

RESEARCH MONOGRAPH . COMPOUND PROFILE

L-Glutamine

L-glutamine; the most abundant free amino acid in plasma; a substrate for enterocyte and immune cell metabolism and a popular but evidence-limited supplement.

DOCUMENT	KDC-MN-398
ISSUED	2026-05-09
REVISION	1.0
AUTHOR	Kodiac biolabs Research
COMPOUND CLASS	Conditionally essential amino acid (immunometabolic substrate)

ABSTRACT

L-glutamine ((S)-2,5-diamino-5-oxopentanoic acid; CAS 56-85-9; molecular formula C₅H₁₀N₂O₃; molecular weight 146.14) is a conditionally essential alpha-amino acid that is the most abundant free amino acid in human plasma (approximately 500 to 800 micromolar). Glutamine is biosynthesized from glutamate and ammonia by glutamine synthetase, with skeletal muscle and lung as principal source tissues. The compound serves as a substrate for enterocyte and immune cell metabolism (the principal biological role outside protein synthesis) and as an ammonia transport carrier. Clinical use is well-established in critical illness (burn injury, sepsis, post-surgery) where parenteral or enteral glutamine improves nitrogen balance and may reduce infection rates; the supplement use in healthy athletes for recovery and immune support has limited supporting evidence. Plasma half-life is approximately 1 hour; the gut largely extracts oral glutamine, with minimal systemic delivery. Used as a reference amino acid in immunometabolism and clinical nutrition research.

1. Compound Identification

L-Glutamine is described as conditionally essential amino acid (immunometabolic substrate). L-glutamine; the most abundant free amino acid in plasma; a substrate for enterocyte and immune cell metabolism and a popular but evidence-limited supplement.

1.1 Class summary

Conditionally essential amino acid (immunometabolic substrate)

1.2 Subtitle

L-glutamine; the most abundant free amino acid in plasma; a substrate for enterocyte and immune cell metabolism and a popular but evidence-limited supplement.

2. Abstract

L-glutamine ((S)-2,5-diamino-5-oxopentanoic acid; CAS 56-85-9; molecular formula C₅H₁₀N₂O₃; molecular weight 146.14) is a conditionally essential alpha-amino acid that is the most abundant free amino acid in human plasma (approximately 500 to 800 micromolar). Glutamine is biosynthesized from glutamate and ammonia by glutamine synthetase, with skeletal muscle and lung as principal source tissues. The compound serves as a substrate for enterocyte and immune cell metabolism (the principal biological role outside protein synthesis) and as an ammonia transport carrier. Clinical use is well-established in critical illness (burn injury, sepsis, post-surgery) where parenteral or enteral glutamine improves nitrogen balance and may reduce infection rates; the supplement use in healthy athletes for recovery and immune support has limited supporting evidence. Plasma half-life is approximately 1 hour; the gut largely extracts oral glutamine, with minimal systemic delivery. Used as a reference amino acid in immunometabolism and clinical nutrition research.

3. Mechanism of Action

Conditionally essential amino acid; substrate for enterocyte and immune cell metabolism; ammonia transport carrier.

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 (critical illness) 0.3 to 0.5 g/kg/day; supplement 5 to 20 g/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. Wernerman J. Glutamine and intensive care unit patients. JPEN J Parenter Enteral Nutr 2008.
2. Gleeson M. Dosing and efficacy of glutamine supplementation in human exercise and sport training. J Nutr 2008.
3. Wischmeyer PE. Glutamine: mode of action in critical illness. Crit Care Med 2007.

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.