

Anti-Obesity Medications in 2024:

What Do I Need To Know?

Sean M. O'Neill, MD, PhD

MSQC/ASPIRE Joint Meeting

April 12, 2024



maridebart cafraglutide vs Oatzempic

Sean M. O'Neill, MD, PhD
MSQC/ASPIRE Joint Meeting
April 12, 2024



BBC

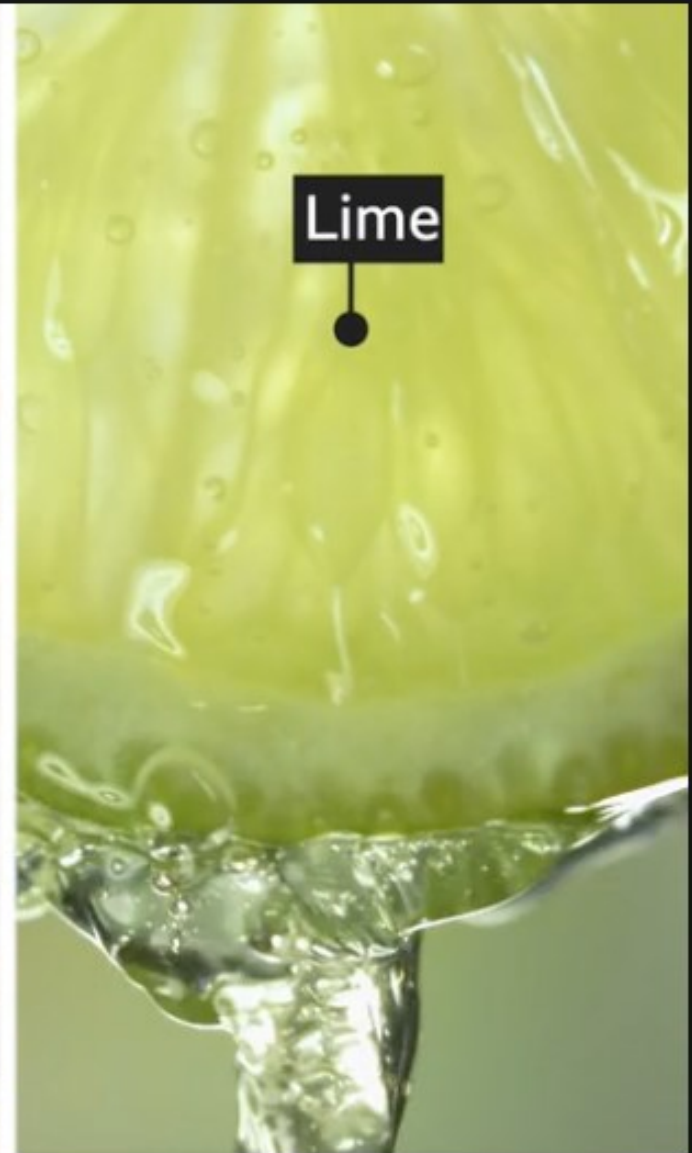
Glass of water



Oats



Lime



Oatzempic: Should you try the oat drink for weight loss?

Disclosures

- None

Objective

- As anesthesia providers and surgeons, what do we absolutely need to know about anti-obesity medications (mainly, GLP-1 receptor agonists) in 2024?

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- As anesthesia providers and surgeons, what do we absolutely need to know about anti-obesity medications (mainly, GLP-1 receptor agonists) in 2024?
 - You may have to cancel cases
 - **You may experience having your cases canceled**

Objective

- As anesthesia providers and surgeons, what do we absolutely need to know about anti-obesity medications (mainly, GLP-1 receptor agonists) in 2024?
 - You may have to cancel cases
 - You may experience having your cases canceled
 - **This area is changing very rapidly, and will continue to do so**

American Society of Anesthesiologists Consensus-Based Guidance on Preoperative Management of Patients (Adults and Children) on Glucagon-Like Peptide-1 (GLP-1) Receptor Agonists

Girish P. Joshi, M.B.B.S., M.D., Basem B. Abdelmalak, M.D., Wade A. Weigel, M.D., Sulpicio G. Soriano, M.D., Monica W. Harbell, M.D., Catherine I. Kuo, M.D., Paul A. Stricker, M.D., Karen B. Domino, M.D., M.P.H., American Society of Anesthesiologists (ASA) Task Force on Preoperative Fasting

Glucagon-like peptide-1 (GLP-1) receptor agonists are approved by the Food and Drug Administration for treatment of type 2 diabetes mellitus and cardiovascular risk reduction in this cohort ([see table](#)).¹ In addition, GLP-1 receptor agonists are also used for weight loss. Several entities have recommended to hold these drugs either the day before or day of the procedure.²⁻⁷

For patients on weekly dosing, it is recommended to hold the dose for a week.⁸

As per ASA guidance, June 2023 on GLP-1 RAs and elective surgery:

[Redacted]

[Redacted]

[Redacted]

- There are anecdotal reports that the delay in stomach emptying could be associated with an increased risk of regurgitation and aspiration of food into the airways and lungs during general anesthesia and deep sedation

Outline

- Fun Facts
- Definitions
- History of AOMs
- Current Pharmacopeia
 - Effectiveness
 - Side Effects/Adverse Events
 - Usage
- Implications for Anesthesia and Surgery

Outline

- **Fun Facts (and non-fact phenomena)**
- Definitions
- History of AOMs
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 - Effectiveness
 - Side Effects/Adverse Events
 - Usage
- Implications for Anesthesia and Surgery

2023

What Is Ozempic and Why Is It Getting So Much Attention?

More people are turning to a diabetes medication to induce weight loss — but experts say it's not a miracle drug.

Celebrities who have used buzzy weight loss drug Ozempic — and who's denied it

Weight-Loss Startup Noom Is Getting Into the Ozempic Business

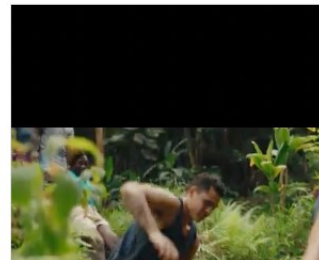
'Everybody is on it': A 'game-changing' weight-loss drug is NYC's hottest new trend

Natalie Rahhal Apr 11, 2023, 6:00 AM EDT



Marianne Ayala/Insider

- Semaglutide, the weight-loss drug sold as Ozempic and Wegovy, is a hot ticket for wealthy New Yorkers.
- An Upper East Side pharmacist says middle-aged women are seeking out the drug, despite shortages.
- Margaret Josephs of "Real Housewives of New Jersey" has lost 22 pounds on a weight-loss injectable.



Elon Musk said semaglutide helped him get "fit, ripped, and healthy."



Elon Musk Gilbert Carrasquillo/GC Images

Business magnate Elon Musk said his weight loss was down to "fasting" and "Wegovy."



The Summer Issue The Summer Issue is here featuring Margot Robbie [SUBSCRIBE NOW](#) »

What Is Ozempic Face? Here's Everything You Need to Know

BY HANNAH COATES

February 13, 2023

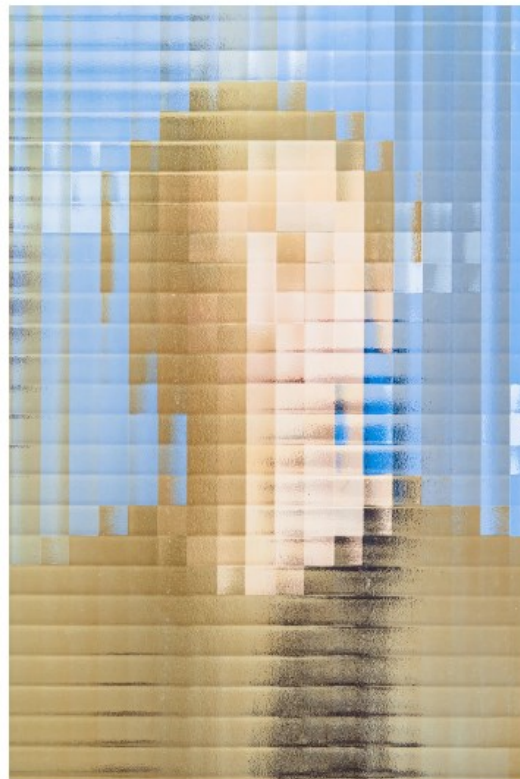


Photo: Getty Images



Destigmatizing 'Ozempic face'

Share —

WELLNESS — January 26, 2023

What to know about 'Ozempic face' as some users claim popular diabetes drugs used for weight loss leave them looking gaunt



By [Katie Kindelan](#)



As the buzz has continued to grow over Ozempic and other new drugs targeted for Type 2 diabetes and obesity, some users are claiming a new side effect.

The term "Ozempic face" has been coined and used on social media to describe what some people say is an aged or gaunt look on the

faces of people who use the medication.

HEALTH

Beware the Ozempic Burp

Some patients taking weight-loss and diabetes drugs end up with sulfur-smelling “eructations.”

By Rachel Gutman-Wei



Lambert / Getty

A TikTok Trend Sold Out Ozempic, Leaving People With Diabetes Dizzy, Scared

Doctors are prescribing the drug off label to people for weight loss





Ozempic



suepinkrobbauer · 1 forum post

Port Severn, Canada

Dec 15, 2022, 11:29 AM



Does anyone know if you purchase Ozempic, preferably brand name, without a perscription in Playa Del Carmen?

Reply

Does anyone preferably Playa Del
Reply

26 replies

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Powerful new obesity drug poised to upend weight loss care

By JONEL ALECCIA April 27, 2023



Jonel Aleccia
JoNel_Aleccia
jaleccia@ap.org



As a growing number of overweight Americans clamor for Ozempic and Wegovy — drugs touted by celebrities and on TikTok to pare pounds — an even more powerful obesity medicine is poised to upend treatment.

Tirzepatide, an Eli Lilly and Co. drug approved to treat type 2 diabetes under the brand name Mounjaro, helped people with the disease who were overweight or had obesity lose up to 16% of their body weight, or more than 34 pounds, over nearly 17 months, the company said on Thursday.

Businessweek | Feature

Good Luck Paying for Those \$10,000 Obesity Drugs Everyone's Talking About

Ozempic, Wegovy and Mounjaro can cause dramatic weight loss, and could create a market worth \$150 billion a year.

By [Emma Court](#) and [Robert Langreth](#)

April 27, 2023 at 6:00 AM EDT



2024

Novo Nordisk Smashes Past \$500 Billion Value on Wegovy Frenzy

- Danish drugmaker eclipses LVMH amid weight-loss drug fervor
- Operating profit seen rising as much as 29% this year



Novo Eclipses \$500 Billion Market Value on Wegovy Frenzy *Source: Bloomberg*

By [Naomi Kresge](#) and [Kit Rees](#)

January 31, 2024 at 3:07 AM EST

Updated on January 31, 2024 at 5:58 AM EST

[Save](#)

[Listen 3:34](#)

Novo Nordisk A/S became the second-ever European company to pass \$500 billion in market value, bolstered by an upbeat outlook for its blockbuster obesity drug.

Ozempic Is Transforming the Health of Denmark's Economy

The success of Novo Nordisk shows the outsized effect a single company can have on a nation.

March 5, 2024 at 12:00 AM EST

Corrected March 5, 2024 at 10:05 AM EST



By Tyler Cowen

Tyler Cowen is a Bloomberg Opinion columnist, a professor of economics at George Mason University and host of the Marginal Revolution blog.





Businessweek | The Big Take

How a Lucky Break Fueled Eli Lilly's \$600 Billion Weight-Loss Empire

The company's new obesity shot, Zepbound, is expected to be the bestselling drug of all time.

Novo Nordisk A/S (NVO)

124.61 ↓ -2.85 (-2.24%) USD | NYSE | Apr

Quote

Performance

Key Stats

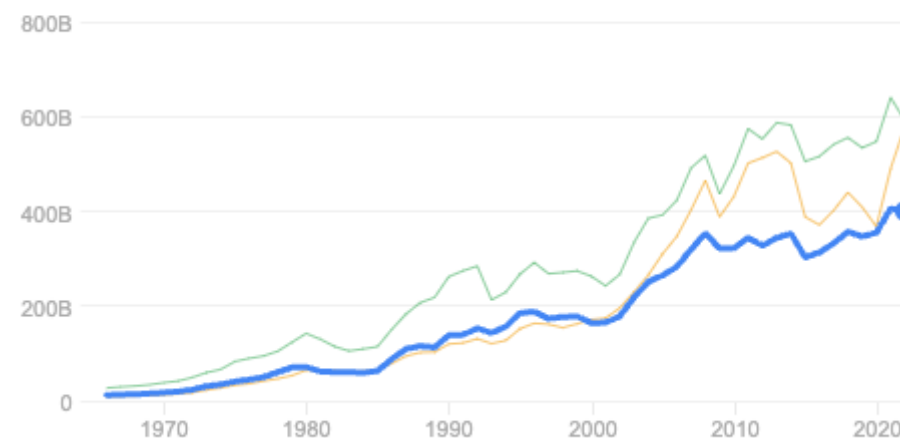
Financials

Novo Nordisk Market Cap: 556.00B

>

Denmark / Gross domestic product

400.2 billion USD (2022)



Eli Lilly and Co (LLY)

754.01 ↓ -23.28 (-3.00%) USD | N

Quote

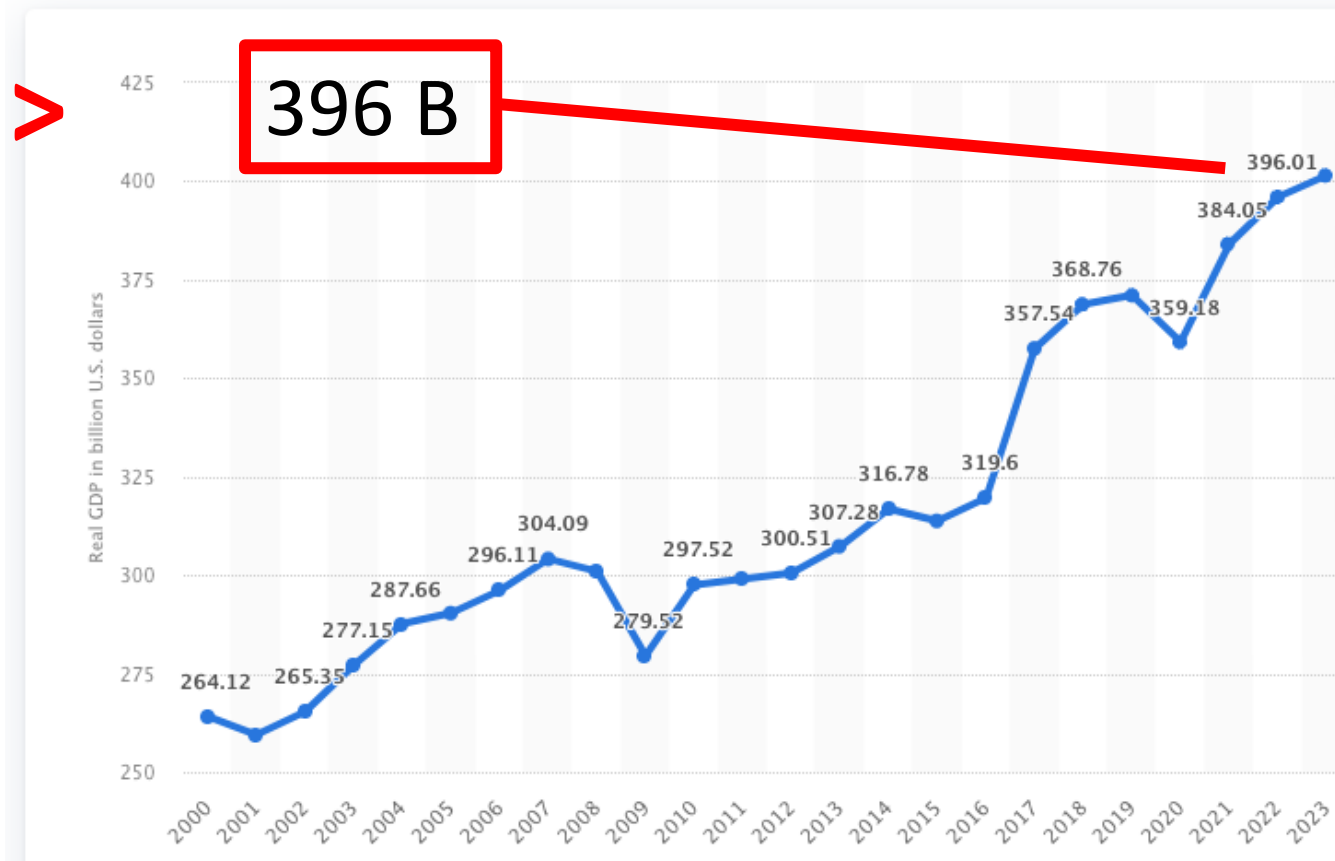
Performance

Key Stats

Eli Lilly Market Cap: **716.89B**



Real gross domestic product of Indiana
(in billion U.S. dollars)



Ozempic to Send Foodmakers Looking for Healthier Offerings

Companies should consider smaller portions, fresh ingredients or offloading unhealthy brands as weight-loss drugs take off, respondents say.



Ozempic Users Cut Grocery Spending by Up to 9%, Survey Finds

- Morgan Stanley says snacks and sweets most hurt by GLP-1s
- Report cites Numerator data from across 90,000 households

Ozempic Maker Novo Gets Calls From ‘Scared’ Food CEOs

- Novo CEO Jorgensen says weight-loss drugs have huge impact
- Company is working to overcome supply shortage hurdles



WATCH: Novo Nordisk CEO Lars Fruergaard Jorgensen discusses the company's acquisition of Catalent for for \$16.5 billion and the production of its weight-loss drug Wegovy and diabetes treatment Ozempic. Source: Bloomberg

By [Naomi Kresge](#) and [Madison Muller](#)

February 7, 2024 at 11:30 PM EST

Updated on February 8, 2024 at 5:32 AM EST

[Save](#)

[Listen 3:36](#)

Makers of everything from snack food to knee implants are facing a potential threat from Novo Nordisk A/S's powerful appetite-suppressing treatments. So they're calling the drugmaker for advice.

"A couple of CEOs from, say, food companies have been calling me," Novo Chief Executive Officer Lars Fruergaard Jorgensen said during a wide-ranging discussion in New York. He declined to name names,

TikTok Is Treating Ozempic Side Effects as Untrained Doctors Dole Out Prescriptions



Jennifer Witherspoon, a former dental office manager, offers advice to her TikTok followers on weight-loss shots' side effects. *Photographer: Montinique Monroe/Bloomberg*

semaglutide injection 2.4 mg

HIGHLIGHTS OF PRESCRIBING INFORMATION

These highlights do not include all the information needed to use WEGOVY® safely and effectively. See full prescribing information for WEGOVY®.

WEGOVY® (semaglutide) injection, for subcutaneous use
Initial U.S. Approval: 2017

WARNING: RISK OF THYROID C-CELL TUMORS See full prescribing information for complete boxed warning.

- In rodents, semaglutide causes thyroid C-cell tumors at clinically relevant exposures. It is unknown whether WEGOVY® causes thyroid C-cell tumors, including medullary thyroid carcinoma (MTC), in humans as the human relevance of semaglutide-induced rodent thyroid C-cell tumors has not been determined (5.1, 13.1).
- WEGOVY® is contraindicated in patients with a personal or family history of MTC or in patients with Multiple Endocrine Neoplasia syndrome type 2 (MEN 2). Counsel patients regarding the potential risk of MTC and symptoms of thyroid tumors (4, 5.1).

RECENT MAJOR CHANGES

Indications and Usage (1).....	12/2022
Dosage and Administration (2.1, 2.3).....	12/2022
Warnings and Precautions (5.3, 5.6, 5.8).....	12/2022

INDICATIONS AND USAGE

WEGOVY® is a glucagon-like peptide-1 (GLP-1) receptor agonist indicated as an adjunct to a reduced calorie diet and increased physical activity for chronic weight management in:

- adult patients with an initial body mass index (BMI) of
 - 30 kg/m² or greater (obesity) or
 - 27 kg/m² or greater (overweight) in the presence of at least one weight-related comorbid condition (e.g., hypertension, type 2 diabetes mellitus, or dyslipidemia) (1).
- pediatric patients aged 12 years and older with an initial BMI at the 95th percentile or greater for age and sex (obesity) (1).

Limitations of Use:

- WEGOVY® should not be used in combination with other semaglutide-containing products or any other GLP-1 receptor agonist (1).
- The safety and efficacy of coadministration with other products for weight loss have not been established (1).
- WEGOVY® has not been studied in patients with a history of pancreatitis (1).

DOSAGE AND ADMINISTRATION

- Administer WEGOVY® once weekly, on the same day each week, at any time of day, with or without meals (2.2).
- Inject subcutaneously in the abdomen, thigh or upper arm (2.2).
- In patients with type 2 diabetes, monitor blood glucose prior to starting and during WEGOVY® treatment (2.2).
- Initiate at 0.25 mg once weekly for 4 weeks. In 4 week intervals, increase the dose until a dose of 2.4 mg is reached (2.3).
- The maintenance dose of WEGOVY® is 2.4 mg once weekly (2.3).

DOSAGE FORMS AND STRENGTHS

Injection: pre-filled, single-dose pen that delivers doses of 0.25 mg, 0.5 mg, 1 mg, 1.7 mg or 2.4 mg (3).

CONTRAINDICATIONS

- Personal or family history of medullary thyroid carcinoma or in patients with Multiple Endocrine Neoplasia syndrome type 2 (4, 5.1).
- Known hypersensitivity to semaglutide or any of the excipients in WEGOVY® (4).

WARNINGS AND PRECAUTIONS

- **Thyroid C-cell Tumors:** See Boxed Warning (5.1).
- **Acute Pancreatitis:** Has occurred in clinical trials. Discontinue promptly if pancreatitis is suspected. Do not restart if pancreatitis is confirmed (5.2).
- **Acute Gallbladder Disease:** Has occurred in clinical trials. If cholelithiasis is suspected, gallbladder studies and clinical follow-up are indicated (5.3).
- **Hypoglycemia:** Concomitant use with an insulin secretagogue or insulin may increase the risk of hypoglycemia, including severe hypoglycemia. Reducing the dose of insulin secretagogue or insulin may be necessary. Inform all patients of the risk of hypoglycemia and educate them on the signs and symptoms of hypoglycemia (5.4, 7.1).

HIGHLIGHTS OF PRESCRIBING INFORMATION

These highlights do not include all the information needed to use ZEPBOUND safely and effectively. See full prescribing information for ZEPBOUND.

ZEPBOUND® (tirzepatide) Injection, for subcutaneous use Initial U.S. Approval: 2022

13.1).

- ZEPBOUND is contraindicated in patients with a personal or family history of MTC or in patients with Multiple Endocrine Neoplasia syndrome type 2 (MEN 2). Counsel patients regarding the potential risk of MTC and symptoms of thyroid tumors (4, 5.1).

INDICATIONS AND USAGE

ZEPBOUND® is a glucose-dependent insulinotropic polypeptide (GIP) receptor and glucagon-like peptide-1 (GLP-1) receptor agonist indicated as an adjunct to a reduced-calorie diet and increased physical activity for chronic weight management in adults with an initial body mass index (BMI) of:

- 30 kg/m² or greater (obesity) or
- 27 kg/m² or greater (overweight) in the presence of at least one weight-related comorbid condition (e.g., hypertension, dyslipidemia, type 2 diabetes mellitus, obstructive sleep apnea or cardiovascular disease). (1)

Limitations of Use:

- Coadministration with other tirzepatide-containing products or any GLP-1 receptor agonist is not recommended. (1)
- The safety and efficacy of coadministration with other products for weight management have not been established. (1)
- ZEPBOUND has not been studied in patients with a history of pancreatitis. (1)

DOSAGE AND ADMINISTRATION

- The recommended starting dosage is 2.5 mg injected subcutaneously once weekly. (2.2)
- After 4 weeks, increase to 5 mg injected subcutaneously once weekly. (2.2)
- Increase the dosage in 2.5 mg increments after at least 4 weeks on the current dose. (2.2)
- The recommended maintenance dosages are 5 mg, 10 mg, or 15 mg injected subcutaneously once weekly. (2.2)

cholecystitis is suspected, gallbladder studies and clinical follow-up are indicated. (5.4)

- **Acute Pancreatitis:** Has been reported in clinical trials. Discontinue promptly if pancreatitis is suspected. Do not restart if pancreatitis is confirmed. (5.5)
- **Hypersensitivity Reactions:** Serious hypersensitivity reactions (e.g., anaphylaxis, angioedema) have been reported postmarketing with tirzepatide. If suspected, advise patients to promptly seek medical attention and discontinue ZEPBOUND. (5.6)
- **Hypoglycemia:** Concomitant use with an insulin secretagogue or insulin may increase the risk of hypoglycemia, including severe hypoglycemia. Reducing dose of insulin secretagogue or insulin may be necessary. Inform all patients of the risk of hypoglycemia and educate them on the signs and symptoms of hypoglycemia. (5.7)
- **Diabetic Retinopathy Complications in Patients with Type 2 Diabetes Mellitus:** Has not been studied in patients with non-proliferative diabetic retinopathy requiring acute therapy, proliferative diabetic retinopathy, or diabetic macular edema. Monitor patients with a history of diabetic retinopathy for progression. (5.8)
- **Suicidal Behavior and Ideation:** Monitor for depression or suicidal thoughts. Discontinue ZEPBOUND if symptoms develop. (5.9)

ADVERSE REACTIONS

The most common adverse reactions, reported in ≥5% of patients treated with ZEPBOUND are: nausea, diarrhea, vomiting, constipation, abdominal pain, dyspepsia, injection site reactions, fatigue, hypersensitivity reactions, eructation, hair loss, gastroesophageal reflux disease. (6.1)

To report SUSPECTED ADVERSE REACTIONS, contact Eli Lilly and Company at 1-800-LillyRx (1-800-545-5979) or FDA at 1-800-FDA-1088 or www.fda.gov/medwatch.

DRUG INTERACTIONS

ZEPBOUND delays gastric emptying and has the potential to impact the absorption of concomitantly administered oral medications. (7.2)

OZEMPIC FACE!?!

WELLNESS — January 26, 2023

HEALTH AND WELLNESS

Weight Loss

Add Topic +

Ozempic face: It's not a medical term and it's hurtful

Delaney Nothaft Special to USA TODAY

Published 5:02 a.m. ET July 19, 2023 | Updated 12:57 p.m. ET Feb. 26, 2024



Destigmatizing 'Ozempic face'

Share —

faces of people who use the medication.

Type 2 diabetes and obesity, some users are claiming a new side effect.

The term "Ozempic face" has been coined and used on social media to describe what some people say is an aged or gaunt look on the



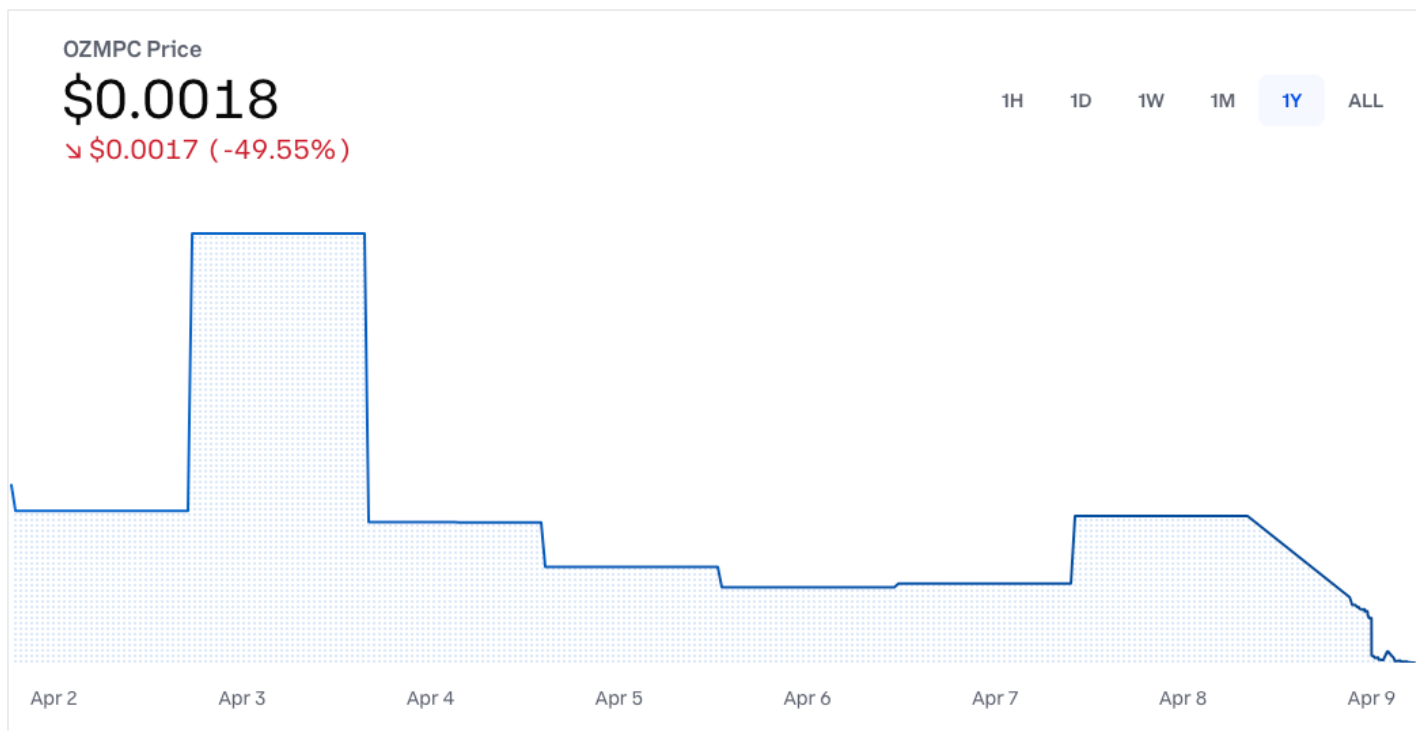
OZMPC/USD: Convert Ozempic (OZMPC) to United States Dollar (USD)

1 Ozempic equals \$0.0018 United States Dollar

Buy Ozempic

1

Ozempic Markets



Ozempic is falling this week.

The current price of Ozempic is \$0.0018 per OZMPC. With a circulating supply of 0 OZMPC, it means that Ozempic has a total market cap of \$0.00. The amount of Ozempic traded has risen by \$56,147.00 in the last 24 hours, which is a 22.88% increase. Additionally, in the last day, \$245,391.27 worth of OZMPC has been traded.

Promising early data details on Amgen weight-loss drug published

By Deena Beasley

February 5, 2024 4:30 PM EST · Updated 2 months ago



HEALTH

The Science Behind Ozempic Was Wrong

The weight-loss effects of GLP-1 drugs have little to do with the gut.

By Sarah Zhang

Outline

- Fun Facts (and non-fact phenomena)
- **Definitions**
- History of AOMs
- Current Pharmacopeia
 - Effectiveness
 - Side Effects/Adverse Events
 - Usage
- Implications for Anesthesia and Surgery

Anti-Obesity Medication (AOM)

- FDA Indication is for:

Chronic weight management as an adjunct to diet and exercise if:

- **BMI > 30 kg/m²**

OR

- **BMI > 27 kg/m² & at least 1 weight-related comorbidity**

Anti-Obesity Medication (AOM)

Minimum benchmark for approval:

- Mean weight loss in treated group is **>5% greater than placebo group**

OR

- **>5% weight loss achieved in >35% of the treated population**
(and **double the rate of >5% weight loss in the placebo group**)

AND

- Cardiovascular safety trials

Outline

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- Definitions
- **History of AOMs**
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- Implications for Anesthesia and Surgery

AOM Timeline

- 1959: Phentermine, Diethylpropion
- 1960: Benzphetamine
- 1961: Phendimetrazine

Mechanism

Sympathomimetic / Appetite Suppression

AOM Timeline

- 1959: Phentermine, Diethylpropion
- 1960: Benzphetamine
- 1961: Phendimetrazine
- 1973: Fenfluramine
- 1996: Dexfenfluramine

Mechanism

Sympathomimetic / Appetite Suppression

Sympathomimetic / Appetite Suppression

AOM Timeline

- 1959: Phentermine, Diethylpropion
- 1960: Benzphetamine
- 1961: Phendimetrazine
- ~~1973: Fenfluramine~~
- ~~1996: Dexfenfluramine~~

Mechanism

Sympathomimetic / Appetite Suppression

(withdrawn 1998, pulmonary HTN)

(withdrawn 1998, pulmonary HTN)

AOM Timeline

- 1959: Phentermine, Diethylpropion
- 1960: Benzphetamine
- 1961: Phendimetrazine
- ~~1973: Fenfluramine~~
- ~~1996: Dexfenfluramine~~
- 1999: Orlistat

Mechanism

Sympathomimetic / Appetite Suppression

Fat absorption (pancreatic lipase) inhibitor

AOM Timeline

- 1959: Phentermine, Diethylpropion
- 1960: Benzphetamine
- 1961: Phendimetrazine
- ~~1973: Fenfluramine~~
- ~~1996: Dexfenfluramine~~
- 1999: Orlistat
- 2012: Lorcaserin

Mechanism

Sympathomimetic / Appetite Suppression

Fat absorption (pancreatic lipase) inhibitor

Serotonin R agonist (Hypothalamic POMC cells)

AOM Timeline

- 1959: Phentermine, Diethylpropion
- 1960: Benzphetamine
- 1961: Phendimetrazine
- ~~1973: Fenfluramine~~
- ~~1996: Dexfenfluramine~~
- 1999: Orlistat
- ~~2012: Lorcaserin~~

Mechanism

Sympathomimetic / Appetite Suppression

Fat absorption (pancreatic lipase) inhibitor
(withdrawn 2020; panc, colon, lung CA risk)

AOM Timeline

- 1959: Phentermine, Diethylpropion
- 1960: Benzphetamine
- 1961: Phendimetrazine
- ~~1973: Fenfluramine~~
- ~~1996: Dexfenfluramine~~
- 1999: Orlistat
- ~~2012: Lorcaserin~~
- 2012: Phentermine/Topiramate
- 2014: Naltrexone/Bupropion

Mechanism

Sympathomimetic

Fat absorption (pancreatic lipase) inhibitor

Sympathomimetic + Appetite Suppressant

POMC ag, Opioid antag, Dopamine reup inhib

AOM Timeline

- 1959: Phentermine, Diethylpropion
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- 1961: Phendimetrazine
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- ~~1996: Dexfenfluramine~~
- 1999: Orlistat
- ~~2012: Lorcaserin~~
- 2012: Phentermine/Topiramate
- 2014: Naltrexone/Bupropion
- 2014: Liraglutide 3 mg SC

Mechanism

Sympathomimetic

Fat absorption (pancreatic lipase) inhibitor

Sympathomimetic + Appetite Suppressant

POMC ag, Opioid antag, Dopamine reup inhib

Glucagon-like Peptide-1 (GLP-1) Rec Agonist

AOM Timeline

- 1959: Phentermine, Diethylpropion
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- 1961: Phendimetrazine
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- ~~1996: Dexfenfluramine~~
- 1999: Orlistat
- ~~2012: Lorcaserin~~
- 2012: Phentermine/Topiramate
- 2014: Naltrexone/Bupropion
- 2014: Liraglutide 3 mg SC
- 2021: Semaglutide 2.4 mg SC
- 2022: Tirzepatide 5/10/15 mg SC
-

Mechanism

Sympathomimetic

Fat absorption (pancreatic lipase) inhibitor

Sympathomimetic + Appetite Suppressant

POMC ag, Opioid antag, Dopamine reup inhib

Glucagon-like Peptide-1 (GLP-1) Rec Agonist

Glucagon-like Peptide-1 (GLP-1) Rec Agonist

GLP-1 Agonist + GIP Receptor Agonist

AOM Timeline

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- 2014: Naltrexone/Bupropion
- 2014: Liraglutide 3 mg SC
- 2021: Semaglutide 2.4 mg SC
- 2022: Tirzepatide 5/10/15 mg SC
- (TBD): maridebart cafraglutide TBD mg SC

Mechanism

Sympathomimetic

Fat absorption (pancreatic lipase) inhibitor

Sympathomimetic + Appetite Suppressant

POMC ag, Opioid antag, Dopamine reup inhib

Glucagon-like Peptide-1 (GLP-1) Rec Agonist

Glucagon-like Peptide-1 (GLP-1) Rec Agonist

GLP-1 Agonist + GIP Receptor Agonist

GLP-1 Agonist + GIP Receptor Antagonist

Outline

- Fun Facts (and non-fact phenomena)
- Definitions
- History of AOMs
- **Current Pharmacopeia**
 - **Mechanism/Dosing**
 - Effectiveness
 - Side Effects/Adverse Events
 - Usage
- Implications for Anesthesia and Surgery

AOMs: Current Pharmacopeia

	<u>Mechanism</u>
• 1959: Phentermine, Diethylpropion	Sympathomimetic
• 1960: Benzphetamine	
• 1961: Phendimetrazine	
• 1999: Orlistat	Pancreatic lipase inhibitor
• 2012: Phentermine/Topiramate	Sympathomimetic + Appetite Supp
• 2014: Naltrexone/Bupropion	POMC ag, Opioid antag, Dopamine
• 2014: Liraglutide 3 mg SC	GLP-1 RA
• 2021: Semaglutide 2.4 mg SC	GLP-1 RA
• 2022: Tirzepatide 5/10/15 mg SC	GLP-1 + GIP RA

AOMs: Current Pharmacopeia

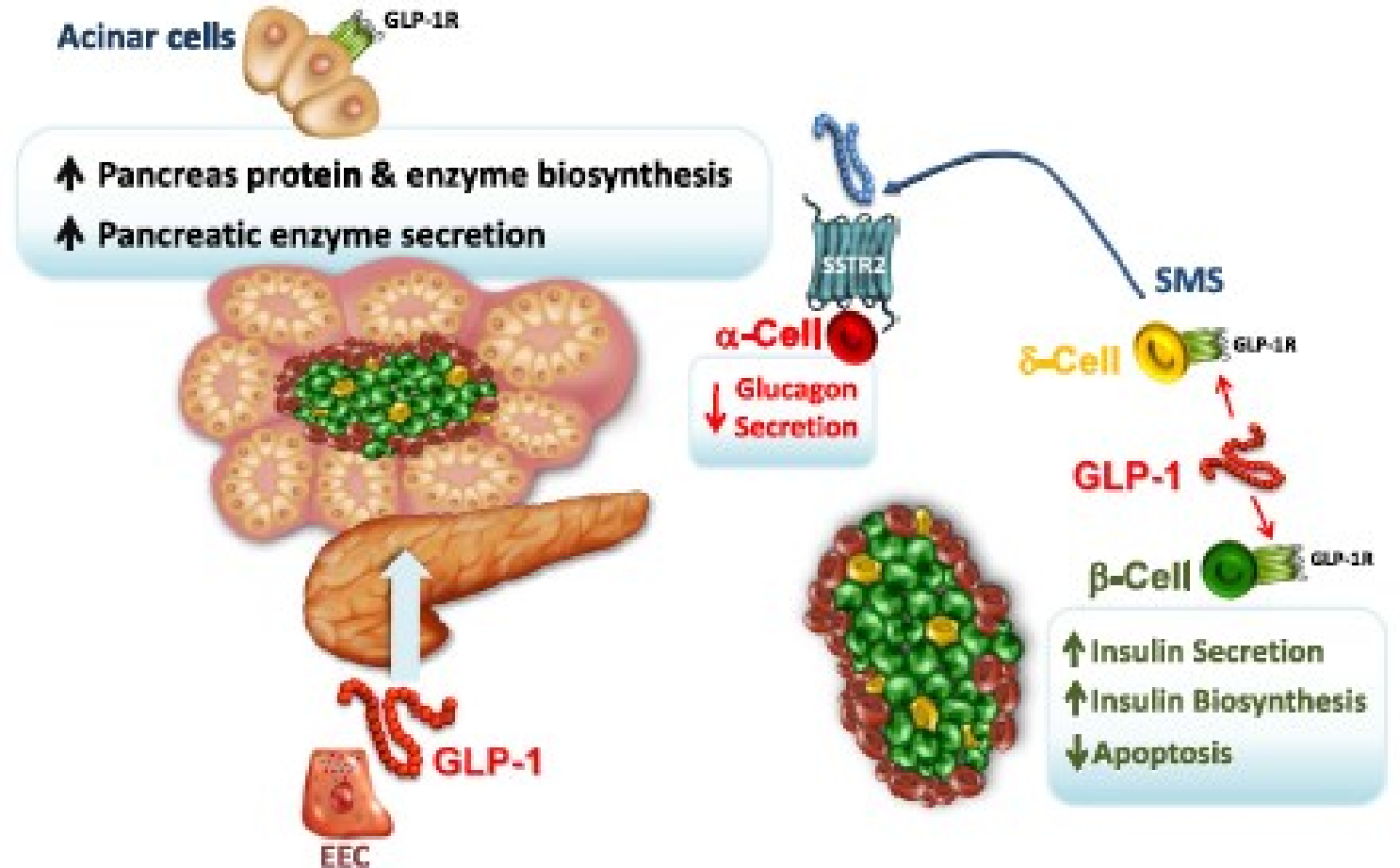
	<u>Trade Name</u>
• 1959: Phentermine, Diethylpropion	Adipex-P, Tenuate
• 1960: Benzphetamine	Didrex
• 1961: Phendimetrazine	Bontrex, Adipost, Anorex, ...
• 1999: Orlistat	Xenical
• 2012: Phentermine/Topiramate	Qsymia
• 2014: Naltrexone/Bupropion	Contrave
• 2014: Liraglutide 3 mg SC	Saxenda
• 2021: Semaglutide 2.4 mg SC	Wegovy
• 2022: Tirzepatide 5/10/15 mg SC	Zepbound / Mounjaro

AOMs: Current Pharmacopeia

	<u>Mechanism</u>
• 1959: Phentermine, Diethylpropion	Sympathomimetic
• 1960: Benzphetamine	
• 1961: Phendimetrazine	
• 1999: Orlistat	Pancreatic lipase inhibitor
• 2012: Phentermine/Topiramate	Sympathomimetic + Appetite Supp
• 2014: Naltrexone/Bupropion	POMC ag, Opioid antag, Dopamine
• 2014: Liraglutide 3 mg SC	GLP-1 RA
• 2021: Semaglutide 2.4 mg SC	GLP-1 RA
• 2022: Tirzepatide 5/10/15 mg SC	GLP-1 + GIP RA

GLP-1 RAs

- Liraglutide
- Semaglutide
- Tirzepatide



GLP-1 RAs for T2DM (but also Obesity)

- Liraglutide 3 mg SC daily
 - *T2DM indication: liraglutide 1.2/1.8 mg SC daily (2010)*
- Semaglutide 2.4 mg SC weekly
 - *T2DM indication: semaglutide 0.5/1/2 mg SC weekly (2017)*
 - *T2DM indication: semaglutide 3/7/14 mg PO daily (2019)*
- Tirzepatide 5/10/15 mg SC weekly*
 - *T2DM indication: tirzepatide 5/10/15 mg SC weekly (2022)*

GLP-1 RAs for T2DM (but also Obesity)

	<u>Trade Name</u>
• Liraglutide 3 mg SC daily	Saxenda
• <i>T2DM indication: liraglutide 1.2/1.8 mg SC daily (2010)</i>	Victoza
• Semaglutide 2.4 mg SC weekly	Wegovy
• <i>T2DM indication: semaglutide 0.5/1/2 mg SC weekly (2017)</i>	Ozempic
• <i>T2DM indication: semaglutide 3/7/14 mg PO daily (2019)</i>	Rybelsus
• Tirzepatide 5/10/15 mg SC weekly*	Zepbound
• <i>T2DM indication: tirzepatide 5/10/15 mg SC weekly (2022)</i>	Mounjaro

Outline

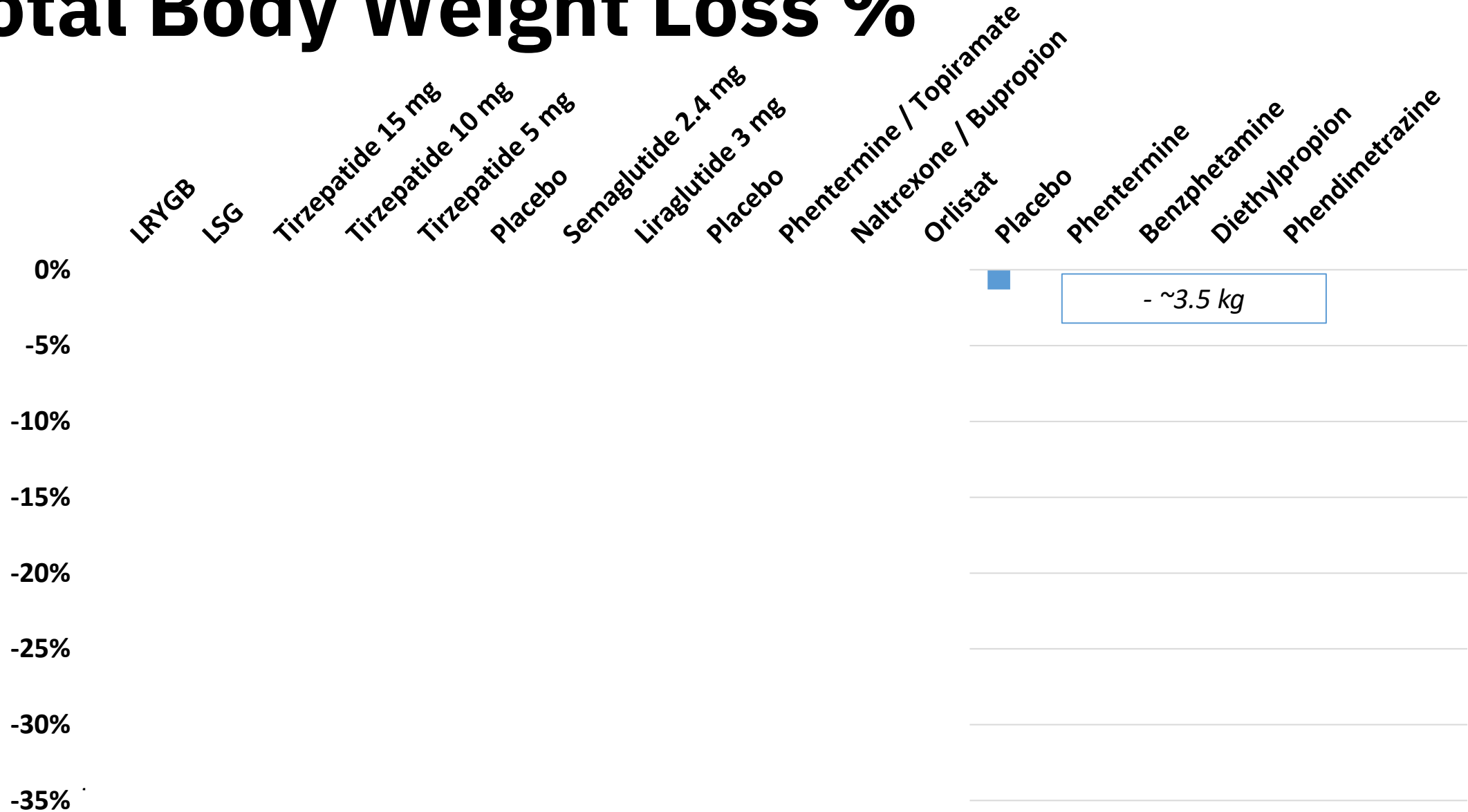
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- Definitions
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Total Body Weight Loss %



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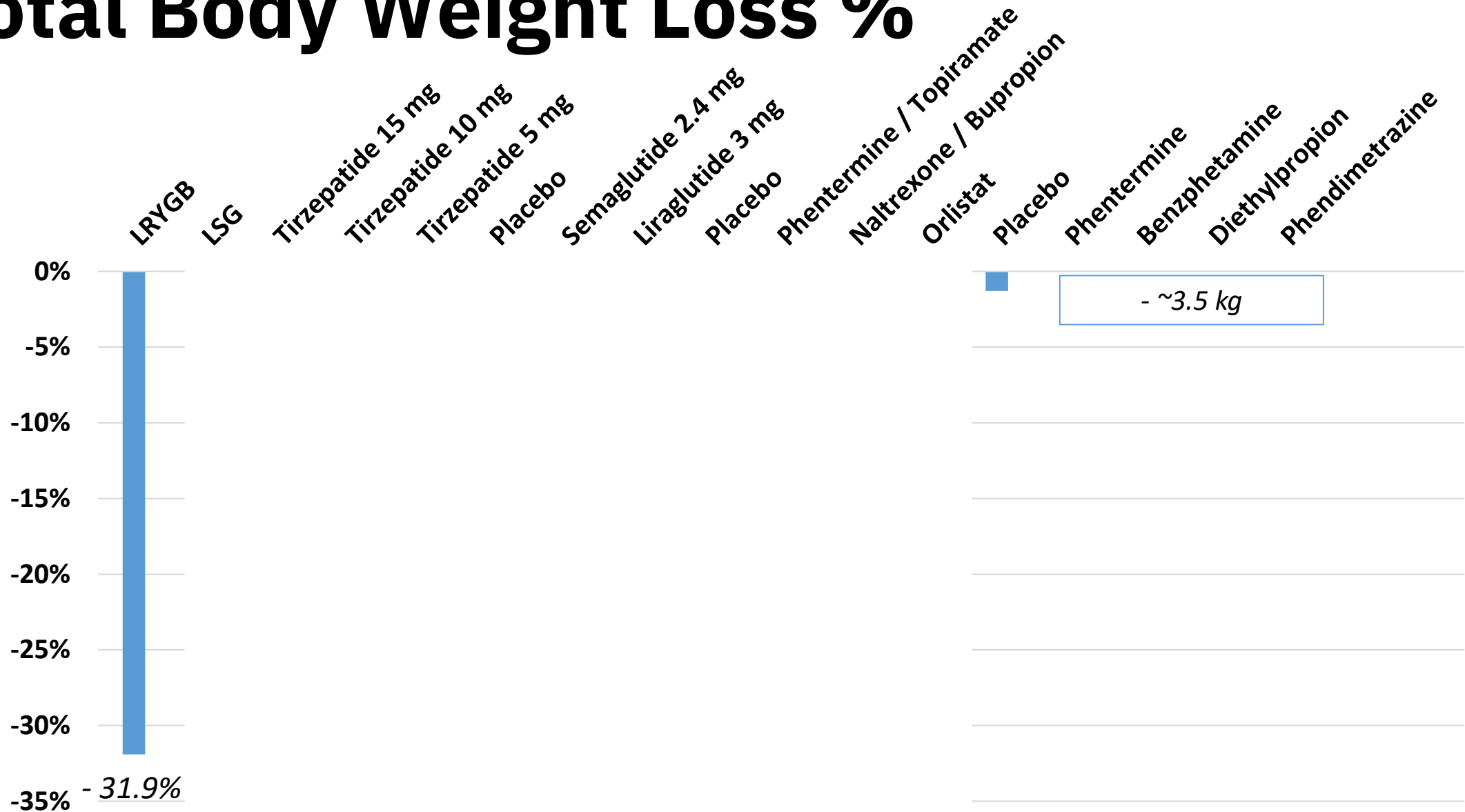
Total Body Weight Loss %



- ~3.5 kg

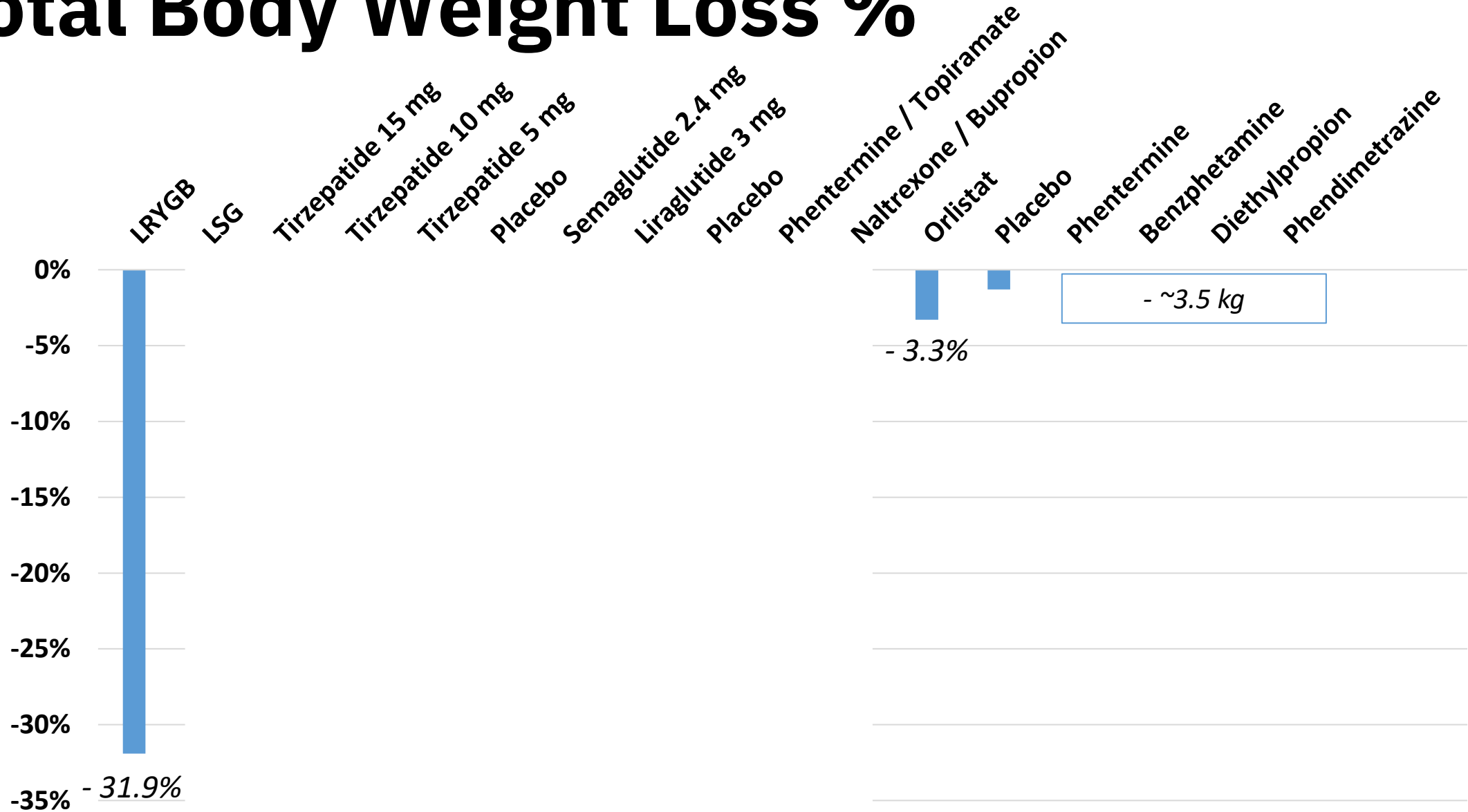
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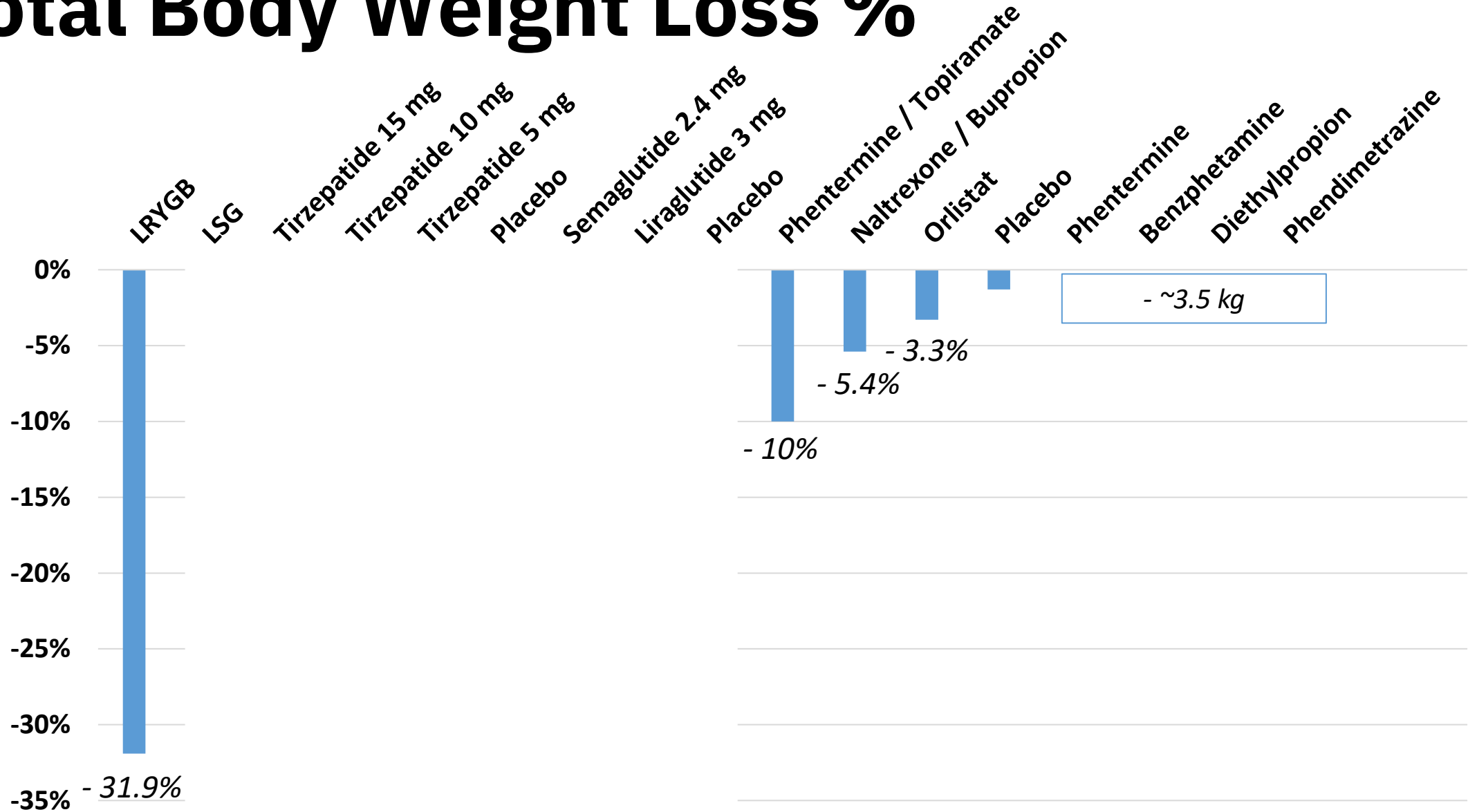
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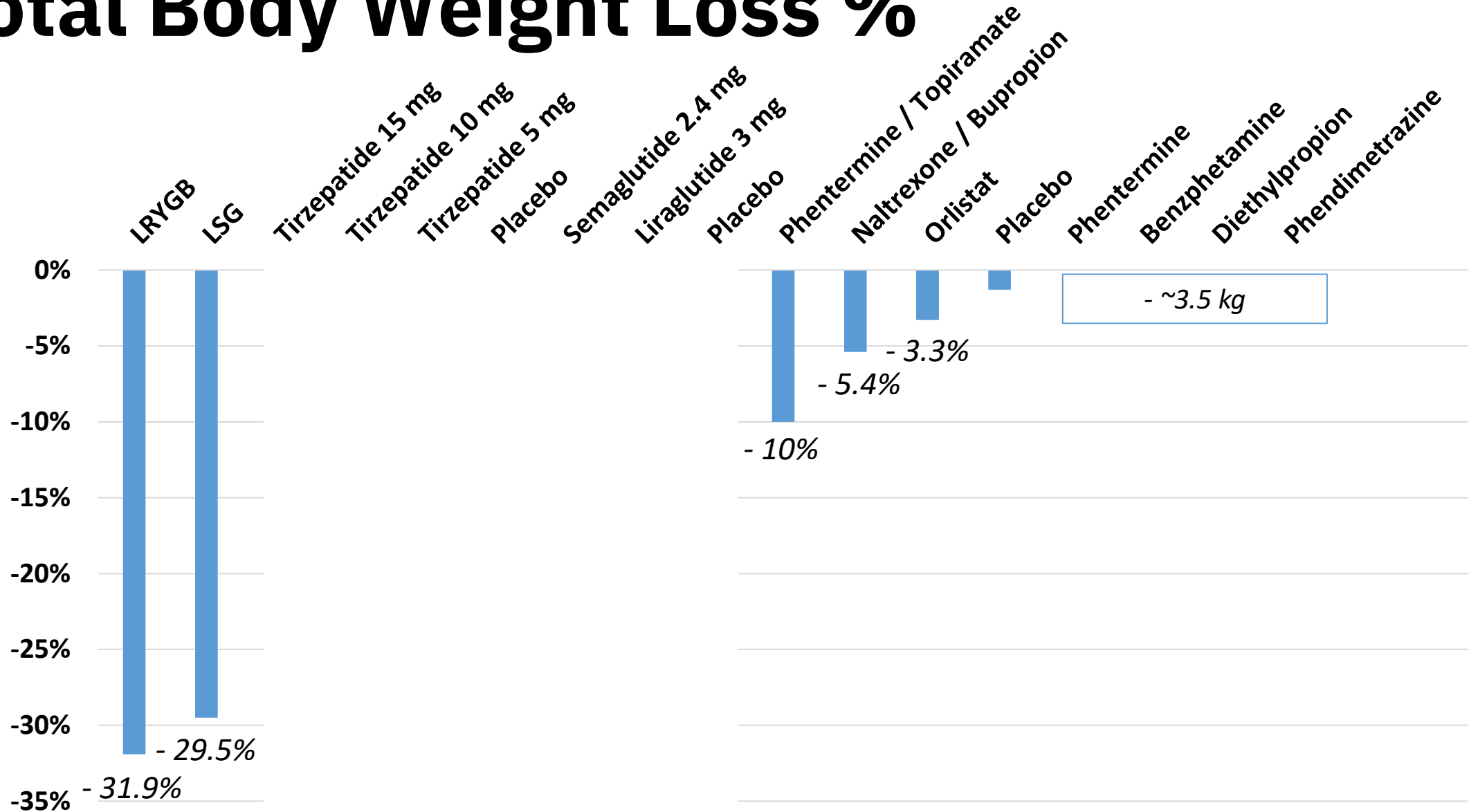
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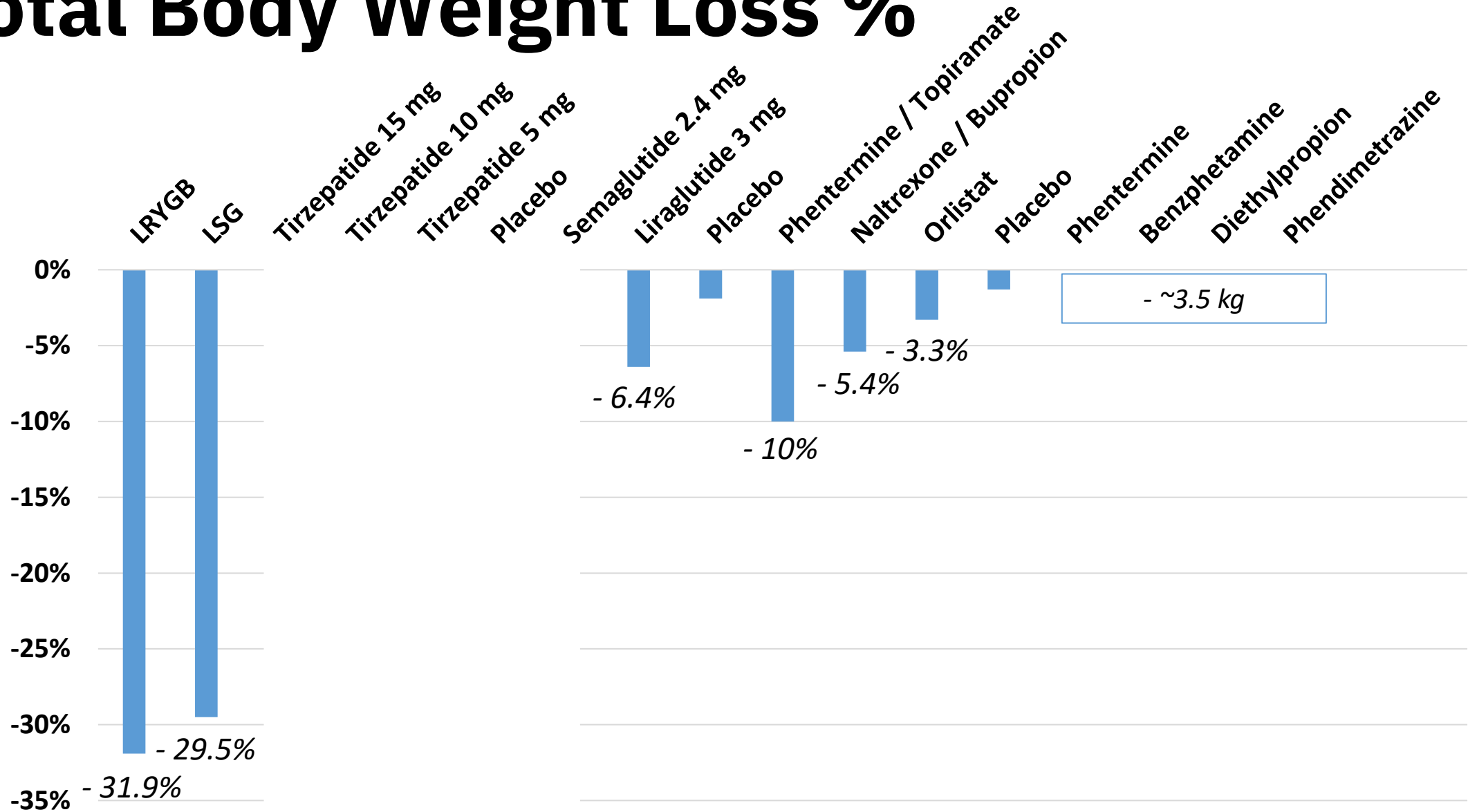
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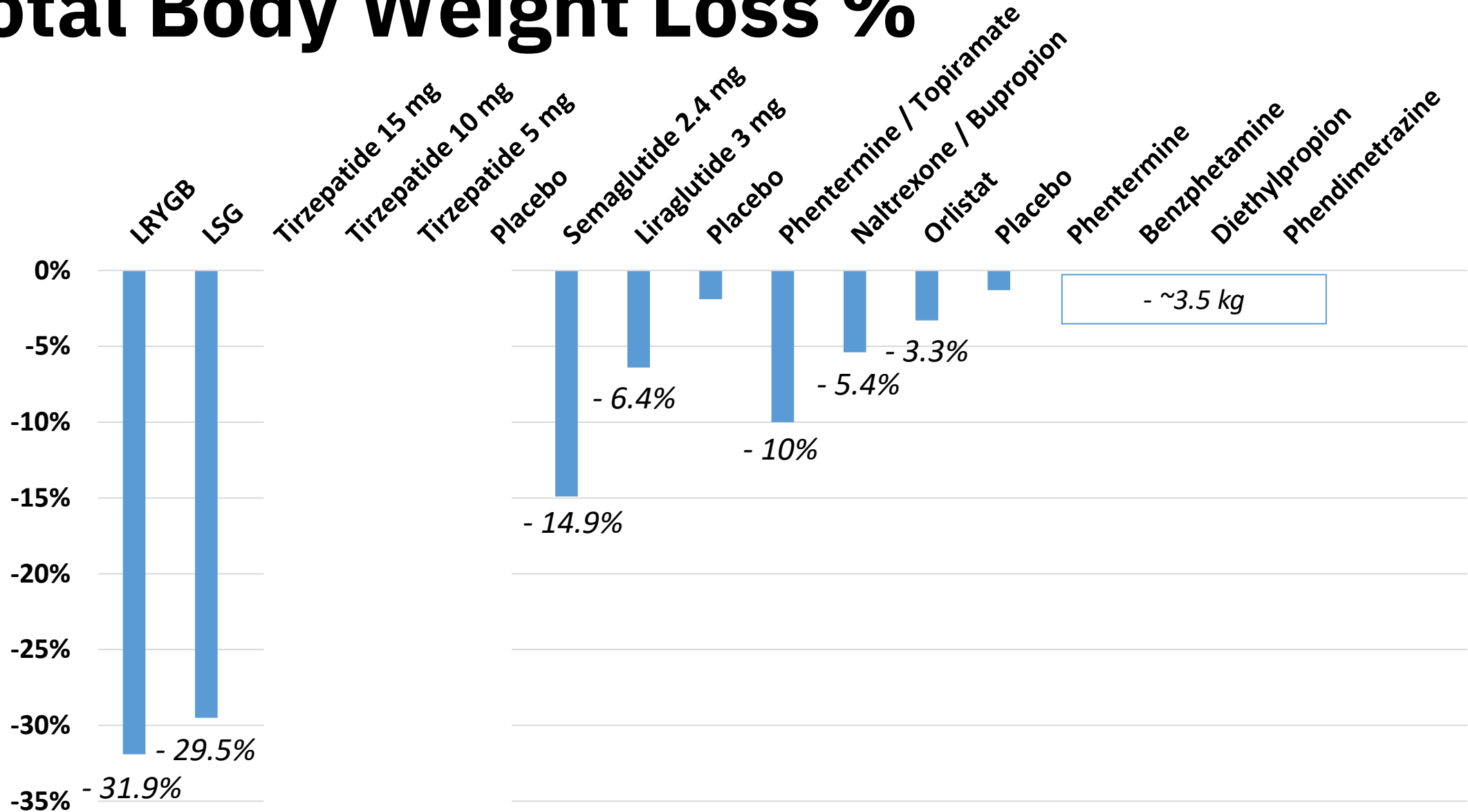
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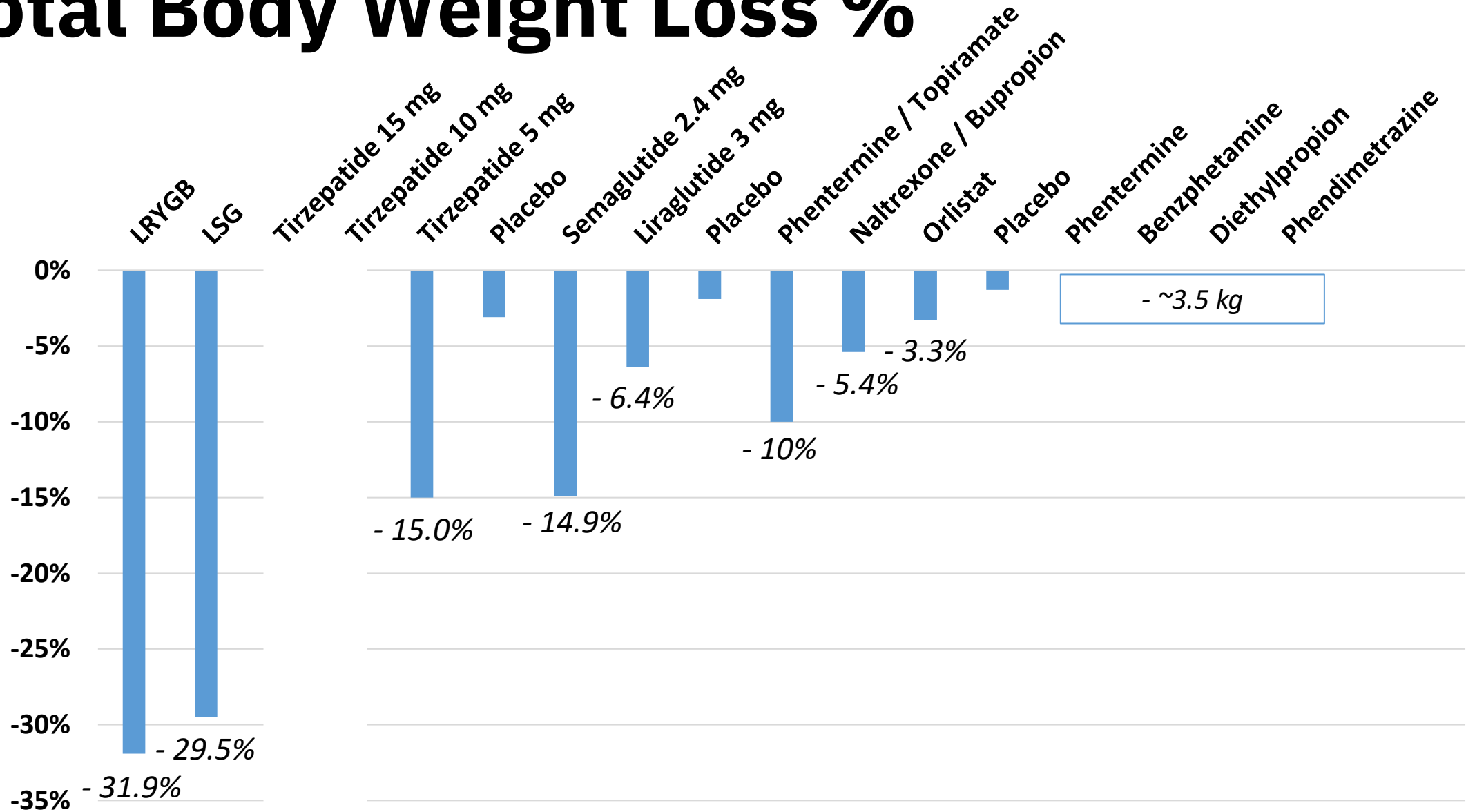
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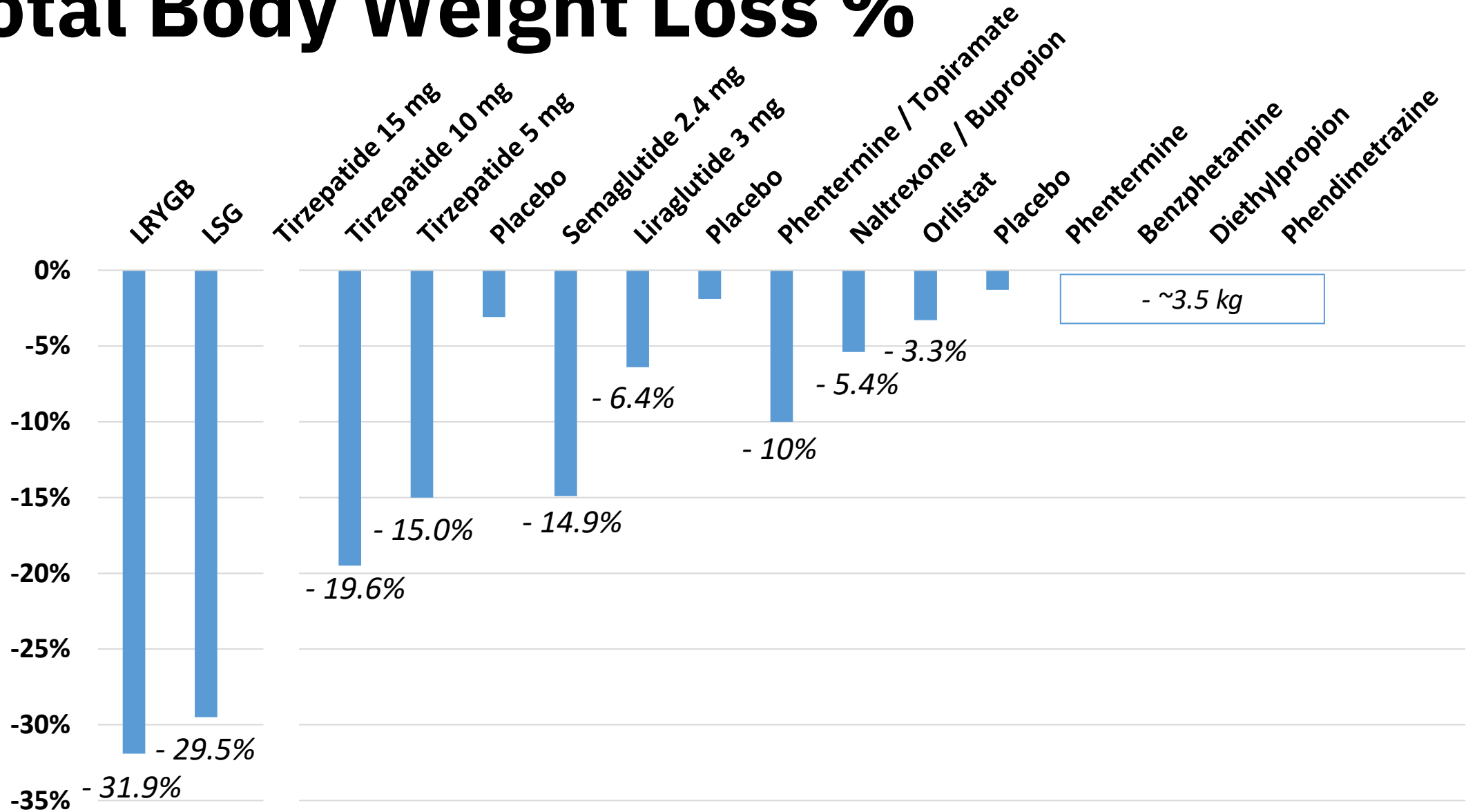
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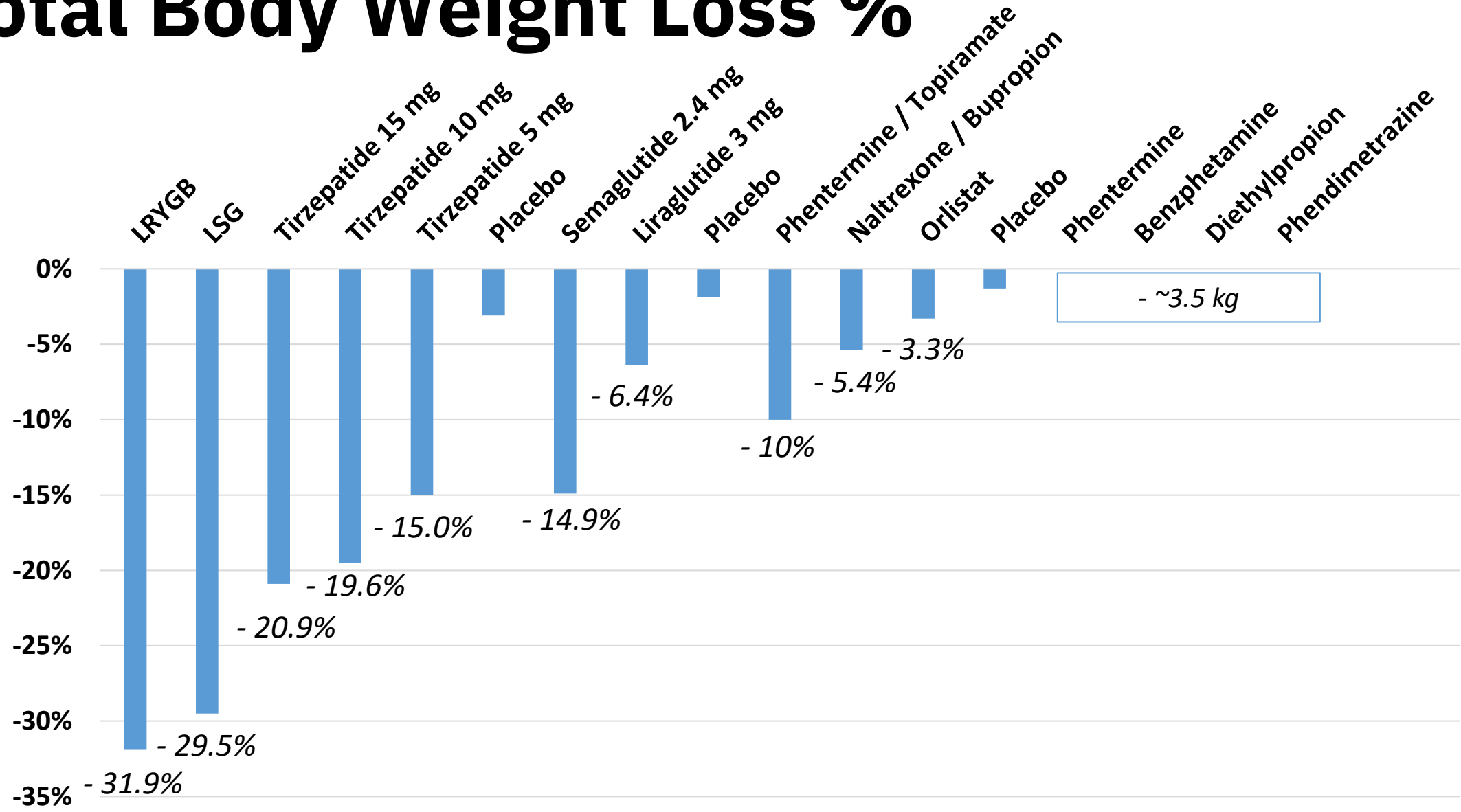
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- Fun Facts (and non-fact phenomena)
- Definitions
- History of AOMs
- **Current Pharmacopeia**
 - Mechanism/Dosing
 - Effectiveness
 - **Side Effects/Adverse Events**
 - Usage
- Implications for Anesthesia and Surgery

Adverse Effects

- Short term (< 12 weeks)
 - Benzphetamine
 - Diethylpropion
 - Phentermine
 - Phendimetrazine
- Long term
 - Orlistat
 - Phentermine/topiramate
 - Naltrexone/bupropion
 - Liraglutide
 - Semaglutide
 - Tirzepatide
- Insomnia, irritability, anxiety, tachycardia, tremor, headache, diarrhea

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- Oily spotting (27%), Flatus/discharge(24%), Fecal urgency (22%)

Adverse Effects

- Short term (< 12 weeks)

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- Oily spotting (27%), Flatus/discharge(24%), Fecal urgency (22%)
- Constipation (15%), paresthesias (14%), dry mouth (14%)

Adverse Effects

- Short term (< 12 weeks)

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- Diethylpropion
- Phentermine
- Phendimetrazine

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- Diarrhea (7%), anxiety (4%), fatigue (4%), tremor (4%)

Adverse Effects

- Short term (< 12 weeks)

- Benzphetamine
- Diethylpropion
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- Nausea (42%), Vomiting (34%), Diarrhea (22%), Low BG (15%)

Adverse Effects

- Short term (< 12 weeks)

- Benzphetamine
- Diethylpropion
- Phentermine
- Phendimetrazine

- Insomnia, irritability, anxiety, tachycardia, tremor, headache, diarrhea

- Long term

- Orlistat
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- Liraglutide
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- Diarrhea (7%), anxiety (4%), fatigue (4%), tremor (4%)
- Nausea (42%), Vomiting (34%), Diarrhea (22%), Low BG (15%)
- Nausea (44%), Diarrhea (30%), Vomiting (24%), Low BG (6%)

Adverse Effects

- Short term (< 12 weeks)

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- Diethylpropion
- Phentermine
- Phendimetrazine

- Insomnia, irritability, anxiety, tachycardia, tremor, headache, diarrhea

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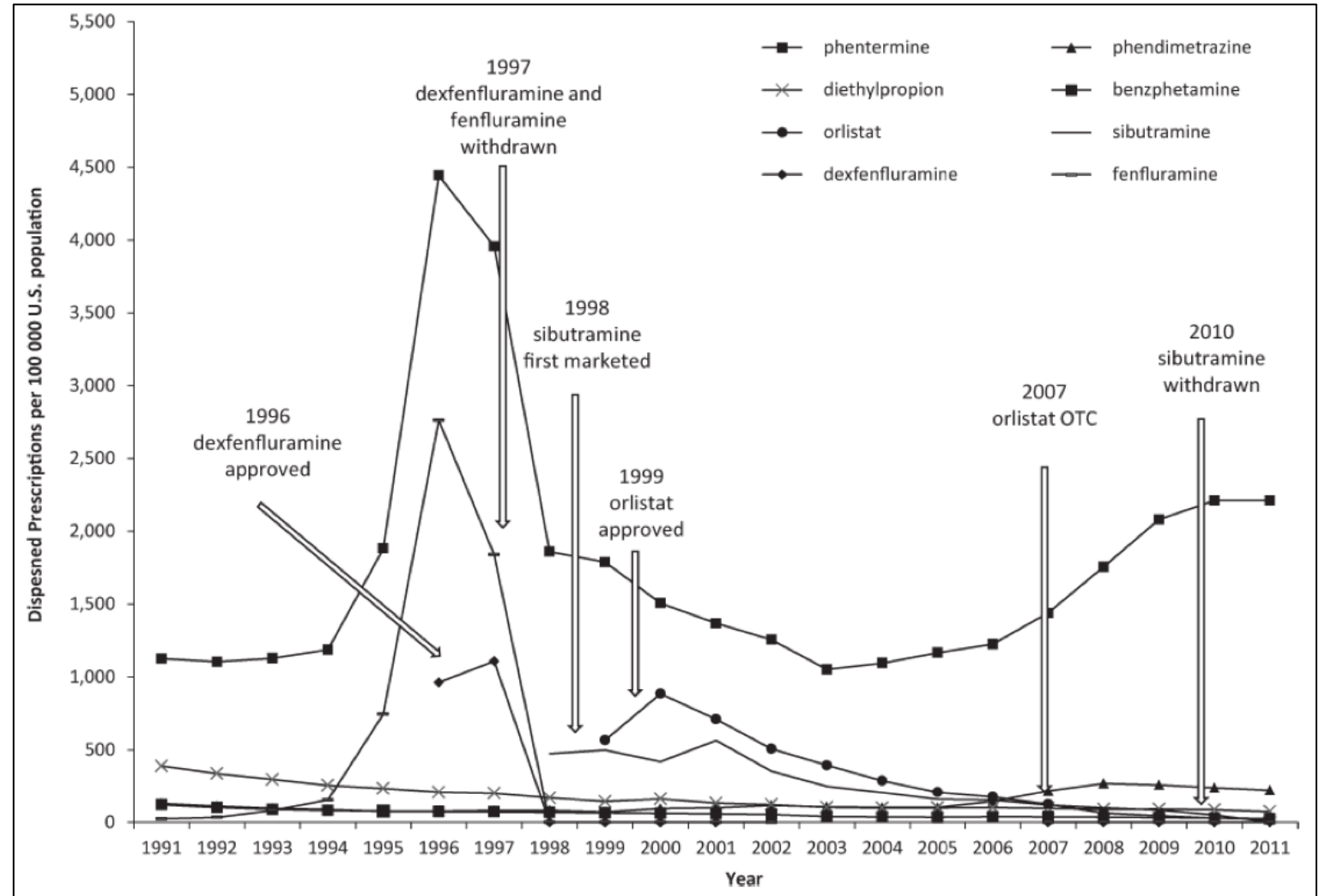
- Oily spotting (27%), Flatus/discharge(24%), Fecal urgency (22%)
- Constipation (15%), paresthesias (14%), dry mouth (14%)
- Diarrhea (7%), anxiety (4%), fatigue (4%), tremor (4%)
- Nausea (42%), Vomiting (34%), Diarrhea (22%), Low BG (15%)
- Nausea (44%), Diarrhea (30%), Vomiting (24%), Low BG (6%)
- Nausea (31%), Diarrhea (23%), Vomiting (12%), Low BG (2%)

Outline

- Fun Facts (and non-fact phenomena)
- Definitions
- History of AOMs
- **Current Pharmacopeia**
 - Mechanism/Dosing
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 - Side Effects/Adverse Events
 - **Usage**
- Implications for Anesthesia and Surgery

Historical Use – Boom or Bust

- 1996: 8,500 per 100,000
- 2011: 2,500 per 100,000 (2.74 M total)
- 2012-2016: 283 per 100,000 (<1M total)
- Phentermine historically dominant (89% in 2011)
- Patients trying to lose weight: 3% reported use of an AOM
- Ineffective Weight Loss (IWL) or Weight Regain (WR) after Bariatric Surgery
 - Use after RYGB and LAGB can produce additional 5% TBWL

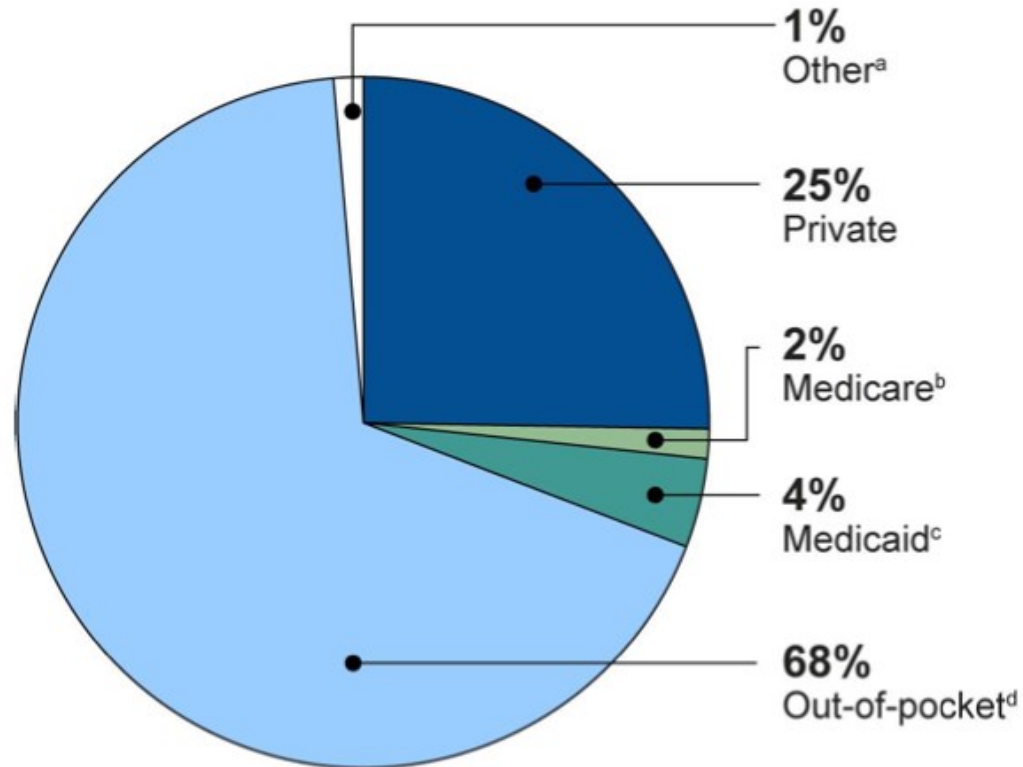


1. Yanovski SZ, Yanovski JA. Long-term drug treatment for obesity: a systematic and clinical review. *JAMA*. 2014 Jan 1;311(1):74-86.
 2. Hampp C, Kang EM, Borders-Hemphill V. Use of prescription antiobesity drugs in the United States. *Pharmacotherapy*. 2013 Dec;33(12):1299-307.
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Historical Use – Out of Pocket \$\$

- Payment most often out of pocket
- Insurance coverage inconsistent

Figure 2: Estimated Average Annual Estimates of Distribution of Payments for Obesity Drugs by Insurance Type, 2012–2016



Source: Agency for Healthcare Research and Quality's estimates from the Medical Expenditure Panel Survey, 2012-2016. | GAO-19-577

1. Yanovski SZ, Yanovski JA. Long-term drug treatment for obesity: a systematic and clinical review. *JAMA*. 2014 Jan 1;311(1):74-86.
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Future Projections (as of 2023)

- > 70 Million Americans with Obesity
- Previous peak AOM use: 1996
 - Fen-Phen Fad, 8,500 rx/100,000 people
- 8,500 per 100,000 x 71M Obese = **>6M prescriptions**

1. Yanovski SZ, Yanovski JA. Long-term drug treatment for obesity: a systematic and clinical review. *JAMA*. 2014 Jan 1;311(1):74-86.

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Businessweek | Feature

Good Luck Paying for Those \$10,000 Obesity Drugs Everyone's Talking About

Ozempic, Wegovy and Mounjaro can cause dramatic weight loss, and could create a market worth \$150 billion a year.

By [Emma Court](#) and [Robert Langreth](#)
April 27, 2023 at 6:00 AM EDT



Future Projections (as of 2024)

- 93 Million Americans meet criteria for a GLP-1
- 74 Million Americans BMI > 30

- Market Forecast: **20M Prescriptions/yr by 2030**
 - This is not investment advice

- PBM Forecast: **Absolutely not**
 - 1% usage will increase total insurance spend by 5%

HEALTH - DRUGS

North Carolina drops coverage for Wegovy and Ozempic, with implications for anti-obesity drug market projected to hit \$100B by 2030

BY SIMONE FOXMAN, MADISON MULLER AND BLOOMBERG
January 27, 2024 at 1:32 PM EST



Medications like Novo Nordisk's Wegovy and Ozempic have soared in popularity, but are expensive and require long-term use.
GEORGE FREY/BLOOMBERG VIA GETTY IMAGES

List Prices

	<i>weekly</i>	<i>yearly</i>
• Short term		
• Benzphetamine	• \$30	\$1,560
• Diethylpropion	• \$27	\$1,404
• Phentermine	• \$25	\$1,300
• Phendimetrazine	• \$23	\$1,170
• Long term		
• Orlistat (OTC)		
• Phentermine/topiramate		
• Naltrexone/bupropion		
• Liraglutide		
• Semaglutide		
• (Tirzepatide)		

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• Semaglutide	• \$1,349	\$70,148
• Tirzepatide	• \$1,023	\$53,198



BREAKING

Bernie Sanders Calls On Novo Nordisk To Lower Cost Of Ozempic And Wegovy

- | | | |
|---------------|-----------|----------|
| • Semaglutide | • \$1,349 | \$70,148 |
| • Tirzepatide | • \$1,023 | \$53,198 |

Future Projections

- **6M prescriptions * \$50,000 = \$300 Billion**
- **20M prescriptions * \$50,000 = \$1 Trillion**
- **CMS Annual Budget = ~\$1 Trillion**

1. Yanovski SZ, Yanovski JA. Long-term drug treatment for obesity: a systematic and clinical review. *JAMA*. 2014 Jan 1;311(1):74-86.

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American Society of Anesthesiologists Consensus-Based Guidance on Preoperative Management of Patients (Adults and Children) on Glucagon-Like Peptide-1 (GLP-1) Receptor Agonists

Girish P. Joshi, M.B.B.S., M.D., Basem B. Abdelmalak, M.D., Wade A. Weigel, M.D., Sulpicio G. Soriano, M.D., Monica W. Harbell, M.D., Catherine I. Kuo, M.D., Paul A. Stricker, M.D., Karen B. Domino, M.D., M.P.H., American Society of Anesthesiologists (ASA) Task Force on Preoperative Fasting

Glucagon-like peptide-1 (GLP-1) receptor agonists are approved by the Food and Drug Administration for treatment of type 2 diabetes mellitus and cardiovascular risk reduction in this cohort ([see table](#)).¹ In addition, GLP-1 receptor agonists are also used for weight loss. Several entities have recommended to hold these drugs either the day before or day of the procedure.²⁻⁷

For patients on weekly dosing, it is recommended to hold the dose for a week.⁸

As per ASA guidance, June 2023 on GLP-1 RAs and elective surgery:

[Redacted]

[Redacted]

[Redacted]

- There are anecdotal reports that the delay in stomach emptying could be associated with an increased risk of regurgitation and aspiration of food into the airways and lungs during general anesthesia and deep sedation

GLP-1 RA Implications for Bariatric Surgery

- Most effective weight loss medications to date
- Side effects better-tolerated or less severe than earlier medications
- More patients will be asking and using these before and after surgery
- Insurance coverage will continue to vary

GLP-1 RA Implications for Bariatric Surgery

- Durability of effects dependent on continued use
- Effectiveness does not surpass that of bariatric surgery
- Opportunity for on-ramp to comprehensive weight management programs
- Some effects of bariatric surgery are GLP-1 independent

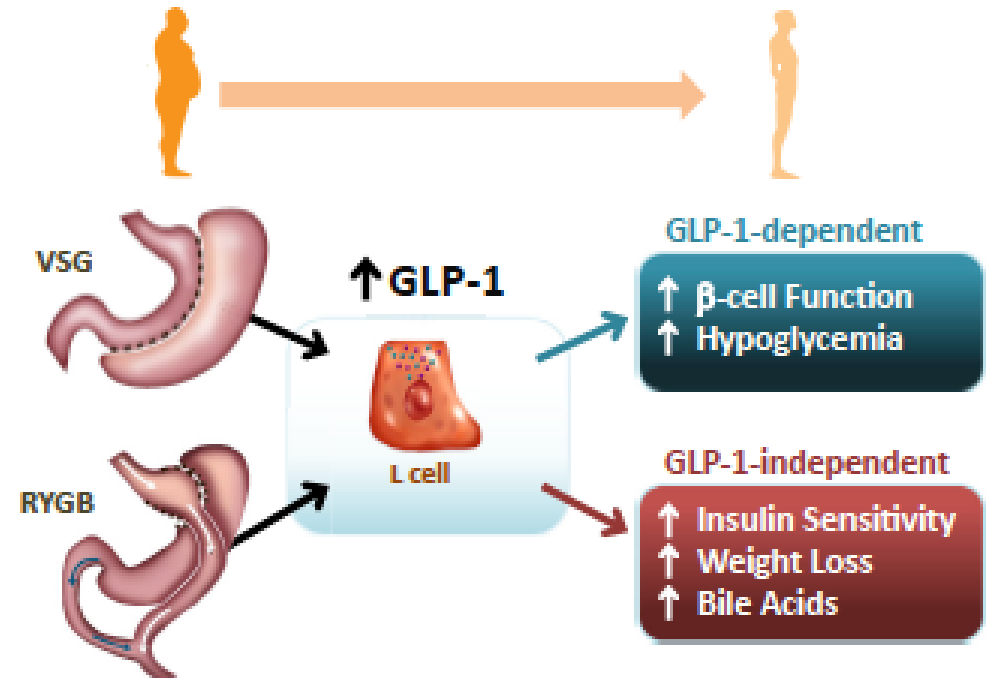


Figure 3. Actions of GLP-1 in the Context of Bariatric Surgery
GLP-1 levels rise following Roux-en-Y gastric bypass (RYGB) or after vertical sleeve gastrectomy (VSG).

GLP-1 RA Implications for Bariatric Surgery

- May eventually increase bariatric surgery utilization
- Important adjunct (adjuvant therapy) for bariatric surgery
- TBWL of 6-9% with GLP-1 RAs
 - 5 years after bariatric surgery
 - Weight regain
 - Ineffective weight loss
- Relationship between GLP-1 RAs and bariatric surgery needs further study

1. Lautenbach A, Wernecke M, Huber TB, Stoll F, Wagner J, Meyhöfer SM, Meyhöfer S, Aberle J. The Potential of Semaglutide Once-Weekly in Patients Without Type 2 Diabetes with Weight Regain or Insufficient Weight Loss After Bariatric Surgery-a Retrospective Analysis. *Obes Surg.* 2022 Oct;32(10):3280-3288.
2. Jensen AB, Renström F, Aczél S, Folie P, Biraima-Steinemann M, Beuschlein F, Bilz S. Efficacy of the Glucagon-Like Peptide-1 Receptor Agonists Liraglutide and Semaglutide for the Treatment of Weight Regain After Bariatric surgery: a Retrospective Observational Study. *Obes Surg.* 2023 Apr;33(4):1017-1025. doi: 10.1007/s11695-023-06484-8. Epub 2023 Feb 11. PMID: 36765019; PMCID: PMC9918402.

Conclusions

- Historical use of AOMs has been low
- Limited by significant side effects, small effect size, temporary results
- Out-of-pocket payment has been the norm
- Recent GLP-1 RAs are the most effective AOMs to date
 - Opportunity to strengthen comprehensive weight management
 - Risk of another fad or boom/bust cycle
- Patients will want to know our recommendations

Questions

#23 of 26 · HAs anyone found it at the airport pharmacies?

Reply