

RESEARCH MONOGRAPH . COMPOUND PROFILE

Suvorexant

*A dual orexin receptor antagonist (DORA)
FDA-approved as Belsomra for insomnia,
the first commercialized of the DORA
class.*

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AUTHOR	Kodi ac bio labs Research
COMPOUND CLASS	Dual orexin receptor antagonist

ABSTRACT

Suvorexant (Belsomra; MK-4305; CAS 1030377-33-3; molecular formula $C_{23}H_{23}ClN_6O_2$; molecular weight 450.92) is a dual orexin receptor (OX1R, OX2R) antagonist developed by Merck and approved by the FDA in 2014 for insomnia. The compound was the first commercialized DORA. Mechanism is competitive antagonism at orexin-A (hypocretin-1) and orexin-B (hypocretin-2) binding sites on OX1R and OX2R, attenuating orexinergic wakefulness signaling without GABAergic hypnotic effects. Pharmacokinetics: plasma half-life 12 hours; CYP3A4 metabolism. Approved doses are 5 to 20 mg at bedtime. Schedule IV.

1. Compound Identification

Suvorexant is described as dual orexin receptor antagonist. A dual orexin receptor antagonist (DORA) FDA-approved as Belsomra for insomnia, the first commercialized of the DORA class.

1.1 Class summary

Dual orexin receptor antagonist

1.2 Subtitle

A dual orexin receptor antagonist (DORA) FDA-approved as Belsomra for insomnia, the first commercialized of the DORA class.

2. Abstract

Suvorexant (Belsomra; MK-4305; CAS 1030377-33-3; molecular formula $C_{23}H_{23}ClN_6O_2$; molecular weight 450.92) is a dual orexin receptor (OX1R, OX2R) antagonist developed by Merck and approved by the FDA in 2014 for insomnia. The compound was the first commercialized DORA. Mechanism is competitive antagonism at orexin-A (hypocretin-1) and orexin-B (hypocretin-2) binding sites on OX1R and OX2R, attenuating orexinergic wakefulness signaling without GABAergic hypnotic effects. Pharmacokinetics: plasma half-life 12 hours; CYP3A4 metabolism. Approved doses are 5 to 20 mg at bedtime. Schedule IV.

3. Mechanism of Action

Dual orexin receptor (OX1R, OX2R) antagonist. No GABAergic activity. Distinct from benzodiazepine and Z-drug hypnotics.

The mechanistic profile described above represents the consensus position from peer-reviewed literature where available; for compounds with sparse formal characterization, this section reflects vendor-grade reports and structurally-related class pharmacology and should be interpreted with appropriate caution.

4. Pharmacokinetics and Routes of Administration

Pharmacokinetic data are summarized within the abstract for compounds with formal Phase 1 records. Compounds without published human pharmacokinetic studies are noted as such; investigators should treat the absence of data as a research limitation.

5. Reported Research Dose Ranges

5 to 20 mg at bedtime.

Doses are scaled from clinical use where the compound is approved as a medicine, from Phase 2/3 trials where development advanced, or from rodent dose-response data scaled by allometric assumptions where the compound has no human clinical record. Investigators should treat dose ranges from research-chemical-grade vendors as starting points for their own pharmacokinetic and tolerability characterization rather than validated dosing recommendations.

6. Sourcing and Quality Verification

Investigators should obtain analytical confirmation of identity (mass spectrometry; for peptides, additionally amino acid analysis or N-terminal sequencing) and purity (HPLC area-percent, ideally greater than 95 percent) on every lot. Vendor certificates of analysis vary in quality; third-party analytical confirmation through independent laboratories (e.g., Janoshik Analytical, Anabolic Lab) is the gold standard for research-grade peptides and small molecules.

For compounds with established pharmaceutical-grade marketing in any jurisdiction, sourcing from the marketed product (where legal and accessible) provides the highest quality assurance.

7. Reconstitution and Handling

Peptides should be reconstituted in bacteriostatic water or sterile water for injection in the volume appropriate to the desired concentration; lyophilized peptides should be allowed to come to room temperature before reconstitution to minimize precipitation. Reconstituted peptides should be stored refrigerated and used within the timeframe specified by the manufacturer (typically 14 to 30 days for bacteriostatic water reconstitutions, shorter for sterile water).

Small molecules: storage conditions vary by compound; consult the certificate of analysis for the specific product. Most are stable at room temperature in dry, dark conditions; oxidation-sensitive compounds (e.g., catecholamine precursors) require cool storage and protection from light.

8. Stack Interaction Considerations

Investigators combining this compound with other research substances should consider receptor-level interactions (additive effects at shared targets), enzyme-level interactions (CYP-mediated drug-drug interactions where applicable), and pharmacodynamic interactions (additive sedation, additive serotonergic activity, additive hemodynamic effects).

The stack interaction section in published monographs of well-characterized compounds is necessarily incomplete for any specific combination; investigators should treat novel combinations with elevated caution and titrate gradually.

9. References

1. Herring WJ, et al. Suvorexant in patients with insomnia: results from two 3-month randomized controlled clinical trials. Biol Psychiatry 2016.

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