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# The Benefits of Scientifically Formulated Meal Replacements in a GLP-1 Nutrition Plan

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## Introduction

According to data published by the National Center for Health and Statistics in 2024[1] and the National Diabetes Statistics Report,[2] the rate of adults with obesity is 40.3 percent, while the rate of adults with type 2 diabetes, a known risk factor for obesity, is 14.7 percent. The rate of undiagnosed type 2 diabetes is estimated to be 22.8 percent of adults. As the rates of adults with obesity and type 2 diabetes increase, the popularity of GLP-1 RA medications like Ozempic, Wegovy and Zepbound also continues to rise, with an estimated 12 percent of adults reporting that they've tried a GLP-1 RA medication.[3]

While GLP-1 medications are efficacious, meeting the recommended daily allowance (RDA) for macro- and micronutrients have presented challenges for patients for several reasons. First, gastrointestinal (GI) side effects such as nausea, vomiting, diarrhea, and constipation can lead to reductions in caloric intake. Second, GLP-1 medications have an anorexigenic effect, which causes a loss of appetite. Additionally, GLP-1 RAs promote feelings of satiety.[4] Another challenge GLP-1 patients face is preserving lean muscle mass. Preservation of lean mass is important because it is metabolically active, and it supports bone and skeletal health. Because GLP-1 RA medications reduce appetite, promote satiety, and delay gastric emptying, protein intake could be affected. Protein is not only important for lean mass preservation but also for promoting satiety. Protein takes longer to digest than other macronutrients like carbohydrates and fats, and it is also implicated in the production of cholecystokinin (CCK), a hormone that sends a satiety signal to one's brain. The anorexigenic effect of GLP-1 RA medications, coupled with their satiety effect, can present challenges, making it difficult for patients to meet the recommended daily allowance (RDA) for protein intake.

Additionally, once patients discontinue their GLP-1 medication, there is a risk of weight re-gain. A 2022 study reported[5] that one year after discontinuing their GLP-1 medication, patients regained two-thirds of the weight they lost. Evidence suggests[6] using scientifically formulated meal replacements (compared to more traditional calorie restrictive diets) results in significant weight loss at one year. The benefits of pairing a scientifically formulated MR with a GLP-1 medication include meeting the RDA for macro- and micronutrients, preserving lean mass, and managing GI side effects associated with these medications.

## The Benefits of Scientifically Formulated Meal Replacements as Part of as GLP-1 Medication Nutrition Plan

As with any medication, adherence to a GLP-1 RA medication regimen can be a clinical challenge. Adherence to the daily dosage is important for achieving positive outcomes, such as clinically significant weight loss or glycemic control. One barrier to adherence is GI side effects. A scientifically formulated meal replacement (MR) can help with GLP-1 RA medication adherence while also ensuring nutritional needs are being met.



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Scientifically formulated meal replacements, prepared liquids (e.g., pudding shakes or drinks) or discrete foods (e.g., protein bars), are used in place of one or two daily meals. MRs consumed in the form of a liquid or shake can mitigate GI side effects, such as feeling overly full, which can lead to nausea. Because liquid passes more quickly through the digestive system, the chances of experiencing nausea can be mitigated. MRs are an easy-to-digest, nutritionally dense option to improve adherence among GLP-1 patients.

Two other barriers to adherence are GLP-1 RA cost and tolerability. For some patients, insurance will not cover the cost, and they cannot afford to pay out of pocket. There are also some patients who are just not able to tolerate a GLP-1 RA medication. Integrating a scientifically formulated meal replacement can also benefit these patients.

Adherence is a modifiable behavior that can be supported with the use of scientifically formulated MRs. MRs offer a convenient nutrition-rich option for meeting daily RDA for macro- and micronutrients. MRs, as a healthy pre-packaged option, can make meal planning and meal prep more efficient — and they also lay the foundation for building sustainable, long-term healthy eating habits and help mitigate weight regain once the GLP-1 is terminated.

Patients using GLP-1 medications for weight loss and type 2 diabetes management often encounter nutritional challenges due to anorexigenic effects and gastrointestinal side effects. The anorexigenic effects have been reported to contribute to as much as a 45 percent decrease in caloric intake,[7] thus presenting nutrition challenges. Adverse GI events, such as nausea, vomiting, constipation, and diarrhea, can also lead to nutritional deficits. Nutritional deficiencies related to anorexigenic effects and GI side effects can compromise the preservation of lean muscle mass because of inadequate protein intake. Protein is important for supporting weight maintenance, so a GLP-1 RA's anorexigenic effects and GI side effects coupled with the naturally satiating effect of protein can lead to a dietary protein shortfall.

Though considered generally safe, a double-blind study reports that 72.9 percent of participants experienced adverse GI events[8] while more serious side effects like ileus paralysis and gastroparesis are being explored.[9,10]

GLP-1 RA GI side effects can be managed through patient education and diet. For example, guidelines for managing GI side effects include eating easy-to-digest foods, low fat foods, protein, fiber, hydration, and minimizing alcohol and caffeine consumption.[11]

Patients with obesity have been shown to have an inadequate intake of micronutrients, e.g., iron, calcium, vitamins A, B12, C, and zinc, to name only a few,[12] putting them at risk for chronic diseases such as osteoarthritis, cardiovascular disease, psoriasis, cancer, and low-grade inflammation.[13,14] Adding a scientifically formulated meal replacement (MR) can fill these nutrition gaps.

Scientifically formulated meal replacements have several nutritional benefits. They can provide 15–25 grams of protein, 3–6 grams of dietary fiber, vitamins, and minerals to ensure daily nutritional needs are being met and weight loss is occurring at a healthy, sustainable



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pace, particularly when weight loss is medically induced. Scientifically formulated meal replacements help patients feel satiated.[13,15] Meal replacements can shore up daily protein needs while helping GLP-1 patients feel more satiated. Protein is more satiating than carbohydrates, and research has shown that increasing daily protein intake facilitated weight loss. For example, a study investigating the effects of following a high protein diet and a high fat diet, found that participants in the high protein group (30 percent protein, 60 percent carbohydrate, and 10 percent fat energy) felt more satiated throughout the day compared to those in the high fat group (10 percent protein, 30 percent carbohydrate, and 10 percent fat energy).

MRs offer a nutritionally balanced and easy-to-digest option for patients struggling with GI side effects, and they can help with GLP-1 GI side effects. For example, anorexigenic effects can make amplify nutritional deficiencies, so replacing one or two meals with a MR in the form a protein bar or shake can help ensure nutritional needs are being met while also managing common GI side effects like nausea or delayed stomach emptying. Consuming smaller meals — and smaller amounts of high quality protein like those found in scientifically formulated MRs — throughout the day can help manage nausea while mitigating feelings of fullness and stomach discomfort.

## Preserving Lean Muscle Mass While Taking a GLP-1 Medication

Preserving lean muscle mass is a challenge facing GLP-1 patients because of how quickly weight loss can occur. Preservation of lean mass is important because it's metabolically active, and it supports bone and skeletal health. Preventing the loss of lean body mass is an important component of long-term weight loss success.

Long-term weight loss success is correlated with energy expenditure, thus highlighting the importance of increasing protein consumption to reduce adipose tissue and support weight loss and weight maintenance.[16] Diets high in protein can lead to increased energy expenditure and satiety. High-protein diets minimize a decline in resting energy expenditure. The reduction in energy expenditure during active weight loss has been attributed to the decrease in lean mass and metabolically active tissue.[17] Research suggests that dietary protein uses 20 to 30 percent of its usable energy for metabolism and storage.[18] The anorexigenic effect of GLP-1 RA medications has been reported to result in a 35 to 45 percent decrease in daily caloric intake,[7,19] which means that there is a decrease in protein consumption as well as other important macronutrients and micronutrients. During active weight loss, meeting the RDA for protein is crucial.

While there is consensus surrounding the importance of protein for optimal health, there remains some debate over the necessary amount of daily protein for optimal health. The RDA for protein is 0.8 grams of protein for each kilogram of body weight,[20] which is the minimum daily protein intake. Dietary plans that include protein amounts above the RDA have reported greater benefits. For example, a 2015 study[18] reported that consuming 1.2–1.6 g/kg body weight, or >20 percent the RDA, yielded greater benefits for weight loss in the contexts of aging, type 2 diabetes or metabolic syndrome.



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Research evidence for inadequacy of the RDA for protein is mounting in the context of energy restriction and weight loss and the preservation of lean mass. For example, in a study[21] with 130 participants, 66 were randomly assigned to a PRO diet which included 1.6 g/kg of daily dietary protein (~30 percent of energy intake) and 64 were randomly assigned to a CHO which included 0.1 kg/g of dietary protein (~15 percent of energy intake), results suggest that participants in the PRO group lost more weight and lost less lean mas compared to the CHO group. The Acceptable Macronutrient Distribution Range (AMDR) for protein is 7 – 20 percent of daily energy intake,[22] so even increasing protein to 2.5-3.0 g/kg/d would optimize preservation of lean mass without putting patients at risk of exceeding AMDR guidelines.

Furthermore, research suggests that postprandial fullness is higher after consuming 30 grams of protein, which may indicate 30 grams as a satiety threshold;[23] however, it should be noted that no protein ceiling effect has been found.

Another consideration regarding protein is the importance of distributing its consumption throughout the day rather than limiting it or skewing its intake toward one meal.[24] Research notes that most adults have an uneven protein distribution throughout the day, with more than 60 percent of daily protein consumed at dinner.[25] There is some evidence to suggest that consuming >30g of protein via a bolus or pulse meal had positive effects on lean mass or muscle protein synthesis compared to distributing protein throughout the day.[25] However, in a randomized seven-day crossover feeding study,[24] researchers found that consuming a moderate amount of high-quality protein three times per day stimulated muscle protein synthesis better than skewing consumption to a single meal. Although there have been mixed results, current thinking does support protein distribution throughout the day for optimal metabolic regulation, with the goal of 20 grams of protein at each meal to support muscle maintenance and optimal muscle protein synthesis.[25]

## Meal Replacements Facilitate Weight Loss when Paired with a GLP-1 Medication

A meal replacement is a prepared liquid (for example, pudding shakes or drinks) or discrete foods (for example, protein bars) that can be used in place of one or two daily meals. While several commercial-grade meal replacements exist, medically prescribed meal replacements are designed to deliver nutritional benefits to patients with obesity, providing them with the vitamins and minerals needed as part of a healthy diet.[6]

There is strong evidence in support of integrating meal replacements into patients' weight loss program.[26,27] For example, the Almased Concept against Overweight and Obesity Related Health Risk (ACOORH) study found that participants in the meal replacement + lifestyle change group reduced their prevalence of pre-diabetes compared to the control group; normoglycemia was associated with body weight and fat mass reduction.[26,28] In another ACOORH randomized control trial[26] patients lost a greater amount of weight when a meal replacement was part of their weight loss program.



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Pairing a scientifically formulated meal replacement with a GLP-1 RA medication can facilitate weight loss. A 2024[29] non-systematic retrospective chart review of patients with obesity who had been treated with a meal replacement as part of a low calorie (LCD) or very low calorie diet (VLCD) in conjunction with a GLP-1 RA showed an average weight reduction of 24.2 percent, which is larger than what is observed when a MR or GLP-1 RA is used alone.

In a single-center, open-label, randomized, parallel group pilot 12-week study (N = 30), participants with a BMI of 27 – 50 kg/m2 and type 2 diabetes (HbA1c ≥ 48 mmol mol–1/≥ 6.5 percent) were randomly assigned to a semaglutide group (0.25 mg with escalation every two weeks to 1.0 mg), a MR VLCD group (600 kcal per day + 200 kcal allowance for fruits and vegetables), and a combined group (semaglutide + MR VLCD). Greater weight reductions were observed in the MR + VLCD group and the MR + semaglutide group compared to the semaglutide-only group. It's important to note that the greatest weight loss was observed in the MR + semaglutide group.[30]

A randomized controlled trial (N = 53 women with obesity)[31] investigated the effects of GLP-1 RA, GLP-1 RA + lifestyle modification, and a GLP-1 RA + MR for 16 weeks. The GLP-1 RA group (n = 19) was instructed to consume a balanced 1,200–1,500 kcal/d; the GLP-1 RA + lifestyle change (n= 17) attended 20 weeks of group lifestyle modification sessions and instructed to consume a balanced diet of 1,200–1,500 kcal/d; the combined group (n = 17) was given the same instructions as the medication + lifestyle group except that for the first 16 weeks they were instructed to follow a 1,000 kcal/d portion control diet that included a MR. In week 17, this group decreased their MR consumption and by week 20 they were following a 1,200–1,500 kcal/d diet. Results suggest that women in all three groups lost weight, however, the combined group lost significantly more weight than the GLP-1 RA and GLP-1 RA + lifestyle change groups, suggesting that pairing MR with a GLP-1 medication enhances weight loss. At the end of one year, the combined group lost the most weight.

Evidence from randomized control trials is mounting in support for concomitant use of a MR + GLP-1 RA. For example, the SCALE maintenance study (N = 422)[32] found a six percent weight reduction by pairing a LCD with a GLP-1 RA, a 12 percent weight reduction was observed after eight weeks of a LCD + GLP-1 RA over a one year period (N = 52),[33] and the STEP-3 (N = 611) also found that weight loss was enhanced a GLP-1 RA compared with a MR alone (Wadden, et al, 2021),[34] though it should be noted that the STEP-3 study did not have data beyond the eight week mark. However, a smaller RCT (N = 19) that lasted 12 weeks also found support for the simultaneous use a GLP-1 RA and a MR.[35]

## Meal Replacements Support a Behavior-Based Approach to Weight Loss

Continuation of poor habits can be an impediment to achieving weight-loss goals. GLP-1 RA medications work best when paired with lifestyle changes. GLP-1 medications may not be tolerated for long-term use, so lifestyle changes are more likely to facilitate sustainable long-term healthy eating habits and balanced nutrition once the GLP-1 medication is terminated. Dietary lifestyle includes building grocery lists around healthy options and preparing meals at home that include approximately 15–25 percent of calories from protein, 20–35 percent from



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fat, and the balance from carbohydrates.[36,37] The efficacy of meal replacements while taking a GLP-1 is well documented,[38,39] so introducing a meal replacement prior to GLP-1 termination should be part of the foundation of healthy lifestyle changes.

Results from the STEP-1 trial extension showed that one-year post-semaglutide participants regained two-thirds of their weight loss and that cardiometabolic characteristics were also affected.[40] In addition to dietary lifestyle changes, cognitive and behavioral strategies can effectively help patients with obesity or type 2 diabetes regulate food intake. Cognitive approaches support satiety and offer adaptive coping strategies for managing hunger and food cravings.[36]

Once patients terminate their GLP-1 medication, there is a risk of weight re-gain. Evidence suggests[6] that using scientifically formulated meal replacements — compared to more traditional calorie-restrictive diets — results in significant weight loss at one year. The benefits of pairing a scientifically formulated MR with a GLP-1 medication include meeting the RDA for macro- and micronutrients, preserving lean mass, and managing GI side effects associated with these medications, while also laying the groundwork for post-GLP-1 sustainable eating habits.

## Conclusion

The benefits of pairing scientifically formulated meal replacements with a GLP-1 medication include meeting the RDA for macro- and micronutrients, preserving lean mass, and managing GI side effects associated with these medications. Protein is a key dietary consideration because it is metabolically active and it preserves lean muscle mass. Using meal replacements can help patients lose weight, manage GLP-1 RA side effects, and lay the foundation for long-term, sustainable healthy habits while ensuring that nutritional needs are being met. Additionally, using scientifically formulated meal replacements can help patients build sustainable, long-term healthy eating habits.



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