

# Patients Who Lose Less Than 20 Pounds on GLP-1 Treatment Lose More Weight After Switching to Phentermine

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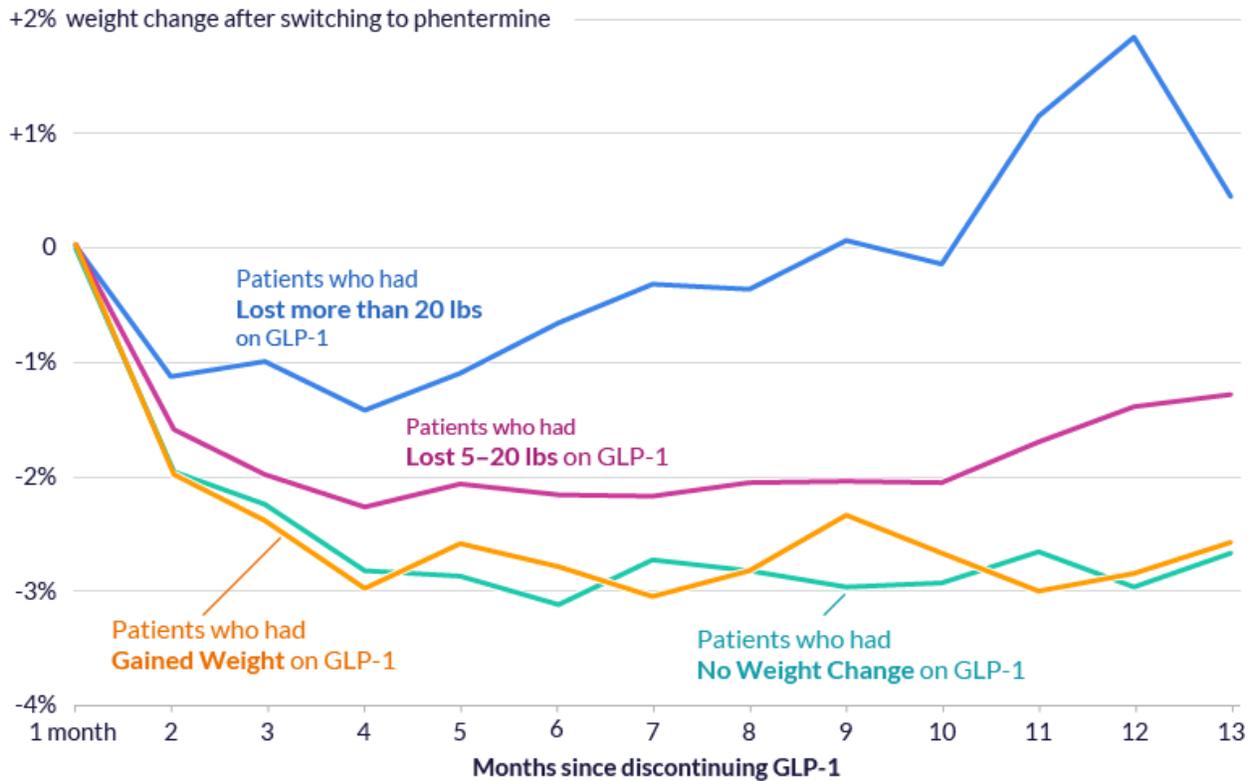
## Key Findings:

- Patients who lost less than 20 pounds on GLP-1 medications and were subsequently prescribed phentermine experienced greater weight loss while on phentermine in the year following GLP-1 treatment than patients who lost at least 20 pounds on the GLP-1 medication.
- Patients prescribed phentermine after discontinuing their GLP-1 medication were 29% less likely to regain all the weight they lost on the GLP-1 medication one year after the end of their GLP-1 treatment compared to those who were not prescribed phentermine (19.3% vs. 27.3%).

Phentermine, one of the earliest FDA-approved weight loss medications, functions by suppressing appetite.<sup>1</sup> To determine whether patients who transitioned to phentermine after discontinuing a glucagon-like peptide-1 receptor agonist (GLP-1) medication maintained or experienced additional weight loss, we studied 7,773 patients who were prescribed phentermine following discontinuation of a GLP-1 medication. We categorized patients based on the amount of weight they lost while on GLP-1 treatment.

Patients who gained weight or maintained their weight while on a GLP-1 medication were most likely to experience weight loss after switching to phentermine with a median weight loss of around 3% in the year after discontinuing the GLP-1 medication. Patients who switched to phentermine after losing at least 20 pounds while on the GLP-1 medication were most likely to regain weight one year after discontinuing their GLP-1 medication, with more than half regaining some or all their weight.

## Median Weight Change on Phentermine by Amount of Weight Lost on GLP-1 Treatment

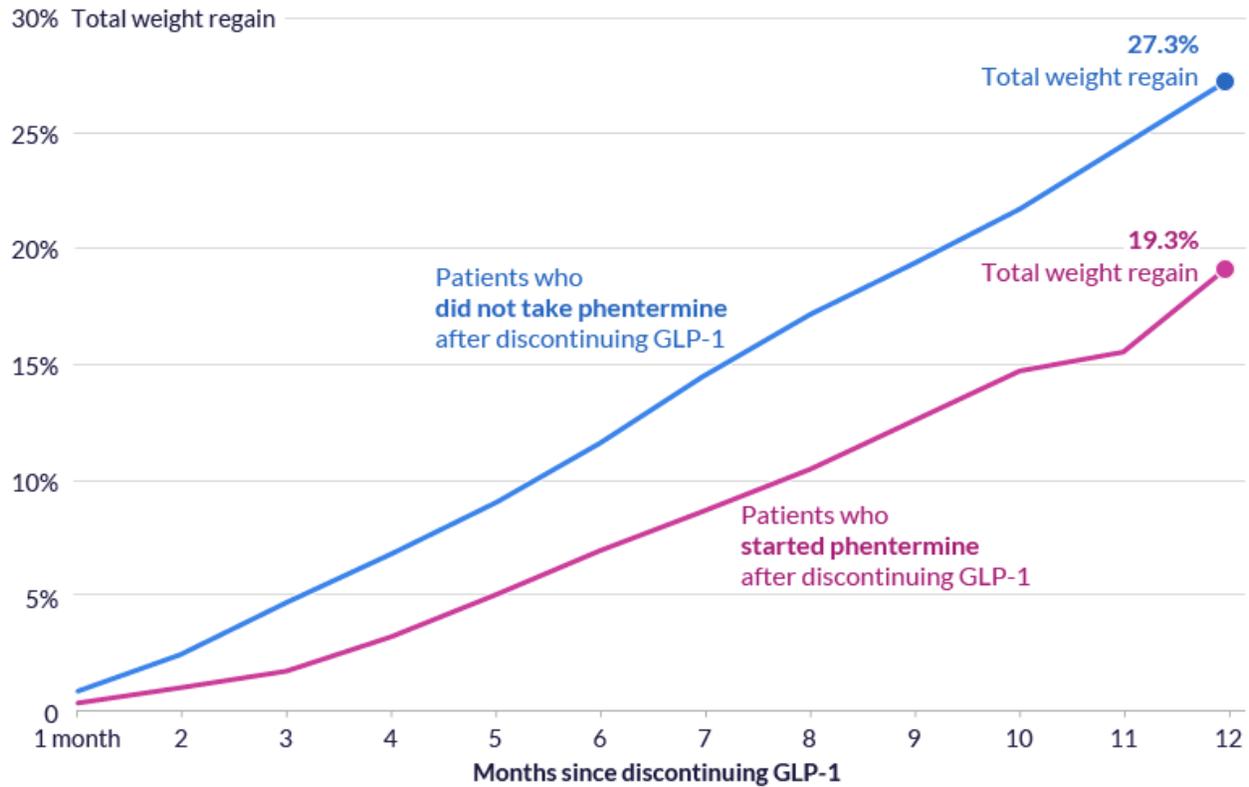


N=7,773 patients \*Median Weight Change on Phentermine by Amount of Weight Lost on GLP-1 Treatment," 2024. EpicResearch.org

Figure 1. The median percentage of weight change after switching from a GLP-1 medication to phentermine by the amount of weight lost while on the GLP-1 medication.

We then evaluated whether patients prescribed phentermine after discontinuation of a GLP-1 medication were more likely to keep their weight off one year later compared to those who did not start phentermine after discontinuing their GLP-1. We found that 27.3% of patients who did not use phentermine after their GLP-1 medication regained all the weight they lost while on the GLP-1 compared to 19.3% of patients who started phentermine after discontinuing their GLP-1.

## Total Weight Regain Rate by Phentermine Use



N=42,441 patients

"Total Weight Regain Rate by Phentermine Use," 2024. EpicResearch.org

Figure 2. The rate of total weight regain by phentermine use after GLP-1 discontinuation.

These data come from Cosmos, a dataset created in collaboration with a community of Epic health systems representing more than 246 million patient records from 1,400 hospitals and more than 32,500 clinics from all 50 states and Lebanon. This study was completed by two teams that worked independently, each composed of a clinician and research scientists. The two teams came to similar conclusions. Graphics by Mark LeBay.

## References

- Davidson K, MScFN, RD, et al. Phentermine for weight loss: Benefits, side effects, and dosage. Healthline. Published January 24, 2019. <https://www.healthline.com/nutrition/phentermine-weight-loss>. Accessed April 16, 2024.

## Data Definitions

Term	Definition
Study period	1/1/2017 – 2/1/2024
Study population	<p>Refill formula derived from UpToDate information about prescription habits of each GLP-1 medication  Days of treatment ((# of Refills + 1) * 28) + 7</p> <p>GLP-1 events of interest must have:</p> <ul style="list-style-type: none"> <li>• Continuous GLP-1 orders for at least 90 days</li> <li>• A BMI &gt;30 at start of GLP-1 treatment</li> <li>• No GLP-1 order in two years following cessation of treatment</li> </ul>

	<ul style="list-style-type: none"> <li>• Pre-treatment weight</li> <li>• Post-treatment weight</li> </ul>
<b>Estimated end of treatment date</b>	<p>Calculated the date following the last end date of a contiguous period of GLP-1 treatment represented by either:</p> <ul style="list-style-type: none"> <li>• The End Date noted on the order</li> <li>• The End Date calculated based on the number of refills as (refills + 1) * 28 after the treatment start date</li> <li>• The end date on the order is prioritized.</li> </ul>
<b>Pre-treatment weight</b>	The average patient weight recorded within the 30 days prior to and 3 days following start of GLP-1 medication prescription
<b>Post-treatment weight</b>	Patient weight recorded within 30 days following the estimated end of treatment date
<b>Pre-treatment BMI</b>	Patient BMI recorded within the 30 days before and 3 days after GLP-1 medication prescription
<b>GLP-1 medication</b>	Any drug with one of the following pharmaceutical classes: ANTI-OBESITY GLUCAGON-LIKE PEPTIDE-1 RECEPT AGONIST ANTIHYPERGLY,INCRETIN MIMETIC(GLP-1 RECEPT.AGONIST) ANTIHYPERGLY,INCRETIN,LONG ACT-GLP-1 RECEPT.AGONIST
<b>GLP-1 medications of interest</b>	<p>Identified by simple generic name and route: Semaglutide – SubQ Liraglutide – SubQ</p> <p>The patient must reach one of the following maximum dosages for the given drug they used during the treatment period: SubQ Semaglutide: 1, 2, 1.7, or 2.4 mg SubQ Liraglutide: 0.6 or 3 mg</p>
<b>Uncertain treatment</b>	If two or more different drugs are prescribed one after another or the dosage does not match a drug on file, we mark the treatment instance drug as “Unsure.”
<b>Obesity class</b>	<p>Not Obese: BMI &lt;30 Class 1 Obesity: BMI Between 30 and 35 Class 2 Obesity: BMI Between 35 and 40 Class 3 Obesity: BMI 40+</p>
<b>Phentermine</b>	Any medication order associated with the RxNorm code 8152
<b>Total weight regain</b>	A post-treatment weight that exceeds the pre-treatment weight
<b>Confounders</b>	<p>Common factors that influence weight loss:</p> <ul style="list-style-type: none"> <li>• Smoking status</li> <li>• Age</li> <li>• Prior weight loss treatment effectiveness</li> <li>• Prior treatment duration</li> <li>• Sex</li> <li>• Race/ethnicity</li> <li>• History of diabetes</li> </ul> <p>Factors that influence access to phentermine:</p> <ul style="list-style-type: none"> <li>• Hypertensive status</li> <li>• Age</li> <li>• Effectiveness of prior treatment regimens</li> <li>• Timing of treatment relative to prior treatment periods</li> </ul>
<b>Smoking status</b>	<p>One of the following: Smoking status of:</p> <ul style="list-style-type: none"> <li>• Former</li> </ul>

	<ul style="list-style-type: none"> <li>• Current Every Day Smoker</li> <li>• Every Day</li> <li>• Heavy Tobacco Smoker</li> <li>• Former Smoker</li> <li>• Light Smoker</li> <li>• Heavy Smoker</li> <li>• Smoker, Current Status Unknown</li> <li>• Some Days</li> <li>• Light Tobacco Smoker</li> <li>• Current Some Day Smoker</li> <li>• Or cigarette pack years greater than 0</li> <li>• Or cigarette packs per day greater than 0</li> </ul>
<b>Diabetes</b>	A diagnosis with SNOMED code 44054006
<b>Hypertensive status</b>	Classification for blood pressures based on the blood pressure taken most recently to the patient's end-of-GLP-1 date: <ul style="list-style-type: none"> <li>• Normal: systolic &lt;120, diastolic &lt;80</li> <li>• Elevated: systolic 120-139, diastolic 80-90</li> <li>• Stage 1 hypertension: systolic 140-159, diastolic 90-100</li> <li>• Stage 2 hypertension: systolic 160-180, diastolic 100-110</li> <li>• Hypertensive crisis: systolic &gt;180, diastolic &gt;110</li> </ul>

**Table 1: Study Population Demographics**

		No Phentermine		Has Phentermine	
Grouping	Subgrouping	Count	Rate	Count	Rate
<b>Overall</b>	Overall	34,668	100.00%	7,773	100.00%
<b>Sex</b>	Female	29,958	86.41%	6,702	86.22%
	Male	4,710	13.59%	1,071	13.78%
<b>Race Ethnicity</b>	White/Non-Hispanic	24,375	70.31%	5,280	67.93%
	Black/Non-Hispanic	5,607	16.17%	1,413	18.18%
	Hispanic or Latino	2,981	8.60%	704	9.06%
	Other/Non-Hispanic	1,705	4.92%	376	4.84%
<b>Age Group</b>	[18,35)	6,125	17.67%	1,855	23.86%
	[35,50)	12,011	34.65%	3,442	44.28%
	[50,65)	12,284	35.43%	2,184	28.10%
	[65,+)	4,248	12.25%	292	3.76%
<b>Study Ingredient</b>	liraglutide	12,826	37.00%	2,771	35.65%
	semaglutide	21,842	63.00%	5,002	64.35%
<b>Hypertension</b>	Normal	7,785	22.46%	1,980	25.47%
	Prehypertension	19,578	56.47%	4,468	57.48%
	Stage 1 Hypertension	5,580	16.10%	1,019	13.11%
	Stage 2 Hypertension	1,082	3.12%	193	2.48%
	Hypertensive Crisis	230	0.66%	29	0.37%
<b>BMI</b>	Class 1 Obesity	9,842	28.39%	2,216	28.51%
	Class 2 Obesity	10,460	30.17%	2,342	30.13%

	Class 3 Obesity	14,366	41.44%	3,215	41.36%
Weight Loss on GLP-1 Group	[20,+)	3,962	11.43%	914	11.76%
	[5,20)	9,330	26.91%	2,107	27.11%
	No Change	13,644	39.36%	3,051	39.25%
	Gained Weight	7,732	22.30%	1,701	21.88%
Smoking Status	Non-Smoker	20,856	60.16%	4,963	63.85%
	Smoker	11,503	33.18%	2,288	29.44%
Duration	[90,180)	16,452	47.46%	3,672	47.24%
	[180,270)	7,684	22.16%	1,729	22.24%
	[270,365)	4,048	11.68%	918	11.81%
	[365,+)	6,484	18.70%	1,454	18.71%

Table 2: Median Weight Change by Weight Lost on GLP-1

	[20,+)				[5,20)			
	Patients	Median Weight Change	95% CI Low	95% CI High	Patients	Median Weight Change	95% CI Low	95% CI High
Month								
0	1,379	0	0	0	3,088	0	0	0
1	620	-1.1%	-1.5%	-0.7%	1,372	-1.5%	-1.8%	-1.3%
2	540	-1.0%	-1.3%	-0.7%	1,214	-2.0%	-2.2%	-1.8%
3	526	-1.4%	-1.9%	-1.0%	1,128	-2.3%	-2.6%	-2.0%
4	409	-1.1%	-1.8%	-0.3%	974	-2.1%	-2.4%	-1.7%
5	361	-0.7%	-1.7%	0.0%	818	-2.1%	-2.6%	-1.6%
6	333	-0.3%	-1.3%	0.5%	801	-2.2%	-2.7%	-1.6%
7	307	-0.3%	-1.2%	0.7%	690	-2.0%	-2.8%	-1.5%
8	257	0.1%	-0.9%	1.5%	610	-2.1%	-2.7%	-1.4%
9	234	-0.1%	-0.9%	1.5%	605	-2.1%	-2.8%	-1.5%
10	226	1.1%	-0.1%	2.0%	540	-1.7%	-2.6%	-1.0%
11	204	1.8%	0.0%	2.9%	488	-1.4%	-2.0%	-0.6%
12	183	0.5%	-1.1%	1.9%	527	-1.2%	-2.4%	-0.2%

	Gained Weight				No Change			
	Patients	Median Weight Change	95% CI Low	95% CI High	Patients	Median Weight Change	95% CI Low	95% CI High
Month								
0	2,495	0	0	0	4,342	0	0	0
1	1,121	-1.9%	-2.2%	-1.7%	1,880	-2.0%	-2.1%	-1.8%
2	965	-2.4%	-2.7%	-2.2%	1,658	-2.3%	-2.5%	-2.2%
3	915	-3.0%	-3.3%	-2.6%	1,600	-2.8%	-3.1%	-2.5%
4	738	-2.6%	-2.9%	-2.1%	1,269	-2.9%	-3.3%	-2.5%

5	627	-2.8%	-3.3%	-2.4%	1,189	-3.1%	-3.5%	-2.7%
6	624	-3.0%	-3.8%	-2.4%	1,138	-2.7%	-3.2%	-2.4%
7	583	-2.9%	-3.5%	-2.2%	999	-2.8%	-3.2%	-2.3%
8	532	-2.3%	-3.2%	-1.8%	899	-2.9%	-3.5%	-2.4%
9	469	-2.7%	-3.3%	-2.2%	850	-2.9%	-3.6%	-2.4%
10	463	-3.0%	-3.8%	-1.8%	753	-2.7%	-3.2%	-2.0%
11	431	-2.9%	-3.6%	-1.9%	739	-3.0%	-3.7%	-2.5%
12	456	-2.6%	-3.2%	-1.4%	711	-2.7%	-3.3%	-2.2%

**Table 3: Total Weight Regain Overtime**

Month	Control		Phentermine		Rate of Total (100%) Regain	
	TW Regain	Total	TW Regain	Total	Phentermine Rate	Control Rate
1	126	13,193	17	3,021	0.6%	1.1%
2	221	8,498	22	2,162	1.3%	4.3%
3	350	7,402	38	1,963	2.8%	7.4%
4	465	6,646	57	1,768	4.3%	9.3%
5	539	5,891	79	1,558	8.1%	11.4%
6	616	5,234	95	1,379	9.1%	14.0%
7	681	4,670	106	1,233	9.9%	16.2%
8	713	4,112	114	1,079	11.7%	17.9%
9	704	3,604	121	955	12.6%	17.0%
10	673	3,105	119	805	15.0%	16.8%
11	632	2,573	104	668	12.0%	20.3%
12	531	1,944	96	497	17.2%	21.4%