PEPTIDE RESEARCH OVERVIEW

Semax

ACTH(4-10) Analog · Investigational Research Compound · Nootropic Heptapeptide

A plain-language guide to what Semax is, how its neurotrophic signaling is designed to work, and what published peptide research has found so far — written for newcomers to peptide science, not just specialists.

COMPOSITION	STRUCTURE	STUDIED HALF-LIFE
Semax acetate 10mg	7-aa synthetic fragment of ACTH(4-10) with a proline-rich extension	~30–40 minutes (intranasal), short and rapidly metabolized

1 What Is Semax?

Semax is a synthetic heptapeptide developed in Russia in the 1980s, built from the 4-10 fragment of Adrenocorticotropic Hormone (ACTH) with an added Pro-Gly-Pro sequence that extends its stability without retaining ACTH's hormonal, cortisol-stimulating activity. That structural separation is what allows Semax to be studied purely for its effects on the central nervous system.

Most research interest centers on Semax as a nootropic and neuroprotective compound: it is studied for its effects on brain-derived neurotrophic factor (BDNF) signaling, attention, and recovery following neurological injury, with a long clinical history in its country of origin for stroke and cognitive-disorder research.

NEW TO THIS? KEY TERMS

ACTH — Adrenocorticotropic Hormone, a pituitary hormone; Semax is derived from a fragment of it but lacks its hormonal activity.

Nootropic — a substance studied for potential effects on cognition, memory, or attention.

BDNF — Brain-Derived Neurotrophic Factor, a protein that supports neuron growth and survival.

Neuroprotective — protective of nerve cells against injury, degeneration, or impaired function.

2 How It's Designed to Work

Semax's research profile rests on three linked steps — a stabilized fragment structure that crosses into the CNS, a neurotrophic signal that supports neuron growth, and a downstream cascade of cognitive and protective effects:

STABILIZED FRAGMENT

NON-HORMONAL ACTH ANALOG

Studied as retaining CNS activity from its ACTH(4-10) origin while its Pro-Gly-Pro extension prevents cortisol-stimulating hormonal effects.

NEUROTROPHIC SIGNAL

BDNF / NGF MODULATION

Studied as elevating BDNF and nerve growth factor (NGF) expression in the brain, supporting neuron survival, growth, and synaptic plasticity.

DOWNSTREAM CASCADE

COGNITIVE & PROTECTIVE EFFECTS

Downstream effects studied include improved attention and memory performance, and neuroprotection during ischemic stress in the brain.

The stabilized structure, neurotrophic signaling, and cognitive cascade are studied together as one mechanism — a hormone-derived fragment repurposed in research as a direct CNS signal.

3 What the Research Shows

Semax has a multi-decade clinical research history in its country of origin, alongside more recent Western preclinical work on its neurotrophic mechanism. Below is a plain-language summary of frequently cited findings.

BDNF Expression Study Dmitrieva et al., Neuroscience & Behavioral Physiology, 2010
Studies reported Semax administration significantly increased BDNF expression in brain tissue, offering a mechanistic basis for its studied nootropic and neuroprotective effects.

Ischemic Stroke Research Gusev & Skvortsova, Journal of the Neurological Sciences, 2007 (review)
Clinical research reviewed in Russian stroke-treatment literature reported Semax improved neurological outcomes and reduced disability when administered during the acute phase of ischemic stroke.

Attention & Cognitive Performance Kolomin et al., Acta Naturae, 2013 (review)
A review of Semax pharmacology reported improved attention, memory consolidation, and stress resilience across multiple studies, attributed to its modulation of neurotrophic and monoaminergic systems.

4 Effects Observed in Research

Across the studies above, three effects recur most often. These are findings from controlled research settings, not guarantees or claims about any individual outcome.

Attention & Memory Support

Improved attention, memory consolidation, and cognitive performance reported across nootropic-focused studies.

Neuroprotection & Stroke Recovery

Improved neurological outcomes reported in acute ischemic stroke research when administered early.

Elevated BDNF & Neurotrophic Activity

Significant increases in BDNF expression reported in preclinical studies, supporting neuron growth and survival.

5 Storage & Reconstitution Guide

Semax is supplied as a lyophilized (freeze-dried) powder that must be reconstituted before use in the lab. The steps below reflect standard peptide-handling practice — always defer to the certificate of analysis (COA) that ships with each vial.

BEFORE RECONSTITUTION

Keep the lyophilized vial refrigerated (2–8°C) for short-term storage, or frozen (–20°C) for longer-term storage, protected from light at all times. The unreconstituted powder is stable for the longest window — reconstitute only what will be used in the near term.

RECONSTITUTING WITH BACTERIOSTATIC WATER

Bring the vial to room temperature. Using a sterile syringe, draw bacteriostatic water and inject it slowly down the inside wall of the vial — not directly onto the powder — to avoid agitating and denaturing the peptide. Gently swirl to dissolve; never shake.

RESULTING CONCENTRATION FOR A 10MG VIAL

Bacteriostatic Water Added	Resulting Concentration
1 mL	10 mg/mL
2 mL	5 mg/mL
3 mL	3.3 mg/mL
5 mL	2 mg/mL

AFTER RECONSTITUTION

Store the reconstituted solution refrigerated at 2–8°C and protected from light. Reconstituted peptide solutions are generally most stable when used within a few weeks — check the COA for the exact window for each lot. Avoid repeated freeze–thaw cycles, label vials with the reconstitution date, and discard any solution that appears cloudy, discolored, or has been left at room temperature for an extended period.

SOURCES

Dmitrieva, V.G. et al. Semax and Pro-Gly-Pro activate the transcription of neurotrophins and their receptor genes · Neuroscience & Behavioral Physiology, 2010 · Gusev, E.I. & Skvortsova, V.I. Semax in the treatment of ischemic stroke · Journal of the Neurological Sciences, 2007 · Kolomin, T. et al. A minor structural modification of Semax gives rise to its own therapeutic effect · Acta Naturae, 2013.