

GLP-1 Side Effects and the Dose

The side effects in the news, how often they happen, and why the right dose differs from person to person

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The stories

An earlier paper on this site, *Is Taking a GLP-1 Drug Cheating?*, argued that appetite is regulated by GLP-1 and that many people with the so-called metabolic syndrome are deficient in GLP-1. The drug makes up the shortfall, quieting the urge to overeat and enabling common diet and exercise advice to take effect.

This week brought a run of stories about GLP-1 side effects. MIT Technology Review's health newsletter listed hair loss, nail damage, pancreatitis, gallstones, and sudden vision loss. The Daily Beast reported that performers are losing their voices. This paper looks at how often each of these side effects occurs and makes two points. The first is that, apart from nausea, vomiting, and diarrhea, the absolute risks are very small, and side effects that have been counted at more than one dose increase with the dose. The second is that people differ greatly in how much of the drug they need, and those who need only a little are probably the same people most likely to experience side effects from a higher dose. Each trial gave everyone in a group the same dose and doesn't account for this, which is all the more reason to manage the dose carefully with a doctor.

Hamzelou J. The Checkup, MIT Technology Review, 8 October 2026. Oshikanlu T. The Daily Beast, 7 October 2026.

How often each side effect happens

Nausea, vomiting, and diarrhea are the most common side effects and have been well documented. Semaglutide, sold as Ozempic for diabetes and Wegovy for weight loss, is the most widely used GLP-1 drug. STEP 1, the trial that led to approval at 2.4 mg for weight loss, followed 1,961 people for 68 weeks. Nausea affected 44 in 100 people on the drug and 17 in 100 on placebo. Vomiting affected 25 in 100 on the drug and 7 in 100 on placebo. Diarrhea affected 32 in 100 on the drug and 16 in 100 on placebo. Five in 100 people on the drug quit because of stomach trouble, compared with 1 in 100 on placebo.

Wilding JPH et al. N Engl J Med 2021;384:989-1002.

Gallbladder disease is much rarer. A review pooling 76 randomized trials with 103,371 people found about 27 additional cases of gallstones and other gallbladder or bile duct disease for every 10,000 people treated for a year, which is about 3 in 1,000. The extra cases were more common in the weight-loss trials, which use higher doses than the diabetes trials, and they appeared at the higher doses but not at the lower ones. So the risk of gallbladder disease increases with the dose.

He L et al. JAMA Intern Med 2022;182(5):513-519.

Pancreatitis is listed on the product labels, but the trials don't show the drug raising the risk. A 2026 review of 31 placebo-controlled trials of semaglutide and tirzepatide, involving 40,274 people, found about 26 cases for every 10,000 people on the drug and 29 for every 10,000 on placebo over the course

of the trials, and the risk did not differ by dose. A separate review of the tirzepatide trials found no difference among the 5, 10, and 15 mg doses, with about 2 in 1,000 people affected at any dose. The first review is a preprint that hasn't been peer reviewed, and a disease this rare could still hide a small risk, but the trials give no sign of one.

Bakker L et al. medRxiv preprint, March 2026. Benny O et al. Pancreatology 2026;26(4):552-565. MHRA. Drug Safety Update 18(3), 24 October 2024.

Sudden vision loss from a loss of blood flow to the optic nerve, called NAION, was covered on this site in Does GLP-1 Make You Blind? Five registry studies of people with type 2 diabetes put the rate at about 1 case in 10,000 a year without semaglutide and about 2 in 10,000 with it. The European and UK regulators now list it on the label as very rare, which means up to 1 in 10,000.

Chrzanowski J et al. PLOS Med 2026;23(5):e1005064. MHRA. Drug Safety Update 19(7), 5 February 2026.

Hair loss was studied in US health records, where 547,993 people taking a GLP-1 drug were matched with the same number who weren't. In a year, about 7 in 1,000 of the drug users were diagnosed with hair loss, compared with about 5 in 1,000 of the others, a difference of 2 in 1,000. The extra cases were the shedding that often follows a shock to the body, such as an illness, surgery, or rapid weight loss. The autoimmune kind of hair loss did not increase. The two groups were matched on weight but not on how fast they lost it, so the study can't tell whether the drug or the weight loss caused the shedding. A 2026 review of 24 studies found that semaglutide below 2 mg a week was rarely linked to hair loss, while the higher weight-loss doses were more often linked, and in the Wegovy trials hair loss was about twice as common in people who lost more than a fifth of their weight, 53 in 1,000, as in those who lost less, 25 in 1,000. Most of that evidence comes from drug-safety reports and health records rather than trials, so it points to a dose link without proving one.

Vidal SI et al. JAAD Int 2026;25:133-135. Counts read from the paper's Figure 1 (about 5 diagnoses in 1,000 per year among non-users) and its 12-month odds ratio of 1.40. Gupta AK et al. Sci Prog 2026;109(2):00368504261444578 (systematic review). Wegovy prescribing information, Novo Nordisk.

The nail study can't show that the drug damages nails. It was a questionnaire presented at a dermatology meeting, comparing 575 people with diabetes or obesity who were taking a GLP-1 drug with 1,329 who weren't, in four countries. At least one nail problem was reported by 66 in 100 of the drug users and 53 in 100 of the others, and nails lifting off the nail bed by 39 in 100 against 9. But half the drug users had nail problems before they started the drug, no one examined their nails, the work hasn't been peer reviewed, and it was paid for by a company that sells nail products. It is not evidence that the drug causes nail problems.

Piraccini BM et al. EADV Congress 2026, press release 1 October 2026.

The story about performers losing their voices is an anecdote. It rests on a single Broadway vocal coach who told the Daily Beast she now sees what she calls "GLP-1 dryness" in her clients, and there is no study or count to support it.

Oshikanlu T. The Daily Beast, 7 October 2026.

Overall, the side effects in the news are rare. Gallbladder disease occurs in about 3 cases for every 1,000 people treated for a year; hair loss in about 2 in 1,000; and sudden vision loss in about 1 in 10,000. The

nail and voice stories have no real evidence behind them. The common side effects are gastrointestinal, and even there, only 5 in 100 people quit the drug because of them.

Side effects rise with the dose

The common stomach effects and gallbladder disease increase with the dose, and this is clearest in trials that gave different groups different doses. Hair loss probably does too. Vision loss has never been counted by dose, and pancreatitis shows no link to the dose in the trials.

Tirzepatide, sold as Mounjaro and Zepbound, acts on GLP-1 and a second gut hormone, GIP. In its diabetes trials, nausea affected 4 in 100 people on placebo, 12 in 100 on the lowest dose, 15 on the middle dose, and 18 on the highest, and vomiting affected 2, 5, 5, and 9 in 100. The extra gallbladder disease described above appeared only at the higher doses.

Gallwitz B. Front Endocrinol 2022;13:1004044, Table 3, pooling SURPASS-1 and SURPASS-5. He L et al. JAMA Intern Med 2022;182(5):513-519.

Semaglutide shows the same pattern. In STEP 2, people with type 2 diabetes were given either 1 mg or 2.4 mg, and stomach side effects were reported by about 58 in 100 on the lower dose and 64 in 100 on the higher. In STEP 1, everyone started at 0.25 mg and was titrated up every four weeks to 2.4 mg, and nausea was worst during those 16 weeks of titration. The label allows people who can't tolerate 2.4 mg to stay at 1.7 mg.

Davies M et al. Lancet 2021;397:971-984. Wilding JPH et al. N Engl J Med 2021;384:989-1002. Wegovy prescribing information, Novo Nordisk.

Outside a trial, the dose can be far higher than intended. About 1 in 5 users takes a compounded product rather than the branded pen. In July 2024, the FDA reported that patients drew 5 to 20 times the intended dose from compounded vials, and prescribers miscalculated by 5 to 10 times because the vials come in different strengths and the instructions are given in "units". The people in those reports had nausea, vomiting, fainting, dehydration, pancreatitis, and gallstones.

Gallup, National Health and Well-Being Index, June 2026 (18 to 19 in 100 current users on compounded product). FDA. Dosing errors associated with compounded injectable semaglutide products, 26 July 2024.

Nobody has counted side effects by dose outside the trials, and the stories don't specify what dose their subjects were taking, so we can't tell how many were simply getting too much.

People differ in how much they need

The same dose can have very different effects in different people. Some lose a great deal of weight on a low dose, while others lose little even at the top dose. In my case, I lost weight without ever going above 1 mg. That is one person's experience, an anecdote, but the trials show the same spread.

In STEP 1, everyone on the drug was titrated to 2.4 mg. Of those still in the trial at 68 weeks, about a third lost at least a fifth of their body weight, while about 14 in 100 lost less than a twentieth. Some of that spread comes from people missing doses, since about 81 in 100 kept taking the drug as planned, but the range is too wide to mean that one dose suits everyone.

Wilding JPH et al. N Engl J Med 2021;384:989-1002 (share of people reaching each level of weight loss at 68 weeks).

Trial comparisons of doses show that a lower dose is sufficient for many people. In SURMOUNT-1, 85 in 100 people on the lowest dose of tirzepatide, 5 mg, lost at least a twentieth of their body weight, compared with 91 in 100 on the highest dose of 15 mg. In STEP 2, people with type 2 diabetes on 1 mg of semaglutide lost 70 pounds for every 1,000 pounds of body weight, compared with 96 on 2.4 mg. On average, the lower dose did most of the work.

Jastreboff AM et al. N Engl J Med 2022;387:205-216. Davies M et al. Lancet 2021;397:971-984.

Why the dose should be managed with a doctor

People differ in how sensitive they are to the drug. A person who is sensitive probably needs less of it to lose weight, and the same sensitivity probably makes a higher dose more likely to cause side effects. If that is right, the people pushed past the dose they need are the ones most likely to suffer for it. Trials comparing doses support this, since most people already lost meaningful weight on the lower dose and the higher dose added side effects, although no trial has yet matched each person's side effects to the dose they actually needed.

None of the studies in this paper account for this. Each study gave everyone in a group the same dose on the same schedule, so its side-effect counts mix people who needed that dose with people who needed much less, and it can't show whether the people with side effects were the ones getting too much. I can find no trial that compared a fixed schedule with adjusting each person's dose to how they respond.

That is all the more reason to manage the dose carefully with a doctor, because the right dose for one person can't be read off a trial average and must be found by watching how that person responds. The goal is the lowest dose that quiets the urge to overeat enough for the diet and exercise advice to take effect, because that is what the drug is for. Whether to start, at what dose, and how fast are decisions for you and your doctor.

Takeaway

Apart from nausea, vomiting, and diarrhea, the side effects in the news are rare, and those measured at more than one dose increase with the dose. People also vary in how much of the drug they need, and in the trials many did nearly as well on a lower dose. So many of the side effects probably occur in people taking more than they need. In the trials that compared doses, most people already lost meaningful weight on the lower dose, and the higher dose added side effects. The dose should be determined with a doctor, based on how the patient responds, not by following a fixed schedule to the maximum.

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This paper is educational and is not medical advice. Decisions about starting, continuing, dosing, or stopping any medication belong with you and your physician.