

Semaglutide

GLP-1 Receptor Agonist · Investigational Research Compound · NN9535



A plain-language guide to what Semaglutide is, how its GLP-1 receptor signaling is designed to work, and what published peptide research has found so far — written for newcomers to peptide science, not just specialists.

COMPOSITION

Semaglutide
10mg

STRUCTURE

31-aa GLP-1 analog with AIB substitution and a C18 fatty-diacid chain

STUDIED HALF-LIFE

~7 days, supporting once-weekly research dosing

1 What Is Semaglutide?

Semaglutide is a synthetic analog of Glucagon-Like Peptide-1 (GLP-1), a naturally occurring gut hormone released after eating. It shares roughly 94% of native GLP-1's sequence, with two key engineered changes: an alpha-aminoisobutyric acid (AIB) substitution that resists degradation by the DPP-4 enzyme, and a C18 fatty-diacid chain that binds albumin in the bloodstream.

Those two modifications are what distinguish it from native GLP-1, which is broken down within minutes. Together they extend Semaglutide's half-life to roughly a week, making it the most extensively studied long-acting GLP-1 analog and the reference compound against which newer dual and triple agonists are compared.

NEW TO THIS? KEY TERMS

GLP-1 — Glucagon-Like Peptide-1, a gut hormone that slows gastric emptying, reduces appetite, and stimulates insulin release.

Incretin — a class of gut hormones released after eating that stimulate glucose-dependent insulin secretion.

DPP-4 — an enzyme that rapidly degrades native GLP-1; Semaglutide's AIB substitution resists this breakdown.

Albumin binding — attaching to a blood protein to slow clearance, the mechanism behind the compound's week-long half-life.

2 How It's Designed to Work

Semaglutide's research profile rests on three linked steps — a stabilized structure that resists degradation, a receptor signal acting on both the pancreas and the brain, and a downstream cascade of appetite and glycemic effects:

STABILIZED STRUCTURE DPP-4 RESISTANCE & ALBUMIN BINDING The AIB substitution resists enzymatic degradation while the fatty-diacid chain binds albumin, together extending activity from minutes to roughly a week.	RECEPTOR SIGNAL GLP-1 RECEPTOR ACTIVATION Activates GLP-1 receptors on pancreatic beta cells to enhance glucose-dependent insulin secretion, and in hypothalamic appetite centers to increase satiety.	DOWNSTREAM CASCADE APPETITE & GLYCEMIC EFFECTS Downstream effects studied include slowed gastric emptying, reduced caloric intake, lowered HbA1c, and suppressed glucagon secretion.
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The stabilized structure, receptor signaling, and metabolic cascade are studied together as one mechanism — an engineered analog of a natural gut hormone extended to weekly duration.

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3 What the Research Shows

Semaglutide has the largest completed clinical trial record of any GLP-1 analog, spanning the SUSTAIN (glycemic control), STEP (body weight), and SELECT (cardiovascular outcomes) trial programs. Below is a plain-language summary of frequently cited findings.

Body Weight Trial Wilding et al., New England Journal of Medicine, 2021 (STEP-1)

A 68-week randomized trial in adults with overweight or obesity reported mean weight reductions of approximately 14.9% with weekly Semaglutide versus 2.4% with placebo.

Cardiovascular Outcomes Lincoff et al., New England Journal of Medicine, 2023 (SELECT)

A large outcomes trial in participants with obesity and established cardiovascular disease reported a 20% reduction in major adverse cardiovascular events relative to placebo, independent of diabetes status.

Glycemic Control Program Sorli et al., Lancet Diabetes & Endocrinology, 2017 (SUSTAIN-1)

The foundational glycemic trial reported significant HbA1c reductions with weekly Semaglutide compared to placebo, with gastrointestinal effects as the most common adverse events.

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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.

Body Weight Reduction
Mean weight reductions of approximately 15% at 68 weeks reported in controlled trials of adults with obesity.

Improved Glycemic Control
Significant HbA1c reductions reported across the SUSTAIN glycemic trial program.

Cardiovascular Event Reduction
A 20% reduction in major adverse cardiovascular events reported in a large outcomes trial.

5 Storage & Reconstitution Guide

Semaglutide 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

Wilding, J.P.H. et al. Once-weekly semaglutide in adults with overweight or obesity · New England Journal of Medicine, 2021 ·
Lincoff, A.M. et al. Semaglutide and cardiovascular outcomes in obesity without diabetes · New England Journal of Medicine,
2023 · Sorli, C. et al. Efficacy and safety of once-weekly semaglutide monotherapy versus placebo in patients with type 2
diabetes · Lancet Diabetes & Endocrinology, 2017.

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