

RESEARCH MONOGRAPH . COMPOUND PROFILE

Glycine

The simplest amino acid with multiple biological roles including methionine restriction mimetic effects studied for lifespan extension.

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COMPOUND CLASS	Amino acid / NMDA co-agonist

ABSTRACT

Glycine (CAS 56-40-6; molecular formula $C_2H_5NO_2$; molecular weight 75.07) is the simplest amino acid, with multiple biological roles: protein synthesis, neurotransmission (inhibitory glycinergic synapses, NMDA co-agonist at the glycine modulatory site), heme synthesis (precursor to porphyrin), and as a substrate for hepatic conjugation. Glycine has been studied as a methionine restriction mimetic; methionine restriction extends lifespan in rodents, and glycine supplementation diverts methionine away from protein synthesis through enhanced one-carbon transfer reactions, producing similar metabolic phenotype to methionine restriction. The compound is also a potent NMDA glycine site co-agonist with sleep-promoting effects at 3-gram bedtime doses. Doses for sleep are 3 grams orally; doses for methionine restriction mimetic effects are 5 to 10 grams per day; the compound is exceptionally safe with rare adverse events.

1. Compound Identification

Glycine is described as amino acid / nmda co-agonist. The simplest amino acid with multiple biological roles including methionine restriction mimetic effects studied for lifespan extension.

1.1 Class summary

Amino acid / NMDA co-agonist

1.2 Subtitle

The simplest amino acid with multiple biological roles including methionine restriction mimetic effects studied for lifespan extension.

2. Abstract

Glycine (CAS 56-40-6; molecular formula $C_2H_5NO_2$; molecular weight 75.07) is the simplest amino acid, with multiple biological roles: protein synthesis, neurotransmission (inhibitory glycinergic synapses, NMDA co-agonist at the glycine modulatory site), heme synthesis (precursor to porphyrin), and as a substrate for hepatic conjugation. Glycine has been studied as a methionine restriction mimetic; methionine restriction extends lifespan in rodents, and glycine supplementation diverts methionine away from protein synthesis through enhanced one-carbon transfer reactions, producing similar metabolic phenotype to methionine restriction. The compound is also a potent NMDA glycine site co-agonist with sleep-promoting effects at 3-gram bedtime doses. Doses for sleep are 3 grams orally; doses for methionine restriction mimetic effects are 5 to 10 grams per day; the compound is exceptionally safe with rare adverse events.

3. Mechanism of Action

Multiple roles. NMDA glycine site co-agonist (sleep effects). Methionine restriction mimetic through one-carbon metabolism.

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

3 grams for sleep; 5 to 10 grams per day for metabolic effects.

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. Brind J, et al. Dietary glycine supplementation mimics lifespan extension by dietary methionine restriction. FASEB J 2011.

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