

# Nutrition—An Evidence-Based, Practical Approach to Chronic Disease Prevention and Treatment

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doi: 10.12788/jfp.0292

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## CASE STUDY

At an annual visit, Mr. S, a 58-year-old man with a history of class III obesity, hypertension, and prediabetes, asks what diet changes he can make to help him lose weight and improve his other medical conditions. He reports trying many weight-loss diets over the years, including low-carbohydrate and various calorie-restricted diets. All resulted in modest

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## DISCLOSURES

The authors have no conflicts of interest to disclose.

short-term, but no long-term, weight loss and did little to improve his other medical concerns. How does one counsel him?

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## INTRODUCTION

This patient's story represents a common clinical scenario faced by many primary care providers (PCPs)—one that medical school, residency, and other training have generally not adequately prepared clinicians to address. The aims of this review are to provide an introduction to a whole-food, plant-predominant eating pattern (a diet consisting predominantly or exclusively of whole plant foods such as fruits, vegetables, legumes, whole grains, nuts, and seeds) and its alignment with major medical societies' dietary recommendations; illustrate a spectrum of dietary change along a continuum from highly processed foods to less-processed plant foods; review current research to support a predominantly whole-food, plant-based (WFPB) dietary pattern for prevention and treatment of cardiovascular disease, overweight and obesity, and type 2 diabetes, as well as for cancer risk reduction; and provide practical guidance on promoting healthful dietary changes in clinical practice.

In his 2009 book, *In Defense of Food*, Michael Pollan famously advised to “eat food, not too much, mostly plants.”<sup>1</sup> This pithy recommendation reflects the overwhelming consensus in the nutrition science literature: eating patterns that emphasize whole, plant foods and minimize calorie-dense, highly processed foods are associated with significant reductions in chronic disease risk and mortality.<sup>2-6</sup> Conversely, high intake of sodium and low intake of whole grains, fruits, nuts, seeds, and vegetables are among the leading dietary

risk factors for death and disability-adjusted life years worldwide.<sup>7</sup> For these reasons, the American College of Lifestyle Medicine (ACLM) recommends “an eating plan based predominantly on a variety of minimally processed vegetables, fruits, whole grains, legumes, nuts, and seeds.”<sup>8</sup>

Predominantly WFPB eating patterns have grown in popularity in recent years, while also being rooted in longstanding cultural traditions from around the world, including the so-called Blue Zones, populations with greater-than-average longevity.<sup>9</sup> In contrast, Western-style diets (aka Standard American Diet, or SAD) typically emphasize ultra-processed foods made with added sugars and refined grains, as well as animal foods high in saturated fats such as meats and high-fat dairy products. This Western dietary pattern is associated with increased risks of mortality from cardiovascular disease, cancer, and all causes compared with diets higher in whole, plant foods.<sup>10</sup> Individuals are likely to experience health benefits from any progression they make along the spectrum from a typical Western-style diet to one based on less-processed plant foods (**FIGURE 1**). Of note, there are many approaches to WFPB eating patterns; many diets studied in the scientific literature represent positive shifts along a spectrum away from a SAD and toward more WFPB eating patterns. Evidence cited in this manuscript encompasses a variety of predominantly WFPB dietary patterns, including entirely WFPB, healthy Mediterranean, Dietary Approaches to Stop Hypertension (DASH), low-fat vegan, various types of vegetarian, and numerous other plant-predominant recommendations or guidelines.

Dietary patterns centered around whole, plant foods are also in alignment with dietary recommendations from numerous organizations, including the American College of Cardiology and the American Heart Association,<sup>11</sup> the American Cancer Society,<sup>12</sup> the American Institute for Cancer Research,<sup>13</sup> the American Association of Clinical Endocrinologists and American College of Endocrinology,<sup>14</sup> and Health Canada.<sup>15</sup> Moreover, the Academy of Nutrition and Dietetics states that “appropriately planned vegetarian, including vegan, diets are healthful, nutritionally adequate, and may provide health benefits for the prevention and treatment of certain diseases. These diets are appropriate for all stages of the life cycle, including pregnancy, lactation, infancy, childhood, adolescence, older adulthood, and for athletes.”<sup>16</sup>

In considering predominantly plant-based diets, it is similarly important to emphasize minimally processed foods. For example, a number of studies have specifically highlighted the distinction between healthful and unhealthful plant-based diets in chronic disease outcomes. In a large prospective cohort study with 4.8 million person-years of follow-up (N=116,969), higher adherence to a healthful plant-based

diet, emphasizing nutrient-dense, fiber-rich, minimally processed plant foods, was linked to a 25% lower risk of coronary heart disease.<sup>4</sup> In contrast, an unhealthful plant-based diet high in sweets, fried foods, refined grains, and added sugars was linked to a 32% increased risk of coronary heart disease.<sup>4</sup>

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### CASE STUDY (CONT'D)

Mr. S's PCP is pleased that Mr. S expresses interest in improving his diet and advises him about the benefits of a predominantly WFPB dietary pattern for addressing his weight, high blood pressure, and prediabetes. Mr. S asks about next steps.

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### EVIDENCE TO SUPPORT A PREDOMINANTLY WHOLE-FOOD, PLANT-BASED EATING PATTERN

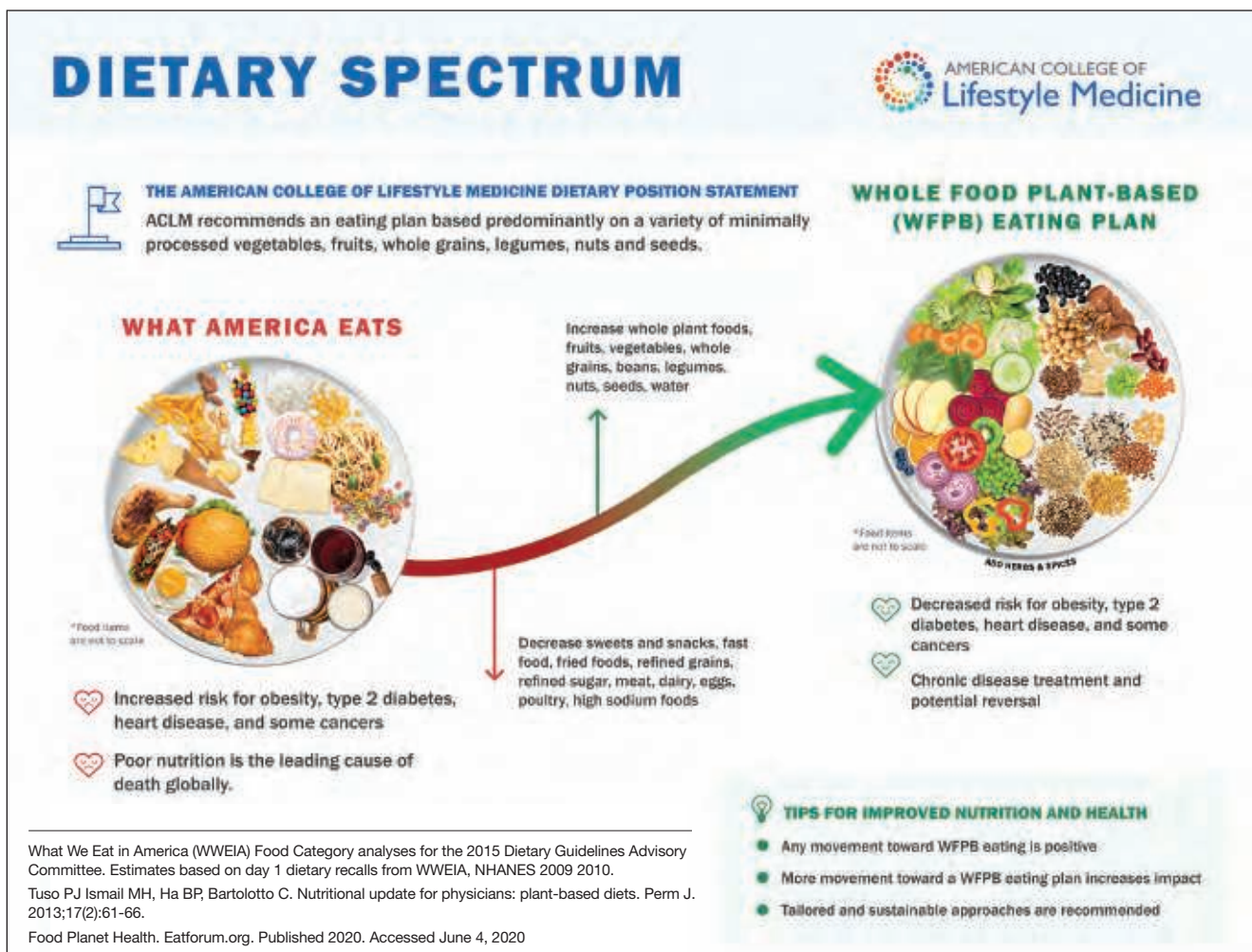
#### Cardiovascular Disease

Healthful plant-based diets appear to confer significant protection against ischemic heart disease, the leading cause of disability-adjusted life years globally among adults aged 50 years and older.<sup>17</sup> A 2012 meta-analysis and systematic review of prospective observational cohorts (N=124,706) found a 29% lower risk of ischemic heart disease mortality among vegetarians compared with nonvegetarians.<sup>18</sup> Similarly, a 2016 meta-analysis (N=72,298) found a 25% lower risk of ischemic heart disease among vegetarians.<sup>19</sup> Among a general population of 12,168 adults, having diets higher in plant foods and lower in animal foods was associated with significantly lower risks of cardiovascular disease, cardiovascular disease mortality, and all-cause mortality (16%, 31%-32%, and 18%-25%, respectively).<sup>20</sup>

In clinical trials, plant-based diets have been shown to improve key cardiovascular risk factors, including serum lipids and hypertension. A 2015 meta-analysis of randomized trials found that vegetarian diets significantly lowered blood concentrations of total cholesterol, low-density lipoprotein (LDL) cholesterol, and non-high-density lipoprotein (non-HDL) cholesterol (−13.9 mg/dL, −13.1 mg/dL, and −11.6 mg/dL, respectively); the effect was even greater for vegan diets.<sup>21</sup> The Portfolio diet, emphasizing plant-based foods, especially almonds, soy, plant sterols, and foods high in viscous fiber, reduced LDL cholesterol by 35%—significantly more than a control diet that was equally low in saturated fats but lacked emphasis on these specific elements.<sup>22</sup>

A wealth of literature supports the use of diets high in whole and minimally processed plant foods for the prevention and treatment of hypertension, perhaps most notably the DASH trials. The DASH diet, which emphasizes whole grains, fruits, and vegetables and limits sweets and red and processed meats, was found to lower blood pressure sig-

FIGURE 1. The ACLM Dietary Position Statement and the spectrum of dietary patterns from Standard American Diet to an entirely whole-food, plant-based plate



nificantly more than comparator diets (-5.5 mm Hg systolic, -3.0 mm Hg diastolic).<sup>23</sup> Modifications on the DASH diet may further reduce blood pressure, including a low-sodium DASH diet<sup>24</sup> and a plant-based diet rich in soy, nuts, and viscous fiber.<sup>25</sup>

Diets rich in whole, plant foods are also important for secondary prevention of cardiovascular disease. These diets are an integral component of successful cardiac rehabilitation programs that include diet, exercise, stress reduction, and group support and aim for comprehensive lifestyle change.<sup>26</sup> Additionally, the DASH and Mediterranean diets have been shown to improve secondary prevention of heart failure.<sup>27</sup>

Plant-based diets promote heart health by multiple potential mechanisms. First, they are higher in beneficial nutrients such as fiber, unsaturated plant fats, potassium, and antioxidants, and lower in potentially harmful nutrients such as cholesterol,<sup>28</sup> heme iron, saturated fats, and nitrite preservatives.<sup>29</sup> Second, plant-based diets are linked to healthier

body weights, lower inflammation,<sup>30,31</sup> reduced risk of type 2 diabetes, lower blood pressure, and improvements in lipids, endothelial function, and gut bacterial profiles.<sup>29</sup> In addition, proportionally high intake of protein from plant vs animal sources has been inversely associated with cardiovascular and all-cause mortality.<sup>32-35</sup>

**Overweight and Obesity**

Plant-based diets are associated with lower body mass indices (BMIs).<sup>36</sup> In a cross-sectional analysis of baseline data from the Adventist Health Study-2<sup>36</sup> (N=60,903), participants' diets were classified as vegan, lacto-ovo vegetarian, pesco-vegetarian, semi-vegetarian, and nonvegetarian. These categories were associated in a stepwise fashion with progressively higher unadjusted mean BMIs, from 23.6 kg/m<sup>2</sup> for vegan to 28.8 kg/m<sup>2</sup> for nonvegetarian diets (P<0.0001).

Interventional studies have similarly shown that plant-based diets of varying types can be used for weight loss—often more effectively than those higher in non-plant foods. A meta-analysis of interventional studies comparing weight loss between those assigned to vegetarian vs nonvegetarian diets showed greater weight reduction in the vegetarian diet arms.<sup>37</sup> Subgroup analyses of the vegetarian diets showed significantly greater weight loss for those following vegan vs lacto-ovo vegetarian diets.<sup>37</sup> In the BROAD study,<sup>38</sup> adults with overweight or obesity, and diabetes, ischemic heart disease, hypertension, or hyperlipidemia, were randomly assigned to either an intervention arm including group education about a low-fat, non-energy-restricted, WFPB diet or a control arm for 6 months, both of which otherwise received usual care.<sup>38</sup> The plant-based intervention group experienced clinically and statistically significant improvements in BMI ( $-4.4$  vs  $-0.4$  kg/m<sup>2</sup>;  $P<0.0001$ ) as well as hemoglobin A1c and waist circumference, compared to the control group.<sup>38</sup> In the 2013 American College of Cardiology/American Heart Association/The Obesity Society Guideline for the Management of Obesity, an expert panel reviewed available evidence to establish guidelines for the treatment of obesity and listed a variety of dietary approaches rich in plant foods, including low-fat vegan-style diets without formal prescribed energy restriction and lacto-ovo vegetarian and Mediterranean-style diets with prescribed energy restriction, as having high levels of evidence to support their use as diets effective for weight loss.<sup>39</sup>

### Type 2 Diabetes Prevention and Treatment

A predominantly plant-based dietary pattern has been recommended by the American Association of Clinical Endocrinologists as the preferred dietary strategy for individuals with type 2 diabetes<sup>40</sup> and by the American Diabetes Association (ADA)<sup>41</sup> as a healthful dietary option. Plant-based diets are associated with markedly lower prevalence and incidence of type 2 diabetes, even after adjustments for BMI and non-dietary lifestyle factors. In the Adventist Health Study-2, vegans and vegetarians had approximately half the odds of having type 2 diabetes compared with nonvegetarians.<sup>36</sup> In the same population, among 41,387 adults followed for 2 years, the risk of developing type 2 diabetes was 62% lower for vegans, and approximately 40% to 50% lower for lacto-ovo and semi-vegetarians, compared with nonvegetarians.<sup>42</sup>

Furthermore, multiple studies have demonstrated a significantly lower risk of type 2 diabetes among individuals who consume diets rich in healthful plant foods and low in highly processed and animal foods, but who are not necessarily vegan or vegetarian. A 2019 meta-analysis of 9 studies including more than 300,000 participants from North America, Europe, and Asia reported a 30% decreased risk of

type 2 diabetes among those whose diets emphasized healthful plant foods including fruits, vegetables, whole grains, legumes, and nuts, despite adjustments for key diabetes risk factors including BMI.<sup>43</sup>

Plant-based diets have also been shown to be effective for the treatment of type 2 diabetes. A 22-week randomized trial (N=99) compared a low-fat, plant-based diet with a conventional calorie-reduced ADA diet.<sup>44</sup> In the plant-based group, 43% of participants were able to reduce their diabetes medications, compared with 25% in the conventional group. Among participants whose medications were stable, those assigned to a low-fat, plant-based diet experienced significantly greater improvements in glycemic control (HbA1c change,  $-1.23\%$  vs  $-0.38\%$ ;  $P=0.01$ ). An additional 52 weeks of follow-up (total follow-up of 74 weeks) demonstrated sustained improvements in glycemic control and lipids for the plant-based group compared with the conventional group in analyses controlling for medication changes.<sup>45</sup> A 2014 meta-analysis of controlled clinical trials found that vegetarian diets were associated with a statistically significant reduction in HbA1c ( $-0.39$  percentage points; 95% confidence interval:  $-0.62$  to  $-0.15$ ;  $P=0.001$ ), compared with consumption of comparator diets.<sup>46</sup> A plant-based diet has also been shown to reduce symptoms of diabetic neuropathy.<sup>47,48</sup>

### Cancer Risk Reduction

The American Cancer Society publishes diet and physical activity guidelines to reduce cancer risk on the basis of expert review of evidence.<sup>12</sup> In addition to controlling weight, achieving adequate physical activity, and eliminating or limiting alcohol intake, dietary recommendations align with a predominantly WFPB dietary pattern, including recommendations to eat ample whole grains and a rainbow of fruits and vegetables and to limit intake of red and processed meat, added sugars, highly processed foods, and refined grain products. The report also cites evidence reviewed in the Dietary Guidelines for Americans<sup>49</sup> and the American Institute for Cancer Research<sup>50</sup> that dietary patterns rich in plant foods and low in animal products and refined carbohydrates are associated with lower risks of breast and colorectal cancer. Conversely, even small amounts of processed meat and moderate amounts of red meat are associated with increased risk of colorectal cancer.<sup>50</sup> Maintaining a healthy weight is also of great importance in reducing risk of 13 common types of cancers<sup>51</sup>; 40% of all cancers in the United States are associated with overweight and obesity.<sup>52</sup> As noted previously, those eating predominantly plant-based diets are more likely to have a healthy body weight than those who are not, and plant-based dietary strategies can be effectively used for weight management in addition to conferring other health benefits.

## CASE STUDY (CONT'D)

Mr. S is presented a range of options for dietary changes that incorporate more whole, plant foods. These recommendations range from small steps such as adding 1 to 2 additional servings of produce to his diet each day, to doing a 21-day plant-based challenge of eating an entirely WFPB diet. Mr. S reflects that he has not been successful with incremental changes in the past and thinks he'll be more motivated to continue if he sees a larger impact on his health more quickly, so he decides to make a bigger change and take on the 21-day challenge. The PCP praises him for his determination and arranges a follow-up visit with him in 1 month.

## PRACTICAL ADVICE FOR ADDRESSING DIETARY BEHAVIOR CHANGE IN CLINICAL PRACTICE

Effectively counseling on behavioral lifestyle changes can be challenging, especially given the time constraints faced by PCPs and the limited training on this topic offered in traditional medical training. The 5 A's (Assess, Advise, Agree, Assist, Arrange) behavioral counseling framework, originally developed by the National Cancer Institute to assist with smoking cessation, is increasingly being used by PCPs to encourage behavior change among patients with overweight and obesity.<sup>53</sup> It is the model referenced by the US Preventive Services Task Force (USPSTF),<sup>54</sup> and is also the model used by Medicare for intensive behavior therapy for obesity.<sup>55</sup> The model is simple, easy to remember, and can be performed as a staged process over several visits, making it feasible to incorporate in most office visit settings.<sup>53</sup> For these reasons, we recommend providers use this framework as a starting place when counseling patients to take steps to move along a spectrum toward adopting a predominantly WFPB eating pattern.

In addition to counseling on dietary and other healthy behavior changes, it is important for physicians to also be role models of good health.<sup>56</sup> Patients perceive physicians who practice healthy lifestyles themselves as more credible and better able to motivate them to make healthy lifestyle choices than those who do not.<sup>57</sup> Adopting a WFPB eating pattern and leading a healthy lifestyle oneself will increase credibility and efficacy with one's patients when it comes to effecting behavior lifestyle changes.

### Assess

The first step of the 5 A's framework as it relates to dietary intake and related behavioral lifestyle changes is to assess whether diet and/or weight is a priority for the patient. Having patients fill out a previsit questionnaire is an efficient

method for ascertaining the patient's current dietary quality, potential concerns about diet/weight, and level of interest in making related changes. An example of a questionnaire that can be used is the Starting The Conversation (STC) nutrition assessment, which is an 8-item, simplified food frequency instrument designed for primary care and health-promotional settings.<sup>58</sup>

If time allows, it can be helpful to further use the tools of motivational interviewing, "a collaborative, person-centered form of guiding to elicit and strengthen motivation for change."<sup>59,60</sup> This could include asking the patient to rate on a scale of 1 to 10 both the importance of making a change and their confidence level in making said change. One might further ask a patient what it would take to move from their selected number to a higher number in order to give insight into perceived barriers and to make plans to address them, if possible. Regardless of the amount of time spent on assessing, starting with an area a patient has already identified as an issue and one they're interested in changing is one of the best ways to make sure the time a clinician spends on behavioral counseling is as high-yield and effective as possible. A patient may also have other life challenges or priorities a PCP might be unaware of that take precedence over making dietary changes. In that case, it is likely better to focus on what matters most to the patient and save a discussion of diet for a future office visit.

### Advise

Once it is established that diet and/or weight is a priority for a patient, the next step is to advise the patient about their specific health risks related to diet/weight and the potential health benefits of moving toward a predominantly WFPB dietary pattern. Focusing on what is motivating to each individual is particularly helpful. For example, younger patients may be more interested in performance or benefits to appearance, whereas middle-aged and older patients may be more interested in disease prevention, treatment, or remission. If a patient has metabolic disease for which they take medication, such as type 2 diabetes or hypertension, emphasizing that a predominantly WFPB dietary pattern can help them lose weight, improve their blood glucose and blood pressure, and reduce or eliminate medications can be particularly motivating. Additionally, make sure it is clear that the goal is dietary changes that can be maintained long-term, because short-lived fad, or crash, diets are of limited utility and can even be harmful.<sup>61,62</sup>

Physicians typically receive very limited education on nutrition and weight management in medical school and postgraduate training and, as a result, report inadequate nutrition knowledge and low self-efficacy when counseling

TABLE 1. Making goals into SMART goals

Example of non-SMART goal	Example of SMART goal
I will eat more fruits and vegetables.	By the end of next week, I will increase my daily fruit and vegetable intake from 0 servings per day to 3 servings per day.
I will decrease the amount of soda that I drink.	Over the next 2 weeks, I will decrease my soda intake from two 12-oz cans per day to one 12-oz can per week.
I will learn how to make home-cooked plant-based meals.	During the next 4 weeks, I will use a specific cooking blog to learn and prepare 1 plant-based recipe per week at home.

SMART, Specific, Measurable, Achievable, Relevant, Time-Bound.

TABLE 2. Foods to emphasize

Category	Examples
Vegetables	Leafy vegetables (eg, kale, spinach, romaine, Swiss chard, collard greens, cabbage), garlic, onions, peppers, leeks, parsnips, potatoes, radishes, turnips, squashes, green beans, tomatoes, carrots, corn, peas, cauliflower, broccoli, cucumbers, eggplant, mushrooms
Fruits	Apples, bananas, kiwi, oranges, blackberries, strawberries, raspberries, blueberries, mango, cantaloupe, watermelon, honeydew, plums, pineapple
Legumes	Black beans, kidney beans, pinto beans, garbanzo beans, cannellini beans, lentils, lima beans, fava beans, soybeans
Whole grains	Quinoa, brown rice, oats, barley, wild rice, black rice, whole-grain tortillas/pasta/breads, whole-grain couscous, millet, teff
Nuts	Almonds, peanuts, pistachios, cashews, Brazil nuts, soy nuts, hazelnuts, walnuts
Seeds	Chia seeds, flax seeds, hemp seeds, pumpkin seeds, sunflower seeds

patients about diet and weight management.<sup>63,64</sup> Thus, the more that a PCP learns about the benefits of predominantly WFPB dietary patterns for chronic, noncommunicable diseases, such as obesity, cardiovascular disease, diabetes, hypertension, and many cancers, the better equipped they will be to advise patients on how to improve their dietary behaviors.

**Agree**

This step involves helping a patient identify and agree to specific steps they plan to take toward achieving their specific dietary change goal(s). Asking a patient how they feel about where they are now and where they'd like to be at discrete times in the future can help a provider to better understand a patient's short- and long-term goals. One way to assist patients in making changes is by using SMART goals (TABLE 1).<sup>65</sup> With SMART goals, patients can practice making goals that are specific, measurable, achievable, relevant, and time-bound.<sup>66</sup> When striving for larger, long-term, or more difficult goals, make sure to build in smaller, easier-to-achieve, short-term components of the goal (ie, an action plan) so the patient can frequently experience a sense of achievement during the process. This helps to foster confidence and maintain momentum and motivation toward achieving the larger goal. It can

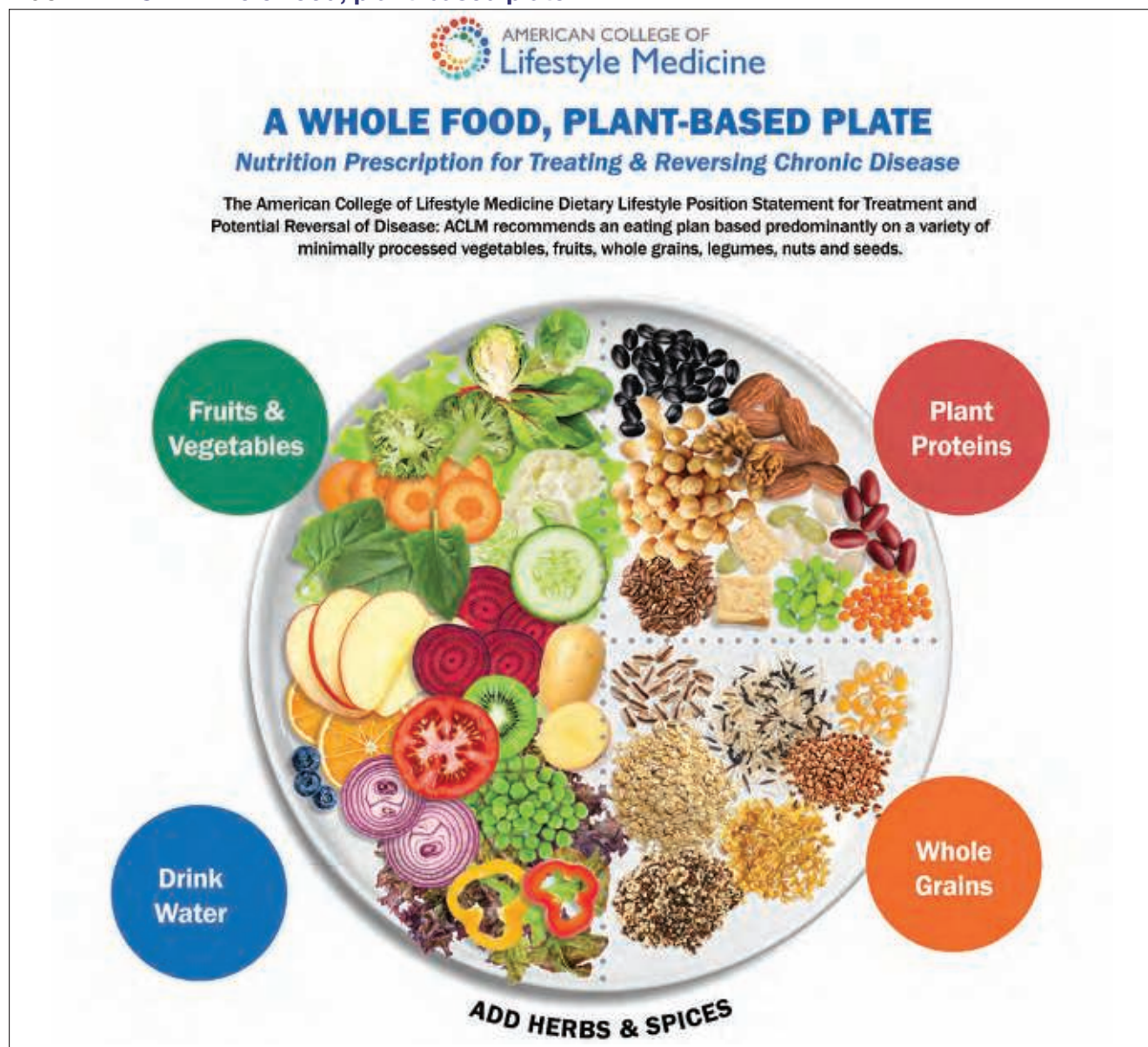
be helpful to, again, use the 1 to 10 scale for confidence in achieving the next component of a goal. If a patient rates their confidence as lower than a 7 out of 10, ask what it would take to increase confidence to a 7 or greater. If this is a barrier that can be addressed, help them make a plan to address it; if not, a more feasible action plan should be selected.<sup>64</sup>

**Assist**

After agreeing upon a SMART goal or specific action plan for a larger goal, clinicians should assist patients in achieving their objectives whenever possible. This can be done simply via a variety of formats and methods in typical clinical settings. Below are a few examples of ways to provide assistance to patients:

- **Handouts:** Provide handouts regarding the benefits of predominantly WFPB dietary patterns and how-to articles (eg, sample meal plans, grocery lists, tips on eating out or batch cooking, etc) that show simple steps patients can take to improve their diets. These can help increase interest and confidence in making dietary changes while patients are waiting to be seen and are easy to take home when they leave. TABLE 2 lists categories of foods to emphasize along with examples; FIGURE 2 illustrates relative proportions of these

FIGURE 2. ACLM whole-food, plant-based plate



The WFPB plate shows relative proportions of whole and minimally processed plant foods within their respective food categories. Following this plate method helps to ensure adequate intake of nutrients and a balanced diet. Refer to **TABLE 2** for examples of foods, and **TABLE 3** for more details about nutrient intake.

foods to recommend; and **TABLE 3**<sup>67-70</sup> reviews nutrients to consider in a WFPB eating pattern.

- **Multimedia:** Learning is enhanced with multiple modalities, and learners sometimes prefer formats other than reading. Therefore, consider providing or recommending videos, podcasts, audiobooks, documentaries, books, or other multimedia resources that patients can use to explore adopting dietary behavior changes.
- **ACLM Tools and Resources:** Go to the ACLM Tools

and Resources webpage to explore evidence-based tools and resources for physicians, health professionals, and patients.<sup>71</sup> **TABLE 4** indicates additional resources (some available publicly, others to ACLM members only).

- **Referral for additional support:** Refer patients to appropriate clinician or allied health professional support (eg, a Certified Diabetes Care and Education Specialist [CDCES], registered dietitian, behavioral medicine psychologist, or weight management specialist).

TABLE 3. Plant-based sources of selected nutrients<sup>67</sup>

Nutrient	Food sources
Protein	Beans, lentils, peas, nuts, seeds, tofu, tempeh
Carbohydrate	Fruits, starchy vegetables, whole grains, legumes
Fat	Nuts, seeds, avocado, olives
Fiber	Fruits, vegetables, whole grains, legumes, nuts and seeds
Omega-3 fatty acids	Chia seed, ground flaxseed, walnuts, soybeans, tofu, tempeh, algae-based omega-3 supplement
Calcium	Fortified plant milks, low-oxalate leafy greens (such as broccoli, bok choy, cabbage, collard greens, kale, watercress), calcium-fortified tofu, almonds, sesame seeds, figs, and molasses
Iron	Beans, lentils, peas, nuts, leafy greens, soybeans, quinoa, dried fruit
Vitamin B <sub>12</sub>	Fortified plant milks, nutritional yeast, cyanocobalamin supplement <sup>†68-70*</sup>

\*Vitamin B<sub>12</sub> supplement is recommended for individuals who consume no animal-based foods.

TABLE 4. Suggested tools and resources for predominantly whole-food, plant-based dietary patterns

Resource type	Name of resource
CME/CE online courses	Foundations of Lifestyle Medicine Board Review Course ( <a href="http://lifestylemedicine.org/boardreview">lifestylemedicine.org/boardreview</a> )
	Lifestyle Medicine Core Competencies ( <a href="http://lifestylemedicine.org/lmcc">lifestylemedicine.org/lmcc</a> )
	Food as Medicine for Medical Professionals ( <a href="http://lifestylemedicine.org/food-as-medicine">lifestylemedicine.org/food-as-medicine</a> )
Academic and patient-facing curriculum	LM 101 Curriculum ( <a href="http://lifestylemedicine.org/lm101">lifestylemedicine.org/lm101</a> )
	Culinary Medicine Curriculum ( <a href="http://lifestylemedicine.org/culinary-medicine">lifestylemedicine.org/culinary-medicine</a> )
Benefits of Plant-Based Nutrition White Paper Series	ACLM Public-Facing (or Open-Source) Tools and Resources ( <a href="http://lifestylemedicine.org/plant-based-nutrition">lifestylemedicine.org/plant-based-nutrition</a> )
Patient-facing tools and resources	ACLM Public-Facing (or Open-Source) Tools and Resources ( <a href="http://lifestylemedicine.org/tools">lifestylemedicine.org/tools</a> )
Clinical validated assessment tools and resources	ACLM Members-Only Portal
Lifestyle Medicine Shared Medical Appointment Toolkit	ACLM Members-Only Portal

For example, if a patient has a history of diabetes, it could be very helpful for the patient to meet with a registered dietitian/CDCES to better understand how shifting to a more plant-based, less processed diet can affect blood glucose and medication use. For a patient who identifies emotional eating as a barrier to making dietary changes, a behavioral medicine psychologist can aid them in distinguishing physiological from psychological hunger and help them develop strategies and techniques for minimizing the latter.<sup>72</sup>

- **Recommend classes and educational opportunities:** Provide patients with a list of classes available within your health system or community that teach

nutrition, cooking, and food purchasing and acquisition skills emphasizing predominantly WFPB dietary patterns. This can be a useful way to share WFPB eating in ways specific to different cultural food practices. Additional potential benefits of group-based classes are community building, developing peer support networks, and increasing accountability. Interactive cooking classes wherein patients learn to cook and sample various plant-based dishes are especially useful for building skills and confidence in the kitchen.

**Arrange**

The next step is to arrange follow-up. Patients making dietary and other lifestyle changes initially require frequent check-



ins. As these changes become more ingrained in a patient's routine, check-ins can gradually be spaced further apart over time. These check-ins can be done in person and/or as synchronous telehealth visits by video or phone with various members of the healthcare team. Some practices and systems also have means of asynchronously checking in such as texting or secure email messaging. Using different team members and different modalities is important for a variety of reasons, including but not limited to time constraints of the busiest team members, adding different perspectives and expertise that may be useful to patients, and more flexible scheduling to meet patient scheduling needs. Using telehealth, texting, or emailing also reduces travel, time, and financial burdens for patients who might not otherwise be able to attend frequent appointments.

Many practices leverage shared medical appointments, otherwise known as group visits, for check-ins as well. Group visits have additional benefits such as providing peer support and giving patients and providers time to address knowledge, attitudes, and behaviors around making lifestyle changes. They also allow time to check in on medical conditions, order laboratory tests/studies, and ensure appropriate preventive health services are provided in a timely manner. For more information on starting shared medical appointments in your practice, ACLM offers a Lifestyle Medicine Shared Medical Appointment Toolkit, which includes a helpful guide; information on coding, billing, and virtual group visits; webinars on shared medical appointments; sample consent forms; a marketing flyer template; and more.<sup>73,74</sup>

### CASE STUDY (CONT'D)

One month later, Mr. S presents for a follow-up visit. He reports that the 21-day challenge of eating only plant-based foods went very well and he feels more energetic and healthier than he has in years. When choosing less-processed and higher-fiber foods, he notices that he feels more satiated and is relieved he no longer needs to spend time trying to count calories. Instead, he now works on choosing appropriate portion sizes, paying more attention to hunger cues, and trying to use non-food rewards for his successes.

Vital signs are reviewed with Mr. S; he has lost 10 pounds and his blood pressure is now low enough to stop 1 of his 2 antihypertensive medications. Mr. S feels a 9 out of 10 level of confidence that he can continue the lifestyle changes he has made, so follow-up appointments are extended in 3-month intervals for the next year to help provide support and encouragement and to monitor his health conditions, especially any need for further reduction in medications.

### OTHER CONSIDERATIONS RELATED TO DIETARY CHANGES

There are numerous factors beyond nutrition knowledge and food choices that affect dietary intake. Many of these are mentioned in the sidebar ("Factors Beyond Nutrition Knowledge That Affect Dietary Choices"). Others, related to social determinants of health, food insecurity, and cultural practices and cooking in families, are briefly addressed below.

#### Social Determinants of Health

For many, cost and access can be barriers to healthy eating. Although the relatively low-calorie density of a healthful plant-based diet can be beneficial in maintaining a healthy weight while feeling satiated, it can make it difficult for some with very limited food budgets to achieve adequate caloric intake. This is because foods higher in nutrient density, such as fruits and vegetables, are associated with higher per-calorie costs than refined grains and sweets.<sup>75</sup> In addition, the investment in equipment necessary for cooking, as well as access to a kitchen, may be obstacles for some individuals. However, those with even a modest food budget can eat a predominantly WFPB diet—if they know how to cook, meal plan, and have access to a kitchen.<sup>76</sup> For example, among the 3 Healthy Food Patterns recommended in the 2015-2020 Dietary Guidelines for Americans,<sup>49</sup> the Healthy Vegetarian dietary pattern was found to be \$2.37 and \$2.87/day/person less expensive than the Healthy US Style and Healthy Mediterranean Style dietary patterns, respectively.<sup>77</sup> Additionally, within this analysis, legumes, whole grains, nuts, seeds, and soy were found to be far more economical per kilocalorie than dairy, meat, poultry, eggs, and seafood.<sup>77</sup>

#### Food Insecurity

To this end, it is important to identify patients with food insecurity, defined by the US Department of Agriculture as the lack of consistent access to enough food to live a healthy and active life.<sup>78</sup> This is quick and easy to do using the validated 2-question Food Insecurity Screener.<sup>79</sup> In many communities, there are a variety of resources and services that can be used to increase access to free, healthy food for those in need. In the United States, these include federal government programs (such as the Supplemental Nutrition Assistance Program [SNAP] and the Special Supplemental Nutrition Program for Women, Infants, and Children [WIC]), food bank programs associated with Feeding America (search <https://www.feedingamerica.org/> for the location nearest you), market match programs associated with farmers markets in selected locations that give participants double their SNAP dollars in vouchers for fresh produce, and many others. Additionally, there has been an increase in the availability of

## FACTORS BEYOND NUTRITION KNOWLEDGE THAT AFFECT DIETARY CHOICES

### *Behavioral Health and Behaviors*

- Trauma or abuse history, post-traumatic stress disorder (PTSD), depression, anxiety, substance use, chronic stress
- Binge eating disorder, anorexia, bulimia, other disordered eating, emotional eating/psychological hunger
- High intake of ultra-processed foods, especially refined grains and added sugars

### *Sleep and Pulmonary*

- Untreated/undertreated obstructive sleep apnea, obesity hypoventilation syndrome, insomnia, poor sleep hygiene

### *Genetics*

### *Neurologic*

- Restless leg syndrome, dementias, traumatic brain injuries, neuromuscular disorders, seizure disorders, migraines, idiopathic intracranial hypertension

### *Digestive-Gastrointestinal*

- Gastroesophageal reflux disease, irritable bowel syndrome, gastroparesis, history of bariatric surgery, inflammatory bowel disease, nausea, other gastrointestinal causes
- Microbiome

### *Endocrine*

- Hypo-/hyperthyroidism, diabetes, elevated cortisol states/conditions, hypogonadism, other hormone derangements

### *Severe Medical Disease and Related Treatments*

- Poor appetite associated with severe medical conditions such as heart failure, cirrhosis, and end-stage renal disease
- Cancer and side effects of cancer treatments

### *Pregnancy and Lactation*

### *Aging and Related Changes in Sense of Taste and Appetite*

### *Medication Side Effects*

- Some medications in the following classes affect dietary intake and can contribute to weight gain: tricyclic antidepressants, selective serotonin reuptake inhibitors (SSRIs), antipsychotics, antiepileptics, beta blockers, insulin, sulfonylureas, thiazolidinediones, corticosteroids, steroids, antihistamines
- Some medications affect dietary intake and can contribute to weight loss: bupropion, topiramate, zonisamide, venlafaxine, desvenlafaxine, stimulant medications or drugs, naltrexone, glucagon-like peptide-1 (GLP-1) agonists, sodium-glucose cotransporter-2 (SGLT2) inhibitors

### *Socioeconomic Status, Food Insecurity, and Food Access*

### *Food and Family Traditions and Foodways, Cultural Traditions, and Religious Beliefs/Practices*

### *Culinary Skills/Literacy, Kitchen Access, and Physical Limitations to Cooking*

### *Built Environment and Food Environment*

food pharmacies—dispensaries that give or sell healthy food upon receipt of a prescription from a healthcare professional for the treatment or prevention of food-related disease. Some of these services and organizations also offer cooking classes, tips, and recipes. For patients with limited food preparation experience, providing support for improving these skills is an important step in making healthy dietary changes.<sup>80</sup>

## Cultural Factors and Families

Considering cultural factors and influences is another essential element in partnering with patients in making dietary

behavior changes. We are all influenced by our cultures of origin and the people who surround us. Taking time to learn about the cultural food traditions of your patients can assist in tailoring recommendations, such as by recommending familiar plant foods, healthy cooking techniques, or local groceries and food establishments. Most cuisines can be tailored to focus on healthier aspects without excluding traditional foods entirely, and many traditional cuisines are healthier than modern, ultra-processed, and fast-food options.<sup>76</sup> Additionally, given that plant-based diets are healthful, adequate, and appropriate for all stages of life,<sup>16</sup>

encourage patients to engage their households in making healthy dietary changes; when changes are a family affair, they are more likely to be maintained. ACLM offers many pediatric-focused resources,<sup>71</sup> and more tips on assisting others in making dietary behavior changes can be found in the Culinary Medicine Curriculum.<sup>76</sup>

## CASE STUDY

Mr. S follows up 1 year after first being advised on dietary behavior changes—specifically, the recommendation to move toward a predominantly WFPB dietary pattern. During this year, he has followed up with his PCP or a member of the healthcare team at least every 3 months and participated in multiple local classes and a conference focused on his desired dietary changes. Mr. S feels the dietary changes he has made have become part of his lifestyle; he doesn't consider himself to be on a diet. Other successes include increasing his physical activity, losing 30 pounds (~10% total body weight loss), achieving a normal blood pressure without antihypertensive medications, and returning to normoglycemia. He thanks his PCP and the rest of the healthcare team profusely for helping him to address the root cause of his chronic health issues and for his current good health.

## CONCLUSION

In traditional primary care settings, healthcare providers commonly see patients with chronic, diet-related diseases, such as cardiovascular disease, type 2 diabetes, hypertension, hyperlipidemia, obesity, and more. There is compelling evidence that eating patterns rich in whole or minimally processed plant foods—ie, predominantly WFPB eating patterns—are associated with reduced risk for, and improvement in, these cardiometabolic conditions; they are also linked to lower risk of cancer. For these reasons, ACLM recommends a predominantly WFPB eating plan, a dietary pattern that is also aligned with guidelines from numerous professional health organizations.

Effective counseling on dietary behavior change is crucial to addressing the root causes of lifestyle-related, chronic diseases. There are many ways to assist patients in making dietary behavior changes that help them move along a spectrum away from diets closely linked with chronic diseases (ie, diets high in saturated fat, sodium, added sugars, and refined grains) and toward diets associated with longevity and lower disease risk (ie, diets rich in whole and less-processed plant foods). This review includes practical, evidence-based counseling methods, tools, and resources for addressing dietary behavior change in traditional clinical practice settings.

ACLM offers lifestyle medicine and nutrition-related continuing medical education opportunities through online educational courses including the Foundations of Lifestyle Medicine Board Review, Lifestyle Medicine Core Competencies, Food as Medicine courses, and events such as the ACLM annual conference and more that can be accessed at [lifestylemedicine.org/education](http://lifestylemedicine.org/education).<sup>81</sup> In becoming familiar with the evidence supporting predominantly WFPB eating patterns and adopting effective techniques to support dietary behavior changes, healthcare providers have the potential to significantly reduce the burden of chronic disease in their patient populations. ●

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