

HIGHLIGHTS OF PRESCRIBING INFORMATION

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

BELSOMRA® (suvorexant) tablets, for oral use, C-IV
Initial U.S. Approval: 2014

INDICATIONS AND USAGE

BELSOMRA is an orexin receptor antagonist indicated for the treatment of insomnia, characterized by difficulties with sleep onset and/or sleep maintenance (1).

DOSAGE AND ADMINISTRATION

- Use the lowest dose effective for the patient (2.1).
- Recommended dose is 10 mg, no more than once per night taken within 30 minutes of going to bed, with at least 7 hours remaining before the planned time of awakening. If the 10 mg dose is well-tolerated but not effective, the dose can be increased, not to exceed 20 mg once daily (2.1, 2.2).
- Time to effect may be delayed if taken with or soon after a meal (2.5).

DOSAGE FORMS AND STRENGTHS

Tablets, 5 mg, 10 mg, 15 mg, 20 mg (3).

CONTRAINDICATIONS

- Do not use in patients with narcolepsy (4).

WARNINGS AND PRECAUTIONS

- Daytime somnolence: Risk of impaired alertness and motor coordination, including impaired driving; risk increases with dose; caution patients taking 20 mg against next-day driving and other activities requiring complete mental alertness (5.1).
- Need to evaluate for co-morbid diagnoses: Reevaluate if insomnia persists after 7 to 10 days of treatment (5.2).

- Nighttime “sleep-driving” and other complex behaviors while out of bed and not fully awake. Risk increases with dose, with use of CNS depressants, and with alcohol (5.3).
- Depression: Worsening of depression or suicidal thinking may occur. Risk increases with dose. Immediately evaluate any new behavioral changes (5.4).
- Compromised respiratory function: Effect on respiratory function should be considered (5.5, 8.6).
- Sleep paralysis, hypnagogic/hypnopompic hallucinations, and cataplexy-like symptoms: Risk increases with dose (5.6).

ADVERSE REACTIONS

The most common adverse reaction (reported in 5% or more of patients treated with BELSOMRA and at least twice the placebo rate) with BELSOMRA was somnolence (6.1).

To report SUSPECTED ADVERSE REACTIONS, contact Merck Sharp & Dohme Corp., a subsidiary of Merck & Co., Inc., at 1-877-888-4231 or FDA at 1-800-FDA-1088 or www.fda.gov/medwatch.

DRUG INTERACTIONS

- CYP3A inhibitors: Recommended dose is 5 mg when used with moderate CYP3A inhibitors. Dose can be increased to 10 mg once daily if the 5 mg dose is not effective. Not recommended for use in patients taking strong CYP3A inhibitors (2.4, 7.2).
- Strong CYP3A inducers: Efficacy may be reduced (7.2).
- Digoxin: Monitor digoxin concentrations (7.3).

USE IN SPECIFIC POPULATIONS

- Pregnancy: Based on animal data, may cause fetal harm (8.1).
- Patients with severe hepatic impairment: Not recommended (8.7).

See 17 for PATIENT COUNSELING INFORMATION and Medication Guide.

Revised: 7/2018

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FULL PRESCRIBING INFORMATION

1 INDICATIONS AND USAGE

BELSOMRA® (suvorexant) is indicated for the treatment of insomnia characterized by difficulties with sleep onset and/or sleep maintenance.

2 DOSAGE AND ADMINISTRATION

2.1 Dosing Information

Use the lowest dose effective for the patient.

The recommended dose for BELSOMRA is 10 mg, taken no more than once per night and within 30 minutes of going to bed, with at least 7 hours remaining before the planned time of awakening. If the 10 mg dose is well-tolerated but not effective, the dose can be increased. The maximum recommended dose of BELSOMRA is 20 mg once daily.

2.2 Special Populations

Exposure to BELSOMRA is increased in obese compared to non-obese patients, and in women compared to men. Particularly in obese women, the increased risk of exposure-related adverse effects should be considered before increasing the dose [see *Clinical Pharmacology* (12.3)].

2.3 Use with CNS Depressants

When BELSOMRA is combined with other CNS depressant drugs, dosage adjustment of BELSOMRA and/or the other drug(s) may be necessary because of potentially additive effects [see *Warnings and Precautions* (5.1)].

2.4 Use with CYP3A Inhibitors

The recommended dose of BELSOMRA is 5 mg when used with moderate CYP3A inhibitors and the dose generally should not exceed 10 mg in these patients. BELSOMRA is not recommended for use with strong CYP3A inhibitors [see *Drug Interactions* (7.2)].

2.5 Food Effect

Time to effect of BELSOMRA may be delayed if taken with or soon after a meal.

3 DOSAGE FORMS AND STRENGTHS

- 5 mg tablets are yellow, round, film-coated tablets with “5” on one side and plain on the other side.
- 10 mg tablets are green, round, film-coated tablets with “33” on one side and plain on the other side.
- 15 mg tablets are white, oval, film-coated tablets with the Merck logo on one side and “325” on the other side.
- 20 mg tablets are white, round, film-coated tablets with the Merck logo and “335” on one side and plain on the other side.

4 CONTRAINDICATIONS

BELSOMRA is contraindicated in patients with narcolepsy.

5 WARNINGS AND PRECAUTIONS

5.1 CNS Depressant Effects and Daytime Impairment

BELSOMRA is a central nervous system (CNS) depressant that can impair daytime wakefulness even when used as prescribed. Prescribers should monitor for somnolence and CNS depressant effects, but impairment can occur in the absence of symptoms, and may not be reliably detected by ordinary clinical exam (i.e., less than formal testing of daytime wakefulness and/or psychomotor performance). CNS depressant effects may persist in some patients for up to several days after discontinuing BELSOMRA.

BELSOMRA can impair driving skills and may increase the risk of falling asleep while driving. Discontinue or decrease the dose in patients who drive if daytime somnolence develops. In a study of healthy adults, driving ability was impaired in some individuals taking 20 mg BELSOMRA [see *Clinical Studies (14.2)*]. Although pharmacodynamic tolerance or adaptation to some adverse depressant effects of BELSOMRA may develop with daily use, patients using the 20 mg dose of BELSOMRA should be cautioned against next-day driving and other activities requiring full mental alertness. Patients taking lower doses of BELSOMRA should also be cautioned about the potential for driving impairment because there is individual variation in sensitivity to BELSOMRA.

Co-administration with other CNS depressants (e.g., benzodiazepines, opioids, tricyclic antidepressants, alcohol) increases the risk of CNS depression. Patients should be advised not to consume alcohol in combination with BELSOMRA because of additive effects [see *Drug Interactions (7.1)*]. Dosage adjustments of BELSOMRA and of concomitant CNS depressants may be necessary when administered together because of potentially additive effects. The use of BELSOMRA with other drugs to treat insomnia is not recommended [see *Dosage and Administration (2.3)*].

The risk of next-day impairment, including impaired driving, is increased if BELSOMRA is taken with less than a full night of sleep remaining, if a higher than the recommended dose is taken, if co-administered with other CNS depressants, or if co-administered with other drugs that increase blood levels of BELSOMRA. Patients should be cautioned against driving and other activities requiring complete mental alertness if BELSOMRA is taken in these circumstances.

5.2 Need to Evaluate for Co-Morbid Diagnoses

Because sleep disturbances may be the presenting manifestation of a physical and/or psychiatric disorder, treatment of insomnia should be initiated only after 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 cognitive or behavioral abnormalities may be the result of an unrecognized underlying psychiatric or physical disorder, and can emerge during the course of treatment with hypnotic drugs such as BELSOMRA.

5.3 Abnormal Thinking and Behavioral Changes

A variety of cognitive and behavioral changes (e.g., amnesia, anxiety, hallucinations and other neuro-psychiatric symptoms) have been reported to occur in association with the use of hypnotics such as BELSOMRA. Complex behaviors such as "sleep-driving" (i.e., driving while not fully awake after taking a hypnotic) and other complex behaviors (e.g., preparing and eating food, making phone calls, or having sex), with amnesia for the event, have been reported in association with the use of hypnotics. These events can occur in hypnotic-naïve as well as in hypnotic-experienced persons. The use of alcohol and other CNS depressants may increase the risk of such behaviors. Discontinuation of BELSOMRA should be strongly considered for patients who report any complex sleep behavior.

5.4 Worsening of Depression/Suicidal Ideation

In clinical studies, a dose-dependent increase in suicidal ideation was observed in patients taking BELSOMRA as assessed by questionnaire. Immediately evaluate patients with suicidal ideation or any new behavioral sign or symptom.

In primarily depressed patients treated with sedative-hypnotics, worsening of depression, and suicidal thoughts and actions (including completed suicides) have been reported. 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 lowest number of tablets that is feasible should be prescribed for the patient at any one time.

The emergence of any new behavioral sign or symptom of concern requires careful and immediate evaluation.

5.5 Patients with Compromised Respiratory Function

Effect of BELSOMRA on respiratory function should be considered if prescribed to patients with compromised respiratory function. BELSOMRA has not been studied in patients with severe obstructive sleep apnea (OSA) or severe chronic obstructive pulmonary disease (COPD) [see *Use in Specific Populations* (8.6)].

5.6 Sleep Paralysis, Hypnagogic/Hypnopompic Hallucinations, Cataplexy-Like Symptoms

Sleep paralysis, an inability to move or speak for up to several minutes during sleep-wake transitions, and hypnagogic/hypnopompic hallucinations, including vivid and disturbing perceptions by the patient, can occur with the use of BELSOMRA. Prescribers should explain the nature of these events to patients when prescribing BELSOMRA.

Symptoms similar to mild cataplexy can occur, with risk increasing with the dose of BELSOMRA. Such symptoms can include periods of leg weakness lasting from seconds to a few minutes, can occur both at night and during the day, and may not be associated with an identified triggering event (e.g., laughter or surprise).

6 ADVERSE REACTIONS

The following serious adverse reactions are discussed in greater detail in other sections:

- CNS depressant effects and daytime impairment [see *Warnings and Precautions* (5.1)]
- Abnormal thinking and behavioral changes [see *Warnings and Precautions* (5.3)]
- Worsening of Depression/Suicidal ideation [see *Warnings and Precautions* (5.4)]
- Sleep paralysis, hypnagogic/hypnopompic hallucinations, cataplexy-like symptoms [see *Warnings and Precautions* (5.6)]

6.1 Clinical Trials 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.

In 3-month controlled efficacy trials (Study 1 and Study 2), 1263 patients were exposed to BELSOMRA including 493 patients who received BELSOMRA 15 mg or 20 mg (see Table 1).

In a long-term study, additional patients (n=521) were treated with BELSOMRA at higher than recommended doses, including a total of 160 patients who received BELSOMRA for at least one year.

Table 1: Patient Exposure to BELSOMRA 15 mg or 20 mg in Study 1 and Study 2

Patients Treated	BELSOMRA 15 mg	BELSOMRA 20 mg
For ≥ 1 Day (n)	202	291
Men (n)	69	105
Women (n)	133	186
Mean Age (years)	70	45
For ≥ 3 Months (n)	118	172

The pooled safety data described below (see Table 2) reflect the adverse reaction profile during the first 3 months of treatment.

Adverse Reactions Resulting in Discontinuation of Treatment

The incidence of discontinuation due to adverse reactions for patients treated with 15 mg or 20 mg of BELSOMRA was 3% compared to 5% for placebo. No individual adverse reaction led to discontinuation at an incidence $\geq 1\%$.

Most Common Adverse Reactions

In clinical trials of patients with insomnia treated with BELSOMRA 15 mg or 20 mg, the most common adverse reaction (reported in 5% or more of patients treated with BELSOMRA and at least twice the placebo rate) was somnolence (BELSOMRA 7%; placebo 3%).

Table 2 shows the percentage of patients with adverse reactions during the first three months of treatment, based on the pooled data from 3-month controlled efficacy trials (Study 1 and Study 2).

At doses of 15 or 20 mg, the incidence of somnolence was higher in females (8%) than in males (3%). Of the adverse reactions reported in Table 2, the following occurred in women at an incidence of at least twice that in men: headache, abnormal dreams, dry mouth, cough, and upper respiratory tract infection.

The adverse reaction profile in elderly patients was generally consistent with non-elderly patients. The adverse reactions reported during long-term treatment up to 1 year were generally consistent with those observed during the first 3 months of treatment.

Table 2: Percentage of Patients with Adverse Reactions Incidence $\geq 2\%$ and Greater than Placebo in 3-Month Controlled Efficacy Trials (Study 1 and Study 2)

	Placebo	BELSOMRA (20 mg in non-elderly or 15 mg in elderly patients)
	n=767	n=493
Gastrointestinal Disorders		
Diarrhea	1	2
Dry mouth	1	2
Infections and Infestations		
Upper respiratory tract infection	1	2

Nervous System Disorders		
Headache	6	7
Somnolence	3	7
Dizziness	2	3
Psychiatric Disorders		
Abnormal dreams	1	2
Respiratory, Thoracic and Mediastinal Disorders		
Cough	1	2

Dose Relationship for Adverse Reactions

There is evidence of a dose relationship for many of the adverse reactions associated with BELSOMRA use, particularly for certain CNS adverse reactions.

In a placebo-controlled crossover study (Study 3), non-elderly adult patients were treated for up to one month with BELSOMRA at doses of 10 mg, 20 mg, 40 mg (2 times the maximum recommended dose) or 80 mg (4 times the maximum recommended dose). In patients treated with BELSOMRA 10 mg (n=62), although no adverse reactions were reported at an incidence of $\geq 2\%$, the types of adverse reactions observed were similar to those observed in patients treated with BELSOMRA 20 mg. BELSOMRA was associated with a dose-related increase in somnolence: 2% at the 10 mg dose, 5% at the 20 mg dose, 12% at the 40 mg dose, and 11% at the 80 mg dose, compared to $<1\%$ for placebo. BELSOMRA was also associated with a dose-related increase in serum cholesterol: 1 mg/dL at the 10 mg dose, 2 mg/dL at the 20 mg dose, 3 mg/dL at the 40 mg dose, and 6 mg/dL at the 80 mg dose after 4 weeks of treatment, compared to a 4 mg/dL decrease for placebo.

6.2 Post-Marketing Experience

The following adverse reactions have been identified during post-approval use of BELSOMRA. Because these reactions are reported voluntarily from a population of uncertain size, it is not always possible to reliably estimate their frequency or establish a causal relationship to drug exposure.

Cardiac disorders: palpitations, tachycardia

Nervous system disorders: psychomotor hyperactivity

Psychiatric disorders: anxiety

7 DRUG INTERACTIONS

7.1 CNS-Active Agents

When BELSOMRA was co-administered with alcohol, additive psychomotor impairment was demonstrated. There was no alteration in the pharmacokinetics of BELSOMRA [see *Warnings and Precautions* (5.1, 5.3) and *Clinical Pharmacology* (12.3)].

7.2 Effects of Other Drugs on BELSOMRA

Metabolism by CYP3A is the major elimination pathway for suvorexant.

CYP3A Inhibitors

Concomitant use of BELSOMRA with strong inhibitors of CYP3A (e.g., ketoconazole, itraconazole, posaconazole, clarithromycin, nefazodone, ritonavir, saquinavir, nelfinavir, indinavir, boceprevir, telaprevir, telithromycin and conivaptan) is not recommended [see *Clinical Pharmacology* (12.3)].

The recommended dose of BELSOMRA is 5 mg in subjects receiving moderate CYP3A inhibitors (e.g., amprenavir, aprepitant, atazanavir, ciprofloxacin, diltiazem, erythromycin, fluconazole, fosamprenavir, grapefruit juice, imatinib, verapamil). The dose can be increased to 10 mg in these patients if necessary for efficacy [see *Clinical Pharmacology* (12.3)].

CYP3A Inducers

Suvorexant exposure can be substantially decreased when co-administered with strong CYP3A inducers (e.g., rifampin, carbamazepine and phenytoin). The efficacy of BELSOMRA may be reduced [see *Clinical Pharmacology* (12.3)].

7.3 Effects of BELSOMRA on Other Drugs

Digoxin

Concomitant administration of BELSOMRA with digoxin slightly increased digoxin levels due to inhibition of intestinal P-gp. Digoxin concentrations should be monitored when co-administering BELSOMRA with digoxin [see *Clinical Pharmacology* (12.3)].

8 USE IN SPECIFIC POPULATIONS

8.1 Pregnancy

Pregnancy Category C

There are no adequate and well-controlled studies in pregnant women. BELSOMRA should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus. Administration of suvorexant to pregnant rats throughout organogenesis in two separate studies at oral doses of 30, 150, and 1000 mg/kg or 30, 80, and 325 mg/kg resulted in a decrease in fetal body weight at doses greater than 80 mg/kg. Plasma exposures (AUC) at the no-effect dose were approximately 25 times that in humans at the maximum recommended human dose (MRHD) of 20 mg/day.

Administration of suvorexant to pregnant rabbits throughout organogenesis in two separate studies at oral doses of 40, 100, and 300 mg/kg or 50, 150, and 325 mg/kg resulted in no apparent adverse effects on embryo-fetal development. Excessive toxicity resulted in premature sacrifice of pregnant animals at 325 mg/kg. The highest maternal plasma exposures (AUC) for which there are fetal data were up to approximately 40 times that in humans at the MRHD.

Administration of suvorexant (oral doses of 30, 80, and 200 mg/kg) to pregnant rats throughout gestation and lactation resulted in decreased body weight in offspring at the highest dose tested. Plasma AUCs at the no-effect dose were approximately 25 times that in humans at the MRHD.

8.3 Nursing Mothers

Suvorexant and a hydroxyl-suvorexant metabolite were excreted in rat milk at levels higher (9 and 1.5 times, respectively) than that in maternal plasma. It is not known whether this drug is secreted in human milk. Because many drugs are excreted in human milk, caution should be exercised when BELSOMRA is administered to a nursing woman.

8.4 Pediatric Use

Safety and effectiveness in pediatric patients have not been established.

8.5 Geriatric Use

Of the total number of patients treated with BELSOMRA (n=1784) in controlled clinical safety and efficacy studies, 829 patients were 65 years and over, and 159 patients were 75 years and over. No clinically meaningful differences in safety or effectiveness were observed between these patients and younger patients at the recommended doses [see *Clinical Pharmacology* (12.3) and *Clinical Studies* (14)].

8.6 Patients with Compromised Respiratory Function

Effects of BELSOMRA on respiratory function should be considered if prescribed to patients with compromised respiratory function.

Obstructive Sleep Apnea

The respiratory depressant effect of BELSOMRA was evaluated after one night and after four consecutive nights of treatment in a randomized, placebo-controlled, 2-period crossover study in patients (n=26) with mild to moderate obstructive sleep apnea. Following once-daily doses of 40 mg, the mean Apnea/Hypopnea Index treatment difference (suvorexant – placebo) on Day 4 was 2.7 (90% CI: 0.22 to 5.09), but there was wide inter- and intra-individual variability such that clinically meaningful respiratory effects of BELSOMRA in obstructive sleep apnea cannot be excluded. BELSOMRA has not been studied in patients with severe obstructive sleep apnea [see *Warnings and Precautions* (5.5)].

Chronic Obstructive Pulmonary Disease

The respiratory depressant effect of BELSOMRA was evaluated after one night and after four consecutive nights of treatment in a randomized, placebo-controlled, 2-period crossover study in patients (n=25) with mild to moderate chronic obstructive pulmonary disease (COPD). BELSOMRA (40 mg in non-elderly, 30 mg in elderly) had no respiratory depressant effects in patients with mild to moderate COPD, as measured by oxygen saturation. There was wide inter- and intra-individual variability such that clinically meaningful respiratory effects of BELSOMRA in COPD cannot be excluded. BELSOMRA has not been studied in patients with severe COPD [see *Warnings and Precautions* (5.5)].

8.7 Patients with Hepatic Impairment

No dose adjustment is required in patients with mild and moderate hepatic impairment. BELSOMRA has not been studied in patients with severe hepatic impairment and is not recommended for these patients [see *Clinical Pharmacology* (12.3)].

8.8 Patients with Renal Impairment

No dose adjustment is required in patients with renal impairment [see *Clinical Pharmacology* (12.3)].

9 DRUG ABUSE AND DEPENDENCE

9.1 Controlled Substance

BELSOMRA contains suvorexant, a Schedule IV controlled substance.

9.2 Abuse

Abuse of BELSOMRA poses an increased risk of somnolence, daytime sleepiness, impaired reaction time and impaired driving skills [see *Warnings and Precautions* (5.1)]. Patients at risk for abuse may include those with prolonged use of BELSOMRA, those with a history of drug abuse, and those who use BELSOMRA in combination with alcohol or other abused drugs.

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 addiction is a cluster of behavioral, cognitive, and physiological phenomena that may develop after repeated abuse of a prescription or over-the-

counter drug, including: a strong desire to take the drug, difficulties in controlling drug use, persisting in drug use despite harmful consequences, a higher priority given to drug use than to other activities and obligations, as well as the possibility of the development of tolerance or development of physical dependence (as manifest by a withdrawal syndrome). Drug abuse and drug addiction are separate and distinct from physical dependence and tolerance (for example, abuse or addiction are not always accompanied by tolerance or physical dependence).

In an abuse liability study conducted in recreational polydrug users (n=36), suvorexant (40, 80 and 150 mg) produced similar effects as zolpidem (15, 30 mg) on subjective ratings of "drug liking" and other measures of subjective drug effects. Because individuals with a history of abuse or addiction to alcohol or other drugs may be at increased risk for abuse and addiction to BELSOMRA, follow such patients carefully.

9.3 Dependence

Physical dependence is a state that develops as a result of physiological adaptation in response to repeated drug use. Physical dependence manifests by drug class-specific withdrawal symptoms after abrupt discontinuation or a significant dose reduction of a drug. In completed clinical trials with BELSOMRA, there was no evidence for physical dependence with the prolonged use of BELSOMRA. There were no reported withdrawal symptoms after discontinuation of BELSOMRA.

10 OVERDOSAGE

There is limited premarketing clinical experience with an overdose of BELSOMRA. In clinical pharmacology studies, healthy subjects who were administered morning doses of up to 240 mg of suvorexant showed dose-dependent increases in the frequency and duration of somnolence.

General symptomatic and supportive measures should be used, along with immediate gastric lavage where appropriate. Intravenous fluids should be administered as needed. As in all cases of drug overdose, vital signs should be monitored and general supportive measures employed. The value of dialysis in the treatment of overdose has not been determined. As suvorexant is highly protein-bound, hemodialysis is not expected to contribute to elimination of suvorexant.

As with the management of all overdose, the possibility of multiple drug ingestion should be considered. Consider contacting a poison control center for up-to-date information on the management of hypnotic drug product overdose.

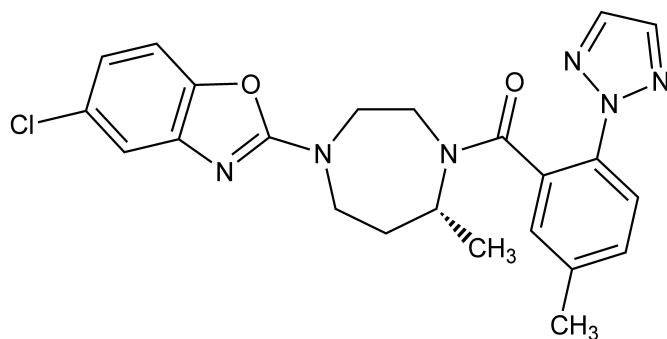
11 DESCRIPTION

BELSOMRA tablets contain suvorexant, a highly selective antagonist for orexin receptors OX1R and OX2R.

Suvorexant is described chemically as:

[(7R)-4-(5-chloro-2-benzoxazolyl) hexahydro-7-methyl-1H-1,4-diazepin-1-yl][5-methyl-2-(2H-1,2,3-triazol-2-yl)phenyl]methanone

Its empirical formula is $C_{23}H_{23}ClN_6O_2$ and the molecular weight is 450.92. Its structural formula is:



Suvorexant is a white to off-white powder that is insoluble in water.

Each film coated tablet contains 5 mg, 10 mg, 15 mg, or 20 mg of suvorexant and the following inactive ingredients: polyvinylpyrrolidone/vinyl acetate copolymer (copovidone), microcrystalline cellulose, lactose monohydrate, croscarmellose sodium, and magnesium stearate.

In addition, the film coating contains the following inactive ingredients: lactose monohydrate, hypromellose, titanium dioxide, and triacetin. The film coating for the 5 mg tablets also contains iron oxide yellow and iron oxide black, and the film coating for the 10 mg tablets also contains iron oxide yellow and FD&C Blue #1/Brilliant Blue FCF Aluminum Lake.

12 CLINICAL PHARMACOLOGY

12.1 Mechanism of Action

The mechanism by which suvorexant exerts its therapeutic effect in insomnia is presumed to be through antagonism of orexin receptors. The orexin neuropeptide signaling system is a central promoter of wakefulness. Blocking the binding of wake-promoting neuropeptides orexin A and orexin B to receptors OX1R and OX2R is thought to suppress wake drive.

Antagonism of orexin receptors may also underlie potential adverse effects such as signs of narcolepsy/cataplexy. Genetic mutations in the orexin system in animals result in hereditary narcolepsy; loss of orexin neurons has been reported in humans with narcolepsy.

12.2 Pharmacodynamics

Evaluation of QTc Interval

The effects of suvorexant on the QTc interval were evaluated in a randomized, placebo-, and active-controlled (moxifloxacin 400 mg) crossover study in healthy subjects (n=53). The upper bound of the one-sided 95% confidence interval for the largest placebo-adjusted, baseline-corrected QTc interval was below 10 ms based on analysis of suvorexant doses up to 240 mg, 12 times the maximum recommended dose. BELSOMRA thus does not prolong the QTc interval to any clinically relevant extent.

12.3 Pharmacokinetics

Suvorexant exposure increases in a less than strictly dose-proportional manner over the range of 10-80 mg because of decreased absorption at higher doses. Suvorexant pharmacokinetics are similar in healthy subjects and patients with insomnia.

Absorption

Suvorexant peak concentrations occur at a median T_{max} of 2 hours (range 30 minutes to 6 hours) under fasted conditions. The mean absolute bioavailability of 10 mg is 82%.

Ingestion of suvorexant with a high-fat meal resulted in no meaningful change in AUC or C_{max} but a delay in T_{max} of approximately 1.5 hours. Suvorexant may be taken with or without food; however for faster sleep onset, suvorexant should not be administered with or soon after a meal.

Distribution

The mean volume of distribution of suvorexant is approximately 49 liters. Suvorexant is extensively bound (>99%) to human plasma proteins and does not preferentially distribute into red blood cells. Suvorexant binds to both human serum albumin and α 1-acid glycoprotein.

Metabolism

Suvorexant is mainly eliminated by metabolism, primarily by CYP3A with a minor contribution from CYP2C19. The major circulating entities are suvorexant and a hydroxy-suvorexant metabolite. This metabolite is not expected to be pharmacologically active.

Elimination

The primary route of elimination is through the feces, with approximately 66% of radiolabeled dose recovered in the feces compared to 23% in the urine. The systemic pharmacokinetics of suvorexant are linear with an accumulation of approximately 1- to 2-fold with once-daily dosing. Steady-state is achieved by 3 days. The mean $t_{1/2}$ is approximately 12 hours (95% CI: 12 to 13).

Special Populations

Gender, age, body mass index (BMI), and race were included as factors assessed in the population pharmacokinetic model to evaluate suvorexant pharmacokinetics in healthy subjects and to predict exposures in the patient population. Age and race are not predicted to have any clinically meaningful changes on suvorexant pharmacokinetics; therefore, no dose adjustment is warranted based upon these factors.

Suvorexant exposure is higher in females than in males. In females, the AUC and C_{max} are increased by 17% and 9%, respectively, following administration of BELSOMRA 40 mg. The average concentration of suvorexant 9 hours after dosing is 5% higher for females across the dose range studied (10-40 mg). Dose adjustment of BELSOMRA is generally not needed based on gender only.

Apparent oral clearance of suvorexant is inversely related to body mass index. In obese patients, the AUC and C_{max} are increased by 31% and 17%, respectively. The average concentration of suvorexant approximately 9 hours after a 20 mg dose is 15% higher in obese patients ($BMI > 30 \text{ kg/m}^2$) relative to those with a normal BMI ($BMI \leq 25 \text{ kg/m}^2$).

In obese females, the AUC and C_{max} are increased by 46% and 25%, respectively, compared to non-obese females. The higher exposure to suvorexant in obese females should be considered before increasing dose [see *Dosage and Administration* (2.2)].

The effects of renal and hepatic impairment on the pharmacokinetics of suvorexant were evaluated in specific pharmacokinetic studies.

Suvorexant exposure after a single dose was similar in patients with moderate hepatic insufficiency (Child-Pugh category 7 to 9) and healthy matched control subjects; however, the suvorexant apparent terminal half-life was increased from approximately 15 hours (range 10 - 22 hours) in healthy subjects to approximately 19 hours (range 11 - 49 hours) in patients with moderate hepatic insufficiency [see *Use in Specific Populations* (8.7)].

Suvorexant exposure (expressed as total and unbound concentrations) was similar between patients with severe renal impairment (urinary creatinine clearance ≤ 30 mL/min/1.73m²) and healthy matched control subjects. No dose adjustment is required in patients with renal impairment [see *Use in Specific Populations* (8.8)].

Drug Interactions

CNS-Active Drugs

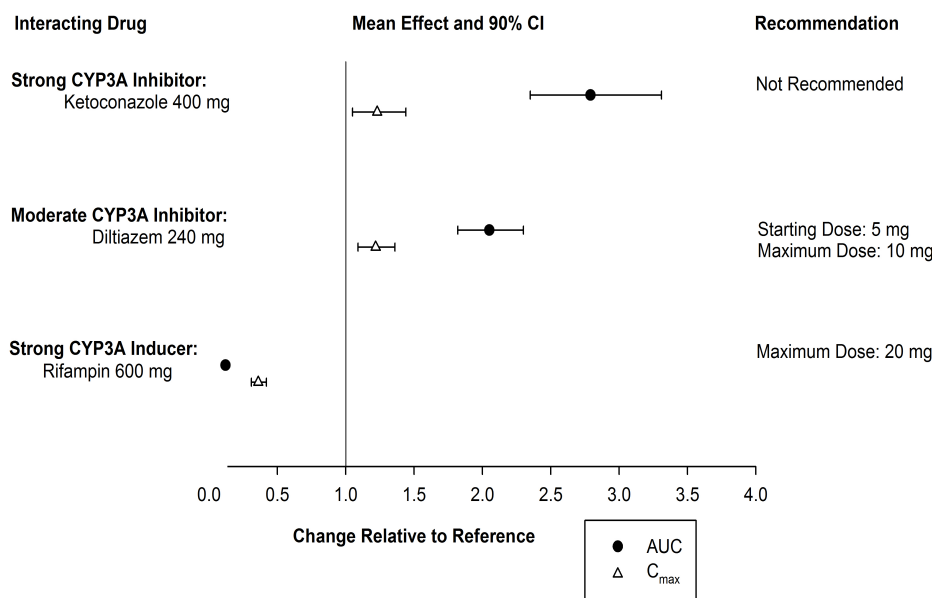
An additive effect on psychomotor performance was observed when a single dose of 40 mg of suvorexant was co-administered with a single dose of 0.7 g/kg alcohol. Suvorexant did not affect alcohol concentrations and alcohol did not affect suvorexant concentrations [see *Warnings and Precautions* (5.1, 5.3) and *Drug Interactions* (7.1)].

An interaction study with a single dose of 40 mg suvorexant and paroxetine 20 mg at steady-state levels in healthy subjects did not demonstrate a clinically significant pharmacokinetic or pharmacodynamic interaction.

Effects of Other Drugs on BELSOMRA

The effects of other drugs on the pharmacokinetics of suvorexant are presented in Figure 1 as change relative to suvorexant administered alone (test/reference). Strong (e.g., ketoconazole or itraconazole) and moderate (e.g., diltiazem) CYP3A inhibitors significantly increased suvorexant exposure. Strong CYP3A inducers (e.g., rifampin) substantially decreased suvorexant exposure [see *Drug Interactions* (7.2)].

Figure 1: Effects of Co-Administered Drugs on the Pharmacokinetics of Suvorexant

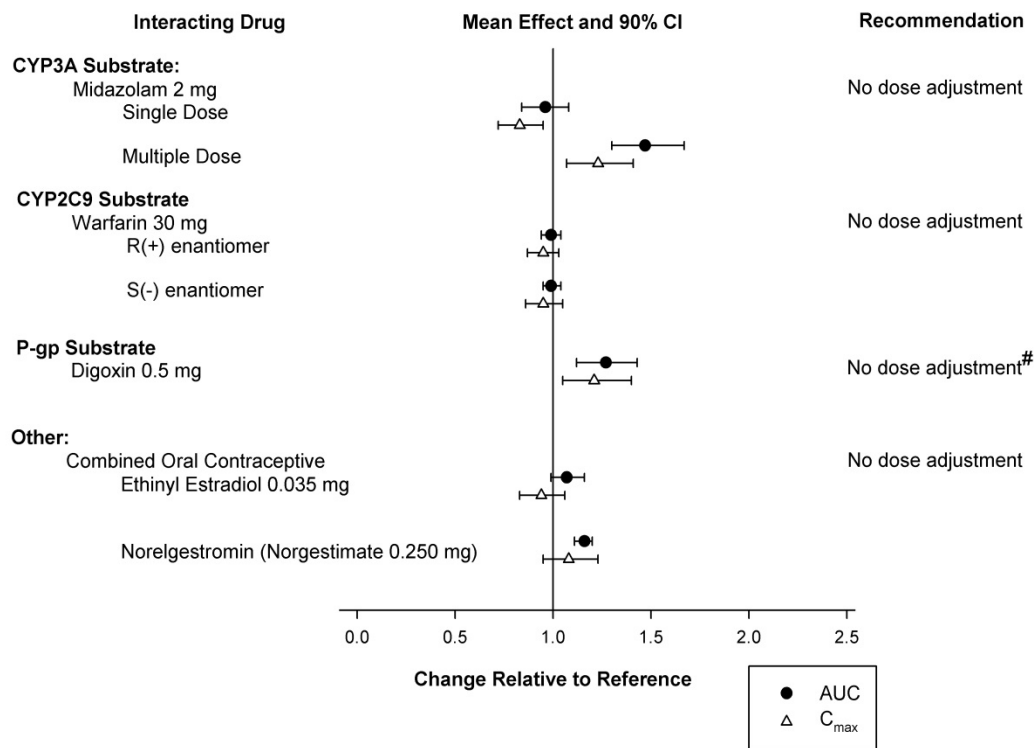


Effects of BELSOMRA on Other Drugs

In vitro metabolism studies demonstrate that suvorexant has the potential to inhibit CYP3A and intestinal P-gp; however, suvorexant is unlikely to cause clinically significant inhibition of human CYP1A2, CYP2B6, CYP2C8, CYP2C9, CYP2C19 or CYP2D6. In addition, no clinically meaningful inhibition of OATP1B1, BCRP and OCT2 transporters is anticipated. Chronic administration of suvorexant is unlikely to induce

the metabolism of drugs metabolized by major CYP isoforms. Specific *in vivo* effects on the pharmacokinetics of midazolam, warfarin, digoxin and oral contraceptives are presented in Figure 2 as a change relative to the interacting drug administered alone (test/reference) [see *Drug Interactions* (7.3)].

Figure 2: Effects of Suvorexant* on the Pharmacokinetics of Co-Administered Drugs



* Suvorexant 40 mg was evaluated in all studies, except midazolam where 80 mg suvorexant was administered.

[#] Monitor digoxin concentrations as clinically indicated [see *Drug Interactions* (7.3)].

13 NONCLINICAL TOXICOLOGY

13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility

Carcinogenesis

In a 26-week study in Tg.rasH2 mice, there was no evidence of suvorexant-induced neoplasms at oral doses of 25, 50, 200, and 650 mg/kg/day.

In a 2-year study in rats (oral suvorexant doses of 80, 160, and 325 mg/kg/day), increases in thyroid (follicular cell adenoma and combined adenoma/carcinoma in high-dose females; follicular cell adenoma in mid- and high-dose males) and liver (hepatocellular adenoma in high-dose males) neoplasms were observed. These findings were consistent with increased TSH and hepatic enzyme induction, respectively, which are mechanisms believed to be rodent-specific. Plasma exposures (AUC) at doses not associated with drug-induced neoplasms in rats were approximately 7 times that in humans at the maximum recommended human dose (MRHD) of 20 mg.

Mutagenesis

Suvorexant was negative in *in vitro* (bacterial reverse mutation and chromosomal aberration) and *in vivo* (mouse and rat micronucleus) assays.

Impairment of Fertility

In two separate studies, male and female rats were treated with suvorexant prior to and during mating and continuing in females to gestation day 7. Increases in peri-implantation loss and resorptions, resulting in a decrease in live fetuses, were observed at the highest doses tested (1200 or 325 mg/kg) when treated males and females were mated with untreated animals. At the no-effect dose for adverse effects on fertility in males and females, plasma AUCs were approximately 20 times that in humans at the MRHD.

13.2 Animal Toxicology and/or Pharmacology

In dogs, daily oral administration of suvorexant (5, 30 mg/kg) for 4-7 days resulted in behavior characteristic of cataplexy (e.g., transient limb buckling, prone posture) when presented with food enrichment, a stimulus demonstrated to induce cataplexy in dogs with hereditary narcolepsy.

In the 2-year carcinogenicity study in rats, an increased incidence of retinal atrophy was observed at all doses. Plasma AUCs at the lowest dose tested were approximately 7 times that in humans at the MRHD.

In subsequent studies of suvorexant in albino and pigmented rats, retinal atrophy was delayed in onset and, after approximately one year of dosing, was of lower incidence and severity in pigmented rats.

14 CLINICAL STUDIES

14.1 Controlled Clinical Studies

BELSOMRA was evaluated in three clinical trials in patients with insomnia characterized by difficulties with sleep onset and sleep maintenance.

Two similarly designed, 3-month, randomized, double-blind, placebo-controlled, parallel-group studies were conducted (Study 1 and Study 2). In both studies, non-elderly (age 18-64) and elderly (age ≥ 65) patients were randomized separately. For the studies together, non-elderly adults (mean age 46 years; 465 females, 275 males) were treated with BELSOMRA 20 mg (n=291) or placebo (n=449). Elderly patients (mean age 71 years, 346 females, 174 males) were treated with BELSOMRA 15 mg (n=202) or placebo (n=318).

In Study 1 and Study 2, BELSOMRA 15 mg or 20 mg was superior to placebo for sleep latency as assessed both objectively by polysomnography (Table 3) and subjectively by patient-estimated sleep latency (Table 4). BELSOMRA 15 mg or 20 mg was also superior to placebo for sleep maintenance, as assessed both objectively by polysomnography (Table 5) and subjectively by patient-estimated total sleep time (Table 6). The effects of BELSOMRA at night 1 (objective) and week 1 (subjective) were generally consistent with later time points. The efficacy of BELSOMRA was similar between women and men and, based on limited data, between Caucasians and non-Caucasians. Twenty seven percent of patients treated with BELSOMRA 15 mg or 20 mg in Study 1 and Study 2 were non-Caucasians. The majority (69%) of the non-Caucasian patients was Asian.

Table 3: Polysomnographic Assessment of Time to Sleep Onset in Studies 1 and 2

	Mean Baseline and Change from Baseline [†] After 1 and 3 Months (minutes)	Difference [†] Between BELSOMRA and Placebo (minutes)	
Study 1			
	Placebo (n=290)	BELSOMRA 15-20 mg [‡] (n=193)	
Baseline	66	69	
Change from Baseline			
Month 1	- 23	- 34	- 10***
Month 3	- 27	- 35	- 8**
Study 2			
	Placebo (n=286)	BELSOMRA 15-20 mg [‡] (n=145)	
Baseline	69	65	
Change from Baseline			
Month 1	- 25	- 33	- 8*
Month 3	- 29	- 29	0

[†] Change from baseline and treatment differences based upon estimated means.

[‡] 15 mg in elderly and 20 mg in non-elderly patients

* p<0.05; **p<0.01; ***p<0.001

Table 4: Patient-Estimated Time to Sleep Onset in Studies 1 and 2

	Mean Baseline and Change from Baseline [†] After 1 and 3 Months (minutes)	Difference [†] Between BELSOMRA and Placebo (minutes)	
Study 1			
	Placebo (n=382)	BELSOMRA 15-20 mg [‡] (n=251)	
Baseline	67	64	
Change from Baseline			
Month 1	- 12	- 17	- 5
Month 3	- 17	- 23	- 5*
Study 2			
	Placebo (n=369)	BELSOMRA 15-20 mg [‡] (n=231)	
Baseline	83	86	
Change from Baseline			
Month 1	- 14	- 21	- 7*
Month 3	- 21	- 28	- 8*

[†] Change from baseline and treatment differences based upon estimated means.

[‡] 15 mg in elderly and 20 mg in non-elderly patients

* p<0.05; **p<0.01; ***p<0.001

Table 5: Polysomnographic Assessment of Sleep Maintenance (Wake After Sleep Onset) in Studies 1 and 2

	Mean Baseline and Change from Baseline [†] After 1 and 3 Months (minutes)	Difference [†] Between BELSOMRA and Placebo (minutes)	
Study 1			
	Placebo (n=290)	BELSOMRA 15-20 mg [‡] (n=193)	
Baseline	115	120	
Change from Baseline			
Month 1	- 19	- 45	- 26***
Month 3	- 25	- 42	- 17***
Study 2			
	Placebo (n=286)	BELSOMRA 15-20 mg [‡] (n=145)	
Baseline	118	119	
Change from Baseline			
Month 1	- 23	- 47	- 24***
Month 3	- 25	- 56	- 31***

[†] Change from baseline and treatment differences based upon estimated means.

[‡] 15 mg in elderly and 20 mg in non-elderly patients

* p<0.05; **p<0.01; ***p<0.001

Table 6: Patient-Estimated Total Sleep Time in Studies 1 and 2

Table 6: Patient-Estimated Total Sleep Time in Studies 1 and 2			
	Mean Baseline and Change from Baseline [†] After 1 and 3 Months (minutes)		Difference [†] Between BELSOMRA and Placebo (minutes)
Study 1			
	Placebo (n=382)	BELSOMRA 15-20 mg [‡] (n=251)	
Baseline	315	322	
Change from Baseline			
Month 1	23	39	16***
Month 3	41	51	11*
Study 2			
	Placebo (n=369)	BELSOMRA 15-20 mg [‡] (n=231)	
Baseline	307	299	
Change from Baseline			
Month 1	22	43	21***
Month 3	38	60	22***

[†] Change from baseline and treatment differences based upon estimated means.

[‡] 15 mg in elderly and 20 mg in non-elderly patients

* p<0.05; **p<0.01; ***p<0.001

In the 1-month crossover study (Study 3), non-elderly adults (age 18-64 years, mean age 44 years) were treated with placebo (n=249) and BELSOMRA at a dose of 10 mg (n=62), 20 mg (n=61), or up to 80 mg. BELSOMRA 10 mg and 20 mg were superior to placebo for sleep latency and sleep maintenance, as assessed objectively by polysomnography.

BELSOMRA was also evaluated at doses of 30 mg and 40 mg in the 3-month placebo-controlled trials (Study 1 and Study 2). The higher doses were found to have similar efficacy to lower doses, but significantly more adverse reactions were reported at the higher doses.

14.2 Special Safety Studies

Effects on Driving

Two randomized, double-blind, placebo- and active-controlled, four-period crossover studies evaluated the effects of nighttime administration of BELSOMRA on next-morning driving performance 9 hours after dosing in 24 healthy elderly subjects (≥65 years old, mean age 69 years; 14 men, 10 women) who received 15 mg and 30 mg BELSOMRA, and 28 non-elderly subjects (mean age 46 years; 13 men, 15 women) who received 20 mg and 40 mg BELSOMRA. Testing was conducted after one night and after 8 consecutive nights of treatment with BELSOMRA at these doses.

The primary outcome measure was change in Standard Deviation of Lane Position (SDLP), a measure of driving performance, assessed using a symmetry analysis. The analysis showed clinically meaningful impaired driving performance in some subjects. After one night of dosing, this effect was observed in non-elderly subjects after either a 20 mg or 40 mg dose of BELSOMRA. A statistically significant effect was not observed in elderly subjects after a 15 mg or 30 mg dose of BELSOMRA. Across these two studies, five subjects (4 non-elderly women on BELSOMRA; 1 elderly woman on placebo) prematurely stopped their driving tests due to somnolence. Patients using the 20 mg dose of BELSOMRA should be cautioned against next-day driving and other activities requiring full mental alertness. Patients taking lower doses of BELSOMRA should also be cautioned about the potential for driving impairment because there is individual variation in sensitivity to BELSOMRA [see *Warnings and Precautions* (5.1)].

Effects on Next-Day Memory and Balance in Elderly and Non-Elderly

Four placebo-controlled trials evaluated the effects of nighttime administration of BELSOMRA on next-day memory and balance using word learning tests and body sway tests, respectively. Three trials showed no significant effects on memory or balance compared to placebo. In a fourth trial in healthy non-elderly subjects, there was a significant decrease in word recall after the words were presented to subjects in the morning following a single dose of 40 mg BELSOMRA, and there was a significant increase on body sway area in the morning following a single dose of 20 mg or 40 mg BELSOMRA.

Middle of the Night Safety in Elderly Subjects

A double-blind, randomized, placebo-controlled trial evaluated the effect of a single dose of BELSOMRA on balance, memory and psychomotor performance in healthy elderly subjects (n=12) after being awakened during the night. Nighttime dosing of BELSOMRA 30 mg resulted in impairment of balance (measured by body sway area) at 90 minutes as compared to placebo. Memory was not impaired, as assessed by an immediate and delayed word recall test at 4 hours post-dose.

Rebound Effects

In 3-month controlled safety and efficacy trials (Study 1, Study 2), rebound insomnia was assessed following discontinuation of BELSOMRA relative to placebo and baseline in non-elderly adult patients receiving BELSOMRA 40 mg or 20 mg and in elderly patients receiving BELSOMRA 30 mg or 15 mg. No clear effects were observed on measures of sleep onset or maintenance.

Withdrawal Effects

In 3-month controlled safety and efficacy trials (Study 1, Study 2), withdrawal effects were assessed following discontinuation in non-elderly adult patients who received BELSOMRA 40 mg or 20 mg and elderly patients who received BELSOMRA 30 mg or 15 mg. The analysis showed no clear evidence of withdrawal in the overall study population based on assessment of patient responses to the Tyrer Withdrawal Symptom Questionnaire or assessment of withdrawal-related adverse events following the discontinuation of BELSOMRA.

Respiratory Safety

Use in Healthy Subjects with Normal Respiratory Function

A randomized, placebo-controlled, double-blind, crossover trial in healthy non-elderly subjects (n=12) evaluated the respiratory depressant effect of BELSOMRA (40 mg and 150 mg) after one night of treatment. At the doses studied, BELSOMRA had no respiratory depressant effect as measured by oxygen saturation [see *Warnings and Precautions* (5.5) and *Use in Specific Populations* (8.6)].

16 HOW SUPPLIED/STORAGE AND HANDLING

16.1 How Supplied

No. 3062 — BELSOMRA tablets, 5 mg, are yellow, round, film-coated tablets, with “5” on one side and plain on the other side. They are supplied as follows: NDC 0006-0005-30 unit-of-use blisters of 30

No. 3063 — BELSOMRA tablets, 10 mg, are green, round, film-coated tablets, with “33” on one side and plain on the other side. They are supplied as follows: NDC 0006-0033-30 unit-of-use blisters of 30

No. 3981 — BELSOMRA tablets, 15 mg, are white, oval, film-coated tablets with the Merck logo on one side and “325” on the other side. They are supplied as follows: NDC 0006-0325-30 unit-of-use blisters of 30

No. 3982 — BELSOMRA tablets, 20 mg, are white, round, film-coated tablets with the Merck logo and “335” on one side and plain on the other side. They are supplied as follows: NDC 0006-0335-30 unit-of-use blisters of 30

16.2 Storage and Handling

Store at 20°C to 25°C (68°F to 77°F); excursions permitted to 15°C to 30°C (59°F to 86°F), [see USP Controlled Room Temperature]. Store in the original package until use to protect from light and moisture.

17 PATIENT COUNSELING INFORMATION

Advise the patient to read the FDA-approved patient labeling (Medication Guide).

Inform patients of the availability of a Medication Guide and instruct them to read the Medication Guide prior to initiating treatment and with each prescription refill. Review the BELSOMRA Medication Guide with every patient prior to initiation of treatment.

CNS Depressant Effects and Next-Day Impairment

Tell patients that BELSOMRA has the potential to cause next-day impairment, and that this risk is increased with higher doses or if dosing instructions are not carefully followed. Patients using the 20 mg dose should be cautioned against next-day driving and other activities requiring full mental alertness as this dose is associated with a higher risk of impaired driving. Patients taking lower doses should also be cautioned about the potential for driving impairment because there is individual variation in sensitivity to BELSOMRA.

Patients should not drive or engage in other activities requiring full alertness within 8 hours of dosing of BELSOMRA.

Sleep-Driving and Other Complex Behaviors

Instruct patients to inform their families that BELSOMRA has been associated with getting out of bed while not being fully awake, and tell patients and their families to call their healthcare providers if this occurs.

Hypnotics, like BELSOMRA, have been associated with “sleep-driving” and other complex behaviors while not being fully awake (preparing and eating food, making phone calls, or having sex). Tell patients and their families to call their healthcare providers if they develop any of these symptoms.

Suicide

Tell patients to report any worsening of depression or suicidal thoughts immediately.

Alcohol and Other Drugs


Ask patients about alcohol consumption, prescription medicines they are taking, and drugs they may be taking without a prescription. Advise patients not to use BELSOMRA if they drank alcohol that evening or before bed.

Tolerance, Abuse, and Dependence

Tell patients not to increase the dose of BELSOMRA on their own, and to inform you if they believe the drug “does not work.”

Administration Instructions

Advise patients to take BELSOMRA only when preparing for or getting into bed and only if they can stay in bed for a full night before being active again. Advise patients to report all of their prescription and nonprescription medicines, vitamins and herbal supplements to the prescriber.

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For patent information: www.merck.com/product/patent/home.html

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