

RESEARCH MONOGRAPH . COMPOUND PROFILE

L-Theanine

A non-protein amino acid present in tea with anxiolytic and attention-modulating effects when combined with caffeine.

DOCUMENT	KDC-MN-165
ISSUED	2026-05-09
REVISION	1.0
AUTHOR	Kodiac bioLabs Research
COMPOUND CLASS	Tea-derived amino acid

ABSTRACT

L-Theanine (gamma-glutamyl-ethylamide; CAS 3081-61-6; molecular formula $C_7H_{14}N_2O_3$; molecular weight 174.20) is a non-proteinogenic amino acid present in tea (*Camellia sinensis*) leaves, accounting for most of the soluble amino acid content of brewed tea. The compound crosses the blood-brain barrier and produces increases in alpha-band EEG activity associated with relaxed alertness. Pharmacology includes weak NMDA receptor antagonism (at the glutamate site, structurally similar to glutamate), modest GABA elevation, and modulation of serotonin and dopamine. The L-theanine + caffeine combination (typically 100 to 200 mg theanine + 50 to 200 mg caffeine) has the most consistent cognitive evidence base; combination produces alertness without the anxiety and cardiovascular effects of caffeine alone. Doses for monotherapy are typically 100 to 400 mg per administration.

1. Compound Identification

L-Theanine is described as tea-derived amino acid. A non-protein amino acid present in tea with anxiolytic and attention-modulating effects when combined with caffeine.

1.1 Class summary

Tea-derived amino acid

1.2 Subtitle

A non-protein amino acid present in tea with anxiolytic and attention-modulating effects when combined with caffeine.

2. Abstract

L-Theanine (gamma-glutamyl-ethylamide; CAS 3081-61-6; molecular formula $C_7H_{14}N_2O_3$; molecular weight 174.20) is a non-proteinogenic amino acid present in tea (*Camellia sinensis*) leaves, accounting for most of the soluble amino acid content of brewed tea. The compound crosses the blood-brain barrier and produces increases in alpha-band EEG activity associated with relaxed alertness. Pharmacology includes weak NMDA receptor antagonism (at the glutamate site, structurally similar to glutamate), modest GABA elevation, and modulation of serotonin and dopamine. The L-theanine + caffeine combination (typically 100 to 200 mg theanine + 50 to 200 mg caffeine) has the most consistent cognitive evidence base; combination produces alertness without the anxiety and cardiovascular effects of caffeine alone. Doses for monotherapy are typically 100 to 400 mg per administration.

3. Mechanism of Action

Weak NMDA glutamate site antagonist; GABA modulation; alpha-EEG enhancement.

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

100 to 400 mg; commonly combined with caffeine for cognitive applications.

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. Owen GN, et al. The combined effects of L-theanine and caffeine on cognitive performance and mood. Nutr Neurosci 2008.

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.