape in the GI tract, EXALGO is contraindicated in patients with preexisting severe gastrointestinal narrowing (pathologic or iatrogenic, for example: esophageal motility disorders, small bowel inflammatory disease, “short gut” syndrome due to adhesions or decreased transit time, past history of peritonitis, cystic fibrosis, chronic intestinal pseudoobstruction, or Meckel’s diverticulum). There have been reports of obstructive symptoms in patients with known strictures or risk of strictures, such as previous GI surgery, in association with the ingestion of drugs in nondeformable extended-release formulations.

It is possible that EXALGO tablets may be visible on abdominal x-rays under certain circumstances, especially when digital enhancing techniques are utilized.

The hydromorphone in EXALGO may cause spasm of the sphincter of Oddi. Monitor patients with biliary tract disease, including acute pancreatitis, for worsening symptoms.

### **5.10 Sulfites**

EXALGO contains sodium metabisulfite, a sulfite that may cause allergic-type reactions including anaphylactic symptoms and life-threatening or less severe asthmatic episodes in certain susceptible people. The overall prevalence of sulfite sensitivity in the general population is unknown and probably low. Sulfite sensitivity is seen more frequently in asthmatic than in nonasthmatic people.

### **5.11 Use in Patients with Convulsive or Seizure Disorders**

The hydromorphone in EXALGO may aggravate convulsions in patients with convulsive disorders, and may induce or aggravate seizures in some clinical settings. Monitor patients with a history of seizure disorders for worsened seizure control during EXALGO therapy.

### **5.12 Avoidance of Withdrawal**

Avoid the use of mixed agonist/antagonist analgesics (i.e., pentazocine, nalbuphine, and butorphanol) in patients who have received or are receiving a course of therapy with a full opioid agonist analgesic, including EXALGO. In these patients, mixed agonists/antagonists analgesics may reduce the analgesic effect and/or may precipitate withdrawal symptoms [see *Drug Interactions (7.2)*].

When discontinuing EXALGO, gradually taper the dose [see *Dosage and Administration (2.3)*]. Do not abruptly discontinue EXALGO.

### **5.13 Driving and Operating Machinery**

EXALGO may impair the mental and/or physical abilities needed to perform potentially hazardous activities such as driving a car or operating machinery. Warn patients not to drive or operate dangerous machinery unless they are tolerant to the effects of EXALGO and know how they will react to the medication.

## **6 ADVERSE REACTIONS**

The following serious adverse reactions are discussed elsewhere in the labeling:

- Respiratory Depression [see *Warnings and Precautions (5.2)*]

- Chronic Pulmonary Disease [see Warnings and Precautions (5.5)]
- Head Injuries and Increased Intracranial Pressure [see Warnings and Precautions (5.8)]
- Interactions with Other CNS Depressants [see Warnings and Precautions (5.6)]
- Hypotensive Effect [see Warnings and Precautions (5.7)]
- Gastrointestinal Effects [see Warnings and Precautions (5.9)]
- Seizures [see Warnings and Precautions (5.11)]

## 6.1 Clinical Studies Experience

Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in clinical practice.

EXALGO was administered to a total of 2,524 patients in 15 controlled and uncontrolled clinical studies. Of these, 423 patients were exposed to EXALGO for greater than 6 months and 141 exposed for greater than one year.

The most common adverse reactions leading to study discontinuation were nausea, vomiting, constipation, somnolence, and dizziness. The most common treatment-related serious adverse reactions from controlled and uncontrolled chronic pain studies were drug withdrawal syndrome, overdose, confusional state, and constipation.

The overall incidence of adverse reactions in patients greater than 65 years of age was higher, with a greater than 5% difference in rates for constipation and nausea when compared with younger patients. The overall incidence of adverse reactions in female patients was higher, with a greater than 5% difference in rates for nausea, vomiting, constipation and somnolence when compared with male patients.

A 12-week double-blind, placebo-controlled, randomized withdrawal study was conducted in opioid tolerant patients with moderate to severe low back pain [see *Clinical Studies (14)*]. A total of 447 patients were enrolled into the open-label titration phase with 268 patients randomized into the double-blind treatment phase. The adverse reactions that were reported in at least 2% of the patients are contained in **Table 2**.

**Table 2.**  
**Number (%) of Patients with Adverse Reactions Reported in ≥ 2% of Patients with Moderate to Severe Low Back Pain During the Open-Label Titration Phase or Double-Blind Treatment Phase by Preferred Term**

Preferred Term	Open-Label Titration Phase	Double-Blind Treatment Phase	
	EXALGO (N=447)	EXALGO (N=134)	Placebo (N=134)
Constipation	69 (15)	10 (7)	5 (4)
Nausea	53 (12)	12 (9)	10 (7)
Somnolence	39 (9)	1 (1)	0 (0)
Headache	35 (8)	7 (5)	10 (7)
Vomiting	29 (6)	8 (6)	6 (4)
Drug Withdrawal Syndrome	22 (5)	13 (10)	16 (12)
Pruritus	21 (5)	1 (1)	0 (0)

Dizziness	17 (4)	3 (2)	2 (1)
Asthenia/Fatigue	16 (4)	2 (1)	6 (4)
Insomnia	13 (3)	7 (5)	5 (4)
Diarrhea	13 (3)	5 (4)	9 (7)
Back Pain	13 (3)	6 (4)	8 (6)
Dry Mouth	13 (3)	2 (1)	0 (0)
Edema Peripheral	13 (3)	3 (2)	1 (1)
Hyperhidrosis	13 (3)	2 (1)	2 (1)
Anorexia/Decreased Appetite	10 (2)	2 (1)	0 (0)
Arthralgia	9 (2)	8 (6)	3 (2)
Anxiety	9 (2)	0 (0)	4 (3)
Abdominal Pain	9 (2)	4 (3)	3 (2)
Muscle Spasms	5 (1)	3 (2)	1 (1)
Weight Decreased	3 (1)	4 (3)	3 (2)

The adverse reactions that were reported in at least 2% of the total treated patients (N=2,474) in the 14 chronic clinical trials are contained in **Table 3**.

**Table 3.**  
**Number (%) of Patients with Adverse Reactions Reported in ≥ 2% of Patients with Chronic Pain Receiving EXALGO in 14 Clinical Studies by Preferred Term**

Preferred Term	All Patients (N=2,474)
Constipation	765 (31)
Nausea	684 (28)
Vomiting	337 (14)
Somnolence	367 (15)
Headache	308 (12)
Asthenia/Fatigue	272 (11)
Dizziness	262 (11)
Diarrhea	201 (8)
Pruritus	193 (8)
Insomnia	161 (7)
Hyperhidrosis	143 (6)
Edema Peripheral	135 (5)
Anorexia/Decreased Appetite	139 (6)
Dry Mouth	121 (5)
Abdominal Pain	115 (5)
Anxiety	95 (4)
Back Pain	95 (4)
Dyspepsia*	88 (4)
Depression	81 (3)
Dyspnea	76 (3)
Muscle Spasms	74 (3)
Arthralgia	72 (3)

<b>Rash</b>	64 (3)
<b>Pain in Extremity</b>	63 (3)
<b>Pain</b>	58 (2)
<b>Drug Withdrawal Syndrome</b>	55 (2)
<b>Pyrexia</b>	52 (2)
<b>Fall</b>	51 (2)
<b>Chest pain</b>	51 (2)

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\* Reflux esophagitis, gastroesophageal reflux disease and Barrett's esophagus were grouped and reported with dyspepsia

The following Adverse Reactions occurred in patients with an overall frequency of < 2% and are listed in descending order within each System Organ Class:

*Cardiac disorders:* palpitations, tachycardia, bradycardia, extrasystoles

*Ear and labyrinth disorders:* vertigo, tinnitus

*Endocrine disorders:* hypogonadism

*Eye disorders:* vision blurred, diplopia, dry eye, miosis

*Gastrointestinal disorders:* flatulence, dysphagia, hematochezia, abdominal distension, hemorrhoids, abnormal feces, intestinal obstruction, eructation, diverticulum, gastrointestinal motility disorder, large intestine perforation, anal fissure, bezoar, duodenitis, ileus, impaired gastric emptying, painful defecation

*General disorders and administration site conditions:* chills, malaise, feeling abnormal, feeling hot and cold, feeling jittery, hangover, difficulty in walking, feeling drunk, hypothermia

*Infections and infestations:* gastroenteritis, diverticulitis

*Injury, poisoning and procedural complications:* contusion, overdose

*Investigations:* weight decreased, hepatic enzyme increased, blood potassium decreased, blood amylase increased, blood testosterone decreased, oxygen saturation decreased

*Metabolism and nutrition disorders:* dehydration, fluid retention, increased appetite, hyperuricemia

*Musculoskeletal and connective tissue disorders:* myalgia

*Nervous system disorders:* tremor, sedation, hypoesthesia, paresthesia, disturbance in attention, memory impairment, dysarthria, syncope, balance disorder, dysgeusia, depressed level of consciousness, coordination abnormal, hyperesthesia, myoclonus, dyskinesia, hyperreflexia, encephalopathy, cognitive disorder, convulsion, psychomotor hyperactivity

*Psychiatric disorders:* confusional state, nervousness, restlessness, abnormal dreams, mood altered, hallucination, panic attack, euphoric mood, paranoia, dysphoria, listless, crying, suicide ideation, libido decreased, aggression

*Renal and urinary disorders:* dysuria, urinary retention, urinary frequency, urinary hesitation, micturition disorder

*Reproductive system and breast disorders:* erectile dysfunction, sexual dysfunction

*Respiratory, thoracic and mediastinal disorders:* rhinorrhea, respiratory distress, hypoxia, bronchospasm, sneezing, hyperventilation, respiratory depression

*Skin and subcutaneous tissue disorders:* erythema

*Vascular disorders:* flushing, hypertension, hypotension

## 6.2 Postmarketing Experience

The following adverse reaction has been identified during post-approval use of EXALGO:

*Skin and subcutaneous tissue disorders:* urticaria

## 7 DRUG INTERACTIONS

### 7.1 CNS Depressants

Avoid use of EXALGO with central nervous system depressants such as hypnotics, sedatives, general anesthetics, antipsychotics and alcohol, due to the increased risk of respiratory depression, hypotension and profound sedation or coma.

### 7.2 Mixed Agonist/Antagonist Opioid Analgesics

Mixed agonist/antagonists (buprenorphine, nalbuphine, pentazocine) may reduce the analgesic effect of EXALGO and/or may precipitate withdrawal symptoms in these patients. Avoid the use of agonist/antagonist analgesics in patients receiving EXALGO.

### 7.3 Monoamine Oxidase Inhibitors (MAOI)

The effects of opioid analgesics may be potentiated by MAOIs. EXALGO is not recommended for use in patients who have received MAOIs within 14 days. If concurrent therapy with an MAOI and EXALGO is unavoidable, monitor patients for increased respiratory and central nervous system depression.

### 7.4 Anticholinergics

Anticholinergics or other medications with anticholinergic activity when used concurrently with EXALGO may result in increased risk of urinary retention and/or severe constipation, which may lead to paralytic ileus. Monitor patients for signs of urinary retention or reduced gastric motility when EXALGO is used concurrently with anticholinergic drugs.

## 8 USE IN SPECIFIC POPULATIONS

### 8.1 Pregnancy

#### Teratogenic Effects

*Pregnancy Category C:* There are no adequate and well-controlled studies in pregnant women. Hydromorphone crosses the placenta. EXALGO should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus [see *Use in Specific Populations (8.2)*].

Hydromorphone was not teratogenic in pregnant rats given oral doses up to 6.25 mg/kg/day or in pregnant rabbits administered oral doses up to 25 mg/kg/day during the period of organogenesis (~1.2 times the human exposure following 32 mg/day).

Hydromorphone administration to pregnant Syrian hamsters and CF-1 mice during major organ development revealed teratogenicity likely the result of maternal toxicity associated with sedation and hypoxia. In Syrian hamsters given single subcutaneous doses from 14 to 258 mg/kg during organogenesis (gestation days 8 to 10), doses  $\geq$  19 mg/kg hydromorphone produced skull malformations

(exencephaly and cranioschisis). Continuous infusion of hydromorphone (5 mg/kg, s.c.) via implanted osmotic mini pumps during organogenesis (gestation days 7 to 10) produced soft tissue malformations (cryptorchidism, cleft palate, malformed ventricles and retina), and skeletal variations (supraoccipital, checkerboard and split sternbrae, delayed ossification of the paws and ectopic ossification sites). The malformations and variations observed in the hamsters and mice were at doses approximately three-fold higher and < one-fold lower, respectively, than a 32 mg human daily oral dose on a body surface area basis.

#### Nonteratogenic Effects

In the pre- and post-natal effects study in rats, neonatal viability was reduced at 6.25 mg/kg/day (~1.2 times the human exposure following 32 mg/day).

Neonates born to mothers who have been taking opioids regularly prior to delivery will be physically dependent. The withdrawal signs include irritability and excessive crying, tremors, hyperactive reflexes, increased respiratory rate, increased stools, sneezing, yawning, vomiting, and fever. The intensity of the syndrome does not always correlate with the duration of maternal opioid use or dose. There is no consensus on the best method of managing withdrawal. Approaches to the treatment of the syndrome have included supportive care and, if indicated, drugs such as paregoric or phenobarbital.

### **8.2 Labor and Delivery**

EXALGO is not for use in women during and immediately prior to labor, where shorter acting analgesics or other analgesic techniques are more appropriate [see *Indications and Usage (1)*]. Occasionally, opioid analgesics may prolong labor by temporarily reducing the strength, duration, and frequency of uterine contractions. However, these effects are not consistent and may be offset by an increased rate of cervical dilatation which tends to shorten labor.

Opioids cross the placenta and may produce respiratory depression and psychophysiologic effects in neonates. Closely observe neonates whose mothers received opioid analgesics during labor for signs of respiratory depression. An opioid antagonist, such as naloxone, should be available for reversal of opioid-induced respiratory depression in the neonate in such situations.

### **8.3 Nursing Mothers**

Low concentrations of hydromorphone have been detected in human milk in clinical trials. Withdrawal symptoms can occur in breastfeeding infants when maternal administration of an opioid analgesic is stopped. Nursing should not be undertaken while a patient is receiving EXALGO since hydromorphone is excreted in the milk.

### **8.4 Pediatric Use**

The safety and effectiveness of EXALGO in patients 17 years of age and younger have not been established.

### **8.5 Geriatric Use**

Elderly patients have been shown to be more sensitive to the adverse effects of opioids compared to the younger population. Therefore, closely monitor elderly patients for respiratory and central nervous system depression when prescribing EXALGO, particularly during initiation and titration.

### **8.6 Neonatal Opioid Withdrawal Syndrome**

Chronic maternal use of hydromorphone during pregnancy can affect the neonate with subsequent withdrawal signs. Neonatal withdrawal syndrome presents as irritability, hyperactivity and abnormal sleep pattern, high pitched cry, tremor, vomiting, diarrhea and failure to gain weight. The onset, duration and severity of neonatal withdrawal syndrome vary based on the drug used, duration of use, the dose of last maternal use, and rate of elimination drug by the newborn. Neonatal opioid withdrawal syndrome may be life-threatening and should be treated according to protocols developed by neonatology experts.

## 8.7 Hepatic Impairment

In a study that used a single 4 mg oral dose of immediate-release hydromorphone tablets, four-fold increases in plasma levels of hydromorphone ( $C_{max}$  and  $AUC_{0-\infty}$ ) were observed in patients with moderate hepatic impairment (Child-Pugh Group B). Start patients with moderate hepatic impairment on 25% of the EXALGO dose that would be used in patients with normal hepatic function. Closely monitor patients with moderate hepatic impairment for respiratory and central nervous system depression during initiation of therapy with EXALGO and during dose titration. The pharmacokinetics of hydromorphone in severe hepatic impairment patients have not been studied. As further increases in  $C_{max}$  and  $AUC_{0-\infty}$  of hydromorphone in this group are expected, use of alternate analgesics is recommended [see *Dosage and Administration* (2.4)].

## 8.8 Renal Impairment

Administration of a single 4 mg dose of immediate-release hydromorphone tablets resulted in two-fold and four-fold increases in plasma levels of hydromorphone ( $C_{max}$  and  $AUC_{0-48h}$ ) in moderate ( $CL_{cr} = 40$  to  $60$  mL/min) and severe ( $CL_{cr} < 30$  mL/min) impairment, respectively. In addition, in patients with severe renal impairment hydromorphone appeared to be more slowly eliminated with longer terminal elimination half-life (40 hours) compared to subjects with normal renal function (15 hours). Start patients with moderate renal impairment on 50% and patients with severe renal impairment on 25% of the EXALGO dose that would be prescribed for patients with normal renal function. Closely monitor patients with renal impairment for respiratory and central nervous system depression during initiation of therapy with EXALGO and during dose titration. As EXALGO is only intended for once daily administration, consider use of an alternate analgesic that may permit more flexibility with the dosing interval in patients with severe renal impairment [see *Dosage and Administration* (2.5)].

## 9 DRUG ABUSE AND DEPENDENCE

### 9.1 Controlled Substance

EXALGO contains hydromorphone, a Schedule II controlled substance with a high potential for abuse similar to fentanyl, methadone, morphine, oxycodone, and oxymorphone. EXALGO can be abused and is subject to misuse, abuse, addiction, and criminal diversion [see *Warnings and Precautions* (5.1)]. The high drug content in the extended release formulation adds to the risk of adverse outcomes from abuse and misuse.

### 9.2 Abuse

All patients treated with opioids require careful monitoring for signs of abuse and addiction, because use of opioid analgesic products carries the risk of addiction even under appropriate medical use.

Drug abuse is the intentional non-therapeutic use of an over-the-counter or prescription drug, even once, for its rewarding psychological or physiological effects. Drug abuse includes, but is not limited to the following examples: the use of a prescription or over-the-counter drug to get “high”, or the use of steroids for performance enhancement and muscle build up.

Drug addiction is a cluster of behavioral, cognitive, and physiological phenomena that develop after repeated substance use and include: a strong desire to take the drug, difficulties in controlling its use, persisting in its use despite harmful consequences, a higher priority given to drug use than to other activities and obligations, increased tolerance, and sometimes a physical withdrawal.

“Drug-seeking” behavior is very common to addicts and drug abusers. Drug-seeking tactics include emergency calls or visits near the end of office hours, refusal to undergo appropriate examination, testing or referral, repeated claims of loss of prescriptions, tampering with prescriptions and reluctance to provide prior medical records or contact information for other treating physician(s). “Doctor shopping” (visiting multiple prescribers) to obtain additional prescriptions is common among drug abusers, people suffering from untreated addiction and criminals seeking drugs to sell.

Abuse and addiction are separate and distinct from physical dependence and tolerance. Physicians should be aware that addiction may not be accompanied by concurrent tolerance and symptoms of physical dependence in all addicts. In addition, abuse of opioids can occur in the absence of true addiction and is characterized by misuse for non-medical purposes, often in combination with other psychoactive substances.

EXALGO can be diverted for non-medical use into illicit channels of distribution. Careful record-keeping of prescribing information, including quantity, frequency, and renewal requests, as required by law, is strongly advised.

Proper assessment of the patient, proper prescribing practices, periodic re-evaluation of therapy, and proper dispensing and storage are appropriate measures that help to limit abuse of opioid drugs.

#### Risks Specific to Abuse of EXALGO

EXALGO is intended for oral use only. Abuse of EXALGO poses a risk of overdose and death. This risk is increased with concurrent abuse of EXALGO with alcohol and other substances.

Taking cut, broken, chewed, crushed, or dissolved EXALGO poses a hazard of overdose and death.

With intravenous abuse, the tablet excipients, especially polyethylene oxide, can be expected to result in necrosis and inflammation of cardiac tissues. In addition, parenteral drug abuse is commonly associated with transmission of infectious disease such as hepatitis and HIV.

Healthcare professionals should contact their State Professional Licensing Board or State Controlled Substances Authority for information on how to prevent and detect abuse or diversion of this product.

### **9.3 Dependence**

Both tolerance and physical dependence can develop during chronic opioid therapy. Tolerance is the need for increasing doses of opioids to maintain a defined effect such as analgesia (in the absence of disease progression or other external factors). Tolerance may occur to both the desired and undesired effects of drugs, and may develop at different rates for different effects.

Physical dependence results in withdrawal symptoms after abrupt discontinuation or a significant dose reduction of a drug. Withdrawal also may be precipitated through the administration of drugs with opioid antagonist activity, e.g., naloxone, nalmefene, or mixed agonist/antagonist analgesics (pentazocine, butorphanol, buprenorphine, nalbuphine). Physical dependence may not occur to a clinically significant degree until after several days to weeks of continued opioid usage.

EXALGO should not be abruptly discontinued [see *Dosage and Administration (2.3)*]. If EXALGO is abruptly discontinued in a physically-dependent patient, an abstinence syndrome may occur. Some or all of the following can characterize this syndrome: restlessness, lacrimation, rhinorrhea, yawning, perspiration, chills, piloerection, myalgia, mydriasis, irritability, anxiety, backache, joint pain, weakness, abdominal cramps, insomnia, nausea, anorexia, vomiting, diarrhea, increased blood pressure, respiratory rate, or heart rate.

Infants born to mothers physically dependent on opioids will also be physically dependent and may exhibit respiratory difficulties and withdrawal symptoms [see *Use in Specific Populations (8.1, 8.2)*].

## **10 OVERDOSAGE**

#### Clinical Presentation

Acute overdosage with opioids can be manifested by respiratory depression, somnolence progressing to stupor or coma, skeletal muscle flaccidity, cold and clammy skin, constricted pupils, and sometimes

pulmonary edema, bradycardia, hypotension and death. Marked mydriasis rather than miosis may be seen due to severe hypoxia in overdose situations.

#### Treatment of Overdose

Due to the delayed mean apparent peak plasma level of EXALGO occurring at 16 hours following administration as well as the 11 hour mean elimination half-life of EXALGO, patients who receive an overdose will require an extended period of monitoring and treatment that may go beyond 24 to 48 hours.

In case of overdose, priorities are the re-establishment of a patent and protected airway and institution of assisted or controlled ventilation if needed. Employ other supportive measures (including oxygen, vasopressors) in the management of circulatory shock and pulmonary edema as indicated. Cardiac arrest or arrhythmias will require advanced life support techniques.

The opioid antagonists, such as naloxone and naltrexone, are specific antidotes to respiratory depression resulting from opioid overdose. Opioid antagonists should not be administered in the absence of clinically significant respiratory or circulatory depression secondary to hydromorphone overdose. Such agents should be administered cautiously to patients who are known, or suspected to be, physically dependent on EXALGO. In such cases, an abrupt or complete reversal of opioid effects may precipitate an acute withdrawal syndrome.

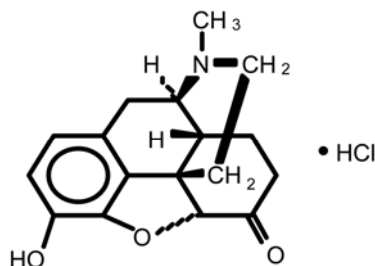
Because the duration of reversal would be expected to be less than the duration of action of hydromorphone in EXALGO, carefully monitor the patient until spontaneous respiration is reliably re-established. EXALGO will continue to release hydromorphone adding to the hydromorphone load for up to 24 hours after administration, necessitating prolonged monitoring for at least 24 to 48 hours beyond the overdose. If the response to opioid antagonists is suboptimal or not sustained, additional antagonist should be given as directed in the product's prescribing information.

In an individual physically dependent on opioids, administration of an opioid receptor antagonist may precipitate an acute withdrawal. The severity of the withdrawal syndrome produced will depend on the degree of physical dependence and the dose of the antagonist administered. If a decision is made to treat serious respiratory depression in the physically dependent patient, administration of the antagonist should be begun with care and by titration with smaller than usual doses of the antagonist.

## 11 DESCRIPTION

EXALGO tablets are for oral use and contain hydromorphone hydrochloride, a mu-opioid agonist.

Hydromorphone hydrochloride USP is 4,5 $\alpha$ -epoxy-3-hydroxy-17-methylmorphinan-6-one hydrochloride. Hydromorphone hydrochloride is a white or almost white crystalline powder that is freely soluble in water, very slightly soluble in ethanol (96%), and practically insoluble in methylene chloride. Its empirical formula is C<sub>17</sub>H<sub>19</sub>NO<sub>3</sub>·HCl. The compound has the following structural formula:



EXALGO also contains the following inactive ingredients: butylated hydroxytoluene, cellulose acetate, iron oxide black, ferric oxide red (8 mg only), ferric oxide yellow (12 mg, 16 mg, and 32 mg only), hypromellose, lactose anhydrous, lactose monohydrate, magnesium stearate, polyethylene glycol, polyethylene oxide, povidone, sodium chloride, titanium dioxide, and triacetin.

## 12 CLINICAL PHARMACOLOGY

### 12.1 Mechanism of Action

Hydromorphone, a semi-synthetic morphine derivative, is a hydrogenated ketone of morphine. Hydromorphone is principally an agonist of mu-receptors, showing a weak affinity for  $\kappa$ -receptors. Comparing relative binding affinity for mu- and  $\kappa$ -opioid receptors, hydromorphone binds more specifically to mu-receptors than structurally related morphine. As an opioid agonist, the principle therapeutic action of hydromorphone is analgesia. The precise mechanism of action of opioid analgesics is not known but the effects are thought to be mediated through opioid-specific receptors located predominantly in the central nervous system (CNS). Interaction with the mu-opioid receptor subtype is believed to be responsible for most of hydromorphone's clinical effects. There is no intrinsic limit to the analgesic effect of hydromorphone. Clinically, however, dosage limitations are imposed by the adverse effects, primarily respiratory depression, sedation, nausea, and vomiting, which can result from high doses.

### 12.2 Pharmacodynamics

#### CNS Depressant/Alcohol Interaction

Additive pharmacodynamic effects may be expected when EXALGO is used in conjunction with alcohol, other opioids, legal or illicit drugs that cause central nervous system depression.

#### Effects on the Central Nervous System

Hydromorphone produces dose-related respiratory depression by direct action on brain stem respiratory centers. The respiratory depression involves a reduction in the responsiveness of the brain stem respiratory centers to increases in carbon dioxide tension and to electrical stimulation.

Hydromorphone depresses the cough reflex by direct effect on the cough center in the medulla.

Hydromorphone causes miosis, even in total darkness. Pinpoint pupils are a sign of opioid overdose but are not pathognomic. Marked mydriasis, rather than miosis, may be seen due to severe hypoxia in overdose situations.

#### Effects on the Gastrointestinal Tract and Other Smooth Muscle

Gastric, biliary and pancreatic secretions are decreased by hydromorphone. Hydromorphone causes a reduction in motility associated with an increase in tone in the antrum of the stomach and duodenum. Digestion of food in the small intestine is delayed and propulsive contractions are decreased. Propulsive peristaltic waves in the colon are decreased, while tone may be increased to the point of spasm. The end result is constipation. Hydromorphone also can cause an increase in biliary tract pressure as a result of spasm of the sphincter of Oddi.

#### Effects on the Cardiovascular System

Hydromorphone produces peripheral vasodilation which may result in orthostatic hypotension or syncope. Release of histamine may be induced by hydromorphone and can contribute to opioid-induced hypotension. Manifestations of histamine release or peripheral vasodilation may include pruritus, flushing, red eyes, and sweating.

#### Effects on the Endocrine System

Opioids inhibit the secretion of ACTH, cortisol, and luteinizing hormone (LH) in humans. They also stimulate prolactin, growth hormone (GH) secretion, and pancreatic secretion of insulin and glucagon.

#### Effects on the Immune System

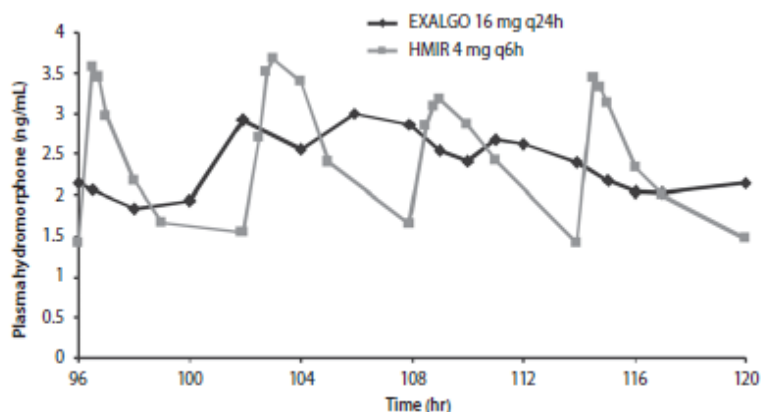
Opioids have been shown to have a variety of effects on components of the immune system in in vitro and animal models. The clinical significance of these findings is unknown. Overall, the effects of opioids appear to be modestly immunosuppressive.

## 12.3 Pharmacokinetics

### Absorption

EXALGO is an extended-release formulation of hydromorphone that produces a gradual increase in hydromorphone concentrations. Following a single-dose administration of EXALGO, plasma concentrations gradually increase over 6 to 8 hours, and thereafter concentrations are sustained for approximately 18 to 24 hours post-dose. The median  $T_{max}$  values ranged from 12 to 16 hours. The mean half-life was approximately 11 hours, ranging from 8 to 15 hours in most individual subjects. Linear pharmacokinetics has been demonstrated for EXALGO over the dose range 8 to 64 mg, with a dose-proportional increase in  $C_{max}$  and overall exposure ( $AUC_{0-\infty}$ ) (see **Table 4**). Steady-state plasma concentrations are approximately twice those observed following the first dose, and steady state is reached after 3 to 4 days of once-daily dosing of EXALGO. At steady state, EXALGO given once daily maintained hydromorphone plasma concentrations within the same concentration range as the immediate-release tablet given 4 times daily at the same total daily dose and diminished the fluctuations between peak and trough concentrations seen with the immediate-release tablet (see **Figure 1**). The bioavailability of EXALGO once daily and immediate-release hydromorphone four times daily in adults is comparable, as presented in **Table 4**.

**Figure 1.**  
**Mean Steady-State Plasma Concentration Profile**



**Table 4.**  
**Mean ( $\pm$ SD) EXALGO Pharmacokinetic Parameters**

Regimen	Dosage	$T_{max}$ * (hrs)	$C_{max}$ (ng/mL)	AUC (ng·hr/mL)	$T_{1/2}$ (hr)
<b>Single Dose</b> (N = 31)	8 mg	12 (4-30)	0.93 (1.01)	18.1 (5.8)	10.6 (4.3)
	16 mg	16 (6-30)	1.69 (0.78)	36.5 (11.3)	10.3 (2.4)
	32 mg	16 (4-24)	3.25 (1.37)	72.2 (24.3)	11.0 (3.2)
	64 mg	16 (6-30)	6.61 (1.75)	156.0 (30.6)	10.9 (3.8)
<b>Multiple Dose<sup>†</sup></b> (N = 29)	16 mg q24h	12 (6-24)	3.54 (0.96) <sup>‡</sup>	57.6 (16.3)	NA
	IR 4 mg q6h	0.75 (0.5-2)	5.28 (1.37) <sup>§</sup>	54.8 (14.8)	NA

NA = not applicable

\* Median (range) reported for  $T_{max}$

<sup>†</sup> Steady-state results on Day 5 (0-24 hours)

<sup>‡</sup>  $C_{min}$  2.15 (0.87) ng/mL

<sup>§</sup>  $C_{min}$  1.47 (0.42) ng/mL

### Food Effect

The pharmacokinetics of EXALGO are not affected by food as indicated by bioequivalence when administered under fed and fasting conditions. Therefore, EXALGO may be administered without regard to meals. When a 16 mg dose of EXALGO was administered to healthy volunteers immediately following

a high-fat meal, the median time to  $C_{max}$  ( $T_{max}$ ) was minimally affected by the high-fat meal occurring at 16 hours compared to 18 hours while fasting.

#### Distribution

Following intravenous administration of hydromorphone to healthy volunteers, the mean volume of distribution was 2.9 ( $\pm 1.3$ ) L/kg, suggesting extensive tissue distribution. The mean extent of binding of hydromorphone to human plasma proteins was determined to be 27% in an in vitro study.

#### Metabolism

After oral administration of an immediate-release formulation, hydromorphone undergoes extensive first-pass metabolism and is metabolized primarily in the liver by glucuronidation to hydromorphone-3-glucuronide, which follows a similar time course to hydromorphone in plasma. Exposure to the glucuronide metabolite is 35 to 40 times higher than exposure to the parent drug. In vitro data suggest that hydromorphone in clinically relevant concentrations has minimal potential to inhibit the activity of human hepatic CYP450 enzymes including CYP1A2, 2C9, 2C19, 2D6, 3A4, and 4A11.

#### Excretion

Approximately 75% of the administered dose is excreted in urine. Most of the administered hydromorphone dose is excreted as metabolites. Approximately 7% and 1% of the dose are excreted as unchanged hydromorphone in urine and feces, respectively.

#### Special Populations

##### Geriatric Patients

Based on data obtained from a study using immediate-release hydromorphone, the pharmacokinetics of hydromorphone in healthy elderly subjects (65 to 74 years old) are similar to the pharmacokinetics in healthy young subjects.

##### Pediatric Patients

The pharmacokinetics of EXALGO were not evaluated in a pediatric population.

##### Gender

Females appeared to have approximately 10% higher mean systemic exposure in terms of  $C_{max}$  and AUC values.

##### Race

The effect of race on EXALGO pharmacokinetics has not been studied.

##### Hepatic Impairment

In a study that used a single 4 mg oral dose of immediate-release hydromorphone tablets, four-fold increases in plasma levels of hydromorphone ( $C_{max}$  and  $AUC_{0-\infty}$ ) were observed in patients with moderate hepatic impairment (Child-Pugh Group B). Pharmacokinetics of hydromorphone in severe hepatic impairment patients has not been studied. Further increase in  $C_{max}$  and  $AUC_{0-\infty}$  of hydromorphone in this group is expected. Start patients with moderate hepatic impairment on 25% of the usual dose of EXALGO and closely monitor for respiratory and central nervous system depression during dose titration. Consider alternate analgesic therapy for patients with severe hepatic impairment [see *Dosage and Administration (2.4) and Specific Populations (8.7)*].

##### Renal Impairment

Renal impairment affected the pharmacokinetics of hydromorphone and its metabolites following administration of a single 4 mg dose of immediate-release tablets. The effects of renal impairment on hydromorphone pharmacokinetics were two-fold and four-fold increases in plasma levels of hydromorphone ( $C_{max}$  and  $AUC_{0-48h}$ ) in moderate ( $CL_{Cr} = 40$  to  $60$  mL/min) and severe ( $CL_{Cr} < 30$  mL/min) impairment, respectively. In addition, in patients with severe renal impairment hydromorphone appeared to be more slowly eliminated with longer terminal elimination half-life (40 hr) compared to subjects with normal renal function (15 hr). Start patients with moderate renal impairment on 50% of the usual EXALGO dose for patients with normal renal function and closely monitor for respiratory and central nervous system

depression during dose titration. As EXALGO is only intended for once-daily administration, consider use of an alternate analgesic that may permit more flexibility with the dosing interval in patients with severe renal impairment [see *Dosage and Administration (2.5) and Use in Specific Populations (8.8)*].

#### Drug Interaction/Alcohol Interaction

An in vivo study examined the effect of alcohol (40%, 20%, 4% and 0%) on the bioavailability of a single dose of 16 mg of EXALGO in healthy, fasted or fed volunteers. The results showed that the hydromorphone mean  $AUC_{0-\infty}$  was 5% higher and 4% lower (not statistically significant) in the fasted and fed groups respectively after co-administration of 240 mL of 40% alcohol. The  $AUC_{0-\infty}$  was similarly unaffected in subjects following the co-administration of EXALGO and alcohol (240 mL of 20% or 4% alcohol).

The change in geometric mean  $C_{max}$  with concomitant administration of alcohol and EXALGO ranged from an increase of 10% to 31% across all conditions studied. The change in mean  $C_{max}$  was greater in the fasted group of subjects. Following concomitant administration of 240 mL of 40% alcohol while fasting, the mean  $C_{max}$  increased by 37% and up to 151% in an individual subject. Following the concomitant administration of 240 mL of 20% alcohol while fasting, the mean  $C_{max}$  increased by 35% and up to 139% in an individual subject. Following the concomitant administration of 240 mL of 4% alcohol while fasting, the mean  $C_{max}$  increased by 19% on average and as much as 73% for an individual subject. The range of median  $T_{max}$  for the fed and fasted treatments with 4%, 20% and 40% alcohol was 12 to 16 hours compared to 16 hours for the 0% alcohol treatments.

### **13 NONCLINICAL TOXICOLOGY**

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

##### Carcinogenesis

Long-term studies in animals to evaluate the carcinogenic potential of hydromorphone hydrochloride have not been conducted.

##### Mutagenesis

Hydromorphone was not mutagenic in the in vitro bacterial reverse mutation assay (Ames assay). Hydromorphone was not clastogenic in either the in vitro human lymphocyte chromosome aberration assay or the in vivo mouse micronucleus assay.

##### Impairment of Fertility

Hydromorphone given orally to rats during the mating period caused a slight but statistically significant reduction in implantations at 6.25 mg/kg/day (~1.2 times the human exposure following to 32 mg/day).

### **14 CLINICAL STUDIES**

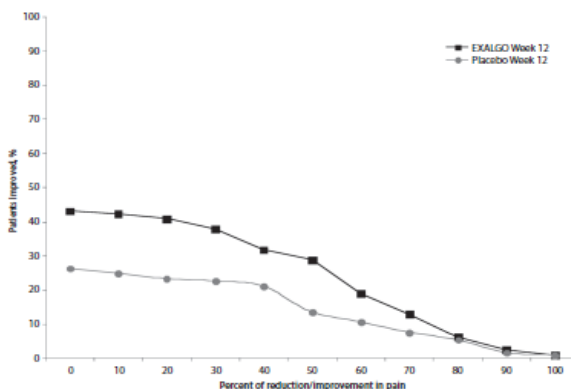
EXALGO was investigated in a double-blind, placebo-controlled, randomized withdrawal study in opioid tolerant patients with moderate-to-severe low back pain. Patients were considered opioid tolerant if they were currently on opioid therapy that was  $\geq 60$  mg/day of oral morphine equivalent for at least 2 months prior to screening. Patients entered an open-label conversion and titration phase with EXALGO, were converted to a starting dose that was approximately 75% of their total daily morphine equivalent dose, and were dosed once daily until adequate pain control was achieved while exhibiting tolerable side effects. Supplemental immediate-release hydromorphone tablets were allowed throughout the study. Patients who achieved a stable dose entered a 12-week, double-blind, placebo-controlled, randomized treatment phase. Mean daily dose at randomization was 37.8 mg/day (range of 12 mg/day to 64 mg/day). Fifty-eight (58) percent of patients were successfully titrated to a stable dose of EXALGO during the open-label conversion and titration phase.

During the double-blind treatment phase, patients randomized to EXALGO continued with the stable dose achieved in the conversion and titration phase of the study. Patients randomized to placebo received, in a blinded manner, EXALGO and matching placebo in doses tapering from the stable dose achieved in

conversion and titration. During the taper down period, patients were allowed immediate-release hydromorphone tablets as supplemental analgesia to minimize opioid withdrawal symptoms in placebo patients. After the taper period, the number of immediate-release hydromorphone tablets was limited to two tablets per day. Forty-nine (49) percent of patients treated with EXALGO and 33% of patients treated with placebo completed the 12-week treatment period.

EXALGO provided superior analgesia compared to placebo. There was a significant difference between the mean changes from Baseline to Week 12 or Final Visit in average weekly pain intensity Numeric Rating Scale (NRS) scores obtained from patient diaries between the two groups. The proportion of patients with various degrees of improvement from screening to Week 12 or Final Visit is shown in **Figure 2**. For this analysis, patients who discontinued treatment for any reason prior to Week 12 were assigned a value of zero improvement.

**Figure 2.**  
**Percent Reduction in Average Pain Intensity from Screening to Week 12 or Final Visit**



## 16 HOW SUPPLIED/STORAGE AND HANDLING

### How Supplied

#### EXALGO Tablet Strengths

Strength	Color	Tablet Description	Bottle Count	NDC
8 mg	Red	Round, biconvex, printed with "EXH 8"	100	23635-408-01
12 mg	Dark yellow	Round, biconvex, printed with "EXH 12"	100	23635-412-01
16 mg	Yellow	Round, biconvex, printed with "EXH 16"	100	23635-416-01
32 mg	White	Round, biconvex, printed with "EXH 32"	100	23635-432-01

Store at 25°C (77°F); excursions permitted to 15° to 30°C (59° to 86°F) [See USP Controlled Room Temperature].

## 17 PATIENT COUNSELING INFORMATION

See FDA-approved patient labeling (Medication Guide)

### Abuse Potential

Inform patients that EXALGO contains hydromorphone, a Schedule II controlled substance that is subject to abuse. Instruct patients not to share EXALGO with others and to take steps to protect EXALGO from theft or misuse.

#### Life-threatening Respiratory Depression

Discuss the risk of respiratory depression with patients, explaining that the risk is greatest when starting EXALGO or when the dose is increased. Advise patients how to recognize respiratory depression and to seek medical attention if they are experiencing breathing difficulties.

#### Accidental Exposure

Instruct patients to take steps to store EXALGO securely. Accidental exposure, especially in children, may result in serious harm or death. Advise patients to dispose of unused EXALGO by flushing the tablets down the toilet or remit to authorities at a certified drug take-back program.

#### Risks from Concomitant Use of Alcohol and other CNS Depressants

Inform patients that the concomitant use of alcohol with EXALGO can increase the risk of life-threatening respiratory depression. Instruct patients not to consume alcoholic beverages, as well as prescription and over-the-counter drug products that contain alcohol, during treatment with EXALGO.

Inform patients that potentially serious additive effects may occur if EXALGO is used with other CNS depressants, and not to use such drugs unless supervised by a health care provider.

#### Important Administration Instructions

Instruct patients how to properly take EXALGO, including the following:

- Swallowing EXALGO whole
- Not crushing, chewing, splitting or dissolving the tablets
- Using EXALGO exactly as prescribed to reduce the risk of life-threatening adverse reactions (e.g., respiratory depression)
- Not discontinuing EXALGO without first discussing the need for a tapering regimen with the prescriber

#### Gastrointestinal Blockage

Advise patients that people with certain stomach or intestinal problems such as narrowing of the intestines or previous surgery may be at higher risk of developing a blockage. Symptoms include abdominal distension, abdominal pain, severe constipation, or vomiting. Instruct patients to contact their healthcare provider immediately if they develop these symptoms.

#### Hypotension

Inform patients that EXALGO may cause orthostatic hypotension and syncope. Instruct patients how to recognize symptoms of low blood pressure and how to reduce the risk of serious consequences should hypotension occur (e.g., sit or lie down, carefully rise from a sitting or lying position).

#### Driving or Operating Heavy Machinery

Inform patients that EXALGO may impair the ability to perform potentially hazardous activities such as driving a car or operating heavy machinery. Advise patients not to perform such tasks until they know how they will react to the medication.

#### Constipation

Advise patients of the potential for severe constipation, including management instructions and when to seek medical attention.

#### Anaphylaxis

Inform patients that anaphylaxis has been reported with ingredients contained in EXALGO. Advise patients how to recognize such a reaction and when to seek medical attention.

#### Pregnancy

Advise female patients that EXALGO can cause fetal harm and to inform the prescriber if they are pregnant or plan to become pregnant.

#### Disposal

Advise patients that when EXALGO is no longer needed to flush the unused tablets down the toilet or remit to authorities at a certified drug take-back program.

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Distributed by:  
Mallinckrodt Brand Pharmaceuticals, Inc.  
Hazelwood, MO 63042 USA

[www.Exalgo.com](http://www.Exalgo.com) or call 1-800-778-7898

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