

RESEARCH MONOGRAPH . COMPOUND PROFILE

Mexidol (Emoxypine)

A Russian-developed pyridine antioxidant (2-ethyl-6-methyl-3-hydroxypyridine succinate) widely prescribed in Russia for cerebrovascular and cognitive disorders.

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COMPOUND CLASS	Pyridine antioxidant

RESEARCH USE ONLY

ABSTRACT

Mexidol (Emoxypine succinate; 2-ethyl-6-methyl-3-hydroxypyridine succinate; CAS 127464-43-1) is a pyridine-class antioxidant developed in the Soviet Union in the 1980s and approved in Russia for cerebrovascular insufficiency, cognitive impairment, and acute neurological events including stroke. The compound combines a 3-hydroxypyridine antioxidant (emoxypine) with succinate as the metabolic energy substrate. Mechanism is multimodal: free radical scavenging, membrane phospholipid stabilization, succinate-driven mitochondrial substrate provision under conditions of compromised respiratory chain function, and modest GABA-A allosteric modulation. The compound is administered orally or by IV/IM injection in clinical use. Doses are 250 to 500 mg per day oral or 100 to 500 mg parenteral. The Russian clinical evidence base is extensive (used in tens of thousands of patients) but Western-grade randomized trials with standard endpoints are limited.

1. Compound Identification

Mexidol (Emoxypine) is described as pyridine antioxidant. A Russian-developed pyridine antioxidant (2-ethyl-6-methyl-3-hydroxypyridine succinate) widely prescribed in Russia for cerebrovascular and cognitive disorders.

1.1 Class summary

Pyridine antioxidant

1.2 Subtitle

A Russian-developed pyridine antioxidant (2-ethyl-6-methyl-3-hydroxypyridine succinate) widely prescribed in Russia for cerebrovascular and cognitive disorders.

2. Abstract

Mexidol (Emoxypine succinate; 2-ethyl-6-methyl-3-hydroxypyridine succinate; CAS 127464-43-1) is a pyridine-class antioxidant developed in the Soviet Union in the 1980s and approved in Russia for cerebrovascular insufficiency, cognitive impairment, and acute neurological events including stroke. The compound combines a 3-hydroxypyridine antioxidant (emoxypine) with succinate as the metabolic energy substrate. Mechanism is multimodal: free radical scavenging, membrane phospholipid stabilization, succinate-driven mitochondrial substrate provision under conditions of compromised respiratory chain function, and modest GABA-A allosteric modulation. The compound is administered orally or by IV/IM injection in clinical use. Doses are 250 to 500 mg per day oral or 100 to 500 mg parenteral. The Russian clinical evidence base is extensive (used in tens of thousands of patients) but Western-grade randomized trials with standard endpoints are limited.

3. Mechanism of Action

Multimodal: 3-hydroxypyridine free radical scavenging, membrane stabilization, succinate substrate provision, modest GABA-A allosteric modulation.

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

250 to 500 mg per day oral; 100 to 500 mg per day parenteral.

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. Voronina TA. Mexidol: spectrum of action and mechanism. Russian J Pharmacol 2000s.

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