

Translating the Dietary Guidelines for Americans 2010 to Bring about Real Behavior Change

This article is one of two papers resulting from two expert dialogues held in the fall of 2010 among nutrition scientists and food scientists charged with innovating strategies to bring Americans' diets more closely in line with the 2010 report from the Dietary Guidelines Advisory Committee (DGAC). This article discusses the perspective of registered dietitians (RDs), nutrition communicators, and counselors who are engaged in translating guidelines into actionable behavior change among clients and the broader public. The second article will be published in January/February issue of the *Journal of Food Science* and approaches dietary change from the perspective of food scientists who are engaged in making positive modifications to the food supply.

SETTING THE STAGE

Since they were first introduced to consumers in 1980, the Dietary Guidelines for Americans (DGA) have aimed to provide the public with science-based nutrition recommendations to build a healthy diet and prevent diet-

related chronic disease. In the following decades, dietary lifestyles have not noticeably improved in the United States. So-called lifestyle diseases such as diabetes, heart disease, cancer, and osteoporosis have become more prevalent, and overweight and obesity rates have risen dramatically. Although the dietary guidance has become increasingly evidence-based and rigorously researched by the DGAC, there seems to be an ever-widening gap between the science and consumer behavior. The need for integration and translation of the evidence has truly never been greater, nor has the need for appropriate communications to the public been more important.

A brief summary of the process by which the DGA are developed and translated is as follows. Once DGAC scientists are selected, they must first determine the questions and search plans that address the assessment of nutrient intakes, shortfalls, and excesses and identify nutrition problems and nutrition prescriptions/goals. In particular, the RD members of the panel must also determine

what questions are missing from the dietary guidelines questions and investigate the effectiveness of various measurable interventions and outcomes. Committee members, employing the US Department of Agriculture's (USDA) Nutrition Evidence Library of the research literature, must then search for, select, and critically appraise the research reports and grade the conclusion statements. They also must identify topics for the guidelines, disseminate evidence analysis, and create recommendations to report to the Department of Health and Human Services (HHS) and USDA, which must then create the implementation tools to communicate the recommendations to the public. Clinical dietetics practitioners note that no rating of guidelines has occurred at the DGAC level: all guidelines seem to be equally applicable to the entire population. Even though there were some recommendations for subpopulations in the 2005 DGA, the communications were based on the total population, raising challenges for effectively changing dietary behavior of various subpopulations because every American is a member of a subpopulation.

For the dietetic clinician, the development and translation of dietary guidance is a practical application for individual clients. RDs use the nutrition care process to approach helping their clients make changes. Translation of the DGA usually occurs within this process. First, questions and plans must be determined that address the following:

- a nutrition assessment to determine the client and/or population status and needs;
- a nutrition diagnosis to identify areas in which problems exist and improvement is needed;
- a nutrition intervention that includes both a prescription and/or goals and the specific interventions that RDs can use to help clients at-

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doi: 10.1016/j.jada.2010.11.007

Statement rating ^a	Definition	Implication for practice
Strong	A Strong recommendation means that the workgroup believes that the benefits of the recommended approach clearly exceed the harms (or that the harms clearly exceed the benefits in the case of a strong negative recommendation), and that the quality of the supporting evidence is excellent/good (grade I or II). ^b In some clearly identified circumstances, strong recommendations may be made based on lesser evidence when high-quality evidence is impossible to obtain and the anticipated benefits strongly outweigh the harms.	Practitioners should follow a Strong recommendation unless a clear and compelling rationale for an alternative approach is present.
Fair	A Fair recommendation means that the workgroup believes that the benefits exceed the harms (or that the harms clearly exceed the benefits in the case of a negative recommendation), but the quality of evidence is not as strong (grade II or III). ^b In some clearly identified circumstances, recommendations may be made based on lesser evidence when high-quality evidence is impossible to obtain and the anticipated benefits outweigh the harms.	Practitioners should generally follow a Fair recommendation but remain alert to new information and be sensitive to patient preferences.
Weak	A Weak recommendation means that the quality of evidence that exists is suspect or that well-done studies (grade I, II, or III) ^b show little clear advantage to one approach vs another.	Practitioners should be cautious in deciding whether to follow a recommendation classified as Weak, and should exercise judgment and be alert to emerging publications that report evidence. Patient preference should have a substantial influencing role.
Consensus	A Consensus recommendation means that expert opinion (grade IV) ^b supports the guideline recommendation even though the available scientific evidence did not present consistent results, or controlled trials were lacking.	Practitioners should be flexible in deciding whether to follow a recommendation classified as Consensus, although they may set boundaries on alternatives. Patient preference should have a substantial influencing role.
Insufficient Evidence	An Insufficient Evidence recommendation means that there is both a lack of pertinent evidence (grade V) ^b and/or an unclear balance between benefits and harms.	Practitioners should feel little constraint in deciding whether to follow a recommendation labeled as Insufficient Evidence and should exercise judgment and be alert to emerging publications that report evidence that clarifies the balance of benefit versus harm. Patient preference should have a substantial influencing role.

^aRating system for recommendations (Strong, Fair, Weak, Consensus, Insufficient Evidence) was developed by the ADA Research Committee and approved by the ADA Evidence-Based Practice Committee based on review of existing systems in February 2006. In addition to rating the recommendation based on the strength of the evidence, the recommendations are classified and worded as *conditional* or *imperative* statements. Conditional statements clearly define a specific situation or subpopulation where they are applicable, while imperative statements are broadly applied to the entire population. A conditional recommendation can be stated in if/then terminology (eg, if an individual does not eat food sources of n-3 fatty acids, then 1 g of eicosapentaenoic acid and docosahexaenoic acid n-3 fatty acid supplements *may* be recommended for secondary prevention). In contrast, imperative recommendations require, or must, or should achieve certain goals, but do not contain conditional text that would limit their applicability to specified circumstances (eg, Portion control should be included as part of a comprehensive weight management program. Portion control at meals and snacks results in reduced energy intake and weight loss).

^bConclusion statements are assigned a grade based on the strength of the evidence: Grade I=Good; Grade II=Fair; Grade III=Limited; Grade IV=Expert Opinion Only; and Grade V=Not Assignable, no evidence to support or refute the conclusion. *Note:* In September 2004, the ADA Research Committee adapted this grading system from: Greer N, Mosser G, Logan G, Wagstrom Halaas G. A practical approach to evidence grading. *Jt Comm J Qual Improv.* 2000;26:700-712.

Figure 1. American Dietetic Association (ADA) Rating System for Guideline Recommendations.

tain a nutrition prescription and/or goals that would incorporate the DGA in the context of other health and/or nutrition problems; and

- nutrition monitoring to determine the effectiveness of the intervention and determine progress toward nutrition goals.

The RD selects the best evidence, which may be an evidence-based guideline from the American Dietetic Association's Evidence Analysis Library or another guideline. If no guideline is available, the RD then searches for, selects, and critically appraises the research reports and grades the conclusion statements in the Evidence Analysis Li-

brary. Finally, recommendations must be created and rated, and these are usually rated to indicate those that are "strong" (meaning that the practitioner should follow the recommendation unless there is compelling reason not to) and those that are less strong ("fair"). The rating also includes a designation indicating whether it applies to the entire population ("imperative") vs those that apply only in certain circumstances or certain populations ("conditional") (Figure 1) (1). After this analysis is complete, implementation tools must then be crafted (Figure 2).

Dietary change, as tall an order as it is, requires two key components to succeed.

First, individual consumers clearly need to be truly motivated by nutrition science as it relates to human health. Second, food scientists also need to modify food products to help balance the food choices available to consumers. One may think of these components as a "push/pull" process, whereby the pull is consumer demand for DGA-aligned food products and the push is the food industry's attempt to align its food products with the DGA. This article will focus on the first component of effectively translating the guidelines for dietetic clients and the broader public.

There is some solid evidence for the first component. Although Americans

US Dietary Guidelines development and implementation	Products	ADA Clinical Practice Guideline development and implementation	Products
<p>Appoint DGAC^a members by Secretaries of HHS^b and USDA^c</p> <p>Determine questions and search plans that address prevention of chronic disease:</p> <ul style="list-style-type: none"> ● Assessment of nutrient intake, shortfall, and excesses ● Identify association between food and nutrient intake and disease ● Identify nutrition prescription/goals ● Identify impact of behavior and environment on health/disease and food/nutrient intake <p><i>Questions in dietary guidelines questions did not specifically address all aspects of implementation (eg, effectiveness of strategies to translate guidelines into consumer behavior)</i></p> <p>Search for, select, and critically appraise the research reports</p> <p>Grade conclusion statements</p> <p>Disseminate evidence analysis</p> <p>Identify topics for guidelines</p> <p>Create recommendations to US government based on conclusion statements within the context of the current US dietary intake. Internal and external review process and approval of DGAC report.</p> <p><i>A guideline rating system was not used, therefore all guidelines appear to be equal and applicable to entire population</i></p> <p><i>Link between conclusion statements and recommendations are not explicit</i></p> <p>USDA and government agencies apply equivalent of clinical judgment in communicating guideline recommendations into organizational policies and consumer guidance and implementation tools</p> <p>Evaluate effectiveness of US Dietary Guidelines</p>	<p>DGAC appointments</p> <p>Search Plan</p> <p>Create content (sort lists, research article worksheets with research design and implementation checklists, evidence summaries, overview tables and conclusion statements) for USDA NEL^d</p> <p>Create Content for NEL</p> <p>Publish NEL</p> <p>Publish DGAC report for government</p> <p>Disseminate to health care professionals</p> <p>Publish and disseminate Guidelines for Americans, My Pyramid, and supporting materials for policy implementation</p> <p>Population assessments (NHANES^g or Healthy People 2010 goal achievement) and evaluation of impact of policies</p>	<p>Appoint expert work group by ADA Evidence-Based Practice Committee</p> <p>Determine questions and search plans that address:</p> <ul style="list-style-type: none"> ● Nutrition assessment to determine client/population status and needs ● Nutrition diagnosis/problems ● Nutrition intervention that includes both prescriptions/goals and the specific interventions that registered dietitians can use to help client attain nutrition prescription/goals ● Nutrition monitoring should be conducted to determine effectiveness of intervention <p>Search for, select, and critically appraise the research reports</p> <p>Grade conclusion statements for EAL</p> <p>Disseminate evidence analysis</p> <p>Group conclusion statements and Identify topics for clinical practice guidelines recommendations</p> <p>Create recommendations with rationale and link to conclusion statements that support recommendations, rate recommendations indicating which are stronger than others based on grades of Conclusion statements used to support recommendations (according to the rating system shown in Figure 1) and designate which apply to entire population (Imperative), and which only apply to sub-populations (Conditional). Create introductory and additional material for clinical practice guidelines. Review by external multidisciplinary panel, revisions as appropriate, and approval by Evidence-Based Practice Committee</p> <p>Create implementation tools (EBNPG^f toolkits)</p> <p>Disseminate and train practitioners on content and using EBNPGs</p> <p>Clinical practitioners use clinical judgment in applying guideline recommendations for clients served</p> <p>Evaluate effectiveness of nutrition care provided</p>	<p>Evidence Analysis Work Group appointments</p> <p>Search Plan</p> <p>Create content (sort lists, research article worksheets with quality checklists, evidence summaries, overview tables and conclusion statements) for ADA EAL^e</p> <p>Create Content for ADA EAL</p> <p>Publish EAL</p> <p>Publish clinical practice guidelines for practitioners</p> <p>Publish EBNPG toolkits</p> <p>Conduct presentations and workshops for practitioners and other appropriate dissemination strategies</p> <p>Document nutrition care provided</p> <p>Outcomes management (outcomes research or performance improvement studies)</p>
<p>^aDGAC=Dietary Guidelines Advisory Committee. ^bHHS=Department of Health and Human Services. ^cUSDA=US Department of Agriculture. ^dNEL=Nutrition Evidence Library. ^eEAL=Evidence Analysis Library. ^fEBNPG=evidence-based nutrition practice guidelines. ^gNHANES=National Health and Nutrition Examination Survey.</p>			

Figure 2. Comparison of process used to develop guidelines by Dietary Guidelines Advisory Committee and American Dietetic Association (ADA) Evidence-Based Nutrition Practice Guideline Working Groups.

typically describe themselves as being relatively familiar with the DGA (albeit significantly more familiar with the old Food Guide Pyramid than MyPyramid, the current graphic representation of the guidelines) (2), this familiarity has yet to translate into meaningful change in dietary lifestyles (3). Data from a 2010 report from the Centers for Disease Control and Prevention suggest that since the 2000 and 2005 DGA were issued, average fruit consumption has actually declined and vegetable consumption has not changed, with both levels falling considerably below DGA targets (4).

Despite publication of the past six DGA reports, official USDA research continues to show that: “The diet quality of Americans needs to be improved. HEI-2005 scores are low for the ‘food groups to encourage’ identified in the Dietary Guidelines for Americans 2005: fruits, vegetables, whole grains, and fat-free or low-fat milk and milk products” (5).

Nutrition scientists, who robustly evaluate the scientific literature every 5 years to determine the next dietary consensus, face a truly daunting task. However, those government agencies charged with communicating this consensus are even more challenged in that: “they must 1) faithfully report the findings of the (dietary guidelines advisory) committee, 2) offer some rationale for why some of the scientific evidence was weighted more heavily than other evidence, and, finally, 3) explain why some findings warrant changes in our diets whereas others do not” (1).

Considerable evidence has also been amassed regarding the interaction between the food environment—physical, demographic, and psychographic—and healthful or unhealthful eating behaviors. As concluded in the 2010 DGAC report, there is greater evidence relating human health to dietary patterns than to any specific food or food component (6).

A BRIEF HISTORY

Government dietary guidance is actually an ancient tradition. The *Old Testament* contains very specific, although restrictive, food recommendations that are believed to be health related as well as religiously based. In 1835, the British Merchant Seaman’s Association offered dietary rules that

related to a very specific disease condition, prescribing lime or lemon juice consumption as an anti-scurvy measure for British sailors. Although formal US food and dietary guidance dates back to the early 20th century when food groups were first identified and included in dietary health recommendations by nutrition practitioners, the major impetus for a more rigorous process came in 1977 with the publication of the *Dietary Goals for the United States*. The 1977 goals were issued not by the HHS and USDA, but by the US Senate Select Committee on Nutrition and Human Needs. In 1979, following a well-publicized White House conference, the American Society for Clinical Nutrition formed a panel of scientists to examine the relationship between diet and health. Their work led to the publication of *Healthy People: the Surgeon General’s Report on Health Promotion and Disease Prevention* in 1979. This exercise was then institutionalized by law in the first DGA, which were published in 1980 (7).

Although the advice offered to the public in the initial DGA brochure seemed modest in terms of behavior modification, the information was nonetheless more or less ignored by consumers. As stated in the Centers for Disease Control and Prevention report:

Ideas for incorporating a variety of foods to provide essential nutrients while maintaining recommended body weight were a focus. The brochure also provided guidance on limiting dietary components such as fat, saturated fat, cholesterol, and sodium, which were beginning to be considered risk factors in certain chronic diseases (4).

Subsequent dietary recommendations and admonitions from their initial issuance through the 2005 DGA were also ignored. The 2005 DGA included major recommendations that were very broad and worded in a consumer-friendly tone:

Control calorie intake to manage body weight; be physically active every day. Increase daily intake of fruits and vegetables, whole grains, and nonfat or low-fat milk and milk products; choose fats wisely for good health; choose carbohydrates wisely for good health . . . (8).

A recent National Cancer Institute statistical study of dietary intake patterns in the United States concluded

rather grimly, but unsurprisingly, that “nearly the entire U.S. population consumes a diet that is not on par with recommendations. These findings add another piece to the rather disturbing picture that is emerging of a nation’s diet in crisis” (9).

It has become abundantly clear to all players and stakeholders (possibly with the exception of consumers) that something must be done to bring dietary behavior in line with dietary guidance. In attempting to do so, it is important to take into account the truly dramatic changes in both the political and social landscapes in recent years, including the time period since the issuance of the 2005 DGA. The food landscape has also seen remarkable evolution in the past decade or so, with the ubiquity of imported foods of all kinds as well as the increasing presence of prepared foods in both restaurants and food markets. In reaching its scientific recommendations, the 2010 DGAC had an unprecedented amount of available dietary and nutrient data, which were collected through the USDA’s new Nutrition Evidence Library.

Reasons for the persistent inability to convert government dietary guidance into actionable eating behavior change are plentiful in the literature. As cited above, two constant themes emerge: 1) there is a need to communicate the guidelines to the public such that they resonate with consumer food and health preferences, and 2) the food environment needs to be modified such that it makes DGA-aligned healthful choices that are accessible and desirable to the public. With these two objectives in mind, a consortium of science and science communications organizations launched a project in mid-2010 to create synergy among nutrition scientists and food scientists through a robust scientific dialogue on the issue of integrating and translating the underlying DGA evidence into sustained behavior change. Nutrition scientists and food scientists are two audiences that are key to addressing both themes and to achieving innovative solutions to make the DGA effective and to reach ultimate public health goals. RDs counsel clients and address broad audiences concerning dietary guidance, whereas food scientists reformulate and innovate food products, as well as create strategies

to align the food environment with dietary recommendations.

THE ROUNDTABLES

The American Dietetic Association, Institute of Food Technologists, International Food Information Council, and North American Branch of the International Life Sciences Institute convened two scholarly discussion/exploration roundtables in Chicago, IL, and Washington, DC. The roundtables enabled these two crucial audiences to interact, innovate, and bridge knowledge gaps in integrating and translating the DGAs in more effective ways than previously seen over the past 3 decades. This article explores the outcome of these roundtables and details both the challenges and opportunities identified by the nutrition and food science participants.

The scientific consortium's roundtables took place on October 5 and 7, 2010. The key DGA audiences—RDs/nutrition communicators, food scientists, and government representatives—were assembled with a select panel of speakers at each event. The new chapter of the 2010 DGAC report integrates and translates “the scientific conclusions reached at the individual level to encompass the broader environmental and societal aspects that are crucial to full adoption and successful implementation of these recommendations (6).” Participants used guidance from the above-referenced chapter to present and critically analyze the following ideas stimulated by the major action themes of the latest DGAC report:

- Reduce the incidence and prevalence of overweight and obesity in the US population by reducing overall caloric intake;
- Shift food intake patterns to a more plant-based diet that emphasizes vegetables, cooked dry beans and peas, fruits, whole grains, nuts, and seeds; and
- Reduce intake of foods containing solid fats and added sugars (SoFAS), refined grains, and sodium (6).

Although they are important in addressing the energy balance equation, the 2010 DGAC physical activity recommendations were omitted from the roundtable discussions because they

were not the main focus of the participating nutrition/food scientists. The speaker panels were augmented by a group of distinguished discussants, whose job was to draw out the speakers and other discussants on the challenges and opportunities in integrating and translating the DGA evidence. All participants were encouraged to focus on the opportunities for achieving widespread behavior change, noting the success stories that have already emerged in the recent past. For example, total sales (and presumably consumption) of whole-wheat bread products surpassed those of refined wheat breads for the first time in August of 2010 (10). Similarly, many food products containing *trans*-fatty acids have been reformulated following recommendations in the 2005 DGA that trans-fat consumption be as low as possible. Consequently, trans fats in the American food supply are now being substantially replaced with mono/polyunsaturated fatty acids (11).

An Aspirational Tone

To encourage a proactive and positive, can-do dialogue, Chicago and Washington roundtable participants were charged with adopting an aspirational tone to their discussion, with the term *aspirational* meaning “possessing a strong desire to achieve something high or great (12).” This type of tone was encouraged precisely so that participants would not get bogged down in past failures and inadequate change. The participating RDs, nutrition communicators, and food scientists were charged with drawing upon ideas and strategies that have actually worked in the past or that show promise. They were also asked to imagine a future in which dietetic science truly drives consumer behavior. These two key DGA audiences are an important part of the larger group of stakeholders called upon by the DGAC to be involved in the effort to translate the guidelines for Americans. In the words of the committee:

A coordinated strategic plan that includes all sectors of society, including individuals, families, educators, communities, physicians and allied health professionals, public health advocates, policy makers, scientists, and small and large businesses (eg, farmers, agricultural producers, food scientists, food manufacturers, and food

retailers of all kinds), should be engaged in the development and ultimate implementation of a plan to help all Americans eat well, be physically active, and maintain good health and function (6).

In addition to the whole-wheat bread product and trans fat examples, there are other real-world instances of success that might serve as springboards for innovation in modifying consumer behavior and the food environment. Serious complications of past efforts to achieve behavior change have been well explained. For example, the low-fat recommendation resulted in the manufacture of low-fat products with increased calorie content. In addition, previous DGA recommendations that Americans should consume less fatty meat resulted in two partially offsetting results: first, a meat industry trend toward producing leaner products, and second, an increase in average meat consumption (primarily chicken) over a period of decades (13). This increased consumption may have resulted because consumers possibly felt that it was not unhealthful to eat greater quantities of leaner meat. The confusion resulted from a failure to integrate and align behavior change with modifications of the food supply, as described below.

A fundamental assumption of the dietary guidelines and food guides is that consumer knowledge will lead to improved food choices and that food availability will then reflect these choices. It is clear that this assumption is only partially correct. For example, the message that meat and meat products are high in fat has led to a reduction in their consumption, which indicates that the consumer has responded to the guideline message. On the other hand, an increase in iron deficiency in women of Australia has occurred, which suggests that they are uninformed about how to find a source of iron that replaces available iron from meat (6). The message in the United States to increase fruit and vegetable consumption to 5 servings/d is not bringing about the desired change, perhaps for many reasons. However, if it did occur, the agricultural production of fruit and vegetables would need to be doubled. This target would appear to be unrealistic, because production of fruit and vegetables has increased by only 10% to 15% from 1970 to 1990

(6). These and similar observations suggest that a more complete understanding of the multitude of factors affecting food availability is required for dietary guidelines to be effective (14).

The above analysis was made in 2000, before the 2005 DGA and before the change in DGA strategy to holistically emphasize diet and food patterns; however, it frames the issue starkly in terms of challenges. The roundtables summarized in this article were organized to take these challenges as a point of departure and to explore the real (some already realized) possibilities in addressing the current DGAC report.

The Roundtable Presentations

Roundtable participants responded to what they regarded as a call to action, an urgent call for collaboration between two key groups necessary for the integration and translation of DGAC recommendations. They began each day-long session by listening to an overview of DGA history with special attention to the 2005 gaps and successes, and a review of changes in the food supply since 2005 was also included. In the interest of brevity, abstracts of the presentations will be excerpted below.

Gaps and Successes and Changes in the Food Supply Since 2005. Connie Weaver, PhD, distinguished professor and head of the Department of Foods & Nutrition at Purdue University, West Lafayette, IN, served as a member of the 2005 DGAC. Her presentation described the gaps and successes since the issuance of the 2005 DGA and changes in the food supply since that time.

“The shortfall nutrients identified by the 2010 Dietary Guidelines for Americans Advisory Committee are vitamin D, calcium potassium, [and] dietary fiber. They further identified vitamins A, C, and E and magnesium as possibly shortfall nutrients. Dietary patterns are more closely linked to health than any one food.

“...The availability of low-fat milk products has been mixed. While milk has become available in vending machines in schools and fast-food restaurants with more appealing packaging to children, some schools have removed flavored milk in an attempt to decrease added

sugars, which has resulted in lower consumption of milk in those schools.

“The emphasis of the 2010 Dietary Guidelines for Americans Advisory Committee was on the growing incidence of obesity . . . [and] the Committee was concerned that Americans are over-consuming solid fats and added sugars and used the term SoFAS as an acronym to emphasize these foods. This term replaced the ‘discretionary calories’ concept introduced by the 2005 Committee . . .

“To meet nutrient needs while ensuring energy balance, the 2010 Committee recommends that Americans shift to more plant-based diets including more fruits and vegetables, cooked dry beans and peas, whole grains, nuts and seeds, seafood, and low-fat milk products with moderate consumption of lean meat, poultry, and eggs. A challenge is to provide these foods in affordable quantities that compete with foods rich in SoFAS and sodium for the palate of consumers.”

Challenges and Opportunities for Implementation of the 2010 Guidelines. Laina Bush, MBA, associate deputy assistant secretary, Science and Data Policy, US Department of Health and Human Services, Washington, DC, presented results of government studies to determine means of overcoming barriers for complying with the DGA among low-income populations and various ethnic groups.

“The focus was on five sub-populations: American Indian/Alaska Native/Native Hawaiian or other Pacific Islander, Black or African American, Hispanic or Latino, Mexican American, [and the] elderly. An extensive literature review was employed. One of the reasons for including Mexican Americans separately from Hispanic populations was that there was a rich literature devoted to Mexican Americans, many of whom live close to the border with Mexico.

“With several of the groups studied, highlighted dietary shortcomings were low intake of fruits and vegetables and high dietary fat intake; in addition, poor dietary quality was associated with overweight/obesity, diabetes, and low folic acid intake. In some cases, as with elderly and American Indian/Pacific Islander/Native Alaskan low-income populations, poor dietary quality was also associated with food insecurity.

“With many of the studied populations, significant barriers were so-

cio-cultural: culture-based food preferences, lack of readiness to change dietary behavior, [and/or] lack of personal or family preference for fresh fruits and vegetables. Food acquisition and preparation customs were also cited as barriers to compliance with [the] DGA, as well as psychological distress and psycho-social stress. The high cost or perceived high cost of food was a barrier for all groups studied.

“Some cited specific means for overcoming these barriers were: education by trusted peers, or traditional cultural role models; direct phone intervention and follow-up; group discussions led by cultural role models (such as *abuelas* or grandmothers in Hispanic subpopulations); and voucher redemption programs.

“No one barrier was identified for all five subpopulations. The most successful intervention programs were those that targeted very narrow dietary shortcomings and addressed only one or two barriers per subpopulation.”

The NPD Group, founded more than 40 years ago, is a global research firm specializing in consumer behavior and retail sales and marketing data. The organization serves a wide range of industries, including the food industry. NPD roundtable participant Joe Derochowski, executive director, Port Washington, NY, offered with the groups his company’s take on consumer behavior in the face of dietary guidance:

“... As more and more women were entering the work force throughout the 20th century, the increased pressure and responsibilities added to an already full plate [have] been one of the key drivers to changes in America’s eating habits, particularly in the area of convenience. The growing need for convenience has given rise to quickly prepared meals, like frozen and ready-to-eat; appliances that enable food to be prepared quickly or with little or no effort; and drive-thru windows. While the percent[age] of women working appears to have reached its peak since 2000, convenience remains at the center of this country’s day-to-day lifestyles.”

Regarding health concerns, Derochowski stated that:

“Even with all of the top-of-mind awareness about health and wellness, while improving, Americans are more behind in adopting

healthy lifestyles than they were in the [19]80s.

“Consumers’ need for health wanes as the day progresses . . . As the day advances, health competes with time limitations and other priorities.”

Regarding the adoption of the DGA, Derochowski said that:

“Mom is the key to fully integrating the Dietary Guidelines into her family’s lifestyle. In order for her to accomplish this, we need to make it easy and seamless for her. The guidelines need to become part of the daily routine, quick and convenient to apply throughout the day, every day. Since home is the primary source of meals, how can she easily implement the Dietary Guidelines into meal planning for her family?”

The Path Forward: Addressing Three Key Concepts of 2010 DGAC Report. “Reduce the incidence and prevalence of overweight and obesity in the U.S. population by reducing overall caloric intake.” Pat Crawford, DrPH, RD, director of the Dr. Robert C. and Veronica Atkins Center for Weight and Health and adjunct professor in the School of Public Health, University of California at Berkeley, began by asking the group to consider the following question: “How it is possible, with our education and knowledge, that the United States is leading the industrialized world in rates of obesity?” She asserted that the best strategy for curbing the prevalence of obesity is to tackle its incidence by creating healthier food environments for children—the youngest consumers.

“The focus on obesity is unprecedented in the new report of the Dietary Guidelines. To not focus on obesity would be unconscionable since approximately two-thirds of American adults are classified as either overweight or obese.

“The 2010 report, like earlier reports, will be of value to professionals working in the area of obesity, including clinicians, dietitians, and public health workers. It synthesizes the relevant literature and uses a new evidence-based approach. The current report will reach a broader audience than earlier versions because it focuses more on foods than on nutrients.

“For the first time, the Committee examined the impact of the food environment on dietary intake and body weight, including restaurants, especially fast-food restaurants,

portion sizes whether at home or away, and grocery store location, particularly as it relates to access to nutrient dense foods. While much of the focus is still on individual or personal choice, this report attempts to integrate the broader environmental and societal context of food that the report states is ‘crucial to full adoption and successful implementation of [the] recommendations.’ Recommendations related to the food environment include:

- Increasing nutrition education programs in schools and the availability of nutrition education programs for adults, especially parents;
- Creating greater financial incentives to purchase, prepare, and consume vegetables and fruit, whole grains, seafood, low-fat milk products, and lean meats, especially by low-income Americans;
- Improving access to affordable fresh produce and food;
- Developing safe, effective, and sustainable practices to expand aquaculture to increase the availability of seafood;
- Encouraging restaurants and the food industry to offer health-promoting foods that are low in sodium, solid fat and added sugars, refined grains, and served in smaller portions; [and]
- Offering foods that comply with the 2010 Advisory Report in schools, removing sugar-sweetened beverages and high-calorie snacks from schools and recreational facilities, and promoting zoning policies that limit the location of fast-food restaurants near schools, playgrounds, and places where children play.”

Richard Black, PhD, a nutrition scientist at Kraft Foods in Glenview, IL, offered the group some of his company’s insights on the obesity issue, arguing that consumers are largely unwilling or unable to closely monitor their caloric intake, much less their daily caloric expenditure. He stated that for a single company to simply “sell fewer calories” as a strategy is problematic because as a calorie-reduced food becomes successful, more of the product will be sold and more calories will thus be sold. However, an industry-wide approach could work because greater amounts of the calorie-reduced versions should displace the full-calorie versions of foods, lowering the *overall* calories sold by the food industry. He also pointed out

that setting small-step goals and taking an incremental approach to achieving the aspirational public health goals of the DGAC would be strategies that are more likely to succeed in the long run.

“Shift food intake patterns to a more plant-based diet that emphasizes vegetables, cooked dry beans and peas, fruits, whole grains, nuts, and seeds.” Nancy Keim, PhD, RD, nutrition scientist with the USDA’s Agricultural Research Service and Lindsay Allen, PhD, RD, research professor and director of the USDA’s Agricultural Research Service Western Human Nutrition Research Center at the University of California at Davis, discussed the challenges posed by shifting to plant-based diets.

“The new Dietary Guidelines are recommending a more “plant-based diet,” which does not necessarily mean a vegetarian or vegan diet . . . [but] the Committee determined that this diet would contain at least 50% of its protein be contributed by plant sources.

“For Americans to shift to a ‘plant-based’ diet would require reducing the source of protein in the meat group (which includes poultry) from 73% in the base diet to 18%, and substituting with soy (to 15% of total protein), nuts and seeds (21%), and dry beans and peas (25%). (Even larger shifts would be needed to adopt vegetarian or vegan diets.) The analysis revealed that all types of plant-source diets tested could provide enough of all nutrients, as long as nutrient-dense foods are chosen including foods fortified with calcium, vitamin D, and vitamin B₁₂.

“ . . . Taste likes and dislikes—some of which are genetically based—represent a major challenge to increasing acceptability of vegetables . . . Consumers should also be encouraged to try other sources of grains in addition to wheat until they find some to suit their taste.

“ . . . Substituting nuts for less nutrient-dense snacks is one effective way to increase intake.

“ . . . Preparation time is a major constraint to increasing consumption of dry beans and peas . . . it might be possible for the food industry to produce more attractive forms of dry legumes that are processed to cook more rapidly.”

Nelson Almeida, PhD, FACN, a food scientist with Kellogg Company,

Battle Creek, MI, summarized a strategic study of the world market estimate of potential business earnings for production and commercialization of vegetarian and plant-based foods. Pointing out that fortification with nutrients of need has been a successful means of increasing recommended nutrients in Americans' diets, he argued that currently available fortified plant-based and fiber-rich meal items and snack foods containing whole grain should be promoted and continue to be improved. In addition, snack items and desserts can provide "more plant-based appeal with fruit as fat replacers, and additives such as dried fruit in cookies, muffins, and quick-breads."

Reduce intake of foods containing added sugars, solid fats, refined grains, and sodium. Penny Kris Etherton, PhD, RD, distinguished professor of Nutrition, The Pennsylvania State University, University Park, PA, offered the following overview of some notably successful dietary interventions.

"Americans of all ages eat too much added sugars, solid fats, refined grains, and sodium . . .

"Despite current intakes of added sugars, solid fats, refined grains, and sodium which exceed current dietary recommendations, consumers express interest in foods containing these ingredients. For example in 2008, many Americans reported that they had heard of many types of fats and fatty acids, with trans fats (91%), saturated fats (90%), and vegetable oils (85%) being the most highly recognized types of fats . . . Respondents generally understand that saturated fats and trans fats are unhealthy, however, their understanding is much less about the health effects of unsaturated fatty acids (15). In 2010, 72% and 73% reported trying to consume more fiber and whole grains in their diets. However, only 41% reported trying to consume less refined carbohydrate. Also, 53% indicated they were concerned about sodium, and 60% reported purchasing reduced/ lower sodium foods (see Figure 2).

"The 'big gap' between dietary recommendations and current intake, as well as heightened consumer interest in diet and health, provides an opportunity to develop effective strategies that improve the American diet.

"On an individual and group basis, cognitive-behavioral strategies have

proved effective in eliciting nutrition-related behavior changes . . . Of note is that multiple communication venues (ie, Internet and computer-based programs) can be used to deliver nutrition information.

"What can be done now? This is the central question. Registered dietitians/nutrition professionals and other health care providers have the expertise to develop and deliver effective intervention programs. Given that the 2010 Dietary Guidelines Advisory Committee Recommendations present a flexible approach that incorporates a wide range of individual tastes and food preferences for achieving a healthy diet, there are different patterns of eating that can be implemented . . . The path forward for health professionals is to individualize the dietary guidance presented by the 2010 Dietary Guidelines Advisory Committee in a manner that integrates best practices of cognitive behavior-change strategies in the appropriate cultural and social context to achieve a population-wide change in dietary behavior that is consistent with current diet recommendations."

Robbie Burns, PhD, nutrition consultant, Nutrition Implications, LLC, Montville, NJ, formerly of Cadbury, offered the perspective of a food industry scientist. He pointed out that: "In order to remain viable, food manufacturers must make products that meet consumer desires for taste, price, and convenience (portable, easy to prepare, etc)." In addition, he stated that:

"Simply raising the goal is unlikely to effect a greater rate of change in dietary habits unless accompanied by better ways to induce long-term changes in consumer behavior and/or specific engagement by food manufacturers in education efforts, creation of new products . . . and/or reformulations of existing products."

Burns believes that reformulations alone will not meet the DGAC goals without more radical dietary behavior changes because the available technologies do not permit more than incremental reductions in SoFAS, refined grains, and sodium without compromising consumer acceptance. However, continued reformulation efforts by the food industry will reduce the intake of SoFAS, refined grains, and sodium over time.

THE DISCUSSIONS

The roundtable discussions each day focused on the communication and other real-world challenges toward implementing the guidelines. Participants raised several main themes that were echoed and elaborated on throughout the sessions and are described as follows.

- There needs to be a coordinated strategic plan with the active involvement of all sectors to achieve effective implementation.
- Trust is a key factor in communicating dietary goals and modifying the food supply; mutual understanding and trust among all stakeholders is critical to implementation and requires input from public health professionals; RDs, nutrition communicators, and counselors; academic and food industry scientists; and others in the food chain, as well as government.
- The DGA should be viewed as aspirational with the bar set high. If the guidelines are seen as all-or-nothing goals, there will be no room to embrace or celebrate small changes and incremental dietary progress.
- Consumer messages around nutrition and especially weight loss need to be even simpler and more targeted than the past communications of the DGA.
- Sociocultural factors should be a major consideration in composing messages for consumers of different ethnic and demographic groups.
- In considering the best evidence for what works and what does not work to improve consumer dietary choice, the best available evidence should point the way.
- Children's nutrition education seems an optimal starting point for changing adult dietary patterns.
- Behavioral science needs to be employed in drafting messages to influence consumer dietary choices (16).
- Environmental modifications need to be part of any overall strategy in altering dietary patterns, and need to be reinforced in messaging so as to enable the healthy choice to be the easy choice (17).
- Food scientists, in striving to innovate and reformulate products, should employ both gradual modifications, or "stealth" methods, where consumers would perceive no change whatsoever in their favorite foods as they

became healthier, and also education, or transparent means, whereby consumers would be encouraged to understand healthful modifications in their food.

- There is a need to communicate more fully to the public the complexities inherent in enhancing nutrient profiles of their accustomed foods.

Although the DGAC raised the issue of sustainability in its report, the roundtables acknowledged the issue but did not address it explicitly. Within the above-listed broad thematic ideas that were explicitly addressed, the roundtable participants produced a rich body of ideas, suggestions, and insights, which will be highlighted in the following paragraphs. Within these somewhat broad thematic concepts, a number of ideas were offered in greater specificity.

There needs to be a coordinated strategic plan with the active involvement of all sectors to achieve effective implementation. As previously noted, the call was made by the DGAC to include all stakeholders:

A coordinated strategic plan that includes all sectors of society, including individuals, families, educators, communities, physicians and allied health professionals, public health advocates, policy makers, scientists, and small and large businesses (eg, farmers, agricultural producers, food scientists, food manufacturers, and food retailers of all kinds), should be engaged in the development and ultimate implementation of a plan to help all Americans eat well, be physically active, and maintain good health and function.

Roundtable participants concurred wholeheartedly, adding groups that had not been specifically mentioned by the DGAC such as behavioral scientists and consumer advocates.

Trust is a key factor in communicating dietary goals and modifying the food supply; mutual understanding and trust among all stakeholders is critical to implementation and requires input from public health professionals; RDs, nutrition communicators, and counselors; academic and food industry scientists; and others in the food chain, as well as government. In both roundtables,

participants argued that “public health advocates don’t trust industry; industry doesn’t trust government; there is too much mistrust currently for all interested groups to work together effectively.”

A participating food scientist pointed out that some policy-making scientific groups specifically prohibit industry-employed scientists from advisory panels. There is an opportunity to provide industry expertise on such panels to widen the scientific knowledge base being drawn upon and also to create a basis for trust among government-based and private sector-based scientists. Many participants in both roundtables were impressed (and some admitted to being surprised) at the degree of cooperation between what were essentially two distinct groups of practitioners. One of the major conclusions at both meetings was the positive potential of collaboration: if all stakeholders understand the demands on other players in the space and work together, they can attack the challenges from many angles and employ different approaches in different sectors to achieve the same result.

The DGA should be viewed as aspirational with the bar set high. If the guidelines are seen as all-or-nothing goals, there will be no room to embrace or celebrate small changes and incremental dietary progress. Some participants suggested that past DGA messages sounded perhaps too aspirational, failing to offer the public lesser, intermediate dietary goals and opportunities for interim behavior-modification successes. Some of the participants felt that much of the current language used to communicate nutrition messages could be re-evaluated with an eye toward simplification. It was also suggested that dietary recommendations should not only be simple but few, with no more than three overarching messages at a time.

Participants from both roundtables agreed that the public health community would benefit by promoting small steps in behavior change and developing ways to measure incremental dietary improvements. RDs/nutrition communicators heard food scientists argue strongly that product reformulations could achieve and are, in fact, already achieving small, meaningful changes in consumer behavior. How-

ever, more can be done and needs to be done.

Consumer messages around nutrition and especially weight loss need to be even simpler than the past communications of the DGA. One participant stated that “consumers need to be reminded to enjoy food.” Others observed that the evolutionary nature of nutrition has led to some consumer confusion as newer research augments and modifies older research. However, this was also seen as a potentially positive view in framing new messages for the public because consumers are constantly seeking the “new.” Therefore, delivering positive DGA-aligned messages becomes a question of framing, packaging, and marketing those messages in a believable, convenient, and livable way.

Sociocultural factors should be a major consideration in composing messages for consumers of different ethnic and demographic groups. There was a robust discussion about underserved populations, including Hispanic Americans, African Americans, Native Americans, and older adults. One participant pointed out that in communicating with these subpopulations, the messenger may be as important as the message (eg, abuelas or grandmothers, who are trusted advisers in food and health matters among Hispanic populations). It was also pointed out that because of deep-rooted sociocultural traditions, shifting individual eating habits is extremely difficult. It was noted in the discussions that ethnic groups will often pay more for food with which they are familiar than for recommended healthier alternatives. In addressing specific subpopulations, it was argued that the most effective strategies should be highly targeted dietary messages, geographically and socioculturally targeted messages, and messages that do not link physical activity and dietary changes. However, it was acknowledged that sociocultural conditions and consumer habits are realities for all populations.

In considering the best evidence for what works and what does not work to improve consumer dietary choice, the best available evidence should point the way. Along the lines of messaging, some participants drew on an Institute of Medicine recommendation

to evidence-based policy makers that when definitive research conclusions are not available, they should work with the best evidence available, rather than avoid making policy (18). The roundtable participants agreed that using the best available evidence about what works and what does not work should be the basis for policy, recognizing that the American public cannot be fitted with a one-size-fits-all dietary strategy. This is an opportunity for RDs, nutrition communicators, and counselors to personalize guidance based on the needs and desires of individual consumers.

Children's nutrition education seems an optimal starting point for changing adult dietary patterns. Discussants made several related points that some of the most successful public health campaigns have started with school-age children (eg, recycling, anti-smoking, seatbelt safety, etc). The opportunity for the greatest success may lie in primarily targeting children and the parents of young children with consistent dietary behavior messaging. In addition, the groups with biggest demographic presence (eg, baby boomers) represent the most efficient targeting opportunity among adults. Roundtable participants observed that nutrition education at the very earliest educational stages would yield the most profound results.

One participant argued that in a highly structured environment, such as a calorie-regulated summer camp, research shows that when given a healthy food and activity environment, "every biomarker for children's health improves." One participant referred to a new cell phone "app" that tracks energy balance and could help educate children through its "cool factor." Another opportunity exists for nutrition educators in that celebrity chefs have become popular invitees into schools, and RDs and nutrition educators could easily follow suit. There was agreement among participants to support the DGAC's recommendation to emphasize cooking skills in both school and family settings. Finally, it is critical that any education of the child be transferable to his or her mother, whether that includes having materials to share with the child's mother or inviting her to learn with the child.

Behavioral science needs to be employed in drafting messages

to influence consumer dietary choices. Participants realized early in the discussion periods that the science of psychology was extremely relevant to their work: they suggested that behavioral scientists be included in the collaborative effort of translating dietary guidelines for the public (16). Behavior modification strategies need to be adopted that are in line with behavioral science. One participant cited a medical adage that it takes not one, but three heart attacks before a patient is ready to permanently change behavior. The same resistance to change may well characterize difficulties in achieving dietary behavior modification. There was considerable discussion of cognitive-behavioral strategies in improving consumer diets. Motivational interviewing—a technique employing goal setting, feedback mechanisms, and self-monitoring—was singled out as one of the most effective strategies, with its seven key principles (19). The technique, although expensive and very labor intensive, is already being employed with good results by many RDs.

Environmental modifications need to be part of any overall strategy in altering dietary patterns, and need to be reinforced in messaging so as to enable the healthy choice to be the easy choice. The 2010 DGAC raises a new issue regarding the physical food-related environment, from the ubiquity of restaurants and food markets to the "built environment" that limits opportunities for physical activity (17). Roundtable participants regarded the environment as a key consideration, especially in addressing the nation's obesity epidemic. They urged all stakeholders to develop strategies to modify environmental barriers to adopting the DGA and they stressed that without such strategies, any plan to translate DGA into actionable behavior is doomed to failure.

Food scientists, in striving to innovate and reformulate products, should employ both gradual modifications, or "stealth" methods, where consumers would perceive no change whatsoever in their favorite foods as they became healthier, and also education, or transparent means, whereby consumers would be encouraged to understand healthful modifications in their food. Consumers have been resistant to dietary change, partly

because of established food preferences: "stealth" methods of change are potentially effective because they do not upset those established preferences, whether driven by taste or habits. Of course, data on food innovations or reformulations would still be transparent on the product labels (both the ingredients listing and the nutrition facts panel) for consumers interested in this information. RDs in the roundtable groups were informed that food companies spent roughly 60% to 70% of their research and development budgets on renovation and only 30% to 40% on innovation of new food products. Reformulations are therefore the most efficient way to produce more healthful foods. Participants pointed out that consumer resistance to dietary change might be an opportunity for both the dietetic and food science communities. By operating on a push/pull basis, nutrition communicators could persuade consumers to demand foods in line with the DGA and food scientists could both innovate and reformulate products to meet that demand and create a marketplace of healthier alternatives.

There is a need to communicate more fully to the public the complexities inherent in enhancing nutrient profiles of their accustomed foods. Both roundtable groups came to the same conclusion as the sessions progressed: there is a need to explain the food manufacturing process more simply to consumers. Healthy reformulation of products without changing their taste/appearance profiles is difficult and costly, and the public preference for extremely short ingredient lists on processed food products may be unrealistic. A little known fact of food manufacturing is that 80% to 90% of new food products fail to achieve market acceptance.

CONSENSUS FINDINGS

The most important consensus findings from the two roundtables, and those themes that enjoyed the greatest consensus, were as follows.

- There is an urgent need for a coordinated strategic plan with the active involvement of all sectors to achieve effective implementation of the DGA.
- Both goals—more impactful communication strategies and modifi-

cation of the food supply—are critical to achieving the desired public health outcomes.

- In order for the DGA to achieve the maximum impact on public health, new approaches need to be employed such as setting strategic priorities, placing greater emphasis on practical solutions, and establishing realistic public health objectives.
- Behavioral science needs to be brought to bear on the challenges.
- Dietary messages need to be positive, very simple, few in number, and targeted to subpopulations to both inform and motivate consumers.
- Messages need to take sociocultural factors, consumer habits, and the realities of today's lifestyles into account.
- To address the obesity epidemic, a key focus should be on very young children and on their parents.
- Above all, trust and collaboration are essential among all stakeholders, including public health community members, government agencies, nutrition communicators, food industry scientists, retail food industry representatives, environmental planners, and others.

The last point was clearly the one with greatest consensus and was regarded by participants at both roundtables as an essential component of any communication and dietary behavior change program. Mutual trust and understanding have eroded over the years for a variety of reasons and must be regained. Such trust and collaboration must start with greater understanding among RDs, nutrition communicators, counselors, and food scientists. These two groups are critical to pursuing the dietary changes necessary to reach public health goals. Small steps, small successes, and open, transparent processes will do much to build trust among the large number of stakeholders with an interest in seeing Americans' health and dietary regimes reach the desired DGAC-recommended goals.

DISCLOSURES: The roundtables were organized and funded jointly by the American Dietetic Association, the Institute of Food Technologists, the International Food Information Council, and the North American branch of

the International Life Sciences Institute. The American Dietetic Association is funded primarily by member and corporate contributions and sponsorships. The Institute of Food Technologists is funded by meetings, publications, and the dues of its members, individual food scientists and technologists employed in academia, government, and industry. The International Food Information Council is funded by the broad based agriculture and food industry but do not lobby or further any political, partisan, or corporate interest. The North American branch of the International Life Sciences Institute is a public nonprofit scientific foundation with branches around the world that provides a forum to advance the understanding of scientific issues related to the nutritional quality and safety of the food supply. The programs of ILSI North America are supported primarily by its industry membership.

ACKNOWLEDGEMENTS: We would like to acknowledge with gratitude the participation of the speakers, discussants, and staff for their contributions to the roundtables. A special thanks to Joe Derochowski of the NPD Group for his contributions to the roundtables and papers. We also would like to extend further thanks to Sylvia Rowe and Nick Alexander for organizing the abstracts into a concise and seamless whole that truly is greater than the sum of its parts, and to Ms Rowe again for acting as moderator of the roundtables.

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The following individuals attended the roundtables:

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Discussants: Jeanne Blankenship, American Dietetic Association; Dondeena Bradley, PepsiCo Inc; Mary Christ-Erwin, Porter Novelli; Janet Collins, DuPont; Suzie Crockett, General Mills Inc; Johanna Dwyer, National Institutes of Health; Robert Earl, The Coca-Cola Company; Cecilia Fileti, Latino Health Communications; Constance Geiger, Geiger & Associates; Marianne Gillette, McCormick & Company, Inc; Jeanne Goldberg, Tufts University; Cathy Adams Hutt, RdR Solutions; Barbara Ivens, ConAgra Foods, Inc; Guy Johnson, McCormick Science Institute; Michelle Matto, International Dairy Foods Association; Kathy McMahon, Sara Lee Corporation; Melissa Musiker, Grocery Manufacturers Association; Jill Nicholls, National Dairy Council; Susan Nitzke, University of Wisconsin; Jessie Pavlinac, Oregon Health & Science University; Mary Pat Raimondi, American Dietetic Association; Judith Rodriguez, University of North Florida; Leila Saldanha, NutriIQ LLC; Marilyn Schorin, Schorin Strategies; and Pamela Starke-Reed, National Institutes of Health.

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