

RESEARCH MONOGRAPH . COMPOUND PROFILE

Bupropion

An aminoketone norepinephrine and dopamine reuptake inhibitor FDA-approved for depression (Wellbutrin) and smoking cessation (Zyban).

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COMPOUND CLASS	Aminoketone NDRI / nicotinic antagonist

ABSTRACT

Bupropion (Wellbutrin, Zyban; CAS 34911-55-2; molecular formula $C_{13}H_{18}ClNO$; molecular weight 239.74) is a unicyclic aminoketone developed by Burroughs Wellcome and approved by the FDA in 1985 for major depressive disorder, with subsequent approval for smoking cessation (1997) and seasonal affective disorder. Mechanism is selective inhibition of norepinephrine and dopamine reuptake (NDRI) plus non-competitive nicotinic acetylcholine receptor antagonism. The active metabolite hydroxybupropion contributes substantially to the antidepressant activity. Pharmacokinetics: parent half-life ~14 hours; CYP2B6 metabolism. Approved doses are 150 to 450 mg per day. Lowers seizure threshold; contraindicated in seizure disorders and bulimia.

1. Compound Identification

Bupropion is described as aminoketone ndri / nicotinic antagonist. An aminoketone norepinephrine and dopamine reuptake inhibitor FDA-approved for depression (Wellbutrin) and smoking cessation (Zyban).

1.1 Class summary

Aminoketone NDRI / nicotinic antagonist

1.2 Subtitle

An aminoketone norepinephrine and dopamine reuptake inhibitor FDA-approved for depression (Wellbutrin) and smoking cessation (Zyban).

2. Abstract

Bupropion (Wellbutrin, Zyban; CAS 34911-55-2; molecular formula $C_{13}H_{18}ClNO$; molecular weight 239.74) is a unicyclic aminoketone developed by Burroughs Wellcome and approved by the FDA in 1985 for major depressive disorder, with subsequent approval for smoking cessation (1997) and seasonal affective disorder. Mechanism is selective inhibition of norepinephrine and dopamine reuptake (NDRI) plus non-competitive nicotinic acetylcholine receptor antagonism. The active metabolite hydroxybupropion contributes substantially to the antidepressant activity. Pharmacokinetics: parent half-life ~14 hours; CYP2B6 metabolism. Approved doses are 150 to 450 mg per day. Lowers seizure threshold; contraindicated in seizure disorders and bulimia.

3. Mechanism of Action

Norepinephrine and dopamine reuptake inhibitor; nicotinic acetylcholine receptor antagonist. Active metabolite hydroxybupropion.

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

150 to 450 mg per day.

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. Stahl SM, et al. A review of the neuropharmacology of bupropion. Prim Care Companion J Clin Psychiatry 2004.

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