

RESEARCH MONOGRAPH . COMPOUND PROFILE

Sulbutiamine

A lipophilic disulfide thiamine analog that crosses the blood-brain barrier; developed in Japan for asthenia and used as a nootropic.

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ABSTRACT

Sulbutiamine (isobutyryl thiamine disulfide; CAS 3286-46-2; molecular formula $C_{32}H_{46}N_8O_6S_2$; molecular weight 702.89) is a synthetic disulfide derivative of thiamine (vitamin B1) developed in Japan in the 1960s and approved in several Asian and European markets under the trade name Arcalion. The compound is structurally a dimer of two thiamine molecules joined by a disulfide bridge, conferring high lipophilicity and improved blood-brain barrier penetration compared to thiamine itself. Mechanism: thiamine prodrug; sulbutiamine is metabolized to thiamine in the brain, raising central thiamine concentrations and supporting thiamine-dependent enzymes (transketolase, pyruvate dehydrogenase, alpha-ketoglutarate dehydrogenase). Clinical use is in psychogenic asthenia and as a nootropic; evidence is from clinical trials with mixed methodology. Plasma half-life is approximately 5 hours. Used as a lipophilic thiamine prodrug in research and nootropic communities.

1. Compound Identification

Sulbutiamine is described as synthetic disulfide thiamine derivative. A lipophilic disulfide thiamine analog that crosses the blood-brain barrier; developed in Japan for asthenia and used as a nootropic.

1.1 Class summary

Synthetic disulfide thiamine derivative

1.2 Subtitle

A lipophilic disulfide thiamine analog that crosses the blood-brain barrier; developed in Japan for asthenia and used as a nootropic.

2. Abstract

Sulbutiamine (isobutyl thiamine disulfide; CAS 3286-46-2; molecular formula $C_{32}H_{46}N_8O_6S_2$; molecular weight 702.89) is a synthetic disulfide derivative of thiamine (vitamin B1) developed in Japan in the 1960s and approved in several Asian and European markets under the trade name Arcalion. The compound is structurally a dimer of two thiamine molecules joined by a disulfide bridge, conferring high lipophilicity and improved blood-brain barrier penetration compared to thiamine itself. Mechanism: thiamine prodrug; sulbutiamine is metabolized to thiamine in the brain, raising central thiamine concentrations and supporting thiamine-dependent enzymes (transketolase, pyruvate dehydrogenase, alpha-ketoglutarate dehydrogenase). Clinical use is in psychogenic asthenia and as a nootropic; evidence is from clinical trials with mixed methodology. Plasma half-life is approximately 5 hours. Used as a lipophilic thiamine prodrug in research and nootropic communities.

3. Mechanism of Action

Disulfide thiamine prodrug; high blood-brain barrier penetration; supports thiamine-dependent enzymatic metabolism in brain.

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 200 to 600 mg per oral administration daily, in divided doses.

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. Tiev KP, et al. Sulbutiamine in adult asthenia: review of clinical trials. Sem Hop 2006.
2. Lonsdale D. A review of the biochemistry, metabolism and clinical benefits of thiamin(e) and its derivatives. Evid Based Complement Alternat Med 2006.
3. Bizot JC, et al. Sulbutiamine improves memory in animal models. Pharmacol Biochem Behav 2005.

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