

RESEARCH MONOGRAPH . COMPOUND PROFILE

Methamphetamine (Research)

The N-methylated analog of amphetamine; FDA-approved (Desoxyn) for ADHD and obesity but principally encountered as an illicit drug; a research-grade pharmacology probe.

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RESEARCH USE ONLY

ABSTRACT

Methamphetamine (N-methyl-1-phenylpropan-2-amine; CAS 537-46-2; molecular formula C₁₀H₁₅N; molecular weight 149.23) is the N-methylated analog of amphetamine, approved by the FDA in 1944 (Desoxyn) for narcolepsy, ADHD, and obesity. Mechanism is the same as amphetamine (monoamine release via reverse transport) with greater CNS penetration owing to the increased lipophilicity from N-methylation. The d-enantiomer (d-methamphetamine) is approximately 5-fold more potent than d-amphetamine at central dopamine release; the l-enantiomer (l-methamphetamine) is the active component of Vicks Vapor Inhaler. Plasma half-life is approximately 9 to 12 hours. Schedule II prescription drug; principally encountered as illicit Schedule II. Used as a research-grade reference compound for monoamine release pharmacology and as a clinical (rare) ADHD medication.

1. Compound Identification

Methamphetamine (Research) is described as n-methylated phenethylamine stimulant. The N-methylated analog of amphetamine; FDA-approved (Desoxyn) for ADHD and obesity but principally encountered as an illicit drug; a research-grade pharmacology probe.

1.1 Class summary

N-methylated phenethylamine stimulant

1.2 Subtitle

The N-methylated analog of amphetamine; FDA-approved (Desoxyn) for ADHD and obesity but principally encountered as an illicit drug; a research-grade pharmacology probe.

2. Abstract

Methamphetamine (N-methyl-1-phenylpropan-2-amine; CAS 537-46-2; molecular formula C₁₀H₁₅N; molecular weight 149.23) is the N-methylated analog of amphetamine, approved by the FDA in 1944 (Desoxyn) for narcolepsy, ADHD, and obesity. Mechanism is the same as amphetamine (monoamine release via reverse transport) with greater CNS penetration owing to the increased lipophilicity from N-methylation. The d-enantiomer (d-methamphetamine) is approximately 5-fold more potent than d-amphetamine at central dopamine release; the l-enantiomer (l-methamphetamine) is the active component of Vicks Vapor Inhaler. Plasma half-life is approximately 9 to 12 hours. Schedule II prescription drug; principally encountered as illicit Schedule II. Used as a research-grade reference compound for monoamine release pharmacology and as a clinical (rare) ADHD medication.

3. Mechanism of Action

N-methylated amphetamine; same monoamine releaser mechanism with increased CNS penetration and ~5-fold greater dopamine release potency than d-amphetamine.

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

Clinical (Desoxyn) 5 to 25 mg per oral administration daily.

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. Cruickshank CC, Dyer KR. A review of the clinical pharmacology of methamphetamine. *Addiction* 2009.
2. Krasnova IN, Cadet JL. Methamphetamine toxicity and messengers of death. *Brain Res Rev* 2009.
3. Heal DJ, et al. Amphetamine, past and present. *J Psychopharmacol* 2013.

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