

# Diets and Dietary Approaches to Weight Loss

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- Complete the questions at the end of the course.
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### Faculty

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### Faculty Disclosure

Contributing faculty, Chelsey McIntyre, PharmD, has disclosed no relevant financial relationship with any product manufacturer or service provider mentioned.

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The division planners and director have disclosed no relevant financial relationship with any product manufacturer or service provider mentioned.

### Audience

This course is designed for all physicians, nurses, and allied professionals involved in the care of patients who are interested in exploring dietary options to weight control.

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### Disclosure Statement

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### Course Objective

The purpose of this course is to provide healthcare professionals in all practice settings the knowledge necessary to counsel patients regarding diets and dietary approaches to weight management.

### Learning Objectives

Upon completion of this course, you should be able to:

1. Describe the risk factors for and complications of overweight and obesity.
2. Compare and contrast the evidence associated with popular dietary strategies for weight loss.
3. Discuss the possible benefits and risks of plant-based diets.
4. Review the benefits and limitations of low-fat and low-carbohydrate diets.
5. Provide counseling points regarding misconceptions with different dietary strategies.

### Pharmacy Technician Learning Objectives

Upon completion of this course, you should be able to:

1. Outline overweight and obesity and the role of diet in reducing weight.
2. Review various approaches to dietary modification.



EVIDENCE-BASED  
PRACTICE  
RECOMMENDATION

Sections marked with this symbol include evidence-based practice recommendations. The level of evidence and/or strength of recommendation, as provided by the evidence-based source, are also included so you may determine the validity or relevance of the information. These sections may be used in conjunction with the course material for better application to your daily practice.

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## OVERVIEW

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### BACKGROUND

Obesity is an epidemic in North America, particularly in the United States. An estimated 74% of adults in the United States are considered to be overweight, and approximately 42% are obese. The prevalence of obesity is highest among Black adults (50%) and Hispanic adults (46%), followed by White adults (41%), and Asian adults (16%). Additionally, approximately 32% of children and adolescents in the United States are considered to be overweight, and about 20% are obese [1].

Obesity is not limited to only the United States. Recent worldwide obesity rates have more than doubled from what they were in 1980. In 2016, approximately 39% of the world's adult population was overweight, and 13% was obese. Furthermore, a majority of the world's current population lives in countries in which obesity causes more deaths than being underweight [2].

Why are so many people becoming overweight? There are several explanations, but the most common reason for obesity is related to consuming more calories than the number of calories burned. This is primarily due to unhealthy eating behaviors and a lack of physical activity, both of which may be the result of environmental and socioeconomic factors that can limit access to healthy, whole foods and safe places to exercise [3].

Due to occupational and societal changes, physical activity has decreased dramatically. Many Americans engage in less than 30 minutes of exercise per week. Other factors of modern life, including sprawling cities and suburbs requiring motorized transportation, video games, computers, escalators, and elevators, also decrease physical activity. For many people, a lack of time is considered a barrier to physical activity, as is a lack of energy or motivation [5]. Americans also have unprecedented access to affordable food options, which may come in the form of prepared foods or eating out, both of which are known to increase overall calorie intake [4].

Although increased intake of calories and decreased physical activity are the two most common reasons for obesity, other factors may contribute. Genetics and family history can affect a person's weight. Also, health conditions, such as hypothyroidism, Cushing syndrome, and polycystic ovarian syndrome (PCOS), may cause a person to become overweight. In addition, some medications, certain emotional factors, smoking cessation, aging, pregnancy, and lack of sleep can contribute to weight gain [3].

### DEFINING OVERWEIGHT AND OBESITY

The World Health Organization (WHO) codified the body mass index (BMI) as a screening index for obesity in 1995. Although it is an imperfect measure, BMI, which is calculated using height and weight, is the most widely used screening tool for overweight and obesity (**Table 1**). Although BMI does not measure body fat directly, it has been moderately correlated with more direct measures of body fat. It is also strongly correlated with specific adverse health outcomes, including development of diabetes, hypertension, heart disease, stroke, and other conditions [1].

BMI is a fast and easy measure with a significant limitation—it estimates body fat based on excess weight. This means that it does not distinguish between excess weight due to fat, muscle, or bone mass. Consequently, BMI calculations may overestimate body fat in muscular individuals or underestimate body fat in people who have lost muscle. As a result, a fit, muscular person may have a BMI that suggests obesity, when that is clearly not the case. Also, an elderly person who has lost significant lean muscle may have a “normal” BMI despite having a very high body fat content.

Because of this limitation, many experts recommend using BMI only as a screening tool to identify patients who may need further evaluation. Additional evaluation may include health screenings, family history, and other body composition tests including abdominal circumference, skin fold tests, and body fat measured by biometrical impedance.

BMI DEFINITIONS OF WEIGHT			
Weight Category	BMI Definition (kg/m <sup>2</sup> )		
	Adult	Adult, East Asian	Pediatric <sup>a</sup>
Underweight	<18.5	<18.5	<5th percentile
Normal	18.5–24.9	18.5–22.9	5th–85th percentile
Overweight	25–29.9	23–24.9	≥85th percentile
Class I obesity	30–34.9	25–29.9	Obesity: ≥95th percentile
Class II obesity	35–39.9	30–34.9	
Class III obesity (severe obesity)	≥40	≥35	Severe obesity: ≥120% of the 95th percentile
<sup>a</sup> Based on sex-specific BMI for age			
Source: [89; 90; 91]		Table 1	

In 2023, the AMA adopted a policy that recognizes the issues with BMI measurement (e.g., historical harm, no consideration of gender/ethnicity) and suggests that it be used in conjunction with other valid measures of risk, including but not limited to visceral fat, body adiposity index, body composition, relative fat mass, waist circumference, and genetic or metabolic factors [92].

The AMA policy recognizes that [92]:

- BMI is significantly correlated with the amount of fat mass in the general population but loses predictability when applied on an individual level.
- Relative body shape and composition heterogeneity across race and ethnic groups, sexes, genders, and age-span are essential to consider when applying BMI as a measure of adiposity.
- BMI should not be the sole criterion used to deny appropriate insurance reimbursement.

The AMA also modified existing policy on the clinical utility of measuring BMI, body composition, adiposity, and waist circumference to support greater emphasis on education about the risk differences within and between demographic groups.

### COMPLICATIONS

Repercussions of the obesity epidemic are already being felt. Obesity increases a person’s risk for metabolic syndrome, which in turn increases the risk of type 2 diabetes and cardiovascular disease. Obesity also directly raises the risk of developing diabetes by 10 to 20 times. Patients with poorly managed or uncontrolled type 2 diabetes are at an increased risk for a number of significant health complications, including heart disease, nerve damage, eye problems, and kidney disease [6].

Similarly, obesity is associated with hypertension. Evidence suggests that every 10 kg increase in body weight is associated with a 3 mm Hg increase in systolic and 2.3 mm Hg increase in diastolic blood pressure. Obesity is also associated with dyslipidemia and elevated levels of fibrinogen and C-reactive protein. All of these factors increase the risk of cardiovascular disease, including coronary heart disease, myocardial infarction, and heart failure, as well as stroke and chronic kidney failure [7].

Obesity also increases a person’s risk for some less obvious, but equally significant, health complications. Increased weight burden on the body can worsen osteoarthritis and exacerbate respiratory problems, such as obstructive sleep apnea, asthma, and obesity hypoventilation syndrome. It can also damage the gallbladder, due to an increased tendency to develop gallstones, and the liver, through the development of non-alcoholic steatohepatitis (NASH), also known as metabolic-associated steatohepatitis (MASH). Finally, obesity also increases the risk for various forms of cancer [6].

The good news is that even modest weight loss, such as a 5% to 10% reduction in total body weight, can lead to measurable health benefits. These include improvements in blood glucose levels, cholesterol, and blood pressure levels. Research shows that overweight patients who reduce their weight by 6.8

kg or more lower their long-term risk of hypertension by 21% to 29% [8]. Even if a patient remains overweight or obese after weight loss, their overall risk factors for the chronic diseases associated with obesity will be reduced [9].



The U.S. Preventive Services Task Force recommends offering or referring adults with cardiovascular disease risk factors to behavioral counseling interventions to promote a healthy diet.

(<https://jamanetwork.com/journals/jama/fullarticle/2773280>. Last accessed July 25, 2024.)

**Level of Evidence:** B (High certainty that the net benefit is moderate or there is moderate certainty that the net benefit is moderate to substantial)

Similarly, weight loss can help to relieve symptoms from other obesity-associated conditions, including osteoarthritis and sleep apnea. Weight loss of 5% has been shown to provide some relief in patients with osteoarthritis, and weight loss of 10% can provide a significant reduction in pain. Most research also shows that this level of weight loss improves overall quality of life [9].

## DIETING AND DIETARY PATTERNS

### OVERVIEW

Dieting has become so common in the United States that it has been referred to as a national pastime. Each year, approximately 50% of adults younger than 50 years of age report following a diet, with the majority of people pursuing that diet in an effort to either lose weight or improve overall health.

Since 2020, the nation's perceptions of obesity and diet have begun to change. Surveys suggest that many adults are interested in focusing on healthier behaviors in place of specific weight-loss goals and are following a diet or dietary pattern for this purpose. Many adults report dieting for other health-related reasons as well—37% for increased energy, 29% for digestive health, 28% for cardiovascular health, and 26% for better sleep [10].

Interestingly, younger generations may be driving some of these changes. Adults 18 to 24 years of age report pursuing healthier eating strategies for the purpose of improving mental health, the only age group to include this in the top three reasons for dieting. Additionally, more than 70% of adults 40 years and younger report considering the environment when choosing foods, making them more likely to choose products labeled as “carbon neutral” or “plant-based” [10].

In fact, the shift to “plant-based” foods is dramatic, with almost one in three adults reporting that they ate more protein from whole-plant sources in 2022 than the previous year. Additionally, 23% of adults report consuming plant-based dairy alternatives, and 18% report consuming more soy-based milk or yogurt [10].

Although obesity and weight loss continue to be the primary drivers for adults following a diet, it is important for healthcare professionals to understand how widespread the use of dietary patterns has become and to understand the risks and benefits of each of these patterns. Young or otherwise healthy patients may be following dietary patterns that can affect other aspects of their health or quality of life, increasing the importance of having open conversations with patients about their lifestyle choices.

### DIETARY GUIDELINES

Before discussing some of the more popular dietary patterns, it is important to understand foundational strategies for healthy eating.

The U.S. government produces dietary guidelines for Americans every five years. In the past, these guidelines have been relatively prescriptive, providing specific recommendations on caloric intake and food groups. In the Dietary Guidelines for Americans, 2020–2025 from the U.S. Department of Health and Human Services (HHS), the government took a more flexible approach to the guideline to produce four key recommendations [11]. These include:

- Follow a healthy dietary pattern at every life stage.

- Customize and enjoy nutrient-dense food and beverage choices to reflect personal preferences, cultural traditions, and budgetary considerations.
- Focus on meeting food group needs with nutrient-dense foods and beverages, and stay within calorie limits.
- Limit foods and beverages higher in added sugars, saturated fats, and sodium, and limit alcoholic beverages.

These guidelines advise watching portion sizes to help reduce calorie intake. This can be done with some simple tools such as using smaller plates or eliminating access to regular snacks. Shifting to healthier, low-, or no-calorie beverage choices is another simple way for patients to initiate long-term calorie reduction. Patients should also focus on creating meals out of multiple food groups to ensure a well-rounded diet and a lower density of caloric intake [11].

The document also provides general guidance on the typical calorie requirements for people of different biological sexes and ages [11]:

19 to 30 years of age:

- Women: 1,800–2,400 calories daily
- Men: 2,400–3,000 calories daily

31 to 59 years of age:

- Women: 1,600–2,200 calories daily
- Men: 2,200–3,000 calories daily

60 years of age and older:

- Women: 1,600–2,000 calories daily
- Men: 2,000–2,400 calories daily

It is important to remember that these calorie needs will vary with each individual based on size, genetics, patient history, typical physical activity, and more. The best approach for sustained, healthy weight loss is to target a caloric intake that is modestly below daily requirements. For most people, this means lowering total daily calorie intake by 500–1,000 kcal. This approach can decrease weight by 8% over 3 to 12 months.

## Macronutrients

Although the primary focus of any person trying to consume a healthy diet should be the basic principles outlined by national guidelines, it is also important for patients to understand the different macronutrients that comprise a well-rounded diet: carbohydrates, fat, and protein.

Each of these classes of macronutrients provides calories, and each contributes important molecules for bodily function. Although many popular diets over the past decades have vilified an entire class of macronutrients—most commonly carbohydrates and fats—it is important for patients to understand that each of these groups is crucial to overall healthy eating.

According to the U.S. Dietary Guidelines, a relatively healthy distribution of calories from these macronutrient groups is [11]:

- Carbohydrates: 45% to 65%
- Fats: 25% to 35%
- Protein: 10% to 35%

It is important to note that these ranges are relatively wide, allowing for flexibility between each person, and even between days for the same person, in how they obtain their calories. It is also important to remember that different patients may require different alterations to their diets. For example, very active adults or athletes will require higher protein intake. Adults with impaired glucose intolerance or diabetes may want to target the lower end of carbohydrate intake, with a focus on foods with a lower glycemic index, which will be discussed later in this course.

Unfortunately, the general public does not always understand the importance of each macronutrient to a healthy diet. In fact, in 2022, a survey found that only 25% of Americans believed that all calorie sources contribute to weight gain equally. Approximately 19% of Americans believe that fats are more likely to cause weight gain, a number that has risen over time. Additionally, 22% of adults believe that sugar is more likely to cause weight gain than other calorie sources [10].

In alignment with these misunderstandings, respondents also gravitated toward foods that were labeled as “fresh” or “low in sugar” as a way to identify healthier food options. It is important to dispel misunderstandings from patients that certain macronutrients contribute to weight gain more than others [10].

### **Fats**

Patients should also understand that each of these macronutrients is made up of many subgroups. For instance, fats are an important part of the diet, but not all fats are created equal. Saturated fats are known to be especially bad for cardiovascular health, and the Dietary Guidelines recommend limiting intake to no more than 10% of daily calories [11]. Saturated fats are most commonly found in high-fat meat, full-fat dairy products, and in certain oils, such as butter, coconut oil, and palm oil. Thus, fried foods, which use these oils, tend to be high in saturated fat as well. Replacement oils that are low in saturated fat include canola oil, olive oil, soybean oil, and sunflower oil [11].

Certain fats, called polyunsaturated fats, are important components of cell membranes and contribute to reduced levels of inflammation in the body. These are essential fatty acids and are considered part of a healthy diet. Patients may recognize the types of fats that fall into this class: omega-3 and omega-6 fatty acids. These are found in fish, seeds, nuts, soy, eggs, and many other foods [12].

### **Carbohydrates**

Carbohydrates are also comprised of many subgroups. Sugar itself is not an inherently bad thing for people to eat. In fact, many foods, such as fruit, contain healthy and important sugars. However, added sugars are not the same chemicals as the sugars found in fruit. These added sugars, which may include preservatives or high fructose corn syrup, are added to foods and increase their calorie content dramatically [11].

The Dietary Guidelines recommend keeping added sugars to less than 10% of daily calorie intake, similar to the recommendation for saturated fat. One of the fastest ways for some people to cut added sugars from their diets is to eliminate sugar-sweetened beverages and processed desserts [11].

An important and healthy type of carbohydrate is fiber. The U.S. Food and Drug Administration (FDA) has an established definition for what can be called a dietary fiber on a product label. This definition essentially states that the fiber must be a naturally occurring, nondigestible carbohydrate obtained from plants that has beneficial effects in the body. It is recommended that most adult women consume 25–28 grams of fiber daily, and that most adult men consume 31–34 grams daily [11].

Fiber can be either water-soluble or water-insoluble. Water-soluble fibers, such as oats, beta-glucans, and barley, help to lower both blood glucose and cholesterol levels. Water-insoluble fibers, such as wheat bran and rice bran, help the body digest food and improve bowel health. Each of these fibers can help to slow the absorption of other carbohydrates by the body, resulting in lower blood glucose levels after eating [13].

### **Proteins**

Unlike carbohydrates and fats, there are no subgroups of protein that are considered to be more detrimental to overall health. However, a healthy diet includes the consumption of a variety of different types of protein. Proteins are made up of amino acids, which have many important functions in the body. The body requires 20 different amino acids to function properly, 9 of which must come from food because the body cannot make them on its own [14].

Proteins can be obtained from a wide range of sources, including plants, animals, and animal-derived products. This includes meats, eggs, dairy products, and seafood, as well as nuts, seeds, and soy products. Beans, peas, lentils, and other legumes are also important sources of protein. Consuming fresh or frozen forms of these protein sources as opposed to processed forms (e.g., hot dogs, ham) helps to ensure that these protein sources remain healthy and lower in calories [11].

## DIETARY STRATEGIES

For patients looking to lose weight, there is no shortage of strategies that claim to help with this endeavor. Some of these strategies are fad diets, such as those that claim to be the fastest approach, or even a “hack,” for weight loss. Other strategies have been around for some time and fall into relatively straightforward categories, such as “low-carbohydrate” and “low-fat.” Other strategies, such as the Dietary Approaches to Stop Hypertension (DASH) diet and Mediterranean diet, are supported by evidence.

While the popularity of specific diets tends to wax and wane over the years, clinical research has consistently revealed that most diets that ensure adequate nutritional intake, regardless of the food group that is limited, result in similar weight loss. In other words, overall calorie reduction, as opposed to the specific diet chosen, is the most important factor for weight loss. One large meta-analysis evaluated the effectiveness of different diet programs. After compiling the results from 48 randomized controlled trials, the study found that significant weight loss was observed with all diets, and that the differences between diets were minimal [15].

Similarly, various studies have evaluated the benefits of diets that focus on macronutrient intake. One clinical trial of more than 300 adults with moderate obesity showed that following a Mediterranean diet, low-fat diet, or low-carbohydrate diet for two years results in comparable weight loss [16]. Another prospective clinical study in more than 600 adults with obesity found that following a low-fat or low-carbohydrate diet for one year resulted in comparable weight loss [17]. Finally, a clinical study in more than 800 overweight adults found that diets emphasizing various amounts of fat, protein, or carbohydrate intake in conjunction with calorie reduction all produced similar weight loss [18].

Regardless, it is important for healthcare professionals to understand the different diets that their patients may be considering, whether for weight loss or overall health benefits. There are important considerations with every diet, including under-

standing nuances related to risks and benefits. It is also helpful to be familiar with the evidence base (or lack thereof) in order to coach patients in identifying the dietary strategy that may best align with their preferences, needs, and risk factors.

### Low-Carbohydrate Diets

Some of the most popular diets over the past few decades have focused on reducing carbohydrate intake, such as the Atkins diet, ketogenic diet, and South Beach diet. The premise of these diets is that carbohydrates increase insulin levels and induce metabolic changes that cause weight gain.

It is now understood that different forms of carbohydrates have different effects on blood glucose levels immediately after eating. For instance, research has found that some starchy foods can increase blood glucose as much or more than similar amounts of sucrose. In 1981, the glycemic index was developed to address the effect of foods on blood glucose. The glycemic index rates foods based on how much they raise blood glucose levels in the two hours after they are eaten. Higher glycemic index foods raise glucose levels more than lower glycemic index foods [19].

Low-glycemic index foods, which are digested and absorbed more slowly in the small intestine, are thought to promote weight control by causing a feeling of fullness. They also cause less postprandial insulin secretion, which may delay hunger. This reduction of postprandial glucose levels may also be beneficial in patients with impaired glucose tolerance or diabetes [20].

Not surprisingly, added sugars increase the glycemic index of any food. Whole foods that contain natural sugar, on the other hand, may have a lower glycemic index than some people would expect. For example, many fruits, including apples, bananas, strawberries, and peaches, have relatively low glycemic indices. This is due to the fiber content of these foods. Whole grains, which are primarily comprised of carbohydrates, also have a lower glycemic index due to fiber content. Processed grains, on the other hand, such as white bread, corn flakes, and instant porridge, have a high glycemic index [20].

Based on what we know about glucose levels, consuming more low-glycemic index foods is likely to be considered a healthy dietary choice. However, there is no solid evidence that a low-glycemic diet will reduce weight more than any other diet [21]. It is also important to keep in mind that most people eat meals, not single foods at one time. While a single food may have a low- or high-glycemic index, a meal may combine foods of a variety of types, which alters the way that the body breaks down and absorbs the nutrients from each food item.

### ***The Atkins Diet***

The Atkins diet is a high-fat, low-carbohydrate diet that does not utilize the glycemic index [22]. This diet follows four distinct phases, starting with very restrictive limitations on carbohydrate consumption and slowly allowing for increased intake as weight loss progresses. The initial, highly restrictive phase limits carbohydrate consumption to 20 grams per day and is intended to cause rapid weight loss. After this phase, weight loss occurs more slowly and the quantity of carbohydrates consumed increases in increments. The final phase, or lifetime maintenance, is intended to achieve a diet with a carbohydrate equilibrium that results in maintaining the target weight [23].

The Atkins diet seems to cause more short-term weight loss than a traditional low-fat diet. But at the end of one year, weight loss is similar to conventional low-fat diets [21; 24; 25]. Some experts suggest that Atkins and similar diets could have a beneficial role for jumpstarting weight loss, before switching to a long-term, more sustainable maintenance diet. However, there does not seem to be a long-term benefit with the Atkins diet when compared with other calorie-restrictive diets.

### ***The South Beach Diet***

The South Beach diet is a spin-off of the Atkins diet. Like the Atkins diet, the South Beach diet is a low-carbohydrate diet that consists of multiple phases that restrict carbohydrates significantly at the beginning and then slowly allow for an increase in carbohydrate consumption as weight loss progresses.

Unlike the Atkins diet, the South Beach diet uses the glycemic index to segregate carbohydrates into “good” and “bad” carbohydrates. Higher glycemic index foods are considered “bad,” while lower glycemic index foods are considered “good.” Because the South Beach diet allows the consumption of “good” carbs, it is considered more balanced than the Atkins diet [22].

### ***The Ketogenic Diet***

The ketogenic diet is a low-carbohydrate diet that requires a relatively high intake of fat and a very low intake of carbohydrates. There are many variations of this diet, including the modified Atkins diet, the medium-chain triglyceride diet, and the low glycemic index diet. All of these variations rely on the same basic concept of forcing the body into a state of ketosis. When glucose is unavailable to the brain as an energy source, the liver produces ketone bodies from fat. This is thought to result in the reduction of fat stores [26; 27; 28].

Some proponents of the Atkins diet claim that it also induces ketosis. However, the ketogenic diet typically requires carbohydrate intake of less than 20 grams per day, which is stricter than the strictest phase of the Atkins diet [23]. Additionally, unlike the Atkins or South Beach diets, most forms of the ketogenic diet require consistent, long-term maintenance of severe carbohydrate restriction. Due to the lack of a gradual, multi-step approach to carbohydrate reduction, long-term adherence to this diet may be difficult.

Most research on the ketogenic diet, though low quality, shows that it can help to reduce weight in overweight or obese adults. In fact, severely restricting carbohydrate intake to less than 20 grams daily for 24 to 56 weeks can reduce body weight by 10% to 30% when compared with baseline [29; 30]. However, this research also shows that the greatest weight loss is achieved at 24 to 36 weeks, followed by slight weight gain [29]. Furthermore, a meta-analysis of clinical research comparing the ketogenic diet with low-fat diets found that the ketogenic diet resulted in less than 1 kg of additional weight loss [31].

## Safety

Although these diets seem to be safe when used for up to one year, their safety in the long-term is less clear, particularly in relation to the ketogenic diet. Most clinical studies of these diets have not lasted longer than one year, and adherence rates at that point in time are also relatively low. Limited observational research has found that consuming carbohydrates as 39% or less of total daily calorie intake is associated with a higher risk of mortality when compared with higher intakes of carbohydrates. The lowest risk of mortality is associated with a carbohydrate intake of 50% or 55% [32; 33; 34].

It is important to note that a low-carbohydrate diet that consists of high amounts of saturated fat and nutrient-poor foods can negatively impact health outcomes in the long-term. As with any diet, the consumption of varied, nutrient-rich foods should be encouraged.

To capitalize on the low-carbohydrate craze, food manufacturers and many restaurants often offer low-carbohydrate versions of everything from ketchup to beer. Unlike “low-fat,” the FDA has not published a definition of “low-carbohydrate.” Statements on food labels such as “reduced carbohydrate” or “low-carb” are not based on any formalized standard [35].

Some labels list only “net carbs” or “effective carbs.” These are terms used to define the portion of total carbohydrates that affect post-consumption blood sugar levels. Listing “net carbs” makes carbohydrate contents appear lower by excluding ingredients like fiber and sweeteners such as maltitol, lactitol, or sucralose. Patients should be advised to read labels closely and look at calories, not just carbohydrates. Foods labeled “low-carb” or low in “net carbs” may actually have a higher calorie content [35].

## Low-Fat Diets

Low-fat diets such as the Pritikin diet and the Ornish diet were once very popular but have become less so in recent years. This may, in part, be due to the fact that low-fat diets are notoriously difficult to maintain

in the long-term. The Ornish diet allows only 10% of calories per day from fat [36]. However, these diets do allow and encourage fruits and vegetables, which are excluded or minimized in low-carbohydrate diets. Like other diets, low-fat diets can aid in weight loss, likely due to overall caloric restriction [37].

Low-fat diets are often recommended for improving outcomes in heart disease. An older clinical study found that following the Ornish diet in addition to exercise for up to five years decreases cardiac events, including myocardial infarction, coronary angioplasty, coronary artery bypass surgery, heart-related hospitalizations, and heart-related deaths in patients with coronary atherosclerosis [38]. However, a low-fat diet alone may not be effective for reducing the risk for heart disease. In fact, a large, long-term clinical trial enrolling more than 48,000 postmenopausal adults found that a diet containing less than 20% of calories from fat did not reduce the risk of heart disease or stroke [39].

## Ornish and Pritikin Diets

It is important to keep in mind that the Pritikin and Ornish programs have evolved into much more than just diets. These programs now include overarching lifestyle modifications, including exercise, stress management, and smoking cessation. Together, this combination of lifestyle interventions has been shown to improve outcomes in cardiovascular disease. Because of this, the U.S. Medicare program covers the Ornish Program for Reversing Heart Disease and the Pritikin Program for patients requiring intensive cardiac rehabilitation (ICR) following events such as acute myocardial infarction [40; 41].

The only other similar intervention program to be covered by Medicare for this purpose is the Benson-Henry Institute Cardiac Wellness Program, which consists of lifestyle intervention in addition to following the American Heart Association (AHA) diet. Unlike the Ornish and Pritikin programs, however, the AHA diet recommends consuming 25% to 35% of total daily calories from fats [42].

## ***Dietary Approaches to Stop Hypertension (DASH) Diet***

The DASH diet is a low-fat, low-sodium diet commonly recommended by healthcare professionals. As the name implies, the primary goal of the DASH diet is to lower blood pressure in people with prehypertension or hypertension. A large body of clinical research shows that following the DASH diet lowers systolic blood pressure by about 5–11 mm Hg and diastolic blood pressure by 3–6 mm Hg when compared with a control diet. Improvements can be seen as early as one week after implementing the diet [43; 44; 45; 46].

Some research also shows that the DASH diet may be beneficial for weight loss. A meta-analysis of clinical research shows that adhering to the DASH diet can reduce body weight by about 3 pounds more than a control diet [43]. However, this analysis did not assess weight loss in patients with overweight and obesity separately from patients with normal weight at baseline.

There is currently no research comparing the DASH diet to other diets for the purposes of weight loss. However, in patients with hypertension, the main principles of the DASH diet, including reduced intake of sodium and cholesterol and increased consumption of vegetables, fruits, and low-fat dairy products, should be considered an important part of blood pressure control.

Patients should be advised to be wary of low-fat foods in the grocery store. In order to keep these foods tasty, many low-fat foods contain added sugar. That means many low-fat foods can still be high in calories.

## **Plant-Based Diets**

Plant-based diets are becoming an increasingly popular topic of discussion. As might be expected, there is interest in plant-based diets for the purpose of improving overall health and increasing weight loss. Thanks to significant food science research in this area, some innovative plant-based food products have made this dietary strategy more available and appealing to a broader audience.

Plant-based diets encompass a wide range of dietary strategies:

- **Vegan diet:** This is the strictest form of a plant-based diet, in which no products originating from animals are consumed.
- **Classic vegetarian diet:** Also called the lacto-ovo-vegetarian diet, this diet does not allow for meat, fish, or poultry, but does permit eggs and dairy.
- **Pesco-vegetarian diet:** This diet does not allow for meat or poultry but permits fish and shellfish in the diet.
- **Semi-vegetarian or “flexitarian” diet:** This dietary pattern allows for limited amounts of meat and poultry in a diet that is otherwise plant- and fish-based.
- **Eco-Atkins diet:** This is a vegetarian iteration of the Atkins diet. This low-carbohydrate vegan diet contains 26% of calories from carbohydrates, 31% of calories from vegetable proteins, and 43% of calories from vegetable oils.

## ***Evidence for Weight Loss***

Some clinical research shows that plant-based diets can result in modest weight loss. Meta-analyses of clinical studies show that following a vegetarian diet for anywhere from one month to one year is associated with a 2–3.4 kg reduction in weight [47; 48; 49]. Patients following a vegan diet had a greater weight loss when compared with those following a lacto-ovo-vegetarian diet, with a weight loss of 2.5 kg and 1.5 kg, respectively. However, subgroup analyses found that overweight or obese adults had a weight loss of only 2 kg, compared with 2.6 kg in those that were not overweight or obese [47].

Despite the modest weight loss seen in these studies, multiple expert panels agree that a lacto-ovo-vegetarian diet with calorie restriction is one option that can be considered to help overweight or obese individuals lose weight [50]. The benefits of other plant-based diets for weight loss have not been adequately evaluated.

### **Evidence for General Health Benefits**

Research on the health benefits of plant-based diets that are not related to weight loss is growing but limited. A meta-analysis of the available clinical research shows that shifting a diet to contain a higher amount of plant-based proteins in place of red meat-based proteins can modestly reduce total cholesterol and low-density lipoprotein (LDL) cholesterol levels [51]. Some prospective cohort studies have also shown that increased consumption of red meat is associated with higher overall mortality rates when compared with lower consumption [52]. However, meta-analyses of the available observational research suggest that any reduction in overall risks obtained by reducing red meat consumption are likely to be very small [53]. It is not clear how non-red-meat protein sources compare with plant-based proteins.

Additional observational research has found that higher adherence to a plant-based diet reduces cardiovascular mortality by a small amount when compared with low adherence. However, as with all observational dietary research, it is unclear whether this is a causative relationship. People who voluntarily follow a plant-based diet are more likely to be generally healthy, female, and engaged in other healthy practices, such as increased physical activity [54]. Similarly, people who consume large quantities of red and/or processed meats are also more likely to consume diets higher in sugar and saturated fats and to participate in less physical activity [53; 55]. This makes it difficult to draw any firm conclusions regarding the health benefits of reducing meat intake or following a plant-based diet.

Notably, population research suggests that people who regularly consume meat are unlikely to eliminate meat from the diet even when confronted with serious health warnings [55]. Considering the likelihood for poor adherence to a plant-based diet in people who regularly consume meat, the current evidence does not support recommending this dietary strategy in this population.

### **Whole versus Processed Plant Foods**

It is important to distinguish between the quality of foods considered “plant-based” in some of the available research. Some studies have shown that the consumption of highly processed foods is associated with excess calorie intake and weight gain [56]. The reduction in cardiovascular risk factors that was seen with increased consumption of plant-based proteins only occurred when those protein sources were considered to be high-quality. These benefits did not occur with increased intake of low-quality carbohydrates [51]. Furthermore, the increase in mortality rates that was seen with increased consumption of red meats was particularly elevated in adults who consumed high quantities of processed red meats, such as hot dogs, sausages, salami, and cured meat. Unprocessed red meat was associated with a 9% increased risk for mortality, while processed red meat was associated with a 13% increased risk [52].

Advances in meat-like plant products, such as Impossible and Beyond meat-replacement products, have contributed to the appeal of plant-based diets. Some of the more popular products include soy protein and pea protein isolates. Some, but not all, of these products are genetically modified to contain heme from soy leghemoglobin, which results in an appearance and texture that mimics real meat [57]. Due to the processing necessary to produce the desired texture and flavor, these products are higher in saturated fats and are also likely to be lower in nutrients and phytochemicals than their fresh, unprocessed counterparts. They are also higher in sodium than red meat products [58].

Although the exact health benefits of a plant-based diet are unclear, patients may be interested in following one of these diets. These patients should be counseled on ensuring that the diet is implemented safely. As with any other diet, patients should be aware of the quality of the foods that they choose to consume. The health benefits of one product might not be the same as the next product, and the benefits of any diet can be lost if most of the selected foods are highly processed. Additionally, it is important to remember that any health benefits that might be gained from a plant-based diet will occur only when nutrient-dense foods are consumed, as opposed to

simply avoiding meat. Diets that only avoid meat and contain large quantities of foods that are high in sugar and saturated fats can be detrimental.

Plant-based diets are often motivated by non-health factors, most significantly a wish to avoid harming animals. As noted, plant-based diets are also gaining attention for an entirely different reason: the potential to reduce a person's environmental impact, or "carbon footprint." If a patient is interested in changing their diet for environmental or animal-rights purposes, ensure that they understand the importance of food quality and product selection to avoid negative health impacts with this dietary change.

### **Safety**

Plant-based diets, including vegetarian and vegan diets, are safe when used appropriately. The Academy of Nutrition and Dietetics states that a nutritionally adequate vegetarian diet is appropriate for adults and children. However, it is particularly important to ensure that all nutritional needs are met when following a vegetarian diet. Nutrients of concern may include omega-3 fatty acids, iron, zinc, calcium, vitamin D, and vitamin B12 [59]. In fact, one observational study has found that following a vegetarian diet or vegan diet is associated with lower bone mineral density at the femoral neck and lumbar spine when compared with diets that incorporate animal products [60].

### **Mediterranean Diet**

The Mediterranean diet is a balanced and nutrient-dense diet that originally gained popularity as a preventive measure for cardiovascular disease. It has also gained popularity for reducing the risk of dementia, management of diabetes, and improving overall health. It is a moderate-fat diet that emphasizes consuming large amounts of fruits, vegetables, fish, and whole grains, using olive oil as a fat source, and eating low amounts of dairy, red meat, and refined grains. It also allows for the consumption of wine in low-to-moderate amounts, although some forms of the diet exclude this component [62]. This diet is generally considered to be safe as long as nutritional needs are met.

### **Weight Loss**

There is a growing body of research evaluating the Mediterranean diet for weight loss, although the evidence remains limited and conflicting. One clinical study in adults with obesity showed that following a calorie-reduced Mediterranean diet for 12 months reduced body weight by 3.8 kg and waist circumference by 2.6 cm when compared with following a standard calorie-reduced low-fat diet [63]. However, a separate clinical study in adults with overweight shows that the Mediterranean diet was no more effective than a lacto-ovo-vegetarian diet for weight loss or fat loss when calorie restriction is equivalent [64]. As with the other diets discussed, the Mediterranean diet may simply serve as a healthy option for patients who enjoy fish and whole grains.

### **Other Indications**

Based on a number of observational studies, some experts, including the WHO, recommend the Mediterranean diet for the prevention of dementia in healthy adults [65]. Although observational research suggests that higher adherence to the Mediterranean diet is associated with a reduced risk of cardiovascular events and cardiovascular mortality when compared with lower adherence, it does not seem to be associated with a lower total incidence of cardiovascular disease [66]. Also, results from clinical research indicate that the Mediterranean diet has only modest benefit, if any, for the primary prevention of cardiovascular disease.

A landmark clinical study (the PREDIMED study) found that following the Mediterranean diet for about 4.8 years reduces the rate of major cardiovascular events such as myocardial infarction, stroke, or death from cardiac causes by about 30% when compared with a control diet in patients at high cardiovascular risk. However, this study was later retracted and re-published after the exclusion of multiple study sites that violated the study protocol [67]. When clinical endpoints were analyzed separately, the Mediterranean diet was found to reduce the risk of stroke by 40%, with no significant reduction in the risk of myocardial infarction, total mortality, or cardiovascular mortality [68; 69].

### **“Fasting” Dietary Patterns**

There are many variations on “fasting” diets, some of which have become popular in the 2010s and 2020s. As a general rule, fasting involves a voluntary restriction of energy intake for a period of time. However, unlike more traditional forms of fasting, which were sometimes undertaken for religious purposes, the form of fasting that has gained popularity for weight loss and overall health is called “intermittent fasting.”

Intermittent fasting, which is also called time-restricted feeding, involves consuming calories by eating freely during a certain time frame and then fasting during the remaining hours of the day. While time frames may vary, maximum fasting time frames of up to 16 hours have been proposed, which often overlaps with time spent sleeping [71].

Some other forms of fasting have also gained popularity, albeit less so than intermittent fasting. One form, alternate-day fasting, involves fasting followed by “feasting” on alternate days. On fasting days,  $\leq 25\%$  of baseline energy is consumed during that 24-hour period. On feasting days, food is consumed as desired. This cycle is then repeated indefinitely. Another form, periodic fasting, involves very low-calorie intake for one to six days weekly, followed by consuming food as desired for the remainder of the week. The most common type of periodic fasting is the 5:2 diet, which includes two days each week with a very low caloric intake [71].

Each type of fasting tends to result in an overall reduction in caloric intake, and most research indicates that this calorie restriction is the reason that fasting diets can lead to weight loss. Clinical studies, which have mostly been conducted in adults with overweight or obesity, shows that intermittent fasting, often combined with calorie restriction either all day or just on non-fasting days, can reduce weight by about 3–14 kg or up to 14.7% after 8 to 52 weeks. Body size and fat mass also appear to be reduced [71]. However, most research shows that this weight loss is similar to that seen with continuous energy restriction, or a standard calorie-restricted diet [72; 73].

Overall, intermittent fasting is safe as long as all nutritional needs are met. Some patients might find that an intermittent fasting diet works best for their schedule and lifestyle and is a more sustainable approach to weight loss. However, ensure that patients understand it does not seem to offer any additional benefits for weight loss.

### **Cautions**

The forms of fasting discussed here should not be confused with “juice fasting” or “detoxification diets.” Juice fasting is based on the theory that juices can enhance the body’s natural detoxification process. In general, these diets lasts 3 to 10 days and involve consuming a limited amount of carbohydrate-derived calories (about 150–300 daily) from vegetable and fruit drinks [74]. However, there is no evidence to support these theories and juice fasts can cause serious health issues. They are not intended to provide adequate nutrition and involve the consumption of large amounts of fluids, which can result in electrolyte imbalances when used short-term and malnutrition when used long-term [75].

Detoxification (detox) diets typically claim to eliminate toxins, while some also claim to increase weight loss. There are many “branded” diets that last from a couple of days to weeks in length and involve eliminating certain foods, using laxatives, and increasing intake of specific liquids and supplements [76]. There is no evidence to support the majority of these diets or their claims, and there is the risk for short- and long-term health issues with these diets that can be similar to those seen with juice fasting.

### **Miscellaneous Diets**

There are also a number of popular diets that are not built on the idea of vilifying or avoiding specific food groups. Instead, these diets tend to promote a more balanced approach to food.

### **Anti-Inflammatory Dietary Patterns**

Anti-inflammatory diets have become increasingly popular due to celebrity attention. However, there is a common misconception that there is one single anti-inflammatory diet. Rather, there are simply many variations of an overarching anti-inflammatory dietary style. As a whole, these diets focus on

eliminating foods that induce inflammation while also consuming foods and supplements with anti-inflammatory properties.

Despite their popularity, the research supporting the use of anti-inflammatory diets is limited to observational evidence only. Most of this research utilizes an evidence-based, validated scale called the dietary inflammatory index (DII) that was developed to evaluate the inflammatory potential of specific dietary patterns. The DII includes 45 food parameters that have been shown to impact inflammatory markers such as C-reactive protein and tumor necrosis factor. The scale ranges from maximally anti-inflammatory to maximally pro-inflammatory [77]. The available observational research suggests that there is a link between consuming an anti-inflammatory dietary style and a reduced rate of cardiovascular events and cardiovascular mortality [77; 78].

Research on following an anti-inflammatory diet for weight loss is limited. A small study in adults with obesity shows that consuming an energy-restricted anti-inflammatory diet for 24 weeks is similarly effective to a standard energy-restricted diet for weight and visceral fat loss. The anti-inflammatory energy-restricted diet used in this study was based on whole-grain products, legumes, fruit and vegetables, nuts and seeds, fish, herbs and spices [79]. Conversely, a clinical trial in adults with overweight and osteoarthritis shows that following an anti-inflammatory low-calorie diet for two months results in an additional 4.1-kg weight loss when compared with a standard low-calorie diet. The anti-inflammatory diet in this study was comprised of about 66% of energy intake from fruits and vegetables, along with whole grains and protein derived from plants, fish, and low-fat dairy sources [80].

Clinicians should be aware that some diets that are advertised as anti-inflammatory do not actually produce anti-inflammatory scores on the DII. Rather, some diets are simply trying to capitalize on the popularity of the anti-inflammatory dietary pattern. If a patient is interested in following an anti-inflammatory diet, let them know that they may be better off following established diets that score well on the DII, such as the Mediterranean diet and the paleo diet.

### **Organic Foods**

Organic foods have become widely available over the past decade and are often touted as superior to or healthier than non-organic foods. These foods, which are typically fruits and vegetables, but can also include grains and other plants, are grown without synthetic chemicals and are often considered safer to consume because they contain fewer pesticides. However, research on the health effects of consuming pesticides found on foods is limited and conflicting [81; 82].

Some organic food proponents claim that these foods are more nutritive than nonorganic options. Unfortunately, research confirming this claim is limited, and clinical research on the benefits of organic foods remains inconclusive. Although some studies suggest that organic foods might contain higher quantities of certain nutritive components, such as antioxidants and polyunsaturated fatty acids, other research has yielded the opposite finding [83; 84; 85].

If a patient is interested in eating organic foods, let them know that it is not yet clear if organic foods are better for overall health. Considering the higher price point for these items, some patients may benefit more from other lifestyle changes.

### **The Paleo Diet**

The paleo (or paleolithic) diet is another popular diet program. The idea behind the paleo diet is to “eat like a caveman.” Before the Agricultural Revolution, people sustained themselves on the foods that were readily available. These included fruits, vegetables, meats, eggs, nuts, and seafood. Advocates argue that the paleo diet is the diet that humans are genetically adapted to eat. Therefore, following this approach will result in optimized performance, weight, and health.

A small study showed that following the paleo diet for three to five weeks reduces weight by about 2.3 kg in healthy volunteers [86]. A more recent study in postmenopausal adults with overweight showed that, when compared with a low-fat diet, the paleo diet increased weight loss by about 4–5 kg at 6, 12, and 18 months, but not at 24 months [87].

Keep in mind that due to the strict restriction on the foods that can be consumed, the paleo diet can be difficult for many people to follow long-term. Also, there is some concern that the paleo diet does not provide adequate amounts of calcium or vitamin D [88]. People following the paleo diet long-term may require supplementation to prevent nutrient deficiencies.

### **The Zone Diet**

The Zone diet consists of 40% carbohydrates, 30% protein, and 30% fat, uses a 40-30-30 rule. It advocates for limited intake of grains and starches. The yet-unproven theory behind the Zone diet is that a balance of carbohydrates, proteins, and fats maintains insulin levels “in the zone” and therefore minimizes fat storage and inflammation. The Zone diet is promoted to reduce the insulin-to-glucagon ratio. According to Zone diet proponents, this reduction affects metabolism of eicosanoids, which are produced from polyunsaturated fatty acids. This is intended to produce a metabolic state with decreased hunger, increased weight loss, increased energy, enhanced immunity, and a reduction in chronic disease risk [23].

Currently, there is no scientific support for the connections between diet, endocrinology, and eicosanoid metabolism. Additionally, following the Zone diet can be difficult. Meals must be planned with the required proportions of protein, fat, and carbohydrates, and vegetable portions are very large. The complexity of the Zone diet makes long-term maintenance of weight loss difficult [23].

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## **CONCLUSION**

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The most important consideration for a patient that is attempting to lose weight is the long-term sustainability of the diet for that specific individual. Although some of the diets discussed here might produce impressive results initially, extreme diets in any form do not usually work long-term. The most effective diets are those that people can live with day in and day out for the rest of their lives.

An individual’s preferences and cultural traditions should always be taken into account when choosing a dietary strategy, and any selected strategy should be integrated into the person’s lifestyle gradually and consistently. Similarly, food quality should be emphasized for all patients. Each patient should be counseled on avoiding highly processed foods and focusing on consuming whole foods whenever possible, while ensuring adequate nutrient intake.

### **Implicit Bias in Health Care**

The role of implicit biases on healthcare outcomes has become a concern, as there is some evidence that implicit biases contribute to health disparities, professionals’ attitudes toward and interactions with patients, quality of care, diagnoses, and treatment decisions. This may produce differences in help-seeking, diagnoses, and ultimately treatments and interventions. Implicit biases may also unwittingly produce professional behaviors, attitudes, and interactions that reduce patients’ trust and comfort with their provider, leading to earlier termination of visits and/or reduced adherence and follow-up. Disadvantaged groups are marginalized in the healthcare system and vulnerable on multiple levels; health professionals’ implicit biases can further exacerbate these existing disadvantages.

Interventions or strategies designed to reduce implicit bias may be categorized as change-based or control-based. Change-based interventions focus on reducing or changing cognitive associations underlying implicit biases. These interventions might include challenging stereotypes. Conversely, control-based interventions involve reducing the effects of the implicit bias on the individual’s behaviors. These strategies include increasing awareness of biased thoughts and responses. The two types of interventions are not mutually exclusive and may be used synergistically.

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