

## **ESZOPICLONE- eszopiclone tablet, film coated DIRECT RX**

### **ESZOPICLONE C-IV**

Eszopiclone tablets are indicated for the treatment of insomnia. In controlled outpatient and sleep laboratory studies, eszopiclone tablets administered at bedtime decreased sleep latency and improved sleep maintenance.

The clinical trials performed in support of efficacy were up to 6 months in duration. The final formal assessments of sleep latency and maintenance were performed at 4 weeks in the 6-week study (adults only), at the end of both 2-week studies (elderly only) and at the end of the 6-month study (adults only).

Use the lowest effective dose for the patient.

#### **2.1 Dosage in Adults**

The recommended starting dose is 1 mg. Dosing can be raised to 2 mg or 3 mg if clinically indicated. In some patients, the higher morning blood levels of eszopiclone tablets following use of the 2 mg or 3 mg dose increase the risk of next day impairment of driving and other activities that require full alertness [see Warnings and Precautions (5.1)]. The total dose of eszopiclone tablets should not exceed 3 mg, once daily immediately before bedtime [see Warnings and Precautions (5.6)].

#### **2.2 Geriatric or Debilitated Patients**

The total dose of eszopiclone tablets should not exceed 2 mg in elderly or debilitated patients.

#### **2.3 Patients with Severe Hepatic Impairment, or Taking Potent CYP3A4 Inhibitors**

In patients with severe hepatic impairment, or in patients coadministered eszopiclone with potent CYP3A4 inhibitors, the total dose of eszopiclone tablets should not exceed 2 mg [see Warning and Precautions (5.7)].

#### **2.4 Use with CNS Depressants**

Dosage adjustments may be necessary when eszopiclone tablets are combined with other CNS depressant drugs because of the potentially additive effects [see Warnings and Precautions (5.1)].

#### **2.5 Administration with Food**

Taking eszopiclone tablets with or immediately after a heavy, high-fat meal results in slower absorption and would be expected to reduce the effect of eszopiclone tablets on sleep latency [see Clinical Pharmacology (12.3)].

Eszopiclone tablets are available in 1 mg, 2 mg and 3 mg strengths for oral administration.

Eszopiclone 3 mg tablets are dark blue, round, biconvex, film coated tablet, debossed with "L 36" on one side and plain on other side.

Eszopiclone 2 mg tablets are white, round, biconvex, film coated tablet, debossed with "L 35" on one side and plain on other side.

Eszopiclone 1 mg tablets are light blue, round, biconvex, film coated tablet, debossed with "L 34" on one side and plain on other side.

Eszopiclone tablets are contraindicated in patients with known hypersensitivity to eszopiclone. Hypersensitivity reactions include anaphylaxis and angioedema [see Warnings and Precautions (5.3)].

#### **5.1 CNS Depressant Effects and Next-Day Impairment**

Eszopiclone is a central nervous system (CNS) depressant and can impair daytime function in some patients at the higher doses (2 mg or 3 mg), even when used as prescribed. Prescribers should monitor for excess depressant effects, but impairment can occur in the absence of symptoms (or even with subjective improvement), and impairment may not be reliably detected by ordinary clinical exam (i.e., less than formal psychomotor testing). While pharmacodynamic tolerance or adaptation to some adverse depressant effects of eszopiclone may develop, patients using 3 mg eszopiclone should be cautioned against driving or engaging in other hazardous activities or activities requiring complete mental alertness the day after use.

Additive effects occur with concomitant use of other CNS depressants (e.g., benzodiazepines, opioids, tricyclic antidepressants, alcohol), including daytime use. Downward dose adjustment of eszopiclone and concomitant CNS depressants should be considered [see Dosage and Administration (2.4)].

The use of eszopiclone with other sedative-hypnotics at bedtime or the middle of the night is not recommended.

The risk of next-day psychomotor impairment is increased if eszopiclone is taken with less than a full night of sleep remaining (7-to 8 hours); if higher than the recommended dose is taken; if co-administered with other CNS depressants; or co-administered with other drugs that increase the blood levels of eszopiclone [see Dosage and Administration (2.3) and Clinical Studies (14.3)].

## 5.2 Need to Evaluate for Co-Morbid Diagnoses

Because sleep disturbances may be the presenting manifestation of a physical and/or psychiatric disorder, symptomatic treatment of insomnia should be initiated only after a careful evaluation of the patient. The failure of insomnia to remit after 7 to 10 days of treatment may indicate the presence of a primary psychiatric and/or medical illness that should be evaluated. Worsening of insomnia or the emergence of new thinking or behavior abnormalities may be the consequence of an unrecognized psychiatric or physical disorder. Such findings have emerged during the course of treatment with sedative/hypnotic drugs, including eszopiclone. Because some of the important adverse effects of eszopiclone appear to be dose-related, it is important to use the lowest possible effective dose, especially in the elderly [see Dosage and Administration (2.1)].

## 5.3 Severe Anaphylactic and Anaphylactoid Reactions

Rare cases of angioedema involving the tongue, glottis or larynx have been reported in patients after taking the first or subsequent doses of sedative-hypnotics, including eszopiclone. Some patients have had additional symptoms such as dyspnea, throat closing, or nausea and vomiting that suggest anaphylaxis. Some patients have required medical therapy in the emergency department. If angioedema involves the tongue, glottis or larynx, airway obstruction may occur and be fatal. Patients who develop angioedema after treatment with eszopiclone should not be rechallenged with the drug.

## 5.4 Abnormal Thinking and Behavioral Changes

A variety of abnormal thinking and behavior changes have been reported to occur in association with the use of sedative/hypnotics. Some of these changes may be characterized by decreased inhibition (e.g., aggressiveness and extroversion that seem out of character), similar to effects produced by alcohol and other CNS depressants. Other reported behavioral changes have included bizarre behavior, agitation, hallucinations, and depersonalization. Amnesia and other neuropsychiatric symptoms may occur unpredictably. In primarily depressed patients, worsening of depression, including suicidal thoughts and actions (including completed suicides), has been reported in association with the use of sedative/hypnotics.

Complex behaviors such as “sleep-driving” (i.e., driving while not fully awake after ingestion of a sedative-hypnotic, with amnesia for the event) have been reported. These events can occur in sedative-hypnotic-naïve as well as in sedative-hypnotic-experienced persons. Although behaviors such as sleep-driving may occur with eszopiclone alone at therapeutic doses, the use of alcohol and other CNS depressants with eszopiclone appears to increase the risk of such behaviors, as does the use of

eszopiclone at doses exceeding the maximum recommended dose. Due to the risk to the patient and the community, discontinuation of eszopiclone should be strongly considered for patients who report a “sleep-driving” episode. Other complex behaviors (e.g., preparing and eating food, making phone calls, or having sex) have been reported in patients who are not fully awake after taking a sedative-hypnotic. As with sleep-driving, patients usually do not remember these events.

It can rarely be determined with certainty whether a particular instance of the abnormal behaviors listed above are drug-induced, spontaneous in origin, or a result of an underlying psychiatric or physical disorder. Nonetheless, the emergence of any new behavioral sign or symptom of concern requires careful and immediate evaluation.

### 5.5 Withdrawal Effects

Following rapid dose decrease or abrupt discontinuation of the use of sedative/hypnotics, there have been reports of signs and symptoms similar to those associated with withdrawal from other CNS-depressant drugs [see Drug Abuse and Dependence (9)].

### 5.6 Timing of Drug Administration

Eszopiclone should be taken immediately before bedtime. Taking a sedative/hypnotic while still up and about may result in short-term memory impairment, hallucinations, impaired coordination, dizziness, and lightheadedness.

### 5.7 Special Populations

#### Use in Elderly and/or Debilitated Patients

Impaired motor and/or cognitive performance after repeated exposure or unusual sensitivity to sedative/hypnotic drugs is a concern in the treatment of elderly and/or debilitated patients. The dose should not exceed 2 mg in elderly or debilitated patients [see Dosage and Administration (2.2)].

#### Use in Patients with Concomitant Illness

Clinical experience with eszopiclone in patients with concomitant illness is limited. Eszopiclone should be used with caution in patients with diseases or conditions that could affect metabolism or hemodynamic responses.

A study in healthy volunteers did not reveal respiratory-depressant effects at doses 2.5-fold higher (7 mg) than the recommended dose of eszopiclone. Caution is advised, however, if eszopiclone is prescribed to patients with compromised respiratory function.

The dose of eszopiclone should not exceed 2 mg in patients with severe hepatic impairment, because systemic exposure is doubled in such subjects. No dose adjustment appears necessary for subjects with mild or moderate hepatic impairment. No dose adjustment appears necessary in subjects with any degree of renal impairment, since less than 10% of eszopiclone is excreted unchanged in the urine.

The dose of eszopiclone should be reduced in patients who are administered potent inhibitors of CYP3A4, such as ketoconazole, while taking eszopiclone. Downward dose adjustment is also recommended when eszopiclone is administered with agents having known CNS-depressant effects.

#### Use in Patients with Depression

Sedative/hypnotic drugs should be administered with caution to patients exhibiting signs and symptoms of depression. Suicidal tendencies may be present in such patients, and protective measures may be required. Intentional overdose is more common in this group of patients; therefore, the least amount of drug that is feasible should be prescribed for the patient at any one time.

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.

The premarketing development program for eszopiclone tablets included eszopiclone exposures in

patients and/or normal subjects from two different groups of studies: approximately 400 normal subjects in clinical pharmacology/pharmacokinetic studies, and approximately 1550 patients in placebo-controlled clinical effectiveness studies, corresponding to approximately 263 patient-exposure years. The conditions and duration of treatment with eszopiclone varied greatly and included (in overlapping categories) open-label and double-blind phases of studies, inpatients and outpatients, and short-term and longer-term exposure. Adverse reactions were assessed by collecting adverse events, results of physical examinations, vital signs, weights, laboratory analyses, and ECGs.

The stated frequencies of adverse reactions represent the proportion of individuals who experienced, at least once, adverse reaction of the type listed. A reaction was considered treatment-emergent if it occurred for the first time or worsened while the patient was receiving therapy following baseline evaluation.

## 6.1 Clinical Trials Experience

### Adverse Reactions Resulting in Discontinuation of Treatment

In placebo-controlled, parallel-group clinical trials in the elderly, 3.8% of 208 patients who received placebo, 2.3% of 215 patients who received 2 mg eszopiclone, and 1.4% of 72 patients who received 1 mg eszopiclone discontinued treatment due to an adverse reaction. In the 6-week parallel-group study in adults, no patients in the 3 mg arm discontinued because of an adverse reaction.

In the long-term 6-month study in adult insomnia patients, 7.2% of 195 patients who received placebo and 12.8% of 593 patients who received 3 mg eszopiclone discontinued due to an adverse reaction. No reaction that resulted in discontinuation occurred at a rate of greater than 2%.

### Adverse Reactions Observed at an Incidence of $\geq 2\%$ in Controlled Trials

Table 1 shows the incidence of adverse reactions from a Phase 3 placebo-controlled study of eszopiclone at doses of 2 or 3 mg in non-elderly adults. Treatment duration in this trial was 44 days. The table includes only reactions that occurred in 2% or more of patients treated with eszopiclone 2 mg or 3 mg in which the incidence in patients treated with eszopiclone was greater than the incidence in placebo-treated patients.

Table 1: Incidence (%) of Adverse Reactions in a 6-Week Placebo-Controlled Study in Non-Elderly Adults with eszopiclone 1

#### Adverse Reaction

Placebo

(n=99)

Eszopiclone 2 mg

(n=104)

Eszopiclone 3 mg

(n=105)

#### Body as a Whole

Headache

13

21

17

Viral Infection

1

3

3

#### Digestive System

Dry Mouth

3

5

7

Dyspepsia

4

4

5

Nausea 4

5

4

Vomiting 1

3

0

Nervous System

Anxiety 0

3

1

Confusion

0

0

3

Depression

0

4

1

Dizziness

4

5

7

Hallucinations

0

1

3

Libido Decreased

0

0

3

Nervousness

3

5

0

Somnolence

3

10

8

## Respiratory System

### Infection

3  
5  
10

## Skin and Appendages

### Rash 1

3  
4

## Special Senses

### Unpleasant Taste

3  
17  
34

## Urogenital System

### Dysmenorrhea \*

0  
3  
0

### Gynecomastia \*\*

0  
3  
0

1 Reaction for which the eszopiclone incidence was equal to or less than placebo are not listed on the table, but included the following: abnormal dreams, accidental injury, back pain, diarrhea, flu syndrome, myalgia, pain, pharyngitis, and rhinitis.

\* Gender-specific adverse reaction in females

\*\* Gender-specific adverse reaction in males

Adverse reactions from Table 1 that suggest a dose-response relationship in adults include viral infection, dry mouth, dizziness, hallucinations, infection, rash, and unpleasant taste, with this relationship clearest for unpleasant taste.

Table 2 shows the incidence of adverse reactions from combined Phase 3 placebo-controlled studies of eszopiclone at doses of 1 or 2 mg in elderly adults (ages 65 to 86). Treatment duration in these trials was 14 days. The table includes only reactions that occurred in 2% or more of patients treated with

eszopiclone 1 mg or 2 mg in which the incidence in patients treated with eszopiclone was greater than the incidence in placebo-treated patients.

Table 2: Incidence (%) of Adverse Reactions in Elderly Adults (Ages 65 to 86) in 2-Week Placebo-Controlled Trials with Eszopiclone 1

## Adverse Reactions

Placebo (n=208)

Eszopiclone 1 mg (n=72)

Eszopiclone 2 mg (n=215)

Body as a Whole

## Accidental Injury

1

0

3

## Headache

14

15

13

## Pain



2

4

5

Digestive System

Diarrhea

2

4

2

Dry Mouth

2

3

7

Dyspepsia

2

6

2

Nervous System

Abnormal Dreams

0

3

1

Dizziness

2

1

6

Nervousness

1

0

2

Neuralgia

0

3

0

Skin and Appendages

Pruritus

1

4

1

Special Senses

Unpleasant Taste

0

8

12

Urogenital System

Urinary Tract Infection

0

3

1 Reactions for which the eszopiclone incidence was equal to or less than placebo are not listed on the table, but included the following: abdominal pain, asthenia, nausea, rash, and somnolence.

Adverse reactions from Table 2 that suggest a dose-response relationship in elderly adults include pain, dry mouth, and unpleasant taste, with this relationship again clearest for unpleasant taste.

These figures cannot be used to predict the incidence of adverse reactions in the course of usual medical practice because patient characteristics and other factors may differ from those that prevailed in the clinical trials. Similarly, the cited frequencies cannot be compared with figures obtained from other clinical investigations involving different treatments, uses, and investigators. The cited figures, however, do provide the prescribing physician with some basis for estimating the relative contributions of drug and non-drug factors to the adverse reaction incidence rate in the population studied.

#### Other Reactions Observed During the Premarketing Evaluation of Eszopiclone.

Following is a list of modified COSTART terms that reflect adverse reactions as defined in the introduction to the Adverse Reactions section and reported by approximately 1550 subjects treated with eszopiclone at doses in the range of 1 to 3.5 mg/day during Phase 2 and 3 clinical trials throughout the United States and Canada. All reported reactions are included except those already listed in Tables 1 and 2 or elsewhere in labeling, minor reactions common in the general population, and reactions unlikely to be drug-related. Although the reactions reported occurred during treatment with eszopiclone, they were not necessarily caused by it.

Reactions are further categorized by body system and listed in order of decreasing frequency according to the following definitions: frequent adverse reactions are those that occurred on one or more occasions in at least 1/100 patients; infrequent adverse reactions are those that occurred in fewer than 1/100 patients but in at least 1/1,000 patients; rare adverse reactions are those that occurred in fewer than 1/1,000 patients. Gender-specific reactions are categorized based on their incidence for the appropriate gender.

Body as a Whole: Frequent: chest pain; Infrequent: allergic reaction, cellulitis, face edema, fever, halitosis, heat stroke, hernia, malaise, neck rigidity, photosensitivity.

Cardiovascular System: Frequent: migraine; Infrequent: hypertension; Rare: thrombophlebitis.

Digestive System: Infrequent: anorexia, cholelithiasis, increased appetite, melena, mouth ulceration, thirst, ulcerative stomatitis; Rare: colitis, dysphagia, gastritis, hepatitis, hepatomegaly, liver damage, stomach ulcer, stomatitis, tongue edema, rectal hemorrhage.

Hemic and Lymphatic System: Infrequent: anemia, lymphadenopathy.

Metabolic and Nutritional: Frequent: peripheral edema; Infrequent: hypercholesteremia, weight gain, weight loss; Rare: dehydration, gout, hyperlipemia, hypokalemia.

Musculoskeletal System: Infrequent: arthritis, bursitis, joint disorder (mainly swelling, stiffness, and pain), leg cramps, myasthenia, twitching; Rare: arthrosis, myopathy, ptosis.

Nervous System: Infrequent: agitation, apathy, ataxia, emotional lability, hostility, hypertonia, hypesthesia, incoordination, insomnia, memory impairment, neurosis, nystagmus, paresthesia, reflexes



decreased, thinking abnormal (mainly difficulty concentrating), vertigo; Rare: abnormal gait, euphoria, hyperesthesia, hypokinesia, neuritis, neuropathy, stupor, tremor.

Respiratory System: Infrequent: asthma, bronchitis, dyspnea, epistaxis, hiccup, laryngitis.

Skin and Appendages: Infrequent: acne, alopecia, contact dermatitis, dry skin, eczema, skin discoloration, sweating, urticaria; Rare: erythema multiforme, furunculosis, herpes zoster, hirsutism, maculopapular rash, vesiculobullous rash.

Special Senses: Infrequent: conjunctivitis, dry eyes, ear pain, otitis externa, otitis media, tinnitus, vestibular disorder; Rare: hyperacusis, iritis, mydriasis, photophobia.

Urogenital System: Infrequent: amenorrhea, breast engorgement, breast enlargement, breast neoplasm, breast pain, cystitis, dysuria, female lactation, hematuria, kidney calculus, kidney pain, mastitis, menorrhagia, metrorrhagia, urinary frequency, urinary incontinence, uterine hemorrhage, vaginal hemorrhage, vaginitis; Rare: oliguria, pyelonephritis, urethritis.

## 6.2 Post-Marketing Experience

In addition to the adverse reactions observed during clinical trials, dysosmia, an olfactory dysfunction that is characterized by distortion of the sense of smell, has been reported during post-marketing surveillance with eszopiclone. Because this event is reported spontaneously from a population of unknown size, it is not possible to estimate the frequency of this event.

### 7.1 CNS Active Drugs

Ethanol: An additive effect on psychomotor performance was seen with coadministration of eszopiclone and ethanol. Olanzapine: Coadministration of eszopiclone and olanzapine produced a decrease in DSST scores. The interaction was pharmacodynamic; there was no alteration in the pharmacokinetics of either drug.

### 7.2 Drugs that Inhibit or Induce CYP3A4

#### Drugs That Inhibit CYP3A4 (Ketoconazole)

CYP3A4 is a major metabolic pathway for elimination of eszopiclone. The exposure of eszopiclone was increased by coadministration of ketoconazole, a potent inhibitor of CYP3A4. Other strong inhibitors of CYP3A4 (e.g., itraconazole, clarithromycin, nefazodone, troleandomycin, ritonavir, nelfinavir) would be expected to behave similarly. Dose reduction of Eszopiclone is needed for patient co-administered with potent CYP3A4 inhibitors. [see Dosage and Administration (2.3)]

#### Drugs that Induce CYP3A4 (Rifampicin)

Racemic zopiclone exposure was decreased 80% by concomitant use of rifampicin, a potent inducer of CYP3A4. A similar effect would be expected with eszopiclone. Combination use with CYP3A4 inducer may decrease after exposure and effects of eszopiclone.

## 8.1 Pregnancy

### Pregnancy Category C

There are no adequate and well-controlled studies in pregnant women. Eszopiclone should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus.

Oral administration of eszopiclone to pregnant rats (62.5, 125, or 250 mg/kg/day) and rabbits (4, 8, or 16 mg/kg/day) throughout organogenesis showed no evidence of teratogenicity up to the highest doses tested. In rats, reduced fetal weight and increased incidences of skeletal variations and/or delayed ossification were observed at the mid and high doses. The no-observed-effect dose for adverse effects on embryofetal development is 200 times the maximum recommended human dose (MRHD) of 3 mg/day on a mg/m<sup>2</sup> basis. No effects on embryofetal development were observed in rabbits; the highest dose

tested is approximately 100 times the MRHD on a mg/m<sup>2</sup> basis.

Oral administration of eszopiclone (60, 120, or 180 mg/kg/day) to pregnant rats throughout the pregnancy and lactation resulted in increased post-implantation loss, decreased postnatal pup weights and survival, and increased pup startle response at all doses. The lowest dose tested is approximately 200 times the MRHD on a mg/m<sup>2</sup> basis. Eszopiclone had no effects on other developmental measures or reproductive function in the offspring.

### 8.3 Nursing Mothers

It is not known whether this drug is excreted in human milk.

### 8.4 Pediatric Use

Safety and effectiveness have not been established in pediatric patients.

The labeling for Sunovion Pharmaceutical Inc.'s eszopiclone tablets includes additional information from a clinical study in which efficacy was not demonstrated in pediatric patients. However, due to Sunovion Pharmaceuticals, Inc.'s marketing exclusivity rights, this drug product is not labeled with that pediatric information.

In studies in which eszopiclone (2 to 300 mg/kg/day) was orally administered to young rats from weaning through sexual maturity, neurobehavioral impairment (altered auditory startle response) and reproductive toxicity (adverse effects on male reproductive organ weights and histopathology) were observed at doses  $\geq$  5 mg/kg/day. Delayed sexual maturation was noted in males and females at  $\geq$ 10 mg/kg/day. The no-effect dose (2 mg/kg) was associated with plasma exposures (AUC) for eszopiclone and metabolite (S)-desmethylzopiclone [(S)-DMZ] approximately 2 times plasma exposures in humans at the maximum recommended dose (MRHD) in adults (3 mg/day).

When eszopiclone (doses from 1 to 50 mg/kg/day) was orally administered to young dogs from weaning through sexual maturity, neurotoxicity (convulsions) was observed at doses  $\geq$  5 mg/kg/day. Hepatotoxicity (elevated liver enzymes and hepatocellular vacuolation and degeneration) and reproductive toxicity (adverse effects on male reproductive organ weights and histopathology) were noted at dose  $\geq$ 10 mg/kg/day. The no-effect dose (1 mg/kg) was associated with plasma exposures (AUC) to eszopiclone and (S)-DMZ approximately 3 and 2 times, respectively, plasma exposures in humans at the MRHD in adults.

### 8.5 Geriatric Use

A total of 287 subjects in double-blind, parallel-group, placebo-controlled clinical trials who received eszopiclone were 65 to 86 years of age. The overall pattern of adverse events for elderly subjects (median age = 71 years) in 2-week studies with nighttime dosing of 2 mg eszopiclone was not different from that seen in younger adults [see Adverse Reactions: Table 2 (6)]. Eszopiclone 2 mg exhibited significant reduction in sleep latency and improvement in sleep maintenance in the elderly population. Compared with non-elderly adults, subjects 65 years and older had longer elimination and higher total exposure to eszopiclone. Therefore, dose reduction is recommended in the elderly patients [see Dosage and Administration (2.1), Clinical Pharmacology (12.3)].

### 8.6 Hepatic Impairment

No dose adjustment is necessary for patients with mild-to-moderate hepatic impairment. Exposure was increased in severely impaired patients compared with the healthy volunteers. The dose of eszopiclone should not exceed 2 mg in patients with severe hepatic impairment. Eszopiclone should be used with caution in patients with hepatic impairment [see Dosage and Administration (2.3), Clinical Pharmacology (12.3)].

### 9.1 Controlled Substance

Eszopiclone is a Schedule IV controlled substance under the Controlled Substances Act. Other substances under the same classification are benzodiazepines and the nonbenzodiazepine hypnotics zaleplon and zolpidem. While eszopiclone is a hypnotic agent with a chemical structure unrelated to

benzodiazepines, it shares some of the pharmacologic properties of the benzodiazepines.

## 9.2 Abuse

Abuse and addiction are separate and distinct from physical dependence and tolerance. Abuse is characterized by misuse of the drug for non-medical purposes, often in combination with other psychoactive substances. Physical dependence is a state of adaptation that is manifested by a specific withdrawal syndrome that can be produced by abrupt cessation, rapid dose reduction, decreasing blood level of the drug and/or administration of an antagonist. Tolerance is a state of adaptation in which exposure to a drug induces changes that result in a diminution of one or more of the drug's effects over time. Tolerance may occur to both the desired and undesired effects of drugs and may develop at different rates for different effects. Addiction is a primary, chronic, neurobiological disease with genetic, psychosocial, and environmental factors influencing its development and manifestations. It is characterized by behaviors that include one or more of the following: impaired control over drug use, compulsive use, continued use despite harm, and craving. Drug addiction is a treatable disease, utilizing a multidisciplinary approach, but relapse is common.

In a study of abuse liability conducted in individuals with known histories of benzodiazepine abuse, eszopiclone at doses of 6 and 12 mg produced euphoric effects similar to those of diazepam 20 mg. In this study, at doses 2-fold or greater than the maximum recommended doses, a dose-related increase in reports of amnesia and hallucinations was observed for both eszopiclone and diazepam.

## 9.3 Dependence

The clinical trial experience with eszopiclone revealed no evidence of a serious withdrawal syndrome. Nevertheless, the following adverse events included in DSM-IV criteria for uncomplicated sedative/hypnotic withdrawal were reported during clinical trials following placebo substitution occurring within 48 hours following the last eszopiclone treatment: anxiety, abnormal dreams, nausea, and upset stomach. These reported adverse events occurred at an incidence of 2% or less. Use of benzodiazepines and similar agents may lead to physical and psychological dependence. The risk of abuse and dependence increases with the dose and duration of treatment and concomitant use of other psychoactive drugs. The risk is also greater for patients who have a history of alcohol or drug abuse or history of psychiatric disorders. These patients should be under careful surveillance when receiving eszopiclone or any other hypnotic.

## 9.4 Tolerance

Some loss of efficacy to the hypnotic effect of benzodiazepines and benzodiazepine-like agents may develop after repeated use of these drugs for a few weeks.

No development of tolerance to any parameter of sleep measurement was observed over six months. Tolerance to the efficacy of eszopiclone 3 mg was assessed by 4-week objective and 6-week subjective measurements of time to sleep onset and sleep maintenance for eszopiclone in a placebo-controlled 44-day study, and by subjective assessments of time to sleep onset and WASO in a placebo-controlled study for 6 months.

In clinical trials with eszopiclone, one case of overdose with up to 36 mg of eszopiclone was reported in which the subject fully recovered. Since commercial marketing began, spontaneous cases of eszopiclone overdoses up to 270 mg (90 times the maximum recommended dose of eszopiclone) have been reported, in which patients have recovered. Fatalities related to eszopiclone overdoses were reported only in combination with other CNS drugs or alcohol.

## 10.1 Signs and Symptoms

Signs and symptoms of overdose effects of CNS depressants can be expected to present as exaggerations of the pharmacological effects noted in preclinical testing. Impairment of consciousness ranging from somnolence to coma has been described. Rare individual instances of fatal outcomes following overdose with racemic zopiclone have been reported in European postmarketing reports, most often associated with overdose with other CNS-depressant agents.

## 10.2 Recommended Treatment

General symptomatic and supportive measures should be used along with immediate gastric lavage where appropriate. Intravenous fluids should be administered as needed. Flumazenil may be useful. As in all cases of drug overdose, respiration, pulse, blood pressure, and other appropriate signs should be monitored and general supportive measures employed. Hypotension and CNS depression should be monitored and treated by appropriate medical intervention. The value of dialysis in the treatment of overdosage has not been determined.

As with the management of all overdosage, the possibility of multiple drug ingestion should be considered. The physician may wish to consider contacting a poison control center for up-to-date information on the management of hypnotic drug product overdosage.

Eszopiclone is a nonbenzodiazepine hypnotic agent that is a pyrrolopyrazine derivative of the cyclopyrrolone class. The chemical name of eszopiclone is (+)-(5S)-6-(5chloropyridin-2-yl)-7-oxo-6,7-dihydro-5H-pyrrolo[3,4-b] pyrazin-5-yl 4-methylpiperazine-1carboxylate. Its molecular weight is 388.81, and its empirical formula is C<sub>17</sub>H<sub>17</sub>ClN<sub>6</sub>O<sub>3</sub>. Eszopiclone has a single chiral center with an (S)-configuration. It has the following chemical structure:

[eszopiclone-structure]

Eszopiclone is a white to light-yellow crystalline solid. Eszopiclone is very slightly soluble in water, slightly soluble in ethanol, and soluble in phosphate buffer (pH 3.2).

Eszopiclone is formulated as film-coated tablets for oral administration. Eszopiclone tablets contain 1 mg, 2 mg, or 3 mg eszopiclone and the following inactive ingredients: dibasic calcium phosphate dihydrate, colloidal silicon dioxide, croscarmellose sodium, hypromellose, lactose, magnesium stearate, microcrystalline cellulose, polyethylene glycol, titanium dioxide, and triacetin. In addition, both the 1 mg and 3 mg tablets contain FD&C Blue #2.

## 12.1 Mechanism of Action

The precise mechanism of action of eszopiclone as a hypnotic is unknown, but its effect is believed to result from its interaction with GABA-receptor complexes at binding domains located close to or allosterically coupled to benzodiazepine receptors. Eszopiclone is a nonbenzodiazepine hypnotic that is a pyrrolopyrazine derivative of the cyclopyrrolone class with a chemical structure unrelated to pyrazolopyrimidines, imidazopyridines, benzodiazepines, barbiturates, or other drugs with known hypnotic properties.

## 12.3 Pharmacokinetics

The pharmacokinetics of eszopiclone have been investigated in healthy subjects (adult and elderly) and in patients with hepatic disease or renal disease. In healthy subjects, the pharmacokinetic profile was examined after single doses of up to 7.5 mg and after once-daily administration of 1, 3, and 6 mg for 7 days. Eszopiclone is rapidly absorbed, with a time to peak concentration (t<sub>max</sub>) of approximately 1 hour and a terminal-phase elimination half-life (t<sub>1/2</sub>) of approximately 6 hours. In healthy adults, eszopiclone does not accumulate with once-daily administration, and its exposure is dose-proportional over the range of 1 to 6 mg.

## Absorption and Distribution

Eszopiclone is rapidly absorbed following oral administration. Peak plasma concentrations are achieved within approximately 1 hour after oral administration. Eszopiclone is weakly bound to plasma protein (52-59%). The large free fraction suggests that eszopiclone disposition should not be affected by drug-drug interactions caused by protein binding. The blood-to-plasma ratio for eszopiclone is less than one,

indicating no selective uptake by red blood cells.

## Metabolism

Following oral administration, eszopiclone is extensively metabolized by oxidation and demethylation. The primary plasma metabolites are (S)-zopiclone-N-oxide and (S)-N-desmethyl zopiclone; the latter compound binds to GABA receptors with substantially lower potency than eszopiclone, and the former compound shows no significant binding to this receptor. In vitro studies have shown that CYP3A4 and CYP2E1 enzymes are involved in the metabolism of eszopiclone. Eszopiclone did not show any inhibitory potential on CYP450 1A2, 2A6, 2C9, 2C19, 2D6, 2E1, and 3A4 in cryopreserved human hepatocytes.

## Elimination

After oral administration, eszopiclone is eliminated with a mean  $t_{1/2}$  of approximately 6 hours. Up to 75% of an oral dose of racemic zopiclone is excreted in the urine, primarily as metabolites. A similar excretion profile would be expected for eszopiclone, the S-isomer of racemic zopiclone. Less than 10% of the orally administered eszopiclone dose is excreted in the urine as parent drug.

## Effect of Food

In healthy adults, administration of a 3 mg dose of eszopiclone after a high-fat meal resulted in no change in AUC, a reduction in mean  $C_{max}$  of 21%, and delayed  $t_{max}$  by approximately 1 hour. The half-life remained unchanged, approximately 6 hours. The effects of eszopiclone on sleep onset may be reduced if it is taken with or immediately after a high-fat/heavy meal.

## Specific Populations

### Age

Compared with non-elderly adults, subjects 65 years and older had an increase of 41% in total exposure (AUC) and a slightly prolonged elimination of eszopiclone ( $t_{1/2}$  approximately 9 hours).  $C_{max}$  was unchanged. Therefore, in elderly patients the starting dose of eszopiclone should be decreased to 1 mg and the dose should not exceed 2 mg.

### Gender

The pharmacokinetics of eszopiclone in men and women are similar.

### Race

In an analysis of data on all subjects participating in Phase 1 studies of eszopiclone, the pharmacokinetics for all races studied appeared similar.

## Hepatic impairment

Pharmacokinetics of a 2 mg eszopiclone dose were assessed in 16 healthy volunteers and in 8 subjects with mild, moderate, and severe liver disease. Exposure was increased 2-fold in severely impaired patients compared with the healthy volunteers.  $C_{max}$  and  $t_{max}$  were unchanged. No dose adjustment is necessary for patients with mild-to-moderate hepatic impairment. Dose reduction is recommended for patients with severe hepatic impairment. Eszopiclone should be used with caution in patients with hepatic impairment [see Dosage and Administration (2.3)].

## Renal Impairment

The pharmacokinetics of eszopiclone were studied in 24 patients with mild, moderate, or severe renal impairment. AUC and  $C_{max}$  were similar in the patients compared with demographically matched

healthy control subjects. No dose adjustment is necessary in patients with renal impairment, since less than 10% of the orally administered eszopiclone dose is excreted in the urine as parent drug.

### Drug Interactions

Eszopiclone is metabolized by CYP3A4 and CYP2E1 via demethylation and oxidation. There were no pharmacokinetic or pharmacodynamic interactions between eszopiclone and paroxetine. When eszopiclone was coadministered with olanzapine, no pharmacokinetic interaction was detected in levels of eszopiclone or olanzapine, but a pharmacodynamic interaction was seen on a measure of psychomotor function. Eszopiclone and lorazepam decreased each other's C<sub>max</sub> by 22%. Coadministration of eszopiclone 3 mg to subjects receiving ketoconazole, a potent inhibitor of CYP3A4, 400 mg daily for 5 days, resulted in a 2.2-fold increase in exposure to eszopiclone. C<sub>max</sub> and t<sub>1/2</sub> were increased 1.4-fold and 1.3-fold, respectively. Eszopiclone would not be expected to alter the clearance of drugs metabolized by common CYP450 enzymes [see Warnings and Precautions (5.7), Dosage and Administration (2.3)].

**Paroxetine:** Coadministration of single dose of eszopiclone and paroxetine produced no pharmacokinetic or pharmacodynamic interaction. The lack of a drug interaction following single-dose administration does not predict the complete absence of a pharmacodynamic effect following chronic administration.

**Lorazepam:** Coadministration of single doses of eszopiclone and lorazepam did not have clinically relevant effects on the pharmacodynamics or pharmacokinetics of either drug. The lack of a drug interaction following single-dose administration does not predict the complete absence of a pharmacodynamic effect following chronic administration.

### Drugs with a Narrow Therapeutic Index

**Digoxin:** A single dose of eszopiclone 3 mg did not affect the pharmacokinetics of digoxin measured at steady state following dosing of 0.5 mg twice daily for one day and 0.25 mg daily for the next 6 days.

**Warfarin:** Eszopiclone 3 mg administered daily for 5 days did not affect the pharmacokinetics of (R)- or (S)-warfarin, nor were there any changes in the pharmacodynamic profile (prothrombin time) following a single 25 mg oral dose of warfarin.

### Drugs Highly Bound to Plasma Protein

Eszopiclone is not highly bound to plasma proteins (52 to 59% bound); therefore, the disposition of eszopiclone is not expected to be sensitive to alterations in protein binding. Administration of eszopiclone 3 mg to a patient taking another drug that is highly protein-bound would not be expected to cause an alteration in the free concentration of either drug.

## 13.1 Carcinogenesis & Mutagenesis & Impairment Of Fertility

### Carcinogenesis

In a carcinogenicity study in rats, oral administration of eszopiclone for 97 (males) or 104 (females) weeks resulted in no increases in tumors; plasma levels (AUC) of eszopiclone at the highest dose tested (16 mg/kg/day) are approximately 80 (females) and 20 (males) times those in humans at the maximum recommended human dose (MRHD) of 3 mg/day. However, in a 2-year carcinogenicity study in rats, oral administration of racemic zopiclone (1, 10, or 100 mg/kg/day) resulted in increases in mammary gland adenocarcinomas (females) and thyroid gland follicular cell adenomas and carcinomas (males) at the highest dose tested. Plasma levels of eszopiclone at this dose are approximately 150 (females) and 70 (males) times those in humans at the MRHD of eszopiclone. The mechanism for the increase in mammary adenocarcinomas is unknown. The increase in thyroid tumors is thought to be due to increased levels of TSH secondary to increased metabolism of circulating thyroid hormones, a mechanism not considered relevant to humans.

In a 2-year carcinogenicity study in mice, oral administration of racemic zopiclone (1, 10, or 100 mg/kg/day) produced increases in pulmonary carcinomas and carcinomas plus adenomas (females) and

skin fibromas and sarcomas (males) at the highest dose tested. The skin tumors were due to skin lesions induced by aggressive behavior, a mechanism not relevant to humans. A carcinogenicity study of eszopiclone was conducted in mice at oral doses up to 100 mg/kg/day. Although this study did not reach a maximum tolerated dose, and was thus inadequate for overall assessment of carcinogenic potential, no increases in either pulmonary or skin tumors were seen at doses producing plasma levels of eszopiclone approximately 90 times those in humans at the MRHD of eszopiclone (and 12 times the exposure in the racemate study).

Eszopiclone did not increase tumors in a p53 transgenic mouse bioassay at oral doses up to 300 mg/kg/day.

## Mutagenesis

Eszopiclone was clastogenic in in vitro (mouse lymphoma and chromosomal aberration) assays in mammalian cells. Eszopiclone was negative in the in vitro bacterial gene mutation (Ames) assay and in an in vivo micronucleus assay.

(S)-N-desmethyl zopiclone, a metabolite of eszopiclone, was positive in in vitro chromosomal aberration assays in mammalian cells. (S)-N-desmethyl zopiclone was negative in the in vitro bacterial gene mutation (Ames) assay and in an in vivo chromosomal aberration and micronucleus assay.

## Impairment of Fertility

Oral administration of eszopiclone to rats prior to and during mating, and continuing in females to day 7 of gestation (doses up to 45 mg/kg/day to males and females or up to 180 mg/kg/day to females only) resulted in decreased fertility, with no pregnancy at the highest dose tested when both males and females were treated. In females, there was an increase in abnormal estrus cycles at the highest dose tested. In males, decreases in sperm number and motility and increases in morphologically abnormal sperm were observed at the mid and high doses. The no-effect dose for adverse effects on fertility (5 mg/kg/day) is 16 times the MRHD on a mg/m<sup>2</sup> basis.

The effect of eszopiclone on reducing sleep latency and improving sleep maintenance was established in studies with 2100 subjects (ages 18 to 86) with chronic and transient insomnia in six placebo-controlled trials of up to 6 months' duration. Two of these trials were in elderly patients (n=523). Overall, at the recommended adult dose (2 to 3 mg) and elderly dose (1 to 2 mg), eszopiclone significantly decreased sleep latency and improved measures of sleep maintenance (objectively measured as wake time after sleep onset [WASO] and subjectively measured as total sleep time).

### 14.1 Transient Insomnia

Healthy adults were evaluated in a model of transient insomnia (n=436) in a sleep laboratory in a double-blind, parallel-group, single-night trial comparing two doses of eszopiclone and placebo. Eszopiclone 3 mg was superior to placebo on measures of sleep latency and sleep maintenance, including polysomnographic (PSG) parameters of latency to persistent sleep (LPS) and WASO.

### 14.2 Chronic Insomnia (Adults and Elderly)

The effectiveness of eszopiclone was established in five controlled studies in chronic insomnia. Three controlled studies were in adult subjects, and two controlled studies were in elderly subjects with chronic insomnia.

#### Adults

In the first study, adults with chronic insomnia (n=308) were evaluated in a double-blind, parallel-group trial of 6 weeks' duration comparing eszopiclone 2 mg and 3 mg with placebo. Objective endpoints were measured for 4 weeks. Both 2 mg and 3 mg were superior to placebo on LPS at 4 weeks. The 3 mg dose was superior to placebo on WASO.

In the second study, adults with chronic insomnia (n=788) were evaluated using subjective measures in a

double-blind, parallel-group trial comparing the safety and efficacy of eszopiclone 3 mg with placebo administered nightly for 6 months. Eszopiclone was superior to placebo on subjective measures of sleep latency, total sleep time, and WASO.

In addition, a 6-period cross-over PSG study evaluating eszopiclone doses of 1 to 3 mg, each given over a 2-day period, demonstrated effectiveness of all doses on LPS, and of 3 mg on WASO. In this trial, the response was dose-related.

### Elderly

Elderly subjects (ages 65 to 86) with chronic insomnia were evaluated in two double-blind, parallel-group trials of 2 weeks duration. One study (n=231) compared the effects of eszopiclone with placebo on subjective outcome measures, and the other (n=292) on objective and subjective outcome measures. The first study compared 1 mg and 2 mg of eszopiclone with placebo, while the second study compared 2 mg of eszopiclone with placebo. All doses were superior to placebo on measures of sleep latency. In both studies, 2 mg of eszopiclone was superior to placebo on measures of sleep maintenance.

## 14.3 Studies Pertinent to Safety Concerns for Sedative Hypnotic Drugs

### Next Day Residual Effects

In a double-blind study of 91 healthy adults age 25-to 40 years, the effects of eszopiclone 3 mg on psychomotor function were assessed between 7.5 and 11.5 hours the morning after dosing. Measures included tests of psychomotor coordination that are correlated with ability to maintain a motor vehicle in the driving lane, tests of working memory, and subjective perception of sedation and coordination. Compared with placebo, eszopiclone 3 mg was associated with next-morning psychomotor and memory impairment that was most severe at 7.5 hours, but still present and potentially clinically meaningful at 11.5 hours. Subjective perception of sedation and coordination from eszopiclone 3 mg was not consistently different from placebo, even though subjects were objectively impaired.

In a 6-month double-blind, placebo-controlled trial of nightly administered eszopiclone 3 mg, memory impairment was reported by 1.3% (8/593) of subjects treated with eszopiclone 3 mg compared to 0% (0/195) of subjects treated with placebo. In a 6-week adult study of nightly administered eszopiclone confusion was reported by 3.0% of patients treated with eszopiclone 3 mg, compared to 0% of subjects treated with placebo. In the same study, memory impairment was reported by 1% of patients treated with either 2 mg or 3 mg eszopiclone, compared to 0% treated with placebo.

In a 2-week study of 264 elderly insomniacs, 1.5% of patients treated with eszopiclone 2 mg reported memory impairment compared to 0% treated with placebo. In another 2-week study of 231 elderly insomniacs, 2.5% of patients treated with eszopiclone 2 mg reported confusion compared to 0% treated with placebo.

### Withdrawal-Emergent Anxiety and Insomnia

During nightly use for an extended period, pharmacodynamic tolerance or adaptation has been observed with other hypnotics. If a drug has a short elimination half-life, it is possible that a relative deficiency of the drug or its active metabolites (i.e., in relationship to the receptor site) may occur at some point in the interval between each night's use. This is believed to be responsible for two clinical findings reported to occur after several weeks of nightly use of other rapidly eliminated hypnotics: increased wakefulness during the last quarter of the night and the appearance of increased signs of daytime anxiety.

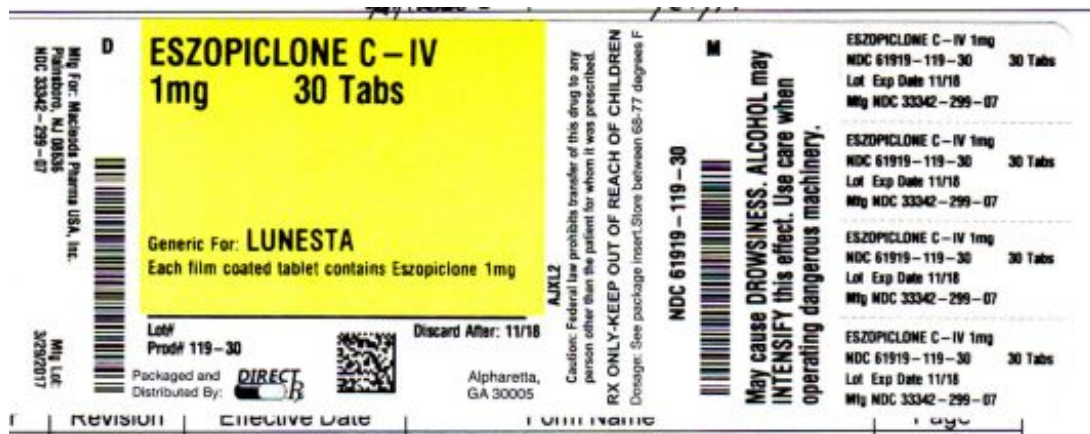
In a 6-month double-blind, placebo-controlled study of nightly administration of eszopiclone 3 mg, rates of anxiety reported as an adverse event were 2.1% in the placebo arm and 3.7% in the eszopiclone arm. In a 6-week adult study of nightly administration, anxiety was reported as an adverse event in 0%, 2.9%, and 1.0% of the placebo, 2 mg, and 3 mg treatment arms, respectively. In this study, single-blind placebo was administered on nights 45 and 46, the first and second days of withdrawal from study drug. New



adverse events were recorded during the withdrawal period, beginning with day 45, up to 14 days after discontinuation. During this withdrawal period, 105 subjects previously taking nightly eszopiclone 3 mg for 44 nights spontaneously reported anxiety (1%), abnormal dreams (1.9%), hyperesthesia (1%), and neurosis (1%), while none of 99 subjects previously taking placebo reported any of these adverse events during the withdrawal period.

Rebound insomnia, defined as a dose-dependent temporary worsening in sleep parameters (latency, sleep efficiency, and number of awakenings) compared with baseline following discontinuation of treatment, is observed with short- and intermediate-acting hypnotics. Rebound insomnia following discontinuation of eszopiclone relative to placebo and baseline was examined objectively in a 6-week adult study on the first 2 nights of discontinuation (nights 45 and 46) following 44 nights of active treatment with 2 mg or 3 mg. In the eszopiclone 2 mg group, compared with baseline, there was a significant increase in WASO and a decrease in sleep efficiency, both occurring only on the first night after discontinuation of treatment. No changes from baseline were noted in the eszopiclone 3 mg group on the first night after discontinuation, and there was a significant improvement in LPS and sleep efficiency compared with baseline following the second night of discontinuation. Comparisons of changes from baseline between eszopiclone and placebo were also performed. On the first night after discontinuation of eszopiclone 2 mg, LPS and WASO were significantly increased and sleep efficiency was reduced; there were no significant differences on the second night. On the first night following discontinuation of eszopiclone 3 mg, sleep efficiency was significantly reduced. No other differences from placebo were noted in any other sleep parameter on either the first or second night following discontinuation. For both doses, the discontinuation-emergent effect was mild, had the characteristics of the return of the symptoms of chronic insomnia, and appeared to resolve by the second night after eszopiclone discontinuation.

Eszopiclone 1 mg tablets are light blue, round, biconvex, film coated tablet, debossed with "L 34" on one side and plain on other side.



## ESZOPICLONE

eszopiclone tablet, film coated

### Product Information

<b>Product Type</b>	HUMAN PRESCRIPTION DRUG	<b>Item Code (Source)</b>	NDC:61919-119-30 119(NDC:33342-299)
<b>Route of Administration</b>	ORAL	<b>DEA Schedule</b>	CIV

### Active Ingredient/Active Moiety

Ingredient Name	Basis of Strength	Strength
ESZOPICLONE (UNII: UZX80K71OE) (ESZOPICLONE - UNII:UZX80K71OE)	ESZOPICLONE	1 mg

## Inactive Ingredients

Ingredient Name	Strength
CALCIUM PHOSPHATE, DIBASIC, DIHYDRATE (UNII: O7TSZ97GEP)	
CROSCARMELLOSE SODIUM (UNII: M28OL1HH48)	
HYPROMELLOSES (UNII: 3NXW29V3WO)	
LACTOSE MONOHYDRATE (UNII: EWQ57Q8I5X)	
MAGNESIUM STEARATE (UNII: 70097M6I30)	
CELLULOSE, MICROCRYSTALLINE (UNII: OPIR32D61U)	
POLYETHYLENE GLYCOL, UNSPECIFIED (UNII: 3WJQ0SDW1A)	
TITANIUM DIOXIDE (UNII: 15FIX9V2JP)	
TRIACETIN (UNII: XHX3C3X673)	
FD&C BLUE NO. 2 (UNII: L06K8R7DQK)	
SILICON DIOXIDE (UNII: ETJ7Z6XBU4)	

## Product Characteristics

Color	blue (LIGHT BLUE)	Score	no score
Shape	ROUND (BICONVEX)	Size	6 mm
Flavor		Imprint Code	L34
Contains			

## Packaging

#	Item Code	Package Description	Marketing Start Date	Marketing End Date
1	NDC:61919-119-30	30 in 1 BOTTLE; Type 0: Not a Combination Product	03/29/2017	

## Marketing Information

Marketing Category	Application Number or Monograph Citation	Marketing Start Date	Marketing End Date
ANDA	ANDA202929	03/29/2017	

**Labeler** - DIRECT RX (079254320)

**Registrant** - DIRECT RX (079254320)

## Establishment

Name	Address	ID/FEI	Business Operations
DIRECT RX		079254320	repack(61919-119)