In Brief

Given the number of individuals with diabetes who are overweight or obese, it is essential for diabetes educators to familiarize themselves with evidence related to common questions patients have when they set a goal to lose weight. Educators need to work with patients to help them develop a realistic approach to weight loss that is consistent with their diabetes management goals.

Current Trends in Weight Management: What Advice Do We Give to Patients?

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The prevalence of overweight U.S. adults has increased dramatically during the past 30 years,[1,2] with type 2 diabetes representing what is perhaps the most serious obesity-related consequence.[3] At least 14 million Americans have been diagnosed with type 2 diabetes, and this number seems to be rising in parallel to the growth of the obesity epidemic.[4] Nearly 90% of individuals with type 2 diabetes are overweight.[5]

The American Diabetes Association has stated that modest weight loss (5–10%) and reduced energy intake will help insulin-resistant individuals improve their glycemic control.[6] In addition, the medical community has increasingly recognized the need to integrate weight management into diabetes care.[7,8] However, health professionals, including diabetes educators, are often competing with the media to give weight-loss advice. Information is, at times, overabundant, fads are common, and there is seemingly little consensus regarding what works. Given the sheer magnitude of diabetes and obesity-related health concerns, it is essential that

diabetes educators provide evidence-informed responses to the common questions patients ask. The purpose of this article is to briefly summarize the state of the evidence related to some common weight-loss questions.

Question: How much weight can individuals expect to lose from a weight-loss program? If patients set unrealistic goals, does it affect their success?

Answer: People participating in weight-loss programs that include both a lower-calorie eating plan and exercise can expect to lose about 11–24 lb over 6 months, at which time weight loss generally plateaus.[9,10] For most, this translates to the recommendation to lose 5–10% of body weight for health benefit.[11] However, this is often less than patients expect to lose when initiating a weight-loss program. Patients typically expect a weight loss of two to three times what is recommended or expected upon entering treatment.[12,13] Even when patients are advised about what to expect, they still anticipate an unrealistic weight loss.[12]

Do such expectations affect treatment outcomes? The common assumption is that unrealistic expectations inhibit program effectiveness, that they are psychologically damaging, and, thus, they should be discouraged by practitioners. These assertions do not seem to hold up, however, in weight-loss research. At least six trials have prospectively examined the association between weight-loss goals, dream weights, and actual weight loss.[14–19] In terms of weight loss, most actually found a positive benefit to unrealistically large weight-loss goals and thin dream weights. No study observed a negative association between these factors.

Bottom line: Patients can expect to lose about 11–24 lb when they eat less, exercise more, and consistently maintain those behaviors over 6 months. This amount is much less than most patients desire, but what they desire seems to matter little in terms of the weight-loss results. Diabetes educators should inform their patients about typical weight-loss results (i.e., what they can expect to lose), but in most cases, do not need to be overly concerned if expectations are unrealistically high. That being said, the ongoing focus of weight-management goals should be on desired behaviors, which are under more immediate control relative to weight loss.

Question: What macronutrient composition is best to promote weight loss?

Answer: Most systematic reviews have concluded that weight loss is primarily caused by eating fewer calories (over a sustained period), which produces an energy deficit regardless of macronutrient composition. The majority of these studies used low-fat, lower-calorie diets.[20,21] More recently, several randomized controlled trials have compared low-carbohydrate diets with standard, low-fat, hypocaloric diets. A meta-analysis[22] of these randomized controlled trials that included 447 individuals found that, after 6 months, those following a low-carbohydrate non–energy-restricted diet lost more weight than those on a low-fat diet (–11.7 to –3.0 lb; weighted mean difference, –7.3 lb). The mean difference was no longer obvious at 1 year (–7.7 lb to 3.3 lb; weighted mean difference, –2.2 lb). However, a recent study[23] observed greater weight losses at 1 year in individuals following a low-carbohydrate Atkins diet (–10.3 lb) relative to the higher-carbohydrate Zone diet (–3.5 lb). When considering the macronutrient composition of the diet, other important considerations include whether individuals can sustain the eating plan and the anticipated health benefits of the diet. Limited evidence is available to answer these questions, and it is difficult to extrapolate results of studies using low-carbohydrate diets because most to date have had a small number of participants, poor adherence to the diet, and high dropout rates.

Bottom line: Low-carbohydrate diets (i.e., < 130 g/day) may be safe and effective in the short term, but limited evidence is available to support using them beyond 1 year, and they are not recommended in the management of diabetes.[6] Often, low-carbohydrate diets restrict foods such as fruits, vegetables, whole grains, legumes, and low-fat milk, which are important for good health. The Recommended Dietary Allowance for carbohydrate is an average minimum of 130 g/day.[24] Diabetes educators should work with patients to develop an eating plan that is both realistic for them to follow and helps them achieve their metabolic goals (i.e., control of blood glucose, lipids, and blood pressure).

Question: Can using the glycemic index (GI) contribute to weight loss?

Answer: The GI was first introduced in 1981 as a way to categorize foods based on how they elevate blood glucose level. Use of the GI originally focused on diabetes management as a way to manage post-meal blood glucose level, but it has more recently received recognition as a possible means to achieve long-term weight management. This is predictably reflected in grocery sales of "low-GI" foods and beverages, which reached roughly $350 million in 2006.[25] Although it appears that consumers are ready to use the GI, the effectiveness of using it for weight management remains highly debatable.

The proposed mechanism by which a low-GI diet is purported to produce weight loss is through *1)* promoting satiety with the thought that a person will eat less at meals and subsequent meals/snacks and *2)* promoting fat oxidation at the expense of carbohydrate oxidation.[26–28] The theory is that if low-GI foods do not elicit a high glycemic response, the release of insulin, an energy storage hormone, is diminished. However, it is not proven that high-GI foods and high insulin levels are correlated; insulin responses do not necessarily correlate with GI levels of foods consumed.

A review of the literature by Raben[29] in 2002 found that in 20 studies comparing high- versus low-GI diets (with duration < 6 months), there was little evidence indicating that a low-GI diet leads to weight loss. Weight loss occurred in four studies, but two studies that used a high-GI diet also observed weight loss, and the remaining studies showed no significant advantage for a low-GI diet.

More recently, low- and high-GI diets in adults have been compared in randomized clinical trials. Sloth et al.[30] conducted a 10-week study in which subjects substituted their typical carbohydrate intake with either low-GI or high-GI carbohydrates. No significant difference in weight loss occurred between the two groups. Raatz et al.[31] compared three diets—high-GI, low-GI, or high-fat—with 500 kcal

less than subjects' estimated energy needs for 12 weeks, with a 24-week follow-up phase. At 12 weeks, weight loss and improved insulin sensitivity were significant in all groups but not different between groups. All groups maintained their weight loss and improved insulin sensitivity independent of diet composition. In a 1-year study, Carols et al.[32] reported that adding GI education to a behavioral weight-loss program did not enhance weight loss.

A 2005 study[33] comparing four diets of varying glycemic load over 12 weeks found that all four energy-restricted diets produced weight loss in varying degrees, but no significant differences were observed. Interestingly, the high-protein/high-GI diet produced the greatest weight loss, whereas the high-carbohydrate/high-GI diet showed the least amount (–11.7 vs. –8.1 lb, respectively).

Bottom line: The GI does not seem to be a particularly effective stand-alone approach for weight loss. At present, it is known that energy restriction determines weight loss and should be the primary focus of intervention efforts.

Question: What is energy density? Is eating low-energy–density foods an effective weight-loss strategy?

Answer: Energy density is the amount of energy in a given weight (or volume) of food (kcal/g). Of all the components in food, water lowers energy density the most because it adds weight and volume but not energy. Water weight accounts for most of the variance in energy density studies (diet volume is simply manipulated by adding water).[34] Energy density can also be lowered by reducing fat content or by adding fiber; however, only a limited amount of fiber can be added to foods, so its effects are limited. Most people think high-fat and high-sugar foods are the most energy-dense foods, but that is not always the case. Fat increases energy density more than carbohydrates or protein, but the most energy-dense foods are actually "dry" foods, such as candies, chips, pretzels, dried fruit, and nuts and seeds.[34]

Reducing energy density is implicit in nearly all weight-loss diets, and there is some evidence indicating it has direct value.[35] Individuals who follow this type of diet often have a higher diet quality and lower energy intake. In one study, participants who initially lost weight using a low-energy–density diet and maintained their weight loss over 2 years (gained < 5% body weight since completion of the program) or lost additional weight showed a trend toward eating fewer calories and choosing lower-energy–density foods while eating similar volumes of food compared to those who gained weight. Maintainers also limited portion sizes of foods that tend to be higher in energy density.[36] In a clinical trial, advising individuals to eat satisfying portions of low-energy–density foods was more successful than advising to reduce fat and restrict portion sizes. Those who received this advice after 6 months ate significantly more servings of low-energy–density fruits and vegetables than the other group and also had a 40% greater weight loss (19.8 lb) compared to the other group (14.7 lb).[37]

Bottom line: More studies are needed to help understand how energy density affects satiety and food intake. However, the concept seems to be a helpful tool for people who are trying to lose weight. If individuals choose low-energy–density foods (e.g., whole fruits, vegetables, beans and legumes, and soups), they may be able to eat a similar volume of food with fewer calories.

Question: Does protein increase satiety?

Answer: Most people believe that protein increases satiety at a meal, which can result in lower caloric intake and thus weight loss. There is very limited research in this area, however. One study found that eating foods high in protein and fiber, as well as foods with greater water/volume (which leads to lower energy density) may be effective in delaying the return of hunger.[38] Studies evaluating bound-water loss when following a high-protein diet have produced inconsistent results and concluded that protein satiety might actually play a more important role during weight loss than the reduction of total body water.[39]

Although subjects report feeling more satisfied after eating protein, this does not always translate into eating fewer calories. Stubbs et al.[40] in a 1-day study reported that, although subjective hunger was less after a high-protein breakfast compared to a high-fat or high-carbohydrate breakfast, lunch intake 5 hours later and energy intake for the rest of the day were similar after all three breakfasts. Currently, research on satiety is generally very short term, and the effect of satiety on future caloric intake is rarely studied.

Bottom line: The highly satiating effect of protein has been observed after eating a meal, as well as after absorption. The extent to which protein promotes satiety may actually be more related to the type and source of the protein, than just protein itself. However, the background of this satiating effect needs further study. Furthermore, it is unknown if individuals can change protein intake. Most studies are short term, with food provided, and there is limited information on whether individuals can maintain a high-protein diet long term.[41]

Question: What is the nondiet approach? Is there evidence to support the use of a nondiet approach?

Answer: A nondiet approach to weight loss encourages people to follow body cues, such as hunger level and satiety, versus counting calories or restricting food intake. Ultimately, this approach removes the focus on weight with the idea that if a person can achieve the objectives of a healthier lifestyle and self-acceptance, weight loss will likely result.[42] Some key features appear to be promoting self-acceptance, taking steps to improve self-esteem, educating individuals about why diets do not work, and increasing physical activity to gain health benefits.[43]

One of the first studies that compared a traditional weight-loss program to a behavioral choice program (i.e., nondiet program) was published in 1999.[43] Participants were randomly assigned to a traditional behavior therapy (TBT) or a behavioral choice therapy (BCT) program and instructed to follow a 1,200- and 1,800-calorie diet, respectively. Although a calorie level is not typically assigned with the nondiet approach, 1,800 calories was used to model a realistic calorie goal to compare to the TBT group. As was expected, the TBT group lost weight more quickly; however, at the 6- and 12-month measures, the nondiet group contin-

ued to lose weight, whereas the TBT group began to regain weight. This weight pattern was also reflected in a study by Rapoport et al.[44] At the end of 10 weeks, participants who were randomized to the modified cognitive behavior therapy group (the nondiet group that focused on physical activity and healthy eating rather than energy restriction) lost 1.3 kg, and the standard cognitive behavior therapy group (advised to follow a 1,200-calorie meal plan) lost 8.6 lb. At the end of 1 year, the gap between the groups closed as the standard group gained a little weight (mean weight loss 7.9 lb), while the nondiet group continued to lose (mean weight loss 4.4 lb).

The nondiet approach may be of particular benefit to those in need of improving obesity-related health factors and who have been previously unsuccessful with traditional programs. One study found that, although nondiet participants did not lose weight like their dieting counterparts, both groups saw equally significant improvements in metabolic fitness and eating behaviors over 1 year. Additionally, the nondiet group was more likely to stick with the intervention and participate in post-program activities.[45]

Bottom line: A nondiet approach may enhance adherence to otherwise difficult lifestyle changes and improve psychological and possibly metabolic factors, especially for individuals who have been unsuccessful in traditional behavioral programs. More research is needed to determine whether the nondiet approach offers a real weight-loss advantage over standard programs. The higher long-term participation levels of individuals show promise as a strategy to improve health and well-being.

Question: How much exercise do individuals really need to do to lose weight?

Answer: Current public health recommendations for physical activity are clear, but recommendations differ when it comes to weight loss. The Centers for Disease Control and Prevention and the American College of Sports Medicine recommend that "every U.S. adult should accumulate 30 minutes or more of moderate-intensity physical activity most, preferably all, days of the week to promote disease prevention."[46] The recommendation is generally interpreted to mean a minimum of 150 minutes of moderate-intensity activity per week; this amount of activity improves health outcomes, but it is less clear if it facilitates weight loss.

A 2002 report from the Institute of Medicine (IOM)[24] concluded that 30 minutes of physical activity is insufficient for weight loss and suggested that 60 minutes of daily, moderate-intensity activity is necessary to maintain a healthy weight. The IOM recommendation took weight management into consideration, but again, it did not indicate whether this amount is satisfactory for weight loss, but only that it will prevent weight gain.

Few studies attempt to address the research question of how much activity is enough for weight loss. The Studies of Targeted Risk Reduction Interventions Through Defined Exercise, a 5-year randomized controlled clinical trial,[47,48] observed that there is a direct dose-response relationship between the amount of exercise and amount of weight loss. This study also found that 30 minutes of daily walking (equaling about 12 miles/week) prevents weight gain in most sedentary people and that any additional exercise can lead to the loss of weight and body fat. However, in another study by Bond Brill et al.[49] there was no dose-response effect. Thirty minutes of walking most days of the week was as beneficial as 60 minutes, and neither 30 nor 60 minutes of walking resulted in a significantly greater amount of weight loss than diet alone.

Bottom line: Given the relative overlap of recommendations and clinical research, 30 minutes of moderate-intensity physical activity per day seems to be effective in providing substantial health benefits, but for most individuals, it probably does little to enhance weight-loss efforts.[50] For those who are currently meeting this minimum recommendation of 30 minutes per day but who are unable to control their weight, additional exercise of up to 60 minutes per day along with caloric restriction seems to be the next helpful goal to promote weight loss or prevent weight gain. However, for people at risk for diabetes or with diabetes, exercise independent of weight loss improves insulin sensitivity—an important reason to encourage and promote an active lifestyle.

Question: What mode and intensity of exercise is most effective for weight loss?

Answer: Exercise prescriptions for overweight or obese adults should meet at least three minimal objectives: to prevent unhealthy weight gain, to reduce current body weight, and to maintain weight loss over the long term.[51] One factor that influences the effectiveness of an exercise prescription is exercise intensity. According to public health recommendations, the minimum recommended intensity of exercise to produce improved health outcomes is moderate intensity.[46] Moderate-intensity physical activity is defined as activity that invokes an energy expenditure of 3–6 metabolic equivalents.[52] This corresponds to the equivalent of brisk walking at 3–4 miles/hour.

There have been limited studies examining which intensity of exercise is most appropriate for weight loss. In a randomized trial conducted by Jakicic et al.,[53] participants were assigned to one of four exercise groups based on energy expenditure and exercise intensity. The results of this study indicated that all four groups of participants improved their fitness level and achieved weight loss; however, no differences were found between vigorous-intensity exercisers and moderate-intensity exercisers. Additionally, in an earlier study by Duncan et al.,[54] it was found that vigorous-intensity exercisers had greater change in cardiorespiratory fitness than moderate-intensity exercisers but again demonstrated no significant differences in weight loss or body composition. As a result, it is concluded that at least moderate-intensity exercise is beneficial for weight loss, with some enhanced benefits in terms of physical fitness observed with more vigorous activities.[55]

Mode, or type, of exercise is another factor that influences the effectiveness of an exercise prescription. Aerobic exercise (e.g., walking, biking, or swimming) has been the mode generally referred to in public health recommendations. The other category of exercise, resistance training, has not been discussed frequently. The benefits of resistance training during the weight-loss process are apparent; conserving fat-free mass while maximizing fat loss should always be a goal of any weight-loss

program.[55] However, when examining whether resistance training alone facilitates weight loss, the current research has determined that there is little benefit.[55] Nevertheless, resistance training should not be overlooked because the effect it has on muscular strength and ability can greatly affect the functional ability of overweight and obese individuals.[56]

Bottom line: When it comes to exercise for weight loss, what matters most is that an individual is getting enough of it to create an energy deficit. Moderately or vigorously intense aerobic activities can be beneficial in this regard. Individuals with type 2 diabetes who have no contraindications are encouraged to perform resistance exercise three times a week to improve functional abilities and preserve muscle mass while actively losing weight.[57]

Conclusion

Weight loss is often a component of overweight individuals' diabetes management plan. Sustained weight loss of up to 10% can have substantial health benefits. Although successful approaches to weight loss typically involve some form of reduced energy intake and exercise, neither will work if an individual fails to engage in them consistently. Diabetes educators are encouraged to work closely with individuals to set tailored strategies and realistic expectations that can help them work toward both their diabetes management and weight goals. Ongoing support and behavioral strategies are necessary to help individuals sustain lifestyle behaviors necessary to manage weight. Techniques common to successful behavioral weight-loss programs include goal setting, self-monitoring, reinforcement, stimulus control, and problem solving.[58]

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