

RESEARCH MONOGRAPH . COMPOUND PROFILE

Harmaline

A beta-carboline alkaloid from Peganum harmala and Banisteriopsis caapi; a reversible MAO-A inhibitor and component of ayahuasca.

DOCUMENT	KDC-MN-337
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COMPOUND CLASS	Beta-carboline reversible MAO-A inhibitor

ABSTRACT

Harmaline (4,9-dihydro-7-methoxy-1-methyl-3H-pyrido[3,4-b]indole; CAS 304-21-2; molecular formula C₁₃H₁₄N₂O; molecular weight 214.27) is a beta-carboline alkaloid isolated from *Peganum harmala* (Syrian rue) and *Banisteriopsis caapi* (ayahuasca vine). The compound is a reversible MAO-A inhibitor (K_i approximately 5 microM at human MAO-A) with greater than 100-fold selectivity over MAO-B; this reversible MAO-A inhibition is central to the pharmacology of ayahuasca, where harmaline (and harmine) prevent intestinal breakdown of the DMT in the brew, allowing oral activity. Harmaline itself has serotonergic and tremorgenic effects in animals and mild psychoactive effects in humans. Plasma half-life is approximately 2 to 3 hours. Used as a reference reversible MAO-A inhibitor and as a research probe for beta-carboline pharmacology.

1. Compound Identification

Harmaline is described as beta-carboline reversible mao-a inhibitor. A beta-carboline alkaloid from *Peganum harmala* and *Banisteriopsis caapi*; a reversible MAO-A inhibitor and component of ayahuasca.

1.1 Class summary

Beta-carboline reversible MAO-A inhibitor

1.2 Subtitle

A beta-carboline alkaloid from *Peganum harmala* and *Banisteriopsis caapi*; a reversible MAO-A inhibitor and component of ayahuasca.

2. Abstract

Harmaline (4,9-dihydro-7-methoxy-1-methyl-3H-pyrido[3,4-b]indole; CAS 304-21-2; molecular formula C₁₃H₁₄N₂O; molecular weight 214.27) is a beta-carboline alkaloid isolated from *Peganum harmala* (Syrian rue) and *Banisteriopsis caapi* (ayahuasca vine). The compound is a reversible MAO-A inhibitor (K_i approximately 5 µM at human MAO-A) with greater than 100-fold selectivity over MAO-B; this reversible MAO-A inhibition is central to the pharmacology of ayahuasca, where harmaline (and harmine) prevent intestinal breakdown of the DMT in the brew, allowing oral activity. Harmaline itself has serotonergic and tremorgenic effects in animals and mild psychoactive effects in humans. Plasma half-life is approximately 2 to 3 hours. Used as a reference reversible MAO-A inhibitor and as a research probe for beta-carboline pharmacology.

3. Mechanism of Action

Reversible MAO-A inhibitor (>100-fold selective over MAO-B). Component of ayahuasca; potentiates oral DMT activity.

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

Research and ayahuasca-context use 100 to 300 mg per oral administration.

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. McKenna DJ, et al. Monoamine oxidase inhibitors in South American hallucinogenic plants. Eur J Pharmacol 1984.
2. Riba J, et al. Pharmacology of ayahuasca administered in two repeated doses. Psychopharmacology 2003.
3. Iurlo M, et al. Pharmacokinetics and pharmacodynamics of harmine and harmaline. CNS Drug Rev 2001.

This monograph is provided for research use only. Not for medical, diagnostic, or therapeutic purposes. Not for human consumption. Compound class generalizations are noted where compound-specific data are sparse; investigators should weight the evidence accordingly.