

Tirzepatide — Research Summary

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1. What It Is

Tirzepatide is a synthetic 39-amino-acid peptide and the first-in-class dual agonist of the GIP (glucose-dependent insulinotropic polypeptide) and GLP-1 (glucagon-like peptide-1) receptors, engineered from the native GIP backbone with a fatty diacid moiety enabling once-weekly dosing.

Tirzepatide is an FDA-approved prescription drug — marketed as Mounjaro (type 2 diabetes) and Zepbound (chronic weight management). It is included here for research-reference purposes only; research-labeled/non-prescription tirzepatide is a distinct regulatory category from the approved product.

2. Reported Effects in Research Literature

Tirzepatide has one of the largest and most rigorous human clinical trial programs of any compound in this set (the SURPASS and SURMOUNT programs).

- Mechanism: In vitro receptor-occupancy studies show tirzepatide is imbalanced/biased toward the GIP receptor relative to the GLP-1 receptor, a pharmacological profile distinct from single-target GLP-1 agonists.
- Type 2 diabetes (SURPASS 1–5): Five randomized controlled trials found tirzepatide 5–15 mg/week reduced HbA1c by 1.24–2.58% and body weight by 5.4–11.7 kg — described in the literature as unprecedented for a single agent. 20.7–68.4% of patients lost more than 10% of baseline body weight.
- Head-to-head data: Tirzepatide produced significantly greater HbA1c and weight reductions than the GLP-1-only agonist semaglutide (1.0 mg/week) and than titrated basal insulin in controlled trials.
- Obesity without diabetes (SURMOUNT program): A meta-analysis of 6 RCTs (4,036 participants) found tirzepatide 5, 10, and 15 mg produced mean weight reductions of –7.7 kg, –11.6 kg, and –11.8 kg respectively versus placebo.
- A separate dose-response meta-analysis (RCTs through April 2025, minimum 52-week duration) confirmed dose-dependent efficacy and characterized the safety profile in non-diabetic adults with obesity.
- Mechanistic/animal data: Rodent studies found tirzepatide selectively reduces preference for dietary fat as part of its food-intake-suppressing effect, and a 2025 preprint reported synergistic weight-loss and metabolic effects when combined with leptin in diet-induced obesity mice.

3. Clinical & Preclinical Study References

Rosenstock J, et al. "Tirzepatide, a dual GIP/GLP-1 receptor co-agonist for the treatment of type 2 diabetes." *Cardiovasc Diabetol*. 2022. PMID: 36050763

Min T, Bain SC. "The Role of Tirzepatide, Dual GIP and GLP-1 Receptor Agonist, in the Management of Type 2 Diabetes: The SURPASS Clinical Trials." *Diabetes Ther*. 2021;12:143-57. PMID: 33325008

Coskun T, et al. "LY3298176, a novel dual GIP and GLP-1 receptor agonist for the treatment of type 2 diabetes mellitus: From discovery to clinical proof of concept." *Mol Metab*. 2018;18:3-14.

Meta-analysis: Efficacy and safety of tirzepatide for weight loss. *Int J Obes*. 2023.

Systematic review: Dose-Dependent Efficacy and Safety of Tirzepatide for Weight Loss in Non-diabetic Adults With Obesity. PMC12234836.

Regulatory/Safety Note: Tirzepatide is FDA-approved by prescription (Mounjaro, Zepbound).

Non-prescription/compounded/research-labeled tirzepatide is a distinct regulatory category from the approved product and carries its own sourcing, purity, and legal risk considerations independent of the drug's approval status.

This compound has not been evaluated by the FDA and is not intended to diagnose, treat, cure, or prevent any disease in humans or animals.

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