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AHA SCIENTIFIC STATEMENT

Popular Dietary Patterns: Alignment With American Heart Association 2021 Dietary Guidance: A Scientific Statement From the American Heart Association

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ABSTRACT: The evolution of dietary guidelines from isolated nutrients to broader dietary pattern recommendations results from growing knowledge of the synergy between nutrients and their food sources as they influence health. Macronutrient and micronutrient needs can be met by consuming various dietary patterns, but guidance is often required to facilitate population-wide adherence to wise food choices to achieve a healthy dietary pattern. This is particularly true in this era with the proliferation of nutrition misinformation and misplaced emphasis. In 2021, the American Heart Association issued a scientific statement outlining key principles of a heart-healthy dietary pattern that could be operationalized in various ways. The objective of this scientific statement is to assess alignment of commonly practiced US dietary patterns with the recently published American Heart Association criteria, to determine clinical and cultural factors that affect long-term adherence, and to propose approaches for adoption of healthy dietary patterns. This scientific statement is intended to serve as a tool for clinicians and consumers to evaluate whether these popular dietary pattern(s) promote cardiometabolic health and suggests factors to consider when adopting any pattern to improve alignment with the 2021 American Heart Association Dietary Guidance. Numerous patterns strongly aligned with 2021 American Heart Association Dietary Guidance (ie, Mediterranean, DASH [Dietary Approaches to Stop Hypertension], pescetarian, vegetarian) can be adapted to reflect personal and cultural preferences and budgetary constraints. Thus, optimal cardiovascular health would be best supported by developing a food environment that supports adherence to these patterns wherever food is prepared or consumed.

Key Words: AHA Scientific Statements ■ diet, food, and nutrition ■ diet, healthy ■ diet patterns ■ eating ■ popular diets

Over the past 30 years, American Heart Association (AHA) dietary guidelines have expanded beyond nutrients to foods and dietary patterns.[1–4] The systematic development of the Dietary Guidelines for Americans includes scientific reviews of the nutrition literature provided by the US Dietary Guideline Advisory Committees every 5 years, and the guidelines provide recommendations on the relevant foods and eating patterns that will help Americans achieve nutrient adequacy and overall diet quality associated with better health and prevention of disease.[5–8] Dietary patterns encompass long-standing cultural traditions, and the transition to dietary patterns and food-based recommendations aligns with the notion that implementation is facilitated when recommendations align with behaviors (ie, people eat foods, not nutrients, and food choice is influenced by the broader social context). The recommendations on dietary patterns are intended to be flexible, but because of the somewhat nonspecific nature, there is risk of potential misunderstanding or unintended food choices. One area of flexibility includes relative proportions of the 3 major macronutrient categories that provide calories: carbohydrates, fats, and proteins.

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The Dietary Reference Intakes, established by the Institute of Medicine, include an Acceptable Macronutrient Distribution Range[9] recommendation that constitutes a broad range of these macronutrients that could support healthy nutritional intake: carbohydrate, 45% to 65%; fat, 20% to 35%; and protein, 10% to 35%. Several of the popularized dietary patterns are outside of the Acceptable Macronutrient Distribution Range ranges (eg, very low-fat diet is lower in fat and higher in carbohydrates; Mediterranean diet is higher in fat specifically from extra-virgin olive oil; ketogenic diet is lower in carbohydrates). Other sources of confusion can come from the recommendations of popularized dietary patterns for the exclusion of major food groups. For example, the Paleolithic (Paleo) diet excludes dairy; vegan diet excludes animal-sourced foods; and ketogenic diet excludes most food sources of carbohydrates. Further contributing to consumer misunderstanding is the proliferation of popular diet books, blogs, as well as clinicians with limited understanding of what the dietary patterns entail and the evidence base for promoting cardiometabolic health. The most recent 2021 AHA Dietary Guidance provides a set of criteria for heart-healthy diets that promote cardiometabolic health and includes 10 features that pertain to food group guidance[4] (Table 1). The objective of this scientific statement is to compare prevailing dietary patterns with the 2021 AHA Dietary Guidance and rank them from the most to the least alignment. This scientific statement also clarifies the intended implementation of prevailing dietary patterns and summarizes strengths, facilitators, challenges, opportunities, and priorities for future dietary pattern research that incorporates historically underrepresented cultural patterns.

Table 1. Evidence-Based Dietary Guidance to Promote CVH

Adjust energy intake and expenditure to achieve and maintain a healthy body weight
Eat plenty of vegetables and fruits; choose a wide variety
Choose foods made mostly with whole grains rather than refined grains
Choose healthy sources of protein
Mostly from plants (legumes and nuts)
Fish and seafood
Low-fat or fat-free dairy products instead of full-fat dairy products
If meat or poultry are desired, choose lean cuts and avoid processed forms
Use liquid plant oils (olive, safflower, corn) rather than animal fats (butter and lard) and tropical oils (eg, coconut, palm kernel)
Choose minimally processed foods instead of ultraprocessed foods*
Minimize intake of beverages and foods with added sugars
Choose and prepare foods with little or no salt
If you do not drink alcohol, do not start; if you choose to drink alcohol, limit intake
Adhere to this guidance regardless of where food is prepared or consumed

CVH indicates cardiovascular health.

*There is no commonly accepted definition for ultraprocessed foods, and some healthy foods may exist within the ultraprocessed food category.

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METHODS: SELECTION OF DIETARY PATTERNS AND DEFINITIONS

A review was conducted to identify popular dietary patterns practiced in the United States with the use of publicly available information about diet trends.[10,11] To characterize the defining features of these dietary patterns, 3 members of the writing group (K.S.P., C.D.G., and M.V.) prioritized randomized controlled trials when available and in some cases used descriptions from US federal agencies or health organizations or from large prospective cohort studies. Dietary patterns aimed at managing noncardiometabolic conditions (eg, gastrointestinal conditions/diseases, allergies, or intolerances), diets designed to be followed for <12 weeks (eg, Whole 30), commercial programs (eg, Noom, Weight Watchers), and diets with unclear definitions were excluded. Similarly, dietary practices (eg, intermittent fasting or time-restricted eating) were considered distinct from dietary patterns and were excluded. Last, modifications to selected dietary patterns due to underlying diseases (eg, celiac), allergies, or intolerances were beyond the scope of this scientific statement.

Three members (K.S.P., C.D.G., and M.V.) of the writing group reviewed available evidence to determine the defining features of each popular dietary pattern (Supplemental Tables 1–12). The identified dietary patterns were grouped into 10 overarching categories based on the degree of similarity in the macronutrient profile, food groups, or both that were emphasized or limited/restricted. Although there is variability among some of the diets within each of these overarching pattern categories, grouping allows increased ease of comparison with the 2021 AHA Dietary Guidance.[4] Dietary patterns identified and summarized in Table 2 include (1) DASH (Dietary Approaches to Stop Hypertension)-style, (2) Mediterranean-style, (3) pescetarian, (4) ovo/lacto-vegetarian, (5) vegan, (6) low-fat, (7) very low-fat, (8) low-carbohydrate, (9) Paleolithic (Paleo), and (10) very low-carbohydrate/ketogenic patterns.

The writing group then evaluated how closely each of the 10 dietary pattern categories aligned with the criteria identified in the 2021 AHA Dietary Guidance. For ease of interpretation, we developed a scoring system to evaluate how closely each dietary pattern addressed 9 of the features described in the 2021 AHA Dietary Guidance. An important underlying assumption for this step was to treat the pattern component definitions "as intended" as much as possible (ie, in a manner consistent with ideal implementation of the diet). We allocated 1 point for a specific component of a dietary pattern if it matched the 2021 statement guidance for that feature. If the component somewhat met the recommendation, we allocated 2 different levels: 0.75 points for mostly and 0.5 for partially. If the component was contrary to 2021 AHA Dietary Guidance, we allocated 0 points for that criterion.

For each of the methodological steps described, extensive discussions were held at the onset of the

Table 2. Dietary Pattern Categories, Their Common/Popular Names, and Their Defining Features

Diet categories	Common/popular diet names	Defining features		
		Emphasize	Include	Limit/avoid
DASH style[12–18]	DASH, Nordic, Baltic	Vegetables, fruits, whole grains, legumes, nuts and seeds, low-fat dairy	Lean meats and poultry, fish, nontropical oils	Limit: saturated fat, sodium, fatty meats, refined grains, added sugars, alcohol
Mediterranean style[19–24]	Mediterranean diet	Vegetables, fruits, whole grains, legumes, nuts and seeds, poultry, fish and seafood (fatty), extra-virgin olive oil	Red wine (moderation)*	Limit: dairy, meat, sugar-sweetened beverages, commercial bakery goods, sweets, and pastries
Vegetarian style[25–28]	Pescetarian[26]	Vegetables, fruits, whole grains, legumes, nuts and seeds	Fish and seafood, dairy, eggs	Limit: added sugars, refined grains, solid fats, alcohol Avoid: meat and poultry
	Lacto/ovo/lacto-ovo-vegetarian[8,25–27]		Dairy (lacto/lacto-ovo only) Eggs (ovo/lacto-ovo only)	Limit: refined grains, solid fats, alcohol Avoid: meat, poultry, fish and seafood dairy (ovo only), eggs (lacto only)
	Vegan[25,28]			Limit: added sugars, refined grains, solid fats, alcohol Avoid: meat, poultry, fish and seafood, dairy, eggs
Low fat[20,29–36]	Low fat, TLC, volumetrics	Vegetables, fruits, whole grains, legumes	Low-fat dairy, lean meats, poultry, and fish	Limit: fat <30% kcal, nuts, oils, fatty meat, poultry, fish, alcohol
Very low fat[37–41]	Ornish, Esselstyn, Pritikin, McDougal, PCRM	Vegetables, fruits, whole grains, legumes		Limit: fat <10% kcal, sodium, refined grains, alcohol Avoid: oils, nuts and seeds, meats, poultry, fish, dairy, eggs
Low carbohydrate[29,35,36,42,43]	Zone, South Beach, low glycemic load	Vegetables, fruits (nonstarchy), nuts and seeds, fish and seafood, nontropical oils		Limit: carbohydrate 30%–40% kcal, whole and refined grains, legumes, dairy, alcohol Avoid: added sugars, fatty meat
Paleolithic[44–48]	Paleo	Vegetables, fruits, nuts, lean meat, fish	Eggs	Limit: sodium Avoid: added sugars, whole and refined grains, legumes, oils, dairy, alcohol
Very Low Carbohydrate[29,49–53]	Atkins, ketogenic, well-formulated ketogenic diet	Nuts and seeds, red meat, poultry, fish and seafood, eggs, full-fat dairy, oils	Vegetables (nonstarchy), berries Ketogenic: 3000–5000 mg/d sodium[54]	Limit: carbohydrate <10% kcal, alcohol Avoid: fruits (except berries), grains, legumes, added sugars

DASH indicates Dietary Approaches to Stop Hypertension; Paleo, Paleolithic; PCRM, Physicians Committee for Responsible Medicine; and TLC, therapeutic lifestyle changes.

*Alcohol intake ≤2 drinks/d for men and ≤1 drink/d women.[8]

drafting of the scientific statement until consensus was first reached among 3 writing group members (C.D.G., M.V., and K.S.P.) for (1) the set of overall diets to be included, (2) the 10 overarching categories of patterns, and (3) the assignment of points. These decisions were then shared with the other 7 experts in the writing group for further discussion. Consensus was reached in this manner for all points.

The original 2021 AHA Dietary Guidance includes 10 primary features (Table 1). For the first feature, "achieving energy balance," we determined that this could not be clearly or meaningfully used to differentiate dietary patterns, so this is addressed separately from the primary pattern scoring. The fourth feature, "choosing healthy sources of protein," has 4 subcategories. These 4 subcategories were evaluated individually and then used to yield just a single score for the protein feature overall. Therefore, the theoretical range of the subjective score is between 0 and 9 points (also presented as a percentage of criteria met), with higher scores reflecting greater alignment with the criteria in the 2021 AHA Dietary Guidance.

DIETARY PATTERN CATEGORIES

For each diet category, 3 writing group members (C.D.G., M.V., K.S.P) tried to identify up to 5 or 6 examples of published scientific studies that included descriptions of the individual components of the diet to emphasize, include, and limit/avoid. The categories of dietary components were selected to be those that matched the AHA 2021 Dietary Guidance. These examples are included in the Supplemental Material (Supplemental Tables 1–12). As for the number of examples selected, a saturation approach was used such that identifying additional references was not expected to change the defining features (summarized in Table 2).

The DASH pattern is focused on increasing the intake of plant and lean meat/fish/dairy micronutrients associated with lowering blood pressure (potassium, calcium, and magnesium) and limiting macronutrients and micronutrients associated with increased blood pressure (saturated fat, added sugars, and sodium).[12–18] DASH-style patterns are well aligned with AHA criteria. Other dietary patterns included in this category include the Baltic and the Nordic

diets because there is substantial overlap with the DASH-type diets in terms of food groups emphasized (ie, vegetables, fruits, whole grains, legumes, nuts and seeds, and dairy).

Mediterranean-style diets refer to patterns originally derived from Mediterranean regions of the world but not a specific macronutrient or micronutrient approach.[19–24] Operationalization of these patterns differs in some of their specific food group recommendations but shares commonalities in the areas of the diet they emphasize and the areas of the diet they restrict (Table 2). They tend to be relatively high in unsaturated fat, particularly from extra-virgin olive oil. Guidance on sodium varies across different sources and includes both implicit and explicit recommendations (ie, many Mediterranean patterns implicitly limit sodium by restricting the consumption of commercial food, which is a primary contributor of sodium). Dairy foods are another source of variability across different sources, with some recommendations to limit and some to include both yogurt and cheese and limited focus on differentiating low-fat from whole-fat food. This dietary pattern is unique in its inclusion of alcohol, although this is specifically qualified as alcohol in moderation. The 2020 to 2025 Dietary Guidelines for Americans state that for adults choosing to drink alcohol, intake should be limited to ≤2 drinks/d for men and ≤1 drink/d for women.[8]

Vegetarian-style dietary patterns include some degree of restriction of animal products. Although there are many vegetarian-style patterns, including plant based and flexitarian, we focused on 3 patterns with the clearest definitions:

- Pescetarian (excludes meat and poultry but includes fish; also usually includes dairy and eggs),
- Lacto-ovo-vegetarian (excludes meat, poultry, and fish; this subcategory also includes lacto-vegetarian [includes dairy but not eggs] and ovo-vegetarian [includes eggs but not dairy]), and
- Vegan (excludes meat, poultry, fish, dairy, eggs, and, in some cases, honey).[25–27]

Although it is possible to adhere to any animal-restricted dietary pattern and consume unhealthy foods (eg, refined grains, foods high in added sugars, solid fats), for the purposes of this evaluation, here we consider optimal versions of these patterns (ie, patterns that otherwise align with the US Dietary Guidelines). A healthy vegetarian dietary pattern is recommended in the Dietary Guidelines for Americans, and most of the features of this pattern align with 2021 AHA Dietary Guidance.

Low-fat patterns generally target total fat intake between 20% and 30% of kilocalories alongside other healthy dietary guidelines.[20,29–36] Low-fat patterns generally align with 2021 AHA Dietary Guidance for vegetables, fruits, whole grains, low-fat dairy, and lean protein but are less likely to meet recommendations for nuts and healthy oils. Other dietary patterns that fit in this category include therapeutic lifestyle changes[55] and volumetrics.[56]

Very low-fat patterns are characterized predominantly by having ≤10% energy from fat.[37,39–41,57,58] This approach is promoted and described in publications by Drs Ornish, Barnard, Esselstyn, McDougal, Campbell, and Pritikin. These diets are often referred to as vegan (or low-fat vegan) because almost all animal products are excluded, although both the Ornish and Pritikin diets provide some allowance for low-fat dairy. Very low-fat patterns differ from vegan patterns by strictly limiting nontropical plant sources of fat. Therefore, the most defining feature of this pattern is its severe restriction of dietary fat, that is, limiting or avoiding high-fat plant foods such as nuts, seeds, avocados, and liquid plant oils, which are currently viewed as important characteristics to consider when evaluating overall nutrient adequacy and alignment with features of the 2021 AHA Dietary Guidance.

Low-carbohydrate patterns generally refer to patterns with total carbohydrate targets between 20% and 40% of kilocalaroies.[20,29–36] A distinguishing characteristic of low-kilocalories patterns is the restriction of whole grains, legumes, and, in some cases, total and whole fruit. Moreover, because low-carbohydrate patterns are higher in fat and protein, they are often higher in animal-sourced foods and saturated fat as a result. Other dietary patterns that fit in this category are the Zone, South Beach, and low-glycemic-load diets. The glycemic index refers to how much carbohydrate-containing foods raise blood glucose levels after consumption, with low-glycemic-index foods leading to smaller increases in blood glucose levels compared with high-glycemic-index foods. Glycemic load takes into consideration how much carbohydrate is consumed; low-glycemic-load diets have a lower carbohydrate load and contain mostly low-glycemic-index foods.

The Paleo diet is specific about food groups to avoid.[44–48] Foods to avoid include many that are featured in the 2021 AHA Dietary Guidance such as whole grains, legumes, oils, and dairy (regardless of the fat content of the dairy foods). The Paleo diet emphasizes meat, poultry, and fish (and tends to be high in saturated fat as a result), as well as vegetables, fruits, and nuts.

Very low-carbohydrate diet (VLCD) patterns restrict total carbohydrates to 5% to 10% of kilocalories.[29,49–53] To achieve this, total avoidance of all grains and legumes, almost all fruits (except for some berries), and starchy vegetables (sometimes characterized as "below ground," eg, potatoes, carrots) is required. To avoid the lactose contribution of most dairy products, the only dairy permitted is the highest-fat versions such as heavy cream. Because of these restrictions and recommendations, the VLCD is high in animal-sourced foods and saturated fat and therefore raises concerns about nutrient adequacy. The diet patterns that fit this category include Atkins[59] and ketogenic.[60]

ALIGNMENT SCORING

The selected 10 dietary pattern categories are scored in the Figure for alignment with 9 of the 10 features from the 2021 AHA Dietary Guidance. The 1 feature

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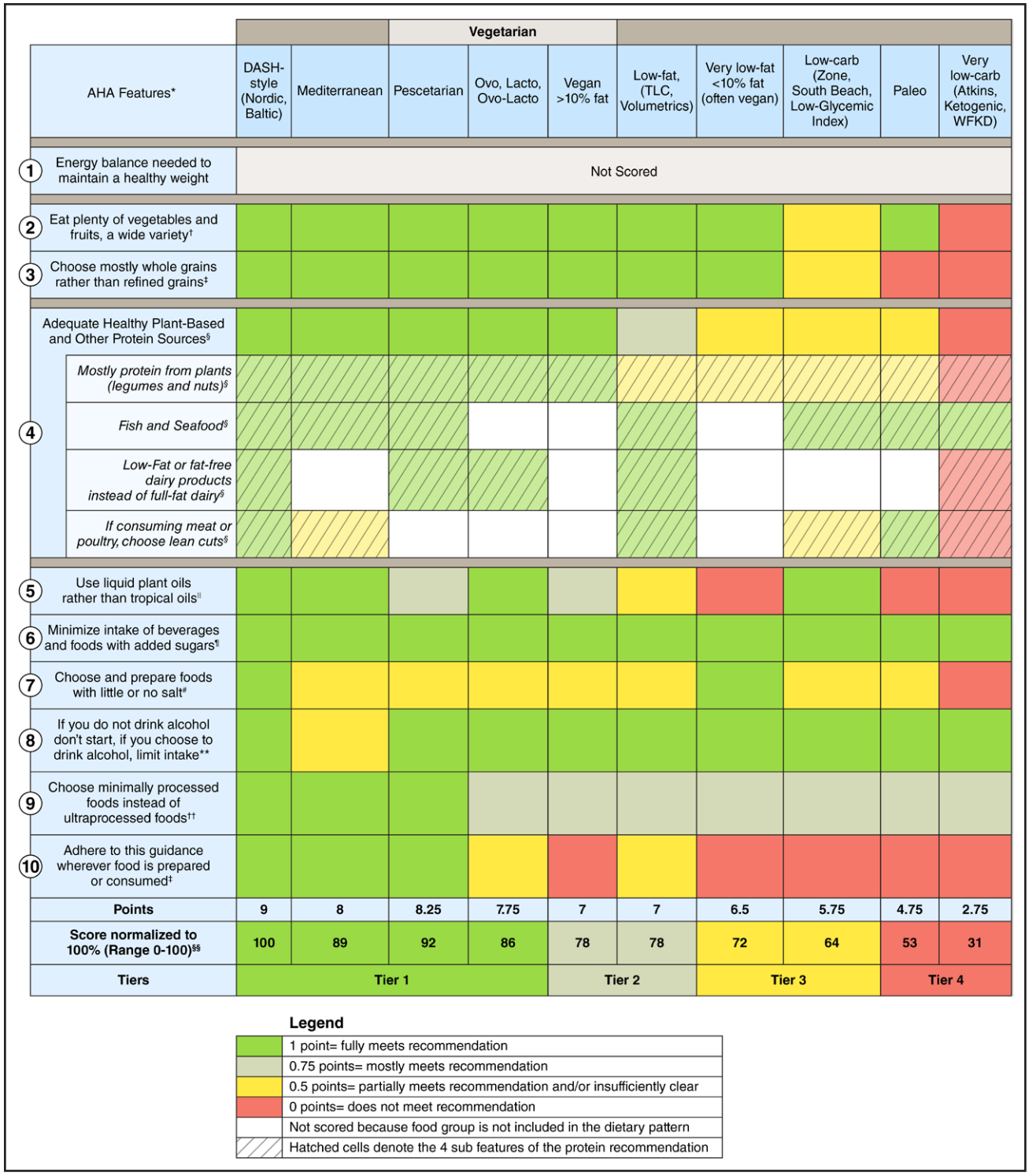

Figure. Alignment of dietary pattern with 2021 AHA Dietary Guidance.

AHA indicates American Heart Association; DASH, Dietary Approaches to Stop Hypertension; TLC, therapeutic lifestyle changes; and WFKD, well-formulated ketogenic diet.

*Each component is worth up to 1 point: 1, 0.75, 0.5, and 0 points for fully, mostly, partially, and not meeting each recommendation, respectively. Of the 10 initial criteria, 9 have been included in the score with 1 criterion (ie, achieving energy balance) discussed separately. Some subjectivity was required in scoring.

†Full points are awarded for patterns that emphasize both vegetables and fruits. Patterns that do not encourage whole fruit and encourage only nonstarchy vegetables because of carbohydrate content received partial credit (0.5 points).

‡As intended, dietary patterns that do not restrict carbohydrate intake recommend choosing whole grains rather than refined grains because whole-grain foods have health benefits. Thus, full points were awarded to patterns that, as intended, emphasize whole grains in place of refined grains. Patterns that limited both whole grains and refined grains received partial credit (ie, low carbohydrate [low carb]) and patterns in which all grains were explicitly avoided (ie, Paleolithic [Paleo] and very low carb/ketogenic) received 0 points. (*Continued*)

Figure Continued. §The protein recommendation within the 2021 AHA Dietary Guidance has 4 subfeatures: (1) mostly protein from nuts and legumes; (2) fish and seafood; (3) if choosing dairy, low-fat or fat-free dairy products instead of full-fat dairy products; and (4) if consuming meat or poultry, lean cuts. The 4 subcategories of protein-related features were all addressed individually but were used to yield just a single score for that overall feature, operationalized as follows. Given the emphasis on plant-based proteins from whole foods, only patterns that aligned with the first protein subcomponent and emphasized consumption of both legumes and nuts could receive the full 1 point for the healthy protein recommendation. Furthermore, if legumes and nuts were emphasized, there was no penalty if the patterns excluded the other 3 subcomponents, and no further points were awarded for additionally incorporating fish and seafood, although fish and seafood are considered sources of healthy protein, However, because 2021 AHA Dietary Guidance recommends fish and seafood intake as a healthy source of protein because of the omega-3 fatty acid content, patterns not awarded the full point for emphasizing plant-based proteins received more credit (ie, 0.75) if they emphasized seafood and fish relative to other animal-source foods such as nonfat or low-fat dairy, lean meat, or poultry. For the remaining 2 protein subcategories, if a pattern included dairy and explicitly emphasized fat-free or low-fat dairy, it was considered to align with AHA criteria; patterns that were not clear about full-fat vs low-fat dairy (ie, lacto-ovo-vegetarian) received most but not full credit. Similarly, if a pattern included meat and poultry and explicitly emphasized lean sources of meat and poultry, it was considered to align with AHA criteria; if guidance focused on limiting high-fat cuts of meat and poultry, partial points were awarded, and if higher-fat cuts of meat and poultry were advised, no points were awarded.

‖ Choosing liquid vegetable oils rather than tropical oils and solid fats was emphasized in heart-healthy dietary patterns. Patterns received full points if they emphasized intake of nontropical oils, including olive, canola, or other vegetable oils. Patterns received most of the credit (ie, 0.75) if they focused on limiting solid fats but did not explicitly emphasize the importance of liquid vegetable oils (ie, pescetarian, vegetarian, and vegan). Patterns that limited oils (ie, low fat) received partial credit, and patterns that avoided oils (ie, very low-fat vegan and Paleo) received 0 points.

¶As intended, all patterns recommend restricting foods and beverages with added sugars; the wide availability of foods and beverages high in added sugars and marketed toward specific dietary patterns is addressed under the ultraprocessed food criteria.

#Excess sodium intake is a potent cardiovascular risk factor, and choosing and preparing foods with little or no salt is a key recommendation in the 2021 AHA Dietary Guidance. Although many patterns, as intended, focus on choosing foods (eg, vegetables, fruits, legumes) that are naturally low in sodium, if explicit guidance was not provided on added salt, only partial credit was given.

**Patterns that advise avoiding or limiting alcohol received full points; patterns that advised moderate alcohol consumption (ie, Mediterranean) received partial credit.

††Patterns that focus on whole foods and have few processed foods marketed for that dietary pattern received full credit; patterns that have many processed foods marketed toward the dietary pattern but for which patterns, as intended, would be met through consumption of minimally processed foods were designated as mostly meeting the recommendation (ie, lacto-ovo-vegetarian, vegan, low fat, low carbohydrate, Paleo, very low carb/ketogenic).

‡‡Adherence to guidelines regardless of where foods are prepared or consumed reflects the evolution of eating behavior in the United States and acknowledges that many people consume more than one-third of calories outside the home.[61] Thus, this implementation criterion was scored on the basis of the relative ease of adhering to a given dietary pattern within the broader food environment. Although cost may always be a factor that shapes food choice, the scoring criteria were based on how many of the healthy dietary features emphasized in the 2021 AHA Dietary Guidance individuals are asked to limit or restrict. The foods emphasized include vegetables, fruits, whole grains, legumes, nuts, seafood and fish, and vegetable oils, with low-fat dairy and lean meat consumption allowed as desired. Patterns that do not limit any of these food groups receive a full point for ease of adherence; patterns that limit ≤2 food groups receive 0.5 points (ie, lacto/ovo-vegetarian and low fat); and patterns that limit >2 food groups (ie, vegan, very low fat, low carb, Paleo, and very low carb/ketogenic) receive 0 points, indicating that, although possible, it is more challenging to adhere to this pattern because of the restrictions.

§§Tiers were created by the writing group to delineate the general levels of alignment with the AHA 2021 Dietary Guidelines: tier 1, strongly in alignment; tier 2, mostly in alignment; tier 3, low to moderate in alignment; and tier 4, least in alignment.

not included in scoring was the energy balance needed to maintain a healthy weight. Energy balance is affected by various factors. Low-energy-dense foods such as vegetables and fruits are associated with greater satiety, and some evidence suggests that higher intakes of fiber and protein promote satiety.[62,63] Energy balance may also be influenced by dietary restraint: Highly restrictive diets can support short-term energy restriction and weight loss but have been associated with higher food cravings and attrition over time, although that may be modulated by individual characteristics.[64] In addition, food availability and exposure to highly palatable, often ultraprocessed foods may affect energy balance.[65,66] Given the variability of influences from these different dietary features on energy balance and the variability of the selected 10 dietary pattern categories, it was determined that this feature was difficult to include meaningfully in the scoring process; alternatively, it is described here in general as it applies to all the dietary pattern categories.

FACILITATORS AND CHALLENGES FOR IMPLEMENTATION: PRACTICAL TIPS FOR CLINICIANS AND OTHER MEMBERS OF THE HEALTH CARE TEAM

Clinicians and other members of the health care team are trusted sources of dietary advice and thus play an important role in providing evidence-based dietary advice for primary prevention.[67–69] Yet, many clinicians cite insufficient time and inadequate nutrition training as barriers to providing nutrition advice or counseling. Therefore, the objectives of this section are (1) to highlight the strengths or favorable attributes of the 10 identified dietary patterns if implemented as intended, (2) to discuss facilitators to adopting each pattern, (3) to identify challenges and misconceptions that should be addressed by clinicians and other members of the health care team to ensure that the pattern is adopted appropriately, and (4) to provide actionable

opportunities to improve adherence or enhance the health-promoting aspects of the pattern. Optimal nutrition counseling and lifestyle interventions are best accomplished by team-based care and may be particularly facilitated by referral to a registered dietitian. Such referrals may be especially important for patients with food allergies, intolerances, or sensitivities who may require modifications to dietary patterns based on an underlying health condition.

The evaluated patterns are organized into 4 tiers, roughly quartiles, for the practical purpose of organizational efficiency in presentation and discussion. The first tier of 4 patterns (ie, Mediterranean, DASH style, pescetarian, and ovo-lacto-vegetarian), if implemented as intended, align best with the recent 2021 AHA Dietary Guidance[4] and can be adapted to respect cultural practices, food preferences, and budget to promote long-term adherence. The second group of patterns (ie, vegan and low fat), as intended, mostly align with AHA criteria. The third group of patterns (ie, low carbohydrate and very low fat), with careful guidance from a registered dietitian and some known inherent limitations, have low to moderate alignment with AHA criteria, and the fourth group of patterns (ie, Paleo, and VLCD) align poorly with AHA Dietary Guidance, even if implemented as intended.

Tier 1: Mediterranean, DASH-Style, Pescetarian, and Ovo/Lacto-Vegetarian Diets

When implemented as intended, these 4 patterns are rich in vegetables, fruits, whole grains, and plant-protein sources. Key differentiating factors are that Mediterranean-style diets more explicitly emphasize plant-based oils, especially extra-virgin olive oil, and moderate alcohol consumption. DASH patterns are differentiated by their greater focus on limiting sodium intake and emphasizing low-fat dairy. Pescetarian and ovo/lacto-vegetarian patterns remain differentiated by the degree to which they restrict animal-sourced foods.

Facilitators

These 4 dietary patterns are flexible, providing a broad array of healthy foods from which to choose. For patients preferring some animal-sourced protein, the Mediterranean, pescetarian, and DASH-style patterns may be easier to adopt because protein from both plant and animal sources is included such as low-fat dairy, eggs, and fish (specifically fatty fish for Mediterranean and including lean meat and poultry in the DASH-style pattern). Fatty fish such as salmon, herring, and sardines are rich in long-chain omega-3 fatty acids, which have many cardiovascular benefits. These patterns emphasize familiar healthful foods, and recipes are widely available. Moreover, with few restricted foods and food groups, it is relatively easy to adhere to this guidance wherever food is prepared or consumed.

Challenges

With all patterns, there is the potential for oversimplification and misinterpretation of the defining features. With the Mediterranean pattern, some patients may focus solely on olive oil consumption, increasing total calorie intake and missing out on many of the other important features of the diet. Similarly, pescetarian and ovo/lacto-vegetarian diets are not inherently health promoting if made up of primarily fried fish or unhealthy plant-sourced foods (ie, refined grains, sweets, tropical oils). Patients should be counseled on the need to incorporate the full variety of healthy features of these patterns (ie, vegetables, fruits, nuts, legumes, and whole grains). Patients who consume various processed foods may find it challenging to adhere to sodium limits, particularly in DASH-style patterns. Notably, in the PREMIER trial (PREMIER: Lifestyle Interventions for Blood Pressure Control), only 28% of participants met sodium targets (eg, <1500 mg/d) at 6 months, although it was relatively feasible to meet the target of <2300 mg/d by avoiding processed foods.[14,70] Last, higher intake of low-fat dairy products advised in the DASH pattern can be challenging for individuals with lactose intolerance.

Opportunities

Adopting these patterns may increase cost related to vegetables and fruits (ie, 8–10 servings/d are recommended[71]), nuts, fish, and oils. However, reduced red meat, refined grains, and sweets and reduced health care costs due to a healthier diet can make these patterns more cost-effective.[72] Clinicians can also advise patients to consume more frozen or low-sodium/no-sugar-added canned produce, which can be just as nutrient dense as fresh varieties, and to shop seasonally.[4] Herring, rainbow trout, and some forms of tuna (versus salmon) are more cost-effective fatty fish options, and higher consumption of legumes should be encouraged because they are excellent sources of relatively low-cost protein and fiber. Patients can also be assured that the benefits of consuming either farmed or wild-caught seafood and fish outweigh the health risks associated with contaminants.[73,74] The most recent US Dietary Guidelines continue to advise consuming ≥2 servings of seafood or fish per week, with preference given to higher omega-3 sources that have low mercury levels, following federal and local fish and seafood advisories. The budgetary savings and environmental benefits of ovo/lacto-vegetarian diets relative to animal flesh–containing diets may be a desirable feature for some patients. It is easier to achieve sodium targets when preparing foods from scratch, so providing access to DASH-style recipes that use herbs to flavor food can promote adherence.[75] Similarly, encouraging consumption of plant-based milks fortified with calcium or low-lactose yogurts and low-fat hard cheeses can facilitate meeting low-fat dairy recommendations for patients with lactose intolerance. Last, patients should be encouraged to adopt dietary changes gradually if not already consuming a pattern rich in vegetables, fruits, whole grains, nuts, and

legumes because higher intake of these fiber-rich foods can be associated with bloating and cramping if the increase is sudden.[76]

Tier 2: Vegan Diets and Low-Fat Diets

Strengths of these 2 dietary patterns include an emphasis on vegetables, fruits, whole grains, legumes, and, in the case of vegan diets, nuts. Moreover, they also emphasize low intake of foods and beverages with added sugar and limited alcohol, which align with the features of a heart-healthy diet.

Facilitators

Many patients are interested in vegan dietary patterns for animal welfare reasons or because of environmental concerns alongside documented health benefits, which may be a useful impetus to promote behavioral change.[25,77,78] Low-fat diets, widely popularized in the 1970s, continue to have proponents because of their familiarity, plentiful low-fat options in prepared food products, and relative simplicity of recommendations. In addition, although it is not necessary to restrict total dietary fat to promote heart health, low-fat diets may appeal to those with high blood cholesterol levels because studies have consistently demonstrated improvements in low-density lipoprotein cholesterol when dietary saturated fat is replaced with unsaturated fats.[79,80]

Challenges

A key challenge for the vegan pattern is its restrictive nature, making it infeasible and an impediment for long-term adherence for most patients. In addition, restricted intake of foods emphasized in the 2021 AHA Dietary Guidance, which was intended to help adults meet their nutrient needs through foods, places adults following vegan patterns at risk for macronutrient and micronutrient deficiencies, particularly vitamin B_{12} deficiency.[25] Low-fat diets are often implemented by increasing intake of less healthful sources of carbohydrate, which tend to raise triglycerides and lower high-density lipoprotein cholesterol.[81] For both patterns, the proliferation of highly processed foods that are low fat or vegan but sources of refined grains, added sugars, and sodium can often lead to implementation of the pattern not as intended but rather through higher consumption of unhealthy convenience foods.

Opportunities

Patients interested in low-fat diets should be encouraged to focus on replacing sources of saturated fat with healthier fats sources such as monounsaturated and polyunsaturated fats, which are often curtailed by patients who equate all fats as being the same.[82] Data from low-fat dietary trials suggest that few people adhere to total dietary fat limits, and because dietary fats are often replaced by sugar and refined grain, encouraging patients to focus on type of fat more than total fat while managing total energy intake may help with adherence to a heart-healthy pattern. Individuals interested in vegan diets should be counseled to consider taking a vitamin B_{12} supplement or to choose foods fortified with vitamin B_{12} (eg, plant-based alternative milks), which may be limited in the vegan diet. Referral to a registered dietitian or other qualified health professional is encouraged.

Tier 3: Very Low-Fat Diets and Low-Carbohydrate Diets

These 2 dietary patterns have low to moderate alignment with AHA Dietary Guidance. Strengths for these patterns include an emphasis on nonstarchy vegetables, fruits, and legumes (very low fat); intake of nuts and fish (low carbohydrate only); minimal intake of foods and beverages with added sugar; limited alcohol consumption; and often lower sodium consumption.

Facilitators

A motivator for some patients to follow the more restrictive very low-fat (often vegan) diet may be the availability of observational studies and smaller randomized trials demonstrating stabilization and potential reversal of atherosclerotic cardiovascular disease.[37] In addition, a healthy low-carbohydrate diet has been shown to beneficially influence weight loss and cardiometabolic risk factors equivalently to a healthy low-fat pattern.[35]

Challenges

Both patterns restrict some food groups emphasized for inclusion in the AHA Dietary Guidance. Nuts and plant oils are restricted in very low-fat diets, and some legumes, grains, and fruits are restricted in low-carbohydrate diets. Macronutrient and micronutrient deficiencies (particularly vitamin B_{12} but also essential fatty acid and protein) should be monitored in very low-fat diets. For those following low-carbohydrate diets, meats and animal-sourced foods tend to be overemphasized, leading to inappropriate restriction of fiber and increased saturated fat intake.[29,35,36,42,43]

Opportunities

Counseling patients to choose the most nutrient-dense forms of the food groups allowed within the pattern will increase the benefits of either dietary pattern. Medical supervision of more restrictive very low-fat patterns is advised to reduce the likelihood of micronutrient deficiency or, in the cases of very low-fat vegan patterns, deficiencies in protein and essential fatty acids. Research suggests that few people adhere to strict macronutrient targets[83]; thus, some liberalization around restricted food groups such fruits, whole grains, legumes, and nuts and seeds (depending on the pattern) may promote long-term adherence and align more closely with the 2021 AHA Dietary Guidance.

Tier 4: Paleo Diets and VLDC/Ketogenic Diets

These 2 dietary patterns align poorly with AHA Dietary Guidance. Strengths for these patterns include an emphasis

on nonstarchy vegetables, nuts, and fish and minimal intake of foods and beverages with added sugar, with limited alcohol consumption.

Facilitators

Studies of various lengths have shown improvements in weight and measures of glycemia with these patterns.[46,84–87] Similarly, VLCD/ketogenic diets have been shown to improve cardiovascular risk factors, including blood glucose, body weight, triglycerides, and high-density lipoprotein cholesterol, in studies up to 6 months. However, in a 2019 review of available data, most of those improvements relative to a comparison diet were no longer significant after 12 months.[88]

Challenges

Restrictions on whole fruit (VLCD/ketogenic), legumes, and whole grains and inclusion of more animal-sourced foods make it challenging for these 2 patterns to align with AHA guidance and may lead to nutritional deficiencies and loss of beneficial phytochemicals found in plant-based foods consistently associated with reduced morbidity and mortality.[49,89] Although a balanced VLCD/ketogenic or Paleo diet can have healthy attributes, patients should be counseled that overconsuming fatty meats and sodium may be detrimental to health. In addition, VCLD/ketogenic diets are high in fat without limiting saturated fat, leading to increases in low-density lipoprotein cholesterol.[89–92] Many individuals experience "keto flu" with a constellation of symptoms, including headache, fatigue, difficulty sleeping, irritability, nausea, and constipation, at the beginning of the diet, which may be a deterrent for continuation. These symptoms improve over time with continuation on the diet. However, the highly restrictive nature of both of these diets, particularly the VLCD/ketogenic diets, likely limits long-term adherence rates.[49,93]

Opportunities

Counseling patients to ensure high intake of vegetables, fruits, and nuts may increase the benefits of Paleo and VLCD/ketogenic diets. Despite the low alignment with AHA criteria, patients interested in consuming a ketogenic diet short term should be counseled that using VLCD/ketogenic diets may limit hunger while leading to weight loss. Clinicians should work closely with patients to formulate ketogenic diets as healthfully as possible by focusing on healthier, plant-based fats (such as oils) and nuts while limiting saturated fats. Individuals should also consider a multivitamin/mineral supplement including potassium and magnesium, which may be limited in the VLCD/ketogenic diet. Last, individuals interested in consuming a pattern better aligned with 2021 AHA Dietary Guidance should be encouraged to try patterns in higher tiers, including low-carbohydrate patterns, that may better reflect their preferences and contain more favorable attributes.

OPPORTUNITIES TO ADVANCE DIETARY PATTERN RESEARCH AND INTERVENTIONS WHILE PROMOTING HEALTH EQUITY

Disparities in cardiovascular health (CVH) metrics and cardiovascular disease have been persistent, and the burden of mortality is particularly high for non-Hispanic Black individuals.[94–96] Efficacy studies of healthy dietary patterns have resulted in a significant reduction of risk factors.[12,13,19,26,97,98] Furthermore, healthful dietary patterns have been positively associated with CVH in observational epidemiological studies.[99–104] To promote health equity, we must ensure the equitable and systematic uptake of a substantial body of research findings about healthful dietary patterns, and we must create pathways for equitably improving diet, especially in populations in the greatest need of CVH promotion.[105,106] More specifically, evidence-based interventions to improve dietary patterns that are effectively executed with cultural humility[107,108] could lower sodium, added sugar, and saturated fat intake and improve CVH across racial and ethnic groups who bear the burden of cardiovascular disease and its risk factors.

Moving forward, we recommend interventions that are research based and foster structural changes in food systems to promote equity in CVH outcomes The strategies given here are examples that are anchored in the socioecological model[109] and address factors that operate at the individual, relationship, community, and society/policy levels.

1. Individual: Educate individuals about and facilitate their access to culturally relevant and healthy dietary patterns. Educational efforts should have cultural considerations to boost the effectiveness of these efforts in underrepresented racial and ethnic groups.[110] Recent publications recognize Oldways[111] (a nonprofit organization) for designing educational resources (eg, food pyramids, cooking recipes) with respect to heritage (eg, African, Asian, and Latin American) that have led to positive dietary changes in non-Hispanic Black individuals.[110,112,113] These dietary patterns have healthful aspects and are characterized by fiber-rich plant-based foods, lean meat and fish, and herbs, some of which are derived from ancient medicinal practices.[114–116] Future studies that improve data collection modalities and examine dietary patterns from the African, Asian, and Latin American cultures could prove helpful in creating the knowledge base for these types of educational efforts.[117] Anchoring strategies that address the challenges of individuals in the socioecological model allows the incorporation of reasons that might explain disparities in dietary patterns by race and ethnicity. These include racism, social determinants of health such as healthy food access, and related aspects such as cost, convenience, and the built food environment.

2. Relationships and networks: Foster networks for social support to improve dietary intake and patterns. Families, friends, and traditions are key determinants of dietary intake and health behaviors. Programs and interventions are needed to promote relationships that support and facilitate healthy eating across a diverse range of population groups. Leveraging the family structure as a means of social support could positively augment health promotion and prevention efforts.[118] This approach may help to restore a healthy food culture in populations negatively affected by historical injustices and forced acculturation.[119,120]
3. Society: Address structural racism as a contributing factor to disparities in social determinants of health and diet-related disease outcomes. To this end, community-based participatory research approaches and implementation science methods can be used to conduct nutrition interventions at multiple levels of influence. These methods require the inclusion of historically marginalized populations in all phases of research and in the development of programs and interventions. Recent publications that focus on reducing cardiovascular disease–related disparities underscore the importance of considering resilience strategies in addition to unique historical barriers faced by underrepresented racial and ethnic groups.[121–126] According to Churchwell et al,[96] racist policies (eg, the Black code, the Indian Removal Act of 1830, the anti-Hispanic/Latino immigration policy, the Chinese Exclusion Act of 1882, and the 1924 Immigration Act) "established the notion that anyone who is not White is inferior and can be devalued and dehumanized." The behavioral research field is not immune to this historical context[127]; thus, policies are needed to facilitate the inclusion of researchers and community stakeholders from historically marginalized groups in nutrition research at all levels. Policies should be monitored and evaluated for their impact on community-, family-, and individual level eating patterns.[128,129] Health equity through dietary pattern research will require profound cultural humility from the majority of health researchers and professionals, including the redressing of perceived power imbalances, lifelong learning, and constant self-reflection, if progress is to be achieved.[129,130] Otherwise, diet disparities may continue to widen.[130,131]
4. Policy: Develop policies targeting ways to improve systems and structures and dismantle racist and unjust historical and sociopolitical practices. Policies and laws that are initiated at the local, national, and global levels provide broad support for healthful eating. They affect large numbers of people, can be long term, incentivize many sectors of society toward positive change, and can shape more equitable and healthy societies.

CONCLUSIONS

This scientific statement identified popular dietary patterns commonly consumed in the United States and evaluated their alignment with the 2021 AHA Dietary Guidance. Recognizing the many popular dietary patterns characterizing the US dietary intake is challenging for both consumers and health professionals. To enhance interpretation and implementation, these popular dietary patterns were categorized together on the basis of similarities in recommendations of what to emphasize, include, limit, or avoid, resulting in 10 categories. The 2021 AHA Dietary Guidance builds on past AHA reports, takes into consideration the latest research findings, and provides a set of dietary features that are best supported by scientific evidence for promoting CVH. The writing group scored the 10 selected dietary patterns on the basis of alignment with 2021 AHA Dietary Guidance. The scoring approach considered the dietary patterns on an as-intended basis; the scientific statement addresses potential consumer confusion about dietary patterns separate from the scoring. This yielded 4 tiers of alignment.

The tier 1 patterns (scores of >85) are well aligned with the 2021 AHA Dietary Guidance and included DASH, Mediterranean, pescetarian, and vegetarian (ovo, lacto, ovo/lacto). It is notable that high-scoring tiers (tiers 1 and 2), reflective of alignment with the 2021 Dietary Guidance, also have lower environmental impact and are more supportive of planetary health because of reduced meat intake.[4]

The next tier (scores 75–85) includes vegan and low-fat diets. Although tier 2 patterns can support optimal CVH, special attention is warranted to ensure that vegan patterns are rich in healthy plant-based protein sources, especially when eating in restaurants, and that low-fat patterns adequately incorporate healthy sources of unsaturated fat, particularly because of the cardiometabolic risks associated with replacing unsaturated fats with refined carbohydrates and added sugars.

The tier 3 patterns, with scores in the ≈55 to 74 range, do not align optimally with the 2021 AHA Dietary Guidance even if they are followed optimally. The additional avoidance of nuts and liquid plant oils in very low-fat patterns is out of alignment with AHA's emphasis on including healthy fats. Similarly, low-carbohydrate patterns are problematic for limiting healthy grains, legumes, and some whole fruits, which are all AHA priority features. However, in general, a well-designed lower-carbohydrate approach may help encourage avoidance of unhealthy carbohydrate sources such as added sugars and refined grains.

The bottom tier, scoring <55, includes patterns of strong concern: Paleo diet and VLCD. These bottom-tier patterns, even when followed optimally, promote restriction of food groups that are considered essential features of a heart-healthy diet (legumes, whole grains) and allow high-saturated-fat sources that are strongly discouraged (from meats for both Paleo and VLCD and dairy for VLCD).

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For all identified dietary patterns, there are healthier and less healthy ways to follow them, and nutrition misinformation, misplaced emphasis, or oversimplification may lead to adoption of patterns not as intended. Given the poor overall diet quality among US adults, it is critical for health care professionals to query patients or consumers about how they implement a given pattern to identify potential misunderstanding and opportunities for modifications where room for improvement exists to better align with the AHA guidance features. Providing resources, including nutrition education, to improve consumer efficacy around planning and preparing meals[132,133] and cooking and storing food may increase adoption of patterns as intended. For those adopting tier 1 and 2 patterns, clarification of key facets of each dietary pattern may suffice, whereas tier 3 dietary patterns may require referral for more in-depth nutritional counseling. For tier 4 patterns, there is strong concern of misalignment with AHA guidance, and efforts to consider dietary modifications are encouraged.

There is robust evidence supporting diverse dietary patterns (ie, DASH, Mediterranean, pescetarian, vegetarian) that promote cardiometabolic health and that can be designed to reflect personal and cultural preferences and budgetary constraints. Thus, prioritizing resources to investigate other cultural dietary patterns (eg, Asian, African, and Latin American) in lieu of further research on highly restrictive patterns that do not align with 2021 AHA Dietary Guidance is warranted. The guidance provided here underscores the importance of marshalling resources to develop food environments that support adherence to AHA-aligned dietary patterns to address the national poor diet quality crisis.

ARTICLE INFORMATION

The American Heart Association makes every effort to avoid any actual or potential conflicts of interest that may arise as a result of an outside relationship or a personal, professional, or business interest of a member of the writing panel. Specifically, all members of the writing group are required to complete and submit a Disclosure Questionnaire showing all such relationships that might be perceived as real or potential conflicts of interest.

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This table represents the relationships of writing group members that may be perceived as actual or reasonably perceived conflicts of interest as reported on the Disclosure Questionnaire, which all members of the writing group are required to complete and submit. A relationship is considered to be "significant" if (a) the person receives $5000 or more during any 12-month period, or 5% or more of the person's gross income; or (b) the person owns 5% or more of the voting stock or share of the entity, or owns $5000 or more of the fair market value of the entity. A relationship is considered to be "modest" if it is less than "significant" under the preceding definition.

†Significant.

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*Modest.

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