Development of the 2010 US Dietary Guidelines Advisory Committee Report: Perspectives from a Registered Dietitian

LINDA VAN HORN, PhD, RD

The development of the Dietary Guidelines for Americans (DGA) has historical importance. Beginning in 1977, Senator George McGovern chaired the US Senate Select Committee on Nutrition and Human Needs, and recommended that dietary goals for the American people be established (1). At that time, the average total fat intake was 42% of total energy intake, saturated fatty acid (SFA) intake was approximately 14% of total energy, and cardiovascular disease mortality rates were at an all-time high (1-3). Something had to be done.

In addition to curbing and reversing adverse macronutrient intake, guidance favored shifting to a more micronutrient-dense diet, and Americans were advised to consume only as much energy as they expended (1). Other recommendations included increased consumption of complex carbohydrates; reduced consumption of refined and processed sugars, fat, SFA, cholesterol, and sodium; and increased consumption of fruits, vegetables, and whole grains. Additional recommendations to decrease intake of animal fat and salt were also added. Does this sound familiar?

It might be tempting to say that nothing much has changed in 30 years and that the 2010 US Dietary Guidelines Advisory Committee (DGAC) Report has repeated many of these same recommendations, but there are indeed distinct and defining differences that registered dietitians (RDs) should recognize. First, average American intake of total fat and SFA have decreased substantially to 33.6% and 11.4% of energy, respectively, according to the latest National Health and Nutrition Examination Survey data (4,5). Although recommendations in this report include reducing SFA to less than 10% of total energy, with an ultimate goal of a decrease to 7% of total energy, there is no question that substantial population-wide reduction has occurred (6).

Second, the 2010 DGAC report is the first totally evidence-based report that maximizes the quality, quantity, and critical organization of the underlying scientific data that fully substantiate and raise to new levels of significance the importance of these recommendations. Third, although the DGA are provided in general for all Americans age 2 years and older, the emerging research focuses on vulnerable subgroups, including pregnant women and children from birth to 19 years. Detailed summaries of current research on these age groups, as addressed in the sodium, energy balance, and alcohol chapters, is novel and documents how modern science is tackling new, formerly unaddressed territory with sometimes stunning and exciting results. Also, the proverbial “elephant in the room” is the persistent and pervasive obesity epidemic that continues to perpetuate and perplex health care providers in all specialty areas, as well as consumers.

The purpose of this commentary is to highlight the key features and noteworthy findings that are especially relevant to this profession to increase awareness and invite support for innovative translational approaches that are essential to effective intervention. Details of the report and the extensive reference list are fully available online (http://www.cnpp.usda.gov/DGAs2010-DGACReport.htm), so these comments are deliberately brief. This also provides an opportunity to acknowledge and recognize the countless contributions made by RDs, members of the American Dietetic Association, and other nutrition experts at all levels of the 2010 DGAC. Trained evidence abstractors (national service volunteers) systematically reviewed published articles and critiqued the methodology used in each study. Then Nutrition Evidence Library staff reviewed these for overall quality and developed the evidence portfolios used in the DGAC.

KEY FEATURES OF THE 2010 US DGAC REPORT

In many ways, the 2010 US DGAC Report is precedent setting, because:

- It is entirely evidence-based, including the systematic detailed review utilizing the US Department of Agriculture (USDA) Nutrition Evidence Library and a ranking system that qualifies the amount and type of evidence available (http://www.nutritionevidencelibrary.com/default.cfm?library=DGAC). The Nutrition Evidence Library was established by USDA in 2009 and was used for answering 130 of the 180 scientific questions posed by the 2010 DGAC. Trained evidence abstractors (national service volunteers) systematically reviewed published articles and critiqued the methodology used in each study. Then Nutrition Evidence Library staff reviewed these for overall quality and developed the evidence portfolios used in the DGAC.
evaluation of the evidence. Much of this work incorporated reviews conducted by the Evidence Analysis Library of the American Dietetic Association as well as from the Agency for Healthcare Research Quality and the US Cochrane Collaboration. In addition to PubMed/Medline, a wide variety of other databases were searched, ranging from BIOSIS, Scopus, ScienceDirect, and Embase, to more subject specific databases such as AGRICOLA, Food Science and Technology Abstracts, and Aquatic Sciences and Fisheries Abstracts. This represents the most rigorous and extensive review ever conducted in developing a DGAC report.

- It addresses, for the first time, an unhealthy American public, with the majority (72.3% of women, 64.1% of men) classified as overweight or obese and the rest at risk of becoming obese (7). This increases the level of intensity, urgency, and significance associated with the translation and implementation of these DGA. The DGAC was united in emphasizing the importance of primary prevention of obesity, starting in utero (one fifth of all pregnant women are obese prior to conception), infancy, and childhood as new evidence continues to emerge documenting the relevance and rationale for this approach (8). Among children, 9.5% of infants and toddlers are above the 95th percentile of the weight-for-recumbent-length growth charts, and among older children ages 2 to 19 years, 11.9% are above the 97th percentile of body mass index—for-age growth charts (9). Already, 31.7% of this age group is above the 85th percentile (9). Given the dismal success rate of weight-loss efforts in adulthood, and the even less successful efforts to maintain weight loss once it is achieved, primary prevention in childhood becomes the single most potentially powerful method for halting and reversing America’s obesity epidemic.

- It includes a strong and emerging evidence base on infants, children, and pregnant women. All previous DGA have been directed at the population age 2 years and older. On the basis of growing evidence documenting the importance of nutritional intake and eating behaviors during pregnancy and from birth on, the 2010 DGAC emphasized that subsequent reports starting with 2015 should include dietary recommendations from birth onward.

- It was conducted in a completely transparent manner with six public meetings, including three Webinars that uniquely provided worldwide, complete real-time access to all the proceedings as they occurred. Data and proceedings from each of these sessions are also available online. Decisions related to the scientific review are described on the Nutrition Evidence Library Web site.

- The entire report itself is available online to everyone (at http://www.nutritionevidencelibrary.com/default.cfm?library=DGAC), the public as well as health providers and researchers had the opportunity to provide comments throughout the entire process of development of the report and immediately following the initial release.

- It includes two new chapters, one regarding the “Total Diet” to present the totality of the recommended eating patterns, and a “Translation/Implementation” chapter that provides the environmental context that affects the overall usefulness and adaptation of the DGA. Also included as part of the Total Diet chapter is an Appendix that provides the evidence base surrounding a variety of dietary patterns, including vegetarian diets, Dietary Approaches to Stop Hypertension (DASH) diets, and Mediterranean diets that further document cardiovascular health benefits. These patterns offer guidance about approaches to consuming nutrients in foods that reflect certain ethnic, cultural, or prevention-oriented preferences (10).

- It includes 12 USDA Food Pattern Modeling Analyses that were considered essential elements for reassuring that the evidence-based nutrient recommendations could be fully implemented in current society and, in some cases, demonstrated substitution effects of certain foods for others within the context of nutrient adequacy. Models included the overall adequacy of the USDA Food Patterns, Realigning Vegetable Subgroups, Milk Group and Alternatives, Replacing All Non-Whole Grains with Whole Grains, Seafood, and Vegetarian Modeling. In the past, these analyses were further incorporated within the backbone of the MyPyramid eating pattern development and are likely to be similarly used in the future as well (11).

**NOTEWORTHY FINDINGS FROM THE SCIENCE BASE FOR RDs TO CONSIDER AND PURSUE**

The Science Base section of the report addresses eight major chapters that together comprise the fundamental evidence surrounding the 2010 DGAC report. The highlights and essential take-home messages for each chapter are summarized in the following sections.

**Energy Balance and Weight Management**

Accompanying the concerns about the epidemic of overweight and obesity are several documented facts of note. These include:

- US food availability data document an increase in mean daily total energy intake from 2,057 kcal in 1970, to 2,405 kcal in 1980, and 2,674 kcal in 2008 (12). New data from a major randomized controlled clinical trial that macronutrient composition (high-protein vs low-fat) is less important than total energy intake and energy balance (13).

- Grain-based desserts are the highest ranking contributor to mean energy intake among the US population according to the National Health and Nutrition Examination Survey 2005-2006. Among adolescents ages 14 to 18 years, soda and energy sport drinks contribute the highest amount of calories. Pizza ranks number two in this age group (5,11).

It is recommended that no more than 5% to 15% of total energy intake be derived from solid fats and added sugar. This allows for intake of other nutrient-dense foods that can better achieve nutrient adequacy within appropriate energy limits.

**Nutrient Adequacy**

Dietary components that are generally overconsumed by Americans include: total energy, solid fats, added sugars,
sodium, percentage of total energy from SFA, total cholesterol (in men), and refined grains.

Together, the solid fats and added sugars, primarily derived from energy-dense, nutrient-poor sources, contribute slightly more than one third of all energy consumed by the American public. This means that a large proportion of American people at all ages are overfed and undernourished. Figure 1 illustrates this phenomenon across all age/sex groups. Most sedentary Americans cannot accommodate 200 to 500 empty kilocalories without gaining weight.

Conversely, dietary components that are generally underconsumed by Americans at all ages are considered shortfall nutrients. These include: dietary fiber, vitamin D, calcium, and potassium.

Lower-than-recommended intake of milk and dairy products, substituted by sugar-sweetened beverages and other foods, contribute to the inadequate intake of calcium and vitamin D. Likewise, if Americans increased intake of fruits, vegetables, and whole grains, both dietary fiber and potassium intakes would increase without incurring as many kilocalories as currently derived from intake of the calorically dense solid fats and added sugars. Figure 2 illustrates the substantial incongruity between usual vs recommended intakes of dietary fiber across all age/sex groups. Effective behavioral and environmental changes in shifting this intake could have tremendous public health benefits.

**Fatty Acids and Cholesterol**

Higher intakes of SFA, trans-fatty acids, and, to a lesser extent, dietary cholesterol are associated with an adverse lipid/lipoprotein profile and increased risk of cardiovascular disease. This basic premise has not changed. Unsaturated fats, including n-3 fatty acids, monounsaturated fatty acids, and polyunsaturated fatty acids, offer favorable metabolic effects and provide a healthy replacement for SFA on an isocaloric basis. Earlier DGA from 1990-2000 recommended limiting total fat to 30% or less of energy per day, with evidence illustrating the cardiovascular benefits of increased unsaturated fat intake; the 2005 US DGAC report recommended a range from 20% to 35% of energy from total fat per day (14). As stated in the 2010 US DGAC report (Total Diet chapter), the ability to maintain intake of SFA less than 10% of energy per day is typically only achievable when total fat intakes are less than 30% of energy, and this is even more relevant for those attempting to adhere to levels of SFA less than 7% of energy as recommended for everyone (10).

Intake of at least two servings (total of 8 oz) per week of seafood and the n-3 fatty acids these foods provide are recommended for cardiovascular and other health benefits among all segments of the population, including pregnant women and children. All Americans are encouraged to consume more fish to increase n-3 fatty acid intake. In addition, based on growing evidence, intakes of small amounts of unsalted nuts and flavanol-dense dark chocolate and cocoa, when consumed within the context of total daily energy requirements, can have cardiovascular benefits, specifically in reduced blood pressure and flow-mediated dilation (10,15,16).

**Protein and Carbohydrates**

Because protein uniquely contributes essential amino acids as well as serving as an energy source, the DGAC devoted separate chapters to proteins and carbohydrates. Much additional research had been conducted since 2005; thus, additional summary and evaluation were needed. Due to the importance of dietary protein for health and the fact that the Recommended Dietary Allowance for protein is based on ideal body weight, the need to consume high-quality sources even within an energy-reduction diet was considered important. The chapter emphasizes the benefits of combining plant proteins, such as those from beans and nuts, as well as deriving protein from usual animal sources including seafood, meat, poultry, eggs, and milk. A surprising absence of high-quality studies assessing vegetarian eating patterns and their protein content was noted. Also, specific questions regarding the potential role of milk and milk product intake on blood pressure and blood lipids deserve additional research attention.

The chapter on carbohydrates is extensive and comprehensive. It identifies the many categories of carbohydrate based on the number of sugar units present and differentiates starches from sugars nutritionally, as well as their respective influences on blood glucose, blood lipids, and body weight. Also, an extensive section of this chapter is devoted to the benefits of dietary fiber in naturally occurring sources. As illustrated in Figure 2, this is a shortfall nutrient, which if adequately consumed could benefit other nutrient intakes, such as potassium, and could potentially have major health benefits. Emphasizing sources of dietary fiber naturally occurring in foods, not supplements or added to foods, is advocated based on existing evidence and the other nutritional benefits of high-fiber foods, including whole grains, legumes, fruits, and vegetables.

**Sodium, Potassium, and Water**

This chapter cites the strong body of evidence documenting that as sodium intake decreases, blood pressure is reduced in children and adults. This robust nutritional evidence further implicates the excessive sodium intake
Figure 2. Distribution of usual fiber intake, in grams, compared with adequate intake levels by age/sex group. Source: 2010 US Dietary Guidelines Advisory Committee Report (10).
in this country as a major contributor to hypertension, stroke, and atherosclerotic disease (17). Data from randomized controlled clinical trials in feeding studies and in free-living conditions document the benefits of sodium reduction within the context of the diet implemented in the DASH studies (10,18). Shifting to a DASH-type eating pattern in this country could have tremendous public health benefits. Although it is recognized that reductions in sodium intake must be gradual to allow time for taste perception adjustment in the general population, this report advocates that the former recommendation of less than 2,300 mg sodium per day be further reduced, with an eventual goal of 1,500 mg per day. Effective strategies to help achieve these reductions over time will require cooperation and assistance from the food industry, policymakers, and consumers alike.

This chapter also discussed the benefits of increased dietary potassium, a shortfall nutrient, in helping to reduce blood pressure. Potassium intake is known to attenuate the adverse effects of sodium on blood pressure and also helps to reduce risk of developing kidney stones and possibly osteoporosis. Dietary sources of potassium from fruits and vegetables, not supplements, are recommended.

### Alcohol

A thorough review of the evidence and update since the 2005 DGA was done. As has been noted previously, evidence continues to support that among those who consume alcohol, an average daily intake of one to two alcoholic beverages (for women and men, respectively) is associated with the lowest all-cause mortality and low risk for diabetes and coronary heart disease among middle-aged and older adults. Also, there is much evidence that drinking during pregnancy has potential adverse consequences on the fetus and is not recommended at all, even during preconception for those attempting to become pregnant. The report further emphasizes, however, that women who wish to include modest, occasional alcohol intake postpartum need not abandon breastfeeding once consistent breastfeeding behavior has been established (approximately 2 to 3 months); rather, a mother can wait 3 to 4 hours after a single drink (the time it takes to metabolize the ethanol) before breastfeeding with negligible effects on the baby (10).

### Food Safety and Technology

This chapter addressed the basic four principles known to reduce the risk of foodborne illnesses: clean, separate, cook, and chill. Review of current practices revealed a generally unsafe approach to food handling and preparation by many subgroups, including pregnant women, college students, and older adults. Simple but important steps to cleaning, proper storage temperatures, cooking
adequately, and other safety features could greatly reduce the current levels of foodborne illnesses.

A special emphasis on the recognized nutritional benefits of seafood vs risks from mercury toxicity and persistent organic pollutants and other health concerns overwhelmingly advocated for the benefits outweighing the risks for the general population. Pregnant and nursing women should also consume seafood for the benefits for the fetus/infant, while following guidance on a small number of fish to not eat or to limit.

**MAJOR CONCLUSIONS OF THE REPORT**

The entire DGAC reviewed all of the major conclusions to be drawn in each chapter of the report. If there were differences of opinion or lingering questions regarding the interpretation of the evidence, the committee deliberated further, reviewed the evidence again, considered word changes, and otherwise worked toward consensus. The report lists these conclusions and identifies areas of research needing further development and lingering questions needing to be addressed. Figure 3 summarizes the degree to which Americans underconsume recommended foods and overconsume problem foods and the nutrients that should be limited.

Encouraging these changes will require partnership with policymakers, industry, and consumers. RDs are key to facilitating these changes, along with dietetic technicians, registered, and other health care providers.

The 2010 US Dietary Guidelines Advisory Committee Report could not have been accomplished without the contributions of the following individuals:

**Dietary Guidelines Management Team**
- Jan Barrett Adams, MS, MBA, RD
- Shirley A. Blakely, PhD, RD, CAPT, USPHS
- Shanthy Bowman, PhD
- Patricia Britten, MS, PhD
- Eve Essery PhD, RD
- Carole Davis, MS, RD
- Patricia M. Guenther, PhD, RD
- Rachel R. Hayes, MPH, RD
- Kathryn McMurry, MS
- Holly McPeak, MS
- Kellie M. O’Connell, PhD, RD
- Colette I. Rihane, MS, RD
- Anne Brown Rodgers

**NEL Evidence Abstractors**
- Jennifer Aiyer, MS, RD
- Stephanie Allshouse, MS, RD
- Juan Andrade, PhD
- Kimberly Bandelier, MPH, RD
- Jeannette Beasley, PhD, RD
- Sarah Belisle, MS

**TRIBUTE TO THE CONTRIBUTIONS OF RDs IN DEVELOPING, REVIEWING, AND CREATING THE 2010 DGAC REPORT**

The overall experience involved with developing the report, a 20-month endeavor, was daunting. The quality, as well as the quantity, of contributions from countless individuals was remarkable. Among these contributors, tremendous input was provided by an exceptional team of highly qualified, experienced, knowledgeable, and dedicated RDs from many different backgrounds whose efforts made all the difference in achieving this herculean effort. In conclusion, this commentary serves to congratulate and distinguish the many contributions of RDs, American Dietetic Association members, and others throughout this process. Just a few of those known to be involved are listed below, but there are countless additional contributors, perhaps including you, the reader, who have given of their time and energy to bring this report to full fruition. Thank you and congratulations to all. We look forward to the even more challenging next steps regarding the effective translation and implementation of these important recommendations.

THANK YOU!

**STATEMENT OF POTENTIAL CONFLICT OF INTEREST:**
No potential conflict of interest was reported by the author.

**FUNDING/SUPPORT:** The author received no funding to write this commentary/editorial or to serve as chair of the DGAC.

**Acknowledgement**
- Laura Bellows, PhD, MPH, RD
- Ellen Bowser, MS, RD, CSP
- Terri Burgess-Champoux, PhD, RD, LD
- Kathleen Burzynski, MS, RD, LD, CDE, CNS
- Chandra Carty, MMSc, RD, LD
- Jennifer Chapman, PhD, MPH
- Liwei Chen, MD, PhD, MHS
- Pamela Ching, ScD, MS, RD
- Mei Chung, MPH, PhD Candidate
- Alena Clark, PhD, MPH
- Katie Clark, MPH, PhD Candidate
- Mary Cluskey, PhD, LD, RD
- Craig Coleman, PharmD
- Patricia Davidson, DCN, RD, CDE
- Debby Demory-Luce, PhD, RD, LD
- Laura Dick, PhD, RD
- Elizabeth Droke, PhD, RD
- Alison Dvorak, MS, RD
- Jamie Erskine, PhD, RD
- Mable Everette, PhD, RD, FADA
- Nancy Fassinger, PhD, RD
- Laurie G. Forlano, DO, MPH
- Sarah Forrestal, PhD
- Sarah L. Francis, PhD, MHS, RD
- Elizabeth Friedrich, MPH, RD, LDN
- Kristie Funk, MS, RD
- Linda Gauvry, MS

(continued)
References


