

*Nutrition and Your Health:
Dietary Guidelines for Americans*

Dietary Guidelines Advisory Committee Meeting

Sponsored by the
U.S. Department of Health and Human Services (HHS)
U.S. Department of Agriculture (USDA)

Held at the
Hotel Washington
Washington, DC
January 28-29, 2004

Meeting Summary

Wednesday, January 28

(8:40 a.m.)

Participants

Dietary Guidelines Advisory Committee: Dr. Janet C. King (Chair), Dr. Lawrence J. Appel, Dr. Yvonne L. Bronner, Dr. Benjamin Caballero, Dr. Carlos A. Camargo Jr., Dr. Fergus M. Clydesdale, Dr. Vay Liang W. Go, Dr. Penny M. Kris-Etherton, Dr. Joanne R. Lupton, Dr. Theresa A. Nicklas, Dr. Russell R. Pate, Dr. F. Xavier Pi-Sunyer, Dr. Connie M. Weaver

Executive Secretaries: Ms. Carole Davis, Ms. Kathryn McMurry, Dr. Pamela Pehrsson, Dr. Karyl Thomas Rattay

Others: Dr. Cristina Beato, Dr. Eric Hentges

Welcome and Introductions

Dr. Cristina Beato, Acting Assistant Secretary for Health, HHS, welcomed participants to the second meeting of the 2005 Dietary Guidelines Advisory Committee (DGAC). She noted that since the last meeting in September 2003 the Committee has reviewed recent scientific literature pertaining to the key areas of the *Dietary Guidelines*.

Dr. Beato thanked the members of Committee for volunteering their valuable time and services to assist HHS and USDA. She acknowledged the importance of public input to this process and noted that the Committee had received a wide range of comments prior to this meeting. Dr. Beato invited additional written comments from the public and reviewed the procedures for submitting such comments. She noted that respondents should be clear and concise and provide the scientific justification for their views. All comments from the public must be sent to the full committee, using the address in the *Federal Register*.

Dr. Beato concluded by again thanking the members and the staff for their hard work and gave them her best wishes for a productive meeting. She then turned the floor over to Dr. King.

Dr. Janet C. King, Chair, Dietary Guidelines Advisory Committee, noted that the Committee has undertaken a challenging task in the short time since the first meeting. The goal of this meeting is for the full Committee to review the work of the various subcommittees and identify priority issues. At the next DGAC meeting (March 2004), the Subcommittees will present their draft recommendations, with scientific rationale. The Committee will work toward consensus on which recommendations to include in the report. The full Committee will review the draft DGAC report to the Secretaries at the fourth and final DGAC meeting (May 2004). The final report will be submitted to the HHS and USDA Secretaries in June 2004.

Dr. King introduced Dr. Carol Suitor, a scientific writer formerly with the Institute of Medicine (IOM), who will prepare the draft report. Dr. Suitor was also involved in the last DGAC report.

Dr. King summarized the work of the Committee to date. Since the last meeting (September 2003), the DGAC Subcommittees and staff have been working to identify priority research questions, conduct literature reviews, identify key scientific findings, and identify outside experts to address important issues. The Subcommittees also identified overarching topics for consideration by the full Committee. Dr. King noted that the Subcommittees would present their findings on the second day of the meeting.

Dr. King then reviewed the agenda for the day. In the morning session, the Committee would hear an update on the Food Guide Pyramid reassessment process, followed by three expert presentations on components of a healthy American diet. The afternoon session would include an expert presentation on nutritional needs of the elderly, public oral testimony, and a general discussion of overarching issues.

Food Guide Pyramid Reassessment Update ***E. Hentges***

Dr. Eric Hentges, Director, Center for Nutrition Policy and Promotion, USDA, provided an update on the reassessment of the Food Guide Pyramid. He noted that food guidance at USDA dates back to 1916 and has taken a number of forms over the years. The Food Guide Pyramid, which was introduced in 1992, is the current food guidance at the USDA and is widely recognized. A reassessment of the Food Guide Pyramid is currently underway to ensure that it reflects the latest standards in nutrition and to increase consumer use of the Pyramid.

Dr. Hentges noted that his presentation would focus on comments received in response to a notice of proposed changes to the Pyramid that appeared in the *Federal Register* last September. The notice included proposed food intake patterns, the background data from which the patterns were developed, and key issues for public comment.

Dr. Hentges thanked respondents for taking the time to review the extensive data in the *Federal Register* notice and providing their input. USDA received 255 letters in response to the notice, containing 1101 separate comments. Respondents included health and nutrition professionals, health associations, the food industry and trade associations, government agencies, and the general public.

USDA asked for specific input in five areas. The first was the appropriateness of using sedentary, reference-sized individuals in assigning target energy levels for the proposed food intake patterns. The proposed energy level used the estimated energy requirement equation in the Dietary Reference Intake (DRI) Macronutrient Report. The proposal to use sedentary energy levels was based on the fact that 64 percent of the U.S. population is overweight or obese. This issue elicited numerous comments. Most respondents supported the proposed position, although some suggested using an energy level that reflects a physically active lifestyle. Quite a few respondents stressed the need to promote physical activity and to include food patterns for active individuals.

The second topic for public comment was the appropriateness of the nutritional goals for the daily food intake patterns and the standards used to set those goals. The adequacy goal for most nutrients was based on the DRI, the Recommended Daily Allowance (RDA), where one was available, and the Adequate Intake level (AI) or Acceptable Macronutrient Distribution Range (AMDR) from the IOM Macronutrient Report, along with the moderation goals from the 4th and 5th editions of the *Dietary Guidelines*, or Daily Values set by the Food and Drug Administration (FDA) for the Nutrition Facts Labels.

Many respondents supported the use of these standards, although some questioned why Estimated Adequate Requirements (EARs) were not used. Some comments received were in regards to specific nutrients relative to a nutritional standard, including the following concerns:

- Vitamin E: Respondents noted that the proposed food patterns do not meet the new standard for vitamin E. They also asked whether the standard is appropriate and whether the current nutritional database was up to date regarding vitamin E.
- Iodine and Vitamin D: Respondents asked why these nutrients were not included in the proposed food patterns. (Dr. Hentges noted that there is an RDA for these nutrients, but information is lacking in the nutrient database.)
- Sodium and Potassium: Respondents asked what standards were used, or should be used, for these nutrients. (Dr. Hentges stated that USDA is awaiting the findings of the IOM Water and Electrolytes panel.)
- Trans fats: Respondents asked why there was no goal for *trans* fats. (Dr. Hentges noted the DRI states they should be “as low as possible” but does not set a quantitative goal on which to base a recommendation.)
- Fats: Respondents questioned whether there was good reason to limit fats to 30 or 35 percent of calories, once you have taken care of saturated fat.

- Carbohydrates: Respondents suggested using the lowest percentage within the AMDR range as opposed to a median or other goal for carbohydrates.
- Fiber: Some thought the proposed goal was too high; others thought it was too low. (USDA is seeking the Committee's input to set the appropriate standard.)
- Added sugars: Respondents thought the proposed level was too high and that the term "goal" implied that added sugars are needed. (Dr. Hentges noted that the DRI level was a limit, not a goal.)

The third issue for public comment was the appropriateness of the proposed food intake patterns. This issue elicited more comments than any other topic. Dr. Hentges noted that the proposed food groups and patterns were based on nutrient adequacy and typical food choices. Respondents questioned whether the proposed patterns were appropriate for educating Americans about healthful eating. The most common recommendations were that whole grains should be emphasized; types of fats should be differentiated; and foods in the Meat and Beans group should be differentiated. There was broad support for the proposed changes in the food patterns that emphasized unsaturated fats and oils and greater consumption of whole grains, legumes, and dark green vegetables. Additional suggestions included:

- Emphasize nutrient-dense choices for fruits and vegetables and other groups that are typically under-consumed
- Greater encouragement of legume consumption
- Include fortified soy products in the milk group
- Decrease grain servings
- Keep meat servings as is because meats are leaner now
- Move potatoes to another food group
- Increase the amounts recommended in the milk group
- Include fortified foods or supplements in the food patterns.

The fourth issue for public comment was whether the amounts to be eaten should be expressed in household measures, such as cups and ounces, or whether it should continue to be expressed in terms of number of servings per day. There was widespread support for replacing servings with household measures in consumer materials. Some respondents suggested keeping the term "serving," but clarifying or changing serving sizes. Many respondents noted that the USDA's food guidance should be in harmony with the Nutrition Facts label. Dr. Hentges stated that USDA would be meeting with FDA to ensure this happens.

The fifth issue for public comment was the selection of appropriate subsets of the food patterns for use in consumer materials. Most respondents supported the idea of selecting subsets of the proposed patterns to target various audiences, but the recommendations varied widely as to what these subsets should be. Dr. Hentges noted that this issue would be addressed in ongoing consumer testing.

Respondents to the *Federal Register* notice raised a number of additional issues, such as comments on water, recommendations to include physical activity in the food guidance, suggestions for including supplements in the food patterns, and requests to include food patterns for vegetarians. Although the *Federal Register* notice specifically requested

comments on updating the scientific basis, many people suggested changes in the graphic design.

Dr. Hentges stated that USDA was pleased with the large number of responses, the diversity of audiences, and the range of viewpoints that were expressed. Areas of widespread agreement included the importance of energy levels and nutritional goals; support for greater emphasis on whole grains, unsaturated fats, and nutrient-dense choices, especially from groups that are currently under-consumed; and the use of standard household measures.

A number of issues will require further discussion, including whether the vitamin E standard is appropriate; whether nuts should be placed in a separate food group; whether legumes should be left in both the Meat and Bean group and the Vegetable group; whether soft margarines should be classified as oils or moved to solid fats, in light of *trans* fat; whether calcium-fortified soy products should continue to be classified as legumes; and the question of water and whether it should be included in the pyramid revision. CNPP will seek the Committee's input and guidance in these areas.

Dr. Hentges noted that the revision of the food guidance is still a work in progress. The comments provided some clear directions, but CNPP staff will continue to analyze and revise the technical basis. Nothing will be finalized until the Committee has completed its deliberations. CNPP will incorporate new standards the Committee may set and input it may provide relative to any of the issues discussed. Dr. Hentges stressed that the implementation of the *Dietary Guidelines* and the Food Guide Pyramid must be coordinated between all agencies and with many other partners. CNPP looks forward to discussions on strategies for that implementation.

Dr. Hentges presented two tables of data that showed the proposed recommendations versus the current average consumption. While the proposed recommendations are not that different from current consumption when looking at the major food groups, there are major differences within the vegetables, grains, and fats subgroups. The proposed patterns would require a three- to four-fold increase in consumption of dark green vegetables. They would also require consumers to double their consumption of orange vegetables and legumes and triple their consumption of whole grains. Additionally, the proposed patterns would require a 30 to 60 percent decrease in consumption of starchy vegetables, and a 50 to 60 percent decrease in solid fats.

Dr. Hentges stated that the food patterns would be finalized as soon as the Committee completes its technical report. Design aspects will continue until just prior to the release of the revised food guide, next year (2005). Consumer research has been underway for approximately two years and will continue through the implementation of the new guidance. Public comments will be solicited throughout the process. CNPP will publish a *Federal Register* notice in late spring or early summer to solicit input regarding consumer messaging and graphic issues. The revised food guide will be released in 2005, following the release of the official *Dietary Guidelines*.

Dr. Hentges acknowledged that the proposed guidance expects Americans to make significant behavioral changes. He assured the Committee that USDA is committed to providing the public with guidance to help meet this challenge. He stressed that addressing current issues of overweight and obesity will require partnerships between the federal agencies, between

nutrition educators, dietitians, and extension educators, and between federal agencies and industry.

Discussion

Dr. King asked whether the current Food Guide Pyramid includes specific recommendations for intake of whole grains. Dr. Hentges replied that the Pyramid gives a range of 6-11 servings of grains per day and recommends at least 3 servings of whole grains. While this is half of the total grains servings at the lower end of the range, the proportion decreases as the number of servings increases.

Dr. Caballero noted that there seems to be a general consensus that a certain level of activity is an essential component of energy balance. He expressed concern that it would be confusing to base the food guidance on sedentary people while recommending that people be more active and asked whether it might not be better to base the energy level on certain minimal level of physical activity that most people should try to achieve.

Dr. Hentges noted that most of the health groups that responded felt that the energy level should reflect the reality that most of the population is sedentary and overweight. He thought it would be important to promote more active levels and stated that the Physical Activity Coefficients could be used to adjust the recommended food patterns for more active groups. Dr. Hentges emphasized that CNPP is looking to the Committee for guidance in this area.

Dr. Appel asked for details regarding proposed alternatives to the Pyramid. Dr. Hentges stated that most of the respondents suggested rearranging elements within the current shape to emphasize different issues.

Dr. Clydesdale asked if USDA would be conducting consumer research regarding the issue of aligning the recommended serving size with the Nutrition Facts label. Dr. Hentges stated that CNPP recognized the need for these to be in harmony and is setting up a meeting with FDA. He noted that “serving” and “portion” mean the same thing to consumers and that “value sizing” is an economic phenomenon. That issue will be addressed in message testing.

Dr. Weaver noted that some comments suggested that nutrient density should be shown more clearly on food labels, and she stated that the Committee would pursue that as an overarching issue. Dr. Hentges noted that many nutrient-dense foods in the proposed patterns are currently under-consumed. It will be important to identify strategies to get the desired behavior change.

Referring to the question of soft margarines, Dr. Kris-Etherton noted that the food industry is making an effort to get rid of *trans* fat. In light of that, she wondered if it would be possible to rethink that category. Dr. Hentges replied that the previous food pattern was 60% solid fat and 40% oils. The new recommendation shifts that to 60% oils and 40% solid fat. USDA is looking to the Committee for guidance in this area. They are also awaiting recommendations from the IOM as to how *trans* fat and saturated fats will be handled in nutrition labeling.

Dr. Nicklas asked if the comments regarding fiber specified certain age groups. Dr. Hentges and his staff believed the comments were more generalized, but they would look into it.

Dr. Lupton noted that those at the low end of the energy scale need to be very careful about the nutrient density of their foods and may not have many discretionary calories available. She wondered if a decreased intake of added fat or added sugars could be recommended for these groups. Dr. Hentges stated that CNPP recognizes the need for flexibility. The revised Pyramid will reflect the Committee's guidance on total fat consumption and added sugars.

Dr. Camargo asked if it would be possible to develop two graphics—one for sedentary individuals, and a second for those who meet the recommended physical activity goal. Dr. Hentges replied that the challenge is to come out with appropriate food guidance and to make it relevant to individuals. The greatest challenge in implementing the revised Pyramid will be connecting with individuals once they are motivated, which may take a number of targeted tools. Partnerships will also be critical to implementation.

Dr. Camargo also asked where alcohol fits into the Pyramid. Dr. Hentges stated that USDA awaits the Committee's input with regard to the question of alcohol.

Dr. Pate noted that the last DGAC began to address the issue of integrating dietary and physical activity recommendations. He stated that this Committee might need to decide how to bring together the two sets of recommendations.

Dr. Bronner asked whether the new Food Guide Pyramid will state clearly that people need to make the best choices within each food group in order to meet the nutrient requirements. Dr. Hentges replied that it will take a targeted education effort to get consumers to make the behavior changes that will result in more nutrient dense choices in food groups that are currently under-consumed. The food industry can make some changes independent of changes in consumer behavior, but partnerships will be important.

Dr. Weaver commented that it would be relatively easy to develop a computerized program that would translate the twelve proposed food patterns into a customized Pyramid. Dr. Hentges agreed that interactive tools present an important opportunity for implementing the revised Pyramid and noted that USDA has already begun to explore this option.

Dr. Caballero expressed concern that consumers may not understand that the Pyramid recommendations are based on the lowest fat and healthiest type of food in each category and that choosing other foods could affect the energy balance. Dr. Hentges agreed that it would be important to focus education and consumer testing on communicating the energy issue. He stated that previous communications dealt more with the nutrient adequacy of food choices. This time around, it will be essential to emphasize calorie content.

Dr. Nicklas noted that physical activity is indirectly reflected in the current Food Guide Pyramid in the range of servings for various caloric levels. She noted that the Nutrient Adequacy Subcommittee would be looking into whether nutrient density can be quantified in a way that is meaningful to consumers.

Dr. Kris-Etherton asked whether it would be feasible to suggest more nuts in the diet to increase vitamin E intake. Dr. Hentges noted that it would require a ten- to twenty-fold increase in the current consumption of nuts in order to obtain a meaningful level of vitamin E. However, USDA will continue to look at the nutrient databases, the DRI recommendation, and the feasibility of recommending increased intake of nuts. (Dr. Weaver noted that the

Nutrient Adequacy Subcommittee would address that issue in its report.)

Dr. Clydesdale asked whether fortification and/or the addition of vitamin E to foods as an anti-oxidant had been taken into consideration as part of the consumption. Dr. Hentges stated that USDA is reviewing the database to see if it accurately reflects all of the current foods as purchased and available.

Dr. Appel asked whether the title of the document and the Committee could be changed to the "Dietary and Physical Activity Guidelines." Dr. Rattay stated that the Congressional mandate refers to the document as the *Dietary Guidelines* and that the name would have to be changed through Congress. Dr. Appel noted that perhaps the name change could be one of the Committee's recommendations.

Dr. Pate agreed that it seems appropriate to look for ways to draw together the physical activity and dietary guidance, because it is difficult to make energy intake recommendations without considering activity level. However, he recognized that the physical activity guidelines could be as detailed and extensive as the *Dietary Guidelines* being considered by this Committee, and that it might be difficult to combine all of that information.

Dr. Kris-Etherton noted that the American Heart Association and others have recommended increased fish consumption and asked if the revised food guide would do so. Dr. Hentges said there would need to be a strong reason to emphasize an individual food within a group.

Dr. King asked what percent of Americans currently selects a diet that adheres to the Food Guide Pyramid and wondered how to motivate those Americans who do not to make the necessary changes. Dr. Hentges acknowledged this would be a challenge. Most consumers recognize the Pyramid and have a good understanding of the messages, yet implementation is very low. On the other hand, the increased selection of herbal products on grocery shelves and the popularity of diet books indicate that people want to make a change. The new *Dietary Guidelines*, followed by the new food guide and changes in the food labels, present a huge opportunity to connect with consumers. It will be important not to miss that opportunity.

Dr. Clydesdale suggested that the recommendations could be promoted on the basis of the scientific evidence behind them. Dr. King noted that there is a lot of competition when it comes to guidance on health and nutrition.

Dr. King thanked Dr. Hentges for an excellent presentation that showed that the work of this Committee is also going to be important to the development of the Food Guide Pyramid.

(Break: 9:50-10:05)

***Presentations and Discussion: Components of a Healthy American Diet
F. Hu, R. Krauss, J. Slavin***

Dr. King welcomed the three panelists who were invited to share their expertise with the Committee. She noted that the panelists would give their presentations, and would be followed with a discussion between the panel and the full Committee.

Dr. King then introduced the panelists. Dr. Frank Hu is Associate Professor of Nutrition and Epidemiology in the Department of Nutrition at Harvard School of Public Health. His research is primarily focused on the role of diet and lifestyle determinates in the development of type 2 diabetes and cardiovascular disease. Most, though not all, of his research is based on two large ongoing cohort studies at Harvard: the Nurses Health Study and the Health Professionals Follow-Up Study.

Dr. Ronald Krauss is Director of Atherosclerosis Research at Children's Hospital Oakland Research Institute. He is a Guest Senior Scientist in the Genome Sciences Division of Lawrence Berkeley National Laboratory, and Adjunct Professor in the Department of Nutritional Sciences at the University of California at Berkeley. Dr. Krauss has been Senior Advisor to the National Cholesterol Education Program and is actively involved in the American Heart Association, having served as Chairman of the Nutrition Committee. He is founder and Chair of the American Heart Association's Council on Nutrition, Physical Activity and Metabolism. His research focuses on genetics, dietary and hormonal effects on plasma lipoproteins and coronary disease risk.

Dr. Joanne Slavin is Professor of Nutrition at the University of Minnesota. She is an expert in the areas of nutrition across the lifestyle, human nutrition, sports nutrition, dietary fiber, and the role of diet in disease prevention. Her research interests are dietary fiber, phytoestrogens from flax and soy, and whole grains, with a focus on conducting human feeding studies that measure relevant biomarkers for chronic disease prevention.

Dr. Frank Hu, Harvard School of Public Health, noted that he was asked to speak on four very complicated topics: Alternate Healthy Eating Index; the balance of n-6 and n-3 polyunsaturated fatty acids in the diet; fat and obesity; and the foundation of a healthy diet.

Dr. Hu began with a discussion of the Healthy Eating Index (HEI), which was developed by Eileen Kennedy at USDA in 1995 to assess the degree of adherence to the *Dietary Guidelines for Americans* and the Food Guide Pyramid. The index includes 10 different components: grains, vegetables, fruits, milk, meat, total fat, saturated fat, cholesterol, sodium, and variety in the diet. It has been widely used to monitor dietary quality over time in the U.S. and to assess dietary quality in different populations. However, it has not been evaluated in terms of whether it can predict disease risk, especially cardiovascular disease and cancer.

A study conducted in 2000 examined the relationship between the HEI and the risk of major chronic disease (cardiovascular disease and cancer), using the large cohorts in two ongoing studies at Harvard (nurses and health professionals). Subjects in the two cohorts were classified according to HEI quintile (multivariate-adjusted) to determine if there was any association between diet and relative risk of major chronic disease. The data showed a modest inverse association between diet and relative risk in men, but no significant association between diet and risk in women. In light of these findings, the researchers thought the index should be improved because it did not predict major chronic disease in the two cohorts.

The researchers proposed an Alternate Healthy Eating Index (AHEI) to reflect different types of fats; the level of cereal fiber (to represent whole grain intake); the ratio of white meat to red meat in the diet; consumption of nuts, legumes, and soy; and moderate alcohol consumption. They predicted that this index would be a stronger predictor of major chronic disease than the

original HEI. In fact, they found a strong universal association between HEI, the AHEI, and major chronic disease in men, as well as a significant universal association between the AHEI and major chronic disease in women.

Dr. Hu presented a table summarizing percent risk reduction associated with the highest quintiles of the HEI and the AHEI. For men, the HEI was associated with 11 percent decrease in incidence of major chronic disease, and about 28 percent decrease in incidence of cardiovascular disease. The AHEI was associated with a 20 percent decrease in major chronic disease and a 39 percent decrease in cardiovascular disease. These findings were significant.

The results for women were especially dramatic. The HEI predicted no significant risk reduction for women (3 percent reduced risk for major chronic disease, 14 percent for cardiovascular disease). The AHEI, however, predicted an 11 percent decrease in risk of major chronic disease and a 28 percent decrease in risk of cardiovascular disease. These results were significant. This research suggests that the AHEI is a better predictor of major chronic disease than using HEI. Further research is needed to identify dietary patterns associated with different types of cancer risk, because neither the HEI nor the AHEI predict this risk. Dr. Hu recommended that the *Dietary Guidelines* should continue to be evaluated for their ability to reduce risk of chronic diseases that are of major public health concern.

Dr. Hu then turned to a discussion of the relationship between n-6 polyunsaturated fat (n-6 PUFA) and cardiovascular disease, diabetes, and cancer. He briefly reviewed four randomized clinical trials with coronary endpoints. The fat intake for subjects in these studies was 34 to 46 percent of energy. n-6 PUFA was much higher (10 to 20 percent of energy) than the average American diet. The results of these clinical trials consistently showed a significant reduction of serum LDL cholesterol levels and incidence of cardiovascular events.

The findings of observational studies of the relationship between n-6 PUFAs and coronary heart disease have also been studied. A review of 90,000 women in the Nurses' Health Study showed a strong inverse association between median intake of n-6 PUFAs and relative risk of both fatal and non-fatal coronary heart disease.

Dr. Hu noted that there have been several studies, which have examined the effects of n-6 PUFAs on type 2 diabetes. Several controlled metabolic trials support the benefits of substituting linoleic acid for saturated fat in improving insulin sensitivity. The Nurses' Health Study also showed a significant inverse association between median intake of n-6 PUFAs and relative risk of type 2 diabetes.

Dr. Hu stated that one concern with n-6 PUFA is its potential effect on cancer, because high polyunsaturated fat has been found to promote tumor growth in animal studies. However, analysis of twelve major prospective cohort studies found no evidence that high polyunsaturated fat intake is associated with tumor growth. Based on the epidemiological studies, there is no suggestion of increased breast cancer risk with high n-6 PUFA consumption.

Dr. Hu noted that some people are concerned that a high level of n-6 PUFAs may mitigate the benefits of n-3 PUFAs. They suggest reducing n-6 PUFAs to maximize the benefits of n-3 PUFAs, and some have proposed that the ratio is more important than the absolute amount of

n-6 and n-3. Dr. Hu stated that the evidence suggests that both n-6 and n-3 are important, that high intake of n-6 does not mitigate the benefits of n-3, and that the benefits may be additive.

Alpha-Linolenic acid (ALA) is the main source of n-3 PUFAs in the diet, primarily from plant-based foods. A review of the Nurses' Health Study found that both ALA and linoleic acid (LA) were associated with significant decreased risk of fatal coronary heart disease and that the ratio was not associated with risk. A higher amount of n-6 PUFAs does not appear to mitigate the benefits of ALA or fish n-3 fatty acids. Therefore, Dr. Hu recommended that rather than decreasing n-6 PUFA intake, nutritional strategies should maximize the benefits of both types of fatty acids through a modest increase in n-6 and a more dramatic increase in n-3.

Dr. Hu noted that in 1989, the Diet and Health Committee of the National Academy of Sciences concluded that, "Intake of total fat per se, independent of the relative content of different types of fatty acids, is not associated with high blood cholesterol levels and coronary heart disease." Subsequent studies have shown that the type of fat is in fact more important than the total amount of fat in the diet.

Guidelines issued in 2001 by the National Cholesterol Education Program allow 25 to 35 percent of energy from total fat. The 2002 IOM Macronutrient Report recommended 20 to 35 percent of energy as an acceptable range but did not set an upper limit for total fat. The 2000 *Dietary Guidelines* recommend an upper limit of 30 percent of energy from fat.

A major concern today is the high incidence of obesity. A low-fat diet has been promoted for weight loss and prevention of obesity, and conventional wisdom holds that the more fat you eat, the more likely you are to become obese. However, the evidence does not support the conventional wisdom.

Short-term studies show that all types of diet will lead to weight loss if calories are reduced. Long-term studies provide more valuable information because they show whether a diet can be followed over the long run and whether it can be used to maintain weight loss. Sixteen long-term studies (six to eighteen months in duration) found no evidence that a low-fat diet is more beneficial than a control diet. Reducing the percent of dietary energy from fat causes a small short-term reduction in weight, but there appears to be little, if any, relation between dietary fat composition over the range of 18 to 40 percent of energy and body fat.

Dr. Hu stated that studies conducted in the past three years have found a moderately high-fat diet that includes nuts and olive oil to be more beneficial in terms of adherence, weight loss, and weight maintenance, while also reducing cardiovascular risk factors.

Dr. Hu stated that the exclusive focus on dietary fat has been a distraction in efforts to control obesity and that the proliferation of low-fat products has led to increased consumption of refined carbohydrates. While it is difficult to draw a correlation between the decrease in fat intake and the increase in obesity, there is reason to be concerned about this dietary trend.

Dr. Hu suggested that the foundation of a healthy diet should be food-based, not nutrient-based. There is evidence supporting the benefits of plant-based foods. He proposed revising the base of the Food Guide Pyramid to include three food groups—fruits and vegetables, whole grains, and nuts and legumes—in light of the strong evidence that these foods have

benefits for cardiovascular disease and cancer. He recommended placing the entire Pyramid on a base of physical activity.

Dr. Ronald Krauss, Children's Hospital Oakland Research Institute, discussed the role of the carbohydrate to fat ratio and disease risk, the interaction of this ratio with the effects of individual fatty acids on disease risk, and the relationship of the carbohydrate to fat ratio to body weight, including maintenance and weight loss.

He began with several caveats. First, most of the evidence regarding the disease effects of carbohydrate to fat ratio is derived from epidemiological and observational studies because it is difficult to address disease endpoints through clinical trials. Intermediate cardiovascular disease and diabetes risk biomarkers are imperfect predictors of clinical disease. Second, the effects of specific types of carbohydrates and the food sources of those carbohydrates can vary as much as the effects of individual fatty acids. Finally, the impact of this ratio on disease and disease markers is strongly influenced by energy balance.

Dr. Krauss presented a table showing fat to carbohydrate ratios at various levels of protein intake (15 to 30 percent of calories, in five percent intervals). For each protein level, he calculated fat and carbohydrate ratios compatible with the IOM AMDRs. He then looked at published information through 2002 that related these ratios to disease and disease risk markers with particular focus on lipids and lipoproteins since they have a strong predictive value for cardiovascular outcomes.

Two relationships with lipids were very clear in the studies he reviewed: an increase in HDL cholesterol as fat is increased, and a reduction in triglyceride as fat is increased. These findings were highly consistent in many short-term observational and clinical trials.

The most predictive measure for cardiovascular outcomes is the ratio of total to HDL cholesterol. The studies that Dr. Krauss reviewed showed a significant reduction in this ratio as fat level increased in the diet. This raises interesting issues for dietary recommendations regarding fat.

A meta-analysis conducted last year of more than 100 studies found a strong positive effect of saturated fat on both HDL and LDL cholesterol, such that the total to HDL cholesterol ratio is minimally affected by saturated fat. Both mono- and poly-unsaturated fats were associated with reductions in LDL. Monounsaturated fat appears to be driving the inverse relationship between fat and lipid levels, since it is the primary unsaturated fat in the diet.

Dr. Krauss examined disease outcome data from observational studies of omega-3 fatty acids and lipid levels. These studies found a strong inverse relation between intake of omega-3 fatty acid in the form of ALA and triglyceride levels. Another metabolic feature of these fatty acids is their effect on insulin sensitivity. Dr. Krauss reviewed a study that compared a diet high in saturated fats, a high carbohydrate diet, and a Mediterranean Diet. The study found improved insulin sensitivity on the Mediterranean Diet that was comparable to that achieved with a higher carbohydrate diet.

Summarizing the effects of carbohydrate and fat on metabolic risk, Dr. Krauss noted that:

- Higher ratios lower HDL cholesterol and increase triglyceride and total to HDL

cholesterol

- Saturated fatty acids increase LDL and HDL cholesterol and reduce insulin sensitivity, with no significant change in the total to HDL cholesterol ratio, as compared to cis-monounsaturated fats and polyunsaturated fats; these effects are greater for myristic and palmitic acids than for stearic acids
- Cis- monounsaturated and n-6 polyunsaturated fatty acids reduce total/HDL cholesterol ratio
- N-3 polyunsaturated fatty acids reduce triglycerides.

With regard to the question of whether the ratio of carbohydrate to fat modifies the metabolic response to individual fatty acids, Dr. Krauss stated that higher-fat, lower-carbohydrate diets should be considered in the context of moderate to higher protein levels, including more extreme diets that are relatively low in carbohydrate and high in fat and protein.

To assist the Committee in understanding the impact of these more extreme ratios on responsiveness to dietary fatty acids, Dr. Krauss presented data from an unpublished study that he presented last year to the American Heart Association. This three-year study looked at the effects of saturated versus unsaturated fat on weight loss. All subjects followed a baseline diet for one week after which they were randomly assigned to four groups:

- Basal (Control Diet): 54% carbohydrate, 30% fat (7% saturated, 13% monounsaturated), 16% protein
- Moderate Carbohydrate Diet: 39% carbohydrate, 31% fat (6% saturated, 13% monounsaturated), 29% protein
- Lower Carbohydrate/Higher Saturated Fat: 26% carbohydrate, 45% fat (15% saturated, 20% monounsaturated), 29% protein
- Lower Carbohydrate/Lower Saturated Fat: 26% carbohydrate, 46% fat (9% saturated, 27% monounsaturated), 29% protein

This study presented an opportunity to examine the interaction of fatty acid composition at the same level of carbohydrate and total fat. To allow researchers to examine the effect of weight loss on metabolic responses, the study was conducted in three phases: a one-week pre-weight loss phase, with all subjects on the control diet; a five-week weight loss phase, and a four-week post-weight loss phase to stabilize weight.

At the end of the study, the lower carbohydrate/lower saturated fat diet showed the most significant levels of LDL reduction both pre- and post-weight loss. There was no significant change in LDL cholesterol on the moderate carbohydrate diet or the lower carbohydrate/higher saturated fat diet. Although the basal diet was associated with only moderate reduction in LDL cholesterol in the pre-weight loss phase, individuals on this diet actually achieved significant reduction of LDL cholesterol in the post-weight loss phase. The weight loss had virtually no effect on the LDL levels for individuals on the other diets.

Dr. Krauss noted that the published studies he reviewed would have predicted an insignificant reduction of LDL on the lower saturated fat diet, yet this study found a substantial reduction. There appears to be some interaction between carbohydrate intake and the magnitude of saturated and unsaturated fatty acids on LDL cholesterol.

Dr. Krauss offered a potential explanation for these findings. Studies conducted in his and others labs indicate that carbohydrate intake and weight both affect metabolic pathways that give rise to different forms of LDL. Under conditions where triglyceride levels are low, such as in lean or active individuals or those with low carbohydrate intake, the particular pathway that comes from the liver results in a form of large or medium-sized LDL particles that are cleared effectively by the LDL receptor. When triglyceride levels are higher due to higher carbohydrate intake, increased adiposity, or sedentary lifestyle, the pathway shifts to allow the liver to deliver more triglycerides. This gives rise to a distinct, small LDL particle that is cleared less avidly by LDL receptors.

This latter pathway is a critical element of the metabolic syndrome, type 2 diabetes and obesity. Low HDL, insulin resistance, and many other metabolic disturbances that increase the risk for heart disease accompany the small LDL response. The low-carbohydrate, high-fat diet was associated with a substantial reduction in small LDL when compared with the control diet, independent of the saturated fat content of the diet. This is a major benefit of weight loss and needs to be considered in the overall equation.

Dr. Krauss noted that the triglyceride change associated with low-carbohydrate, high-fat intakes appears to be a more significant determinant of the small LDL response than saturated or unsaturated fat content. However, saturated fat increases the concentrations of the larger LDL particles, which are more cholesterol enriched.

Dr. Krauss stated that the best way to integrate this biochemistry is to look at the ratio of total to HDL cholesterol. Both of the low-carbohydrate, higher-protein, higher-fat diets in this study led to a reduction in this ratio that was significantly different from the control diet and more than would be predicted from previous studies. However, the incremental benefits of weight loss on the atherogenic indices are much less pronounced at low carbohydrate to fat ratios. Dr. Krauss noted that there are no significant differences when combining the effects of diet and weight loss. This suggests that the carbohydrate to fat ratio and adiposity contribute to the same net pathways.

Dr. Krauss noted that the experimental diets in this study used a higher protein intake to allow lower carbohydrate levels. The possible effects of increased protein intake are relatively under studied.

Dr. Krauss concluded his presentation by addressing the relationship of carbohydrate and fat intake to weight maintenance and weight loss. He reviewed studies of at least one year in duration that related change in percent fat intake to loss of body weight, with fat intake ranging from about 12 percent to about 32 percent. As Dr. Hu mentioned earlier, these studies suggest that lower-fat diets do not seem to offer particular advantages for weight loss, although they may be acceptable for weight maintenance. Ultimately, it is total energy and total calories that matter. It is clear from all the data that the macronutrient distribution is not a factor influencing weight loss when calories are controlled.

Two studies conducted in the past year sought to provide patients with dietary recommendations based on literature from the Atkins program versus conventional dietary recommendations. These studies involved diets that were very low in carbohydrate and higher in fat and protein (following the recommendations of the Atkins program) compared with lower fat diets (following the conventional dietary recommendations). Data from these

studies showed that a low-carbohydrate diet performed better than the low-fat diet over a six-month period. However, a third study—the only one carried out for a period longer than six months—found that these two diets converged over time, presumably due to lack of compliance. The lipid and lipoprotein changes in the last study are similar to those found in the study conducted by Dr. Krauss. With lower carbohydrate intake, the influence of fat content composition on insulin sensitivity appears to be blunted.

In conclusion, Dr. Krauss stated that reduction in total fat leads to modest reductions in weight. Reduction in dietary carbohydrate to less than 30 percent of calories leads to large early reductions in body weight. In both cases, reductions in body weight are clearly related to changes in energy intake. However, these changes may not be sustainable for most individuals. Trials of low-carbohydrate diets for long-term prevention of weight gain are lacking.

Dr. Joanne Slavin, University of Minnesota, discussed dietary approaches to weight control, with an emphasis on the role of carbohydrates and fiber. She noted that the primary mechanism of weight control is to eat fewer calories and exercise more.

Eating less carbohydrate can lead to significant change, because carbohydrates are the major source of calories. Eating less fat has a positive impact on calorie density, but palatability can be an issue. Eating more protein will also lead to lower calorie intake. But, Dr. Slavin stressed that there is little data that any of these strategies are very effective in the long run.

The eating and exercise targets from the IOM Report propose 45 to 65 percent of calories from carbohydrates, 20 to 35 percent of calories from fat, and 10 to 35 percent of calories from protein, combined with a total of at least one hour each day in moderately intense physical activity, which is double the daily goal set by the 1996 Surgeon General's report. Dr. Slavin stressed that nutritional advice is wasted without physical activity. She expressed concern that consumers do not understand the concept of energy balance.

Dr. Slavin reported that case-control studies of dietary composition find a pattern of Low- carbohydrate intake in obese subjects. These studies also found a positive association between the percentage of dietary fat and Body Mass Index (BMI). Dr. Slavin noted that the form of carbohydrate is important, but there is a shortage of good data in this area.

Studies have found that low-fat diets are the optimal choice for the prevention of weight gain and obesity. Low-carbohydrate diets are more effective at 3 and 6 months for weight loss, but there is no difference between the two types of diets at 12 months. Overweight subjects who consume low-fat, high-carbohydrate diets tend to eat fewer calories, lose weight, and lose body fat.

Dr. Slavin noted that the National Weight Control Registry is a useful source of information on weight management because it tracks people who have lost at least 30 pounds and maintained that loss for at least one year. On average, the individuals in the Registry get 24 percent of their calories from fat, 56 percent from carbohydrate, and 19 percent from protein. Many people stated that eating breakfast was an important factor in their weight loss. Most reported that they regularly monitor their food intake and body weight. All reported high levels of physical activity. This information underscores the fact that weight control is a lifelong process that does not end when the desired weight is achieved.

Dr. Slavin noted that nutritionists typically look at things that can be measured, whether it is calories, macronutrients, or micronutrients. She suggests that broader things—such as dietary patterns, intake of whole foods, timing and frequency of meals—are actually more important than we have given them credit for.

Another problem in nutrition is that elements of the diet are interdependent. Only in a controlled feeding study is it possible to hold fat intake constant and vary fiber intake. In the real world, changing one aspect of the diet can result in many other associated changes in nutrition. Reducing the amount of fat in the diet will affect the intake of fat-soluble vitamins, while eliminating high-carbohydrate foods can affect intake of other nutrients.

In determining the appropriate balance of macronutrients for an individual, Dr. Slavin sets the base with proteins. The DRI recommends a range of 10 to 35 percent of calories from protein, 20 to 35 percent of calories from fat, and 45 to 65 percent of calories from carbohydrates. There needs to be enough fat to get essential fatty acids, fat-soluble vitamins, minerals, and other fat-soluble phytochemicals that are just starting to be studied.

Carbohydrates are also an important source of vitamins, minerals, and phytochemicals. The carbohydrate allowance also needs to include adequate dietary fiber, which is 25 to 38 grams per day, depending on age. The individual's calorie budget and activity level are important factors in determining the overall macronutrient balance.

Dr. Slavin emphasized that the various types of carbohydrates are not equal. They differ in terms of their chemical structure (mono-, di-, and polysaccharides). They differ in terms of digestibility—starches and sugars get digested, but fiber does not. They differ in terms of speed of digestion and absorption. She noted that this variable, often quantified as glycemic index, is important for diabetics. Carbohydrates differ in terms of fermentability—some fibers are more likely than others to ferment in the large intestine, and some ferment more quickly. Finally, the physical structure of carbohydrates—including particle size—is important, though it is hard to measure.

Dr. Slavin stated that there is general agreement that whole grains contain many valuable components. However, many of these important nutrients are lost in the milling that is required to produce the refined grain products that many consumers prefer because of their taste, texture, and longer shelf life.

Dr. Slavin illustrated the evolution of dietary advice regarding whole grains over the past two decades. Prior to 1980, whole grains were promoted as a source of fiber. In 1989, the National Academy of Sciences report, *Diet and Health*, linked whole grains with reduced risk for heart disease and some cancers. In 1999, the FDA permitted whole grain health claims on food packaging. The fifth edition of the *Dietary Guidelines*, issued in 2000, emphasized whole grains. Increased whole grain consumption is one of the objectives of *Healthy People 2010*.

The 2000 *Dietary Guidelines* recommended “several servings” of whole grains but did not set a quantitative goal. The *Healthy People 2010* objectives aim for three servings per day, a goal that is also promoted by the USDA and the American Dietetic Association. However, a 1995 study found that fewer than 10 percent of Americans were only eating one serving a day

of whole grains. A study published last year found that the average whole grain intake was 0.8 servings a day for pre-school children and one serving for adolescents.

Dr. Slavin stressed that before the Committee considers increasing the goal, it is important to consider why people are not meeting the current recommendations. USDA data show that whole grains represent only 15 percent of U.S. grain consumption and 85 percent of grains consumed is non-whole grain. If only whole grains are recommended, consumers who are currently consuming 85 percent non-whole grains will need to find acceptable ways to replace 85 percent of the grains in their diet. USDA data also show that consumers get whole grains from many different products, including breads, breakfast cereal, and grain snacks. The food industry will need to come up with more choices within those categories for consumers to meet whole grain recommendations.

Dr. Slavin summarized a review of whole grains and human health that is currently in press. This review provides strong evidence that whole grains are protective against cardiovascular disease, cancer, diabetes, obesity, and all-cause mortality. Epidemiological studies suggest that an intake of three servings of whole grains per day is associated with significant risk reduction of type 2 diabetes. Another recent study found that whole grain consumption was significantly associated with insulin sensitivity. A clinical study in which overweight subjects were fed whole and refined grain diets for six weeks found that fasting insulin was 10 percent lower and insulin sensitivity improved with the whole grain diet. Subjects on the whole grain diet also tended to lose weight.

Dr. Slavin reviewed epidemiological studies relating to whole grains and obesity. In the Framingham offspring study, whole grain intake was inversely associated with BMI. In the Nurses' Health Study published in 2003, women who consumed more whole grains consistently weighed less than women who consumed less whole grains and also had a significantly lower risk of major weight gain. Another study found that whole grain foods improve markers of bowel health in overweight men.

Although Dr. Slavin does work in the field of dietary fiber, her laboratory also works with lignans and phytoestrogens that are associated with dietary fiber in plant foods. High levels of serum enterolactone, a mammalian lignan, have been associated with decreased cardiovascular disease. People who eat more whole grains have higher levels of serum enterolactone. Other valuable components in whole grains that are known to have protective effects against chronic diseases include sterols, resistant starch, antioxidants, and phytate.

Dr. Slavin stressed that it is important to help consumers understand what whole grains are and where they can be found. The best way to find whole grain products is to read the ingredients label. A whole grains seal or a whole grain health claim on the package can be helpful, but different companies use them in different ways. Many products that appear to be whole grain foods—such as multi-grain bread—are not. Processed foods, such as cereal and crackers, can be whole grains.

She stated that whole grains typically are our best source of dietary fiber. The IOM recommends 25 grams per day for women and 38 grams per day for men under 50, and 21 grams per day for women and 30 grams per day for men over 50. These recommendations are based on protection from cardiovascular disease. There is insufficient evidence to set an

upper intake level for fiber. Current fiber intake is only 12 to 15 grams per day, so most people get less than half of what they need.

Dr. Slavin pointed out that fiber is not a nutrient in the usual sense. Dietary fiber consists of non-digestible carbohydrates and lignan that are intrinsic and intact in plants. Functional fiber consists of isolated, non-digestible carbohydrates that have beneficial physiological effects in humans. Total fiber is the combination of dietary and functional fiber.

Dr. Slavin emphasized that fiber that is intact and naturally occurring in food is preferable to isolated fiber, which is the form found in supplements. The original hypothesis regarding the benefits of dietary fiber was based on populations consuming unrefined diets that were high in dietary fiber and slowly digested carbohydrates. Fiber-rich foods contain many biologically active compounds that are integrated into the plant cellular structure. These compounds are handled differently in the body than isolated fiber.

Dr. Slavin was pleased that Dr. Hu had mentioned the benefits of cereal fiber. She referenced a recent study that looked at cereal, fruit, and vegetable fiber intake and the risk of cardiovascular disease in elderly individuals. This study found that, even late in life, cereal fiber consumption is associated with lower risk of cardiovascular disease.

With regard to fiber and weight loss, Dr. Slavin noted that fiber has many effects on the digestive tract. It takes longer to digest, it slows down absorption, it slows down stomach emptying, and there is more loss of fecal fat. Studies that compared the effects of high-fiber versus low-fiber diets found about a 10 percent decrease in voluntary energy intake. People tend to eat less on high-fiber diets. These effects were more pronounced in obese subjects. There is some data that fiber supplements taken post-weight loss aid in weight maintenance.

A recent study published in The Journal of Nutrition compared the effects of fermentable and non-fermentable fiber supplements (27 grams per day). The researchers saw no effect on food intake or body weight. This pilot study does not support the use of fiber supplements for weight loss. However, Dr. Slavin noted that this was only a three-week study.

Dr. Slavin shifted the focus to the issue of fiber and satiety. She presented a recent study that measured glycemic response and satiety response in subjects who ate several types of breads. While there was very little difference in the glycemic index for the various types of breads, there were fairly significant differences in satiety that were not totally related to fiber. Of the breads that were tested, the low-fat, high moisture bread had the biggest change in the feeling of fullness. This suggests that although fiber is one element of satiety, the volume of the food affects how full people feel. Another study on satiety found that a more viscous beverage produced greater and more prolonged reductions of hunger. These studies underscore that how foods look and taste is as important as their nutritional value.

Dr. Slavin noted that there are fairly consistent findings that higher fiber intakes tend to be linked with lower body mass indexes. The Seven Country Study found that physical activity and dietary fiber, but not dietary fat, were related to skin-fold thickness. Another study, the Coronary Artery Disease Risk Development in Young Adults (CARDIA) study, found that fiber intake predicted weight gain in young adults. Dr. Slavin expressed concern that low-carbohydrate diets are also low-fiber diets. Data published in 2000 found that the Atkins diet

provided only 4 grams of fiber per day, the Zone diet provided 18 grams per day, while the plant-based Pritikin and Ornish diets provided 40 and 49 grams, respectively.

Dr. Slavin turned to a discussion of eating patterns. A recent study found that children who eat breakfast cereal had a low BMI. Another study found that intake of whole grain breakfast cereals was inversely associated with total mortality. Data from the National Weight Control Registry also suggested that eating breakfast is important. Dr. Slavin stressed that it will be important to emphasize to consumers that when you eat is as important as what you eat.

Dr. Slavin noted that most Americans are meeting less than 70 percent of the DRI for fiber. On average, men need an additional 20 grams per day, and women need an additional 12 grams per day. Those on a low-carbohydrate diet have an even greater deficit. Dr. Slavin stressed that the Committee needs to consider how it will help consumers get the fiber they need. Assuming an average of 3 grams of fiber per serving, men would need 12 servings of a fiber-containing food per day, and women would need 8 servings. Another option would be to increase the fiber content of popular foods such as high-fiber cereals, or increase consumption of legumes, dried fruits, fortified foods, or supplements.

Dr. Slavin concluded her presentation with several recommendations for the Committee. First and foremost, she emphasized that people eat food, not nutrients. The guidelines need to include foods that people like and also provide essential nutrients. Taste, convenience, and familiarity are important.

Second, she noted that whole grains are an important vehicle for dietary fiber and other nutrients. The change would be significant if we can get Americans to increase their consumption of this valuable food group.

Finally, she recommended that strategies are needed to get nutrients, including fiber, into the low-calorie diets that are required for typically inactive Americans, and energy levels must be appropriate for sedentary individuals. The base of the Food Guide Pyramid should stress the importance of fruits, vegetables, grains, and legumes.

Discussion

Dr. King thanked the panelists for their presentations and opened the floor for discussion.

Dr. Nicklas directed her question to Dr. Krauss and Dr. Hu. She referenced the literature showing that less than five percent of dietary ALA is available for conversion to EPA and DHA, which is controversial. She noted that Dr. Krauss very nicely showed that ALA decreases triglycerides. She asked if there was any evidence with regard to outcomes for cardiovascular disease between the different types of omega-3.

Dr. Krauss replied that it is well established that the longer chain omega-3s are potent triglyceride lowering agents. On a gram-for-gram basis, he was not sure how different they are from ALA. The dose that is typically used to show triglyceride lowering is far higher than we could expect to achieve in the diet. He deferred to Dr. Hu with regard to the disease outcomes.

Dr. Hu agreed with Dr. Krauss that there is no question that fish oils substantially lower triglycerides. There have been many studies examining the effects of ALA and canola or soybean oil on triglycerides, but the results are not consistent.

The data for fish oil omega-3 is more convincing. Three or four randomized clinical trials—including the Diet and Reinfarction Trial (DART) Study, the GISSI Prevention Trial, and DART-2—have looked at heart disease and fish oil. The GISSI Trial and DART have shown conclusively that increasing fish intake can lower coronary heart disease (CHD) mortality rate. Fish oil is probably beneficial in reducing sudden deaths and fatal CHD among people with established heart disease. There have been no trials to determine whether fish oil can reduce heart disease in the general population.

No randomized trials have been conducted for ALA and CHD in either the general population or the high-risk population. Dr. Hu mentioned the Lyon Diet Heart Study, which showed that a diet high in ALA and with a high amount of fruits and vegetables substantially reduced the risk of sudden deaths, total mortality, and even cancer mortality.

Dr. Kris-Etherton asked Dr. Hu if he would distinguish between the longer chain omega-3s and ALA in his recommendations that nutritional strategies should maximize the benefits of both n-6 and n-3 fatty acids.

Dr. Hu replied that ALA is an essential fatty acid, while fish oil, per se, is not. If you have adequate ALA, you don't need fish oil. The amount of ALA in the diet is at least 10 to 20 times higher than fish oil. Dr. Hu agreed that it is probably important to have separate recommendations for ALA and fish oil.

Dr. Pi-Sunyer asked Dr. Krauss whether, given the fact that monounsaturates drive the change in total HDL cholesterol, the Committee should recommend increasing monounsaturated fat. Dr. Krauss replied that he would not necessarily distinguish mono- and polyunsaturates with respect to their impact on risk for heart disease. In terms of the data, most of the effect is due to monounsaturates because they are a larger percentage of the variation in fat intake that has been studied.

Dr. Lupton asked whether there is sufficient evidence to make specific recommendations on glycemic versus non-glycemic carbohydrates. Dr. Slavin stated that the glycemic index is an interesting concept, but it is not useful as a general guideline. Dr. Krauss noted that the glycemic index poses three problems: it is difficult to quantify and define complex carbohydrates; glucose is not the only issue with carbohydrates; and it is not clear whether there is any benefit regarding satiety and other issues with weight loss. Dr. Hu noted that the glycemic index has been misused to classify specific foods as “good” or “bad” and should not be used as the sole criteria for choosing foods. However, it could be a useful research tool and could serve as the basis of recommendations that address eating patterns, such as guidelines to reduce the overall glycemic index of the diet. This may be more useful for diabetics than for general audiences.

Dr. Pi-Sunyer noted that it is important to consider the overall glycemic index of a mixed meal. For example, whole grains lower the glycemic index of bananas.

Returning to the issue of dietary pattern and cancer risk, Dr. Go asked the panel whether it is the type of fat or total fat intake that is important. Dr. Hu responded that there is no relation between total fat intake and cancer risk. The evidence is fairly strong that higher levels of animal fat result in greater risk for colon cancer, but it is not clear whether that is due to the fat or other compounds in meat. There is no such correlation with breast cancer. The link between fiber and cancer risk is still undetermined. Dr. Slavin noted that colon studies are fairly clear that higher fiber intake is protective for colon and breast cancer, although these findings overlap with phytoestrogen data. It will be important to find dietary patterns that are protective.

Dr. King asked whether the DRIs for fiber are reasonable if no one can follow them. Dr. Slavin responded that the recommendations are not impossible on a plant-based diet, though she acknowledged that they are difficult to meet with the typical diet in this country. The DRIs may be too high for children, but they are a good goal for adults. The real cause for concern is diets that have no fiber.

Dr. Nicklas noted that most studies on fiber and satiety have focused on adults. She asked how the lack of fiber affects satiety and intake of other foods in children. Dr. Slavin responded that a child's initial diet—breast milk—contains no fiber. There is a gradual transition in the diet to foods that contain fiber. In Dr. Slavin's opinion, the DRI levels for fiber in children are too high.

Dr. Lupton asked whether types or amounts of carbohydrates should be the driving force behind recommendations and whether there should be a recommendation on dietary fiber. Dr. Slavin reiterated her concern that recommendations on dietary fiber lead to the use of supplements rather than real foods, with a corresponding loss of other nutrients in plant-based foods. Dr. Hu stated that for maximum benefits, whole grains should be the driving force behind carbohydrate recommendations. It is important to stress that refined carbohydrates should be reduced to balance the increased intake of whole grains. He noted that it is difficult for the general public to count grams of fiber. Dr. Slavin stated that she had been surprised to find that there was no link in the scientific data between carbohydrate intake and obesity. Dr. Hu noted that it is very difficult to study the relation between carbohydrates and body weight because the metabolic process is complex.

Dr. Kris-Etherton asked if the speakers could recommend a fat to carbohydrate ratio for weight loss and maintenance. Dr. Krauss did not think that any macronutrient ratio is better for weight loss, though a low-fat diet appears to be better for maintenance. He noted that the distribution between fats and carbohydrates and the types of carbohydrates in the diet become minimal as physical activity increases. It would be important to promote a variety of ways to achieve weight loss. While the level of carbohydrate consumption in this country may be excessive, reduced carbohydrate intake needs to be balanced with the need for fiber.

Dr. Slavin stated that there is no real solution without exercise. High carbohydrate diets are useful for higher activity levels. There need to be better choices within that category.

Dr. Hu agreed that there is no definitive answer or optimal diet because activity levels and metabolic profiles vary. It is important to balance science with what people will do. The Atkins and Ornish diets represent two extremes; few people can stick with them. Although weight loss studies are inconclusive, they seem to suggest holding fat constant and increasing

protein versus carbohydrate, for levels of about 25 percent protein, 35 percent fat, and 40 to 45 percent carbohydrate. Studies are needed in this area.

Dr. Pate noted that the current *Dietary Guidelines* say to aim for total fat intake of no more than 30 percent of calories as fat. He asked if the panelists would recommend changing that. Dr. Hu said yes; Dr. Slavin said no, except for extremely active individuals.

Dr. Clydesdale asked if it would help to change food labeling to reflect fiber content. Dr. Slavin said this would be helpful, because consumers do want to do better.

Dr. Appel asked whether the Committee should make a distinction between types of carbohydrates, given the confusion regarding this issue. Dr. Hu stated that there is strong evidence for the benefits of substituting whole grains for refined grains. Dr. Krauss said the distinction should be made, but it could be hard to translate this into recommendations that are actionable. He suggested focusing on sugars and fiber. Dr. Slavin stated that the Committee should make no such distinction because there is little evidence that carbohydrates are bad. The current information of total carbohydrates on the Nutrition Facts Label, with the sub-listing of dietary fiber and sugars should be retained. She recommended including a fiber guideline due to its protective factors against chronic disease.

(Lunch: 12:40-1:45)

Dr. Janet C. King welcomed Committee members back to the meeting and introduced Dr. Mary Ann Johnson, who was invited to speak on nutritional needs of the elderly. Dr. Johnson is a Professor of Foods and Nutrition at the University of Georgia. Her interests and areas of expertise include nutrient bioavailability and interactions involving vitamins and minerals. Dr. Johnson's research targets human populations, particularly older individuals. She has studied older individuals in personal care homes, those who are receiving home delivered meals or meals at congregate feeding centers, community-dwelling elderly, as well as the elderly in general. Dr. Johnson works with state and local agencies through the Georgia Division of Aging Services.

Presentation and Discussion: Nutritional Needs of the Elderly
M. Johnson

Dr. Mary Ann Johnson, University of Georgia, began her presentation by providing some context for the issues she was asked to address. Currently, 35 million people in the U.S. are over age 65 (more than 12 percent of the population). By 2020, there will be about 54 million older adults. By 2050, there will be 70 million older adults in the country—one out of every five people. Older adults vary tremendously in their functional level. While some are training for competitive athletic events, others at the same age are institutionalized with nutrition related disorders, such as diabetes or heart disease, or other disorders, such as dementia.

Dr. Johnson pointed out that while dietary recommendations are generally developed with community-dwelling, healthy individuals in mind, many federal and state regulations mandate that these and other diet-related guidelines be used for meal planning for congregate and home delivered meals and for meals at long-term care and assisted living facilities and geriatric hospitals.

Dr. Johnson stated that many older people have a tremendous stake in what the Committee deems as a healthy diet because they are at high risk for nutrition-related chronic diseases. She questioned the endpoints for determining nutritional adequacy, noting that poor vitamin or mineral status have not been ruled out as risk factors for age-related disorders that greatly impair the quality of life for many older people, including sarcopenia, impaired muscle strength, falls, dementia, delirium, depression, hearing and visual disorders, and impaired immune function.

Dr. Johnson presented a table summarizing how and why certain nutritional requirements change with age and how these changes are related to food intake:

- Energy: Energy needs decrease with age because older adults have less muscle tissue and hence less energy expenditure. As a result, they need to eat less to maintain weight.
- Iron: Iron needs in women over age 50 decrease by more than 50 percent due to cessation of menstruation. In theory, women over age 50 could eat less iron-dense foods.
- Vitamin B-6: Requirements for this nutrient increase with age. Several studies have shown a relationship between oral intake of vitamin B-6 and certain biochemical processes. There are many sources for this nutrient, including typical foods, fortified foods, and supplements.
- Vitamin B-12: This nutrient, along with calcium and vitamin D, is widely recognized as a nutrition and health problem in older people. The RDA specifies that above age 50, the majority of vitamin B-12 should be from a crystalline form. This is due to impaired absorption that seems to be linked to the helicobacter pylori (*H. Pylori*) microorganism. Vitamin B-12 can be obtained in some fortified foods and through supplements. Federal regulations do not require adding vitamin B-12 to fortified foods, and it is not naturally present in whole grains.
- Calcium: The need for calcium increases with age to promote bone health in both men and women. The change appears to be related to a decrease in absorption. Calcium is present in typical foods, especially in dairy products. The recommendations are two to three servings of dairy foods for adults and older people, but the typical intake of milk is only about one serving. The current *Dietary Guidelines* emphasize that people who consume few dairy foods should take a calcium supplement. Dr. Johnson encouraged the Committee to retain that language.
- Vitamin D: There is a three-fold increase in the need for this nutrient among older adults. The current recommendation is five micrograms a day for adults under age 50, 10 micrograms from age 50 to 70, and 15 micrograms for those over age 70. This increasing need appears to be linked with decreasing ability of the skin to synthesize vitamin D from the sun. The most common source of vitamin D is fortified milk, because few typical foods contain this nutrient. However, it would take six cups of milk per day to meet the vitamin D

recommendation for those over age 70. Also, most other dairy foods are not made with vitamin D-fortified milk. Dr. Johnson encouraged the committee to keep the current recommendation, but to add that older adults may need a supplement of vitamin D.

- Vitamin E: There is some evidence that high intake might prevent some age-related disorders, though the issue is controversial and the evidence inconsistent. There is currently no change in the RDA for older adults. Vitamin E is low in typical foods and it is difficult to design a diet that meets the current RDA. Vitamin E is present in many supplements. There are many chemical forms of vitamin E in foods; the chemical forms in supplements would be much more limited.

Dr. Johnson noted that she was less enthusiastic about plant-based diets than previous speakers because even the most well designed plant-based diets are deficient in some nutrients, particularly vitamins D and B-12 which are not naturally present in plant-based diets.

Dr. Johnson stated that, in her opinion, indexing beyond age and gender would be extremely impractical for the general public. It would be especially difficult for those using the *Dietary Guidelines* for meal planning in long-term care facilities, assisted living, home delivered, and congregate meals. Fiber would be one exception, as discussed earlier in the day, but micronutrient requirements need to be independent of energy.

Dr. Johnson stated that nutrition problems in older people are not related to energy density problems. They have more to do with problems in food choices, nutrition knowledge, availability of healthy food, and access to food. Food security is also an issue for older adults, many of whom have to choose between buying food and buying medicine or paying rent or utilities. A recent study suggests that the issue of food security is different among older people because they are more knowledgeable about what foods are healthy.

Dr. Johnson stated that while the nutritional problems of the elderly could be overcome in part by consuming more nutrient-dense diets, the requirements for some nutrients are so high that they are beyond what typical, or even fortified foods, can provide. It would be difficult to redesign the food supply to meet nutrient requirements across the lifecycle when younger adults need five micrograms of vitamin D a day and older people may need 15 or more.

Dr. Johnson then presented new evidence that illustrate potential health benefits of vitamin B-12, vitamin D, and vitamin E. She stressed that it is important to include a message about vitamin B-12 and vitamin D in the *Dietary Guidelines* and that the Committee should consider the potential benefits of vitamin E.

Vitamin B-12 status has been linked to depression in some studies, though not all. Depression is a widespread disorder in older people, and it has also been linked to other nutrients. Poor B-12 status has been linked in some studies to poor cognition, dementia, and neurophysiological disorders, which are also common problems in older people. In Dr. Johnson's opinion, the 1998 RDA for B-12 may be too low. Since the DRIs were published for the B vitamins, at least four studies have suggested that older people may need nearly three times the recommended amount of the crystalline B-12. Given the importance of B-12, Dr. Johnson stressed that it is vital to ensure that people get at least what is currently officially

recommended. Crystalline intake should be tracked at the national level and included in the USDA databases.

Vitamin D is another important nutrient for older people. In addition to the role of vitamin D in bone health, there is an emerging literature showing that poor vitamin D status is linked to falls. Other studies are examining the role of vitamin D in muscle function, the link between vitamin D deficiency and chronic pain, and the link between low vitamin D status and multiple sclerosis. Several researchers are concerned that the 1997 adequate intake for vitamin D may be too low because the level that is associated with optimal health is not well defined. While this issue is being clarified, it is important to ensure that older people are getting the vitamin D that they need. Dr. Johnson encouraged the Committee to keep the recommendation that older people may need a vitamin D supplement. It will be difficult to fortify the food supply to ensure adequacy across all age groups.

Vitamin E is controversial but quite interesting. Poor vitamin E status has been linked in some studies to cardiovascular disease and dementia and other cognitive disorders. Some studies have shown that vitamin E supplements may offer some benefit for various cardiovascular disease outcomes, dementia and cognitive disorders, and immune function. Dr. Johnson urged the Committee to consider how the potential benefits of high doses of vitamin E might be included in nutritional recommendations for older people.

In conclusion, Dr. Johnson noted that older people can make beneficial changes in their nutrition and physical activity patterns. Well-designed, community-based educational programs can help them make these changes. She emphasized that older people need practical, reliable, and scientifically valid advice about healthy eating to ensure nutritional adequacy, decrease their risk of chronic disease, and improve their quality of life.

Discussion

Dr. King thanked Dr. Johnson for her comprehensive overview of the nutritional needs of the elderly. She asked if she was correct in understanding that Dr. Johnson suggested that the Committee recommend supplements of vitamin D, calcium (if they don't consume dairy products), and supplements of vitamin E. Dr. Johnson stated that she would encourage the Committee to retain the language in the 2000 *Dietary Guidelines* for vitamin D and calcium. The question of vitamin E supplementation requires further review.

Dr. Weaver stressed that vitamin D requires more attention. She hoped the NIH conference on vitamin D held last October would help raise awareness that the vitamin D requirements may be too low. In the meantime, UV-B lights may be the most practical approach. Dr. Johnson noted that UV-B light exposure can raise the risk of skin cancer and that UV-B light exposure is not that well quantified for older people.

Dr. Weaver asked if Dr. Johnson was recommending crystalline form of vitamin B-12 and how she would handle the recommendations. Dr. Johnson responded that the RDA for B-12 says that the majority should come from crystalline, whether through supplements or fortified foods. The problem is that few fortified foods contain B-12 besides fortified breakfast cereals. Dr. Johnson noted that vitamin B-12 is very common in multi-vitamins.

Referring to Dr. Johnson's statement suggesting that the dietary recommendations for older people should not be indexed for energy, Dr. Pate asked if she would argue against making adjustments for physical activity level. He also asked if her reasoning was based on potential complications for institutions that are required to follow the *Dietary Guidelines*, or if it was based on other factors. Dr. Johnson clarified that she was speaking mainly of the micronutrients, not fat and fiber. There is no good reason to index most micronutrients to energy. However, Dr. Johnson agreed that physical activity is as important for older people as for people of any other age.

Dr. Clydesdale asked what treatments exist for vitamin B-12 deficiency. Dr. Johnson stated that B-12 deficiency in older people results from a variety of factors, one of which is the loss of the intrinsic factor, which is a protein that binds to B-12 to deliver it effectively to the intestinal tract. This results in a much more profound inability to absorb B-12 over time. Oral intakes of at least 500 micrograms per day appear to overcome the loss of intrinsic factor as well as restore B-12 stores resulting from other causes of B-12 deficiency (e.g., atrophic gastritis). The more common cause of B-12 deficiency is atrophic gastritis, which involves a decrease in the production of acid and pepsinogen in the stomach and subsequent decrease in cleavage of B-12 from animal foods. It is currently believed that atrophic gastritis does not markedly diminish the ability to absorb crystalline B-12 found in some dietary supplements and fortified foods, which is why crystalline B-12 is recommended for adults over age 50 as a preventive measure.

Dr. Nicklas asked if some macronutrients were more difficult to digest than others with increased aging. Dr. Johnson replied that most research suggests that general processes of absorption are not that different with older people. Changes with absorption are usually thought to be disease related.

Dr. King asked if Dr. Johnson would recommend any changes in the food patterns for elderly individuals in comparison to younger adults, since her comment about plant-based diets seemed to imply that older adults might need higher levels of animal protein. Dr. Johnson noted that the key issue is to identify strategies to get older people to follow the existing recommendations, rather than developing new food patterns. She clarified that she did not mean to imply that one type of protein was better for older people. Her point was that a plant-based diet does not provide vitamin D and vitamin B-12. Supplements are the best way for older people to get some nutrients unless we radically change our food fortification practices.

Dr. Kris-Etherton asked whether Dr. Johnson would recommend that supplements be at a level to achieve a DRI recommendation, or if there would be any reason to go higher, such as with vitamin E. Dr. Johnson said that it is premature to make specific recommendations for vitamin E at this time.

Dr. Weaver noted that Dr. Johnson had not recommended any specific differences in fiber intake for the elderly and asked her to comment on whether age would make any difference in our understanding of the relationship between alcohol intake and chronic disease. Dr. Johnson stated that the current fiber recommendations are based on studies that include many older people. She would recommend the current DRIs.

Dr. Johnson referred the question of alcohol and age to the Committee because she was not familiar with the literature. However, she noted that since older people consume fewer

calories, they need to be mindful of the fact that alcohol does not provide micronutrients. In addition, alcohol-induced impairments such as falling and visual and cognitive problems could be exaggerated in older people.

Dr. King referred to Dr. Johnson's statement that the capacity to absorb calcium diminishes with aging and noted that some literature suggests the same is true for iron and possibly zinc. She asked whether the capacity of older adults to absorb these minerals would be impaired if the fiber recommendation for the elderly was the same as for younger adults. Dr. Johnson stated that the impact of fiber on mineral absorption is not significant. Dr. King noted that the phytate that is found in the fiber is usually the problem. Dr. Johnson agreed that could be an issue if consumption of unleavened whole grains increased, but, in general, fiber is not a cause for concern.

Dr. King thanked Dr. Johnson for her presentation.

(Break: 2:30-2:45)

Public Oral Testimony

Dr. King introduced the public oral testimony section of the meeting. She noted that over thirty individuals and groups would be sharing their research perspectives and expertise with the Committee. She reiterated Dr. Beato's statement regarding the important role of public comments in developing the *Dietary Guidelines* and emphasized that the Committee would welcome written comments throughout the process. After summarizing the procedures for submitting written comments that were outlined in the *Federal Register* notice, she laid out the ground rules for the public oral testimony. She noted that presenters would have three minutes to present their testimony and should stop speaking when the red light came on at the podium. She then introduced the first presenter.

Mr. Richard Hanneman, Salt Institute, stated that his organization is the trade association of salt companies and is funded from membership dues. He acknowledged that salt in the diet is related to blood pressure and that federal policy since 1980 has encouraged a reduction in dietary sodium intakes. He called the Committee's attention to three important developments in the past decade: the emerging consensus that evidenced-based medicine should direct policy; the emerging consensus that evidence-based medicine should focus on health outcomes; and the Data Quality Act, which requires that data, used as the basis for recommendations, should be replicable, and should meet certain quality standards.

Mr. Hanneman noted that the recommendations of the HHS Preventive Services Task Force, the Cochrane Collaboration cited by Dr. Hu, and the Canadian guidelines have all concluded that there is insufficient evidence to support the reduction of dietary sodium. He stated that the Committee should focus its efforts on improving overall diet quality. The Salt Institute endorses the Dietary Approaches to Stop Hypertension (DASH) Diet, which is also endorsed by the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-7). The DASH-Sodium study shows that sodium reduction is ineffective for normotensives and not very important for hypertensives. The Salt Institute also is concerned about the declining amount of iodine in the American diet—a nutrient that is provided through iodized salt.

The Salt Institute recommends that the Committee make evidence-based recommendations ensuring compliance with the Data Quality Act and eliminate the dietary guideline on salt.

Mr. Robert Earl, National Food Processors Association, stated that the guidelines must be easily understood, easily implemented, and must trigger behavioral change if they are to contribute to public health. The goals of the *Dietary Guidelines* should be to motivate and stimulate action on diet and lifestyle by consumers.

Mr. Earl urged the Committee to place substantial emphasis on “calories count” messages in addressing the balance between food intake and physical activity. The National Food Processors Association believes that it is critical to increase guidance on physical activity, combined with positive, “how to eat” messages, as opposed to negative, “what to eat” messages.

Mr. Earl stressed that there must be a commitment to assessing consumer understanding of the *Dietary Guidelines* and the effectiveness of the *Dietary Guidelines* in promoting behavior change. Consumer education should then follow.

Mr. Earl urged the committee approach any consideration of changing the focus of the guidelines from healthy Americans to America’s overweight and obese populations with consideration to scientific evidence and effective change.

Mr. Earl urged that the Committee clearly articulate the critical need for synergy among the *Dietary Guidelines*, the Food Guide Pyramid, and food labeling. Metrics such as energy requirements, physical activity, serving sizes, and nutrient standards should be consistent across the *Dietary Guidelines* and other communications tools. The DRI values are scientifically sound and should be used for the *Dietary Guidelines*, the Food Guide Pyramid, and for future food nutrition labeling changes.

Dr. Elizabeth Pivonka, Produce for Better Health Foundation (PBH), informed the Committee that PBH is the founding partner, along with the National Cancer Institute, of the National Five-A-Day for Better Health Program that encourages all Americans to eat at least five to nine servings of fruits and vegetables each day. PBH is a not-for-profit 501(c)(3) educational foundation, with financial support from grants and volunteer contributions from the fruit and vegetable industry, the public health community, and concerned citizens.

Dr. Pivonka stated that science supports the important role that fruits and vegetables play in reducing the risks of chronic diseases. She highlighted three recommendations during her testimony for strengthening the guidelines with regard to fruits and vegetables:

- The Committee should strengthen the fruit and vegetable guideline to state, “Eat at least five to ten servings of fruits and vegetables every day,” with greater emphasis on eating fruits and vegetables in a way that maintains their integrity as healthful foods. Dr. Pivonka noted that replacing low-nutrient, energy-dense foods with fruits and vegetables will help fight the obesity epidemic, and that fruits and vegetables are an excellent source of fiber.
- The Committee should include the concept of color as a way for consumers to put into practice the otherwise vague concept of variety and to expand their intake of

traditional nutrients, as well as phytochemicals. Dr. Pivonka mentioned the PBH's The Color Way campaign as a platform for increasing consumption.

- The guideline for fruits and vegetables should be strengthened to stress the importance of introducing fruits and vegetables in the early years, in light of recent evidence that 25 percent of infants and toddlers do not consume any fruits or vegetables.

Ms. Alison Kretser, Grocery Manufacturers of America (GMA), stated that GMA recognizes that it has a role to play in combating obesity and continues to seek opportunities to provide solutions. GMA and its members believe it is important for Americans to understand that to be healthy they must eat a nutritionally balanced diet, be physically active, and moderate their food intake to match their level of physical activity. GMA recommends that the Committee change the name of the *Dietary Guidelines* to the "Dietary and Physical Activity Guidelines."

Ms. Amy Myrdal, Dole Food Company, stated that Dole is a long-time supporter of the National Five-A-Day Partnership, which consists of government agencies, non-profit organizations, and industry working collaboratively to increase consumption of fruits and vegetables for better health. Ms. Myrdal stated that Dole is concerned about the gap between recommended and actual fruit and vegetable intake especially among children. She noted that research demonstrates that children who eat the most fruits are least likely to be overweight and that consumers generally understand the importance of fruits and vegetables in a healthful diet, though they fall far short of meeting the recommended number of servings. Ms. Myrdal stated that consumers need to be provided with the messages, tools, and support in order to meet these recommendations.

Ms. Myrdal presented four recommendations to the Committee:

- Provide a clear actionable guideline for fruits and vegetables, such as "Consider eating at least five to nine, or five to ten servings of colorful fruits and vegetables each day." Include specific examples and simple tips for preparing and serving fruits and vegetables.
- Acknowledge consumer preferences and tastes in the variety of product options available to consumers.
- Include specific information on the role of fruits and vegetables in weight management, providing essential nutrients without excessive calories.
- Encourage increased public/private collaboration to maximize resources to conduct the scientific and consumer research required to develop effective educational and promotional programs.

Dr. Joyce Nettleton, Alaska Seafood Marketing Institute, stated that the Institute believes the scientific evidence supporting a range of health benefits from the regular consumption of fish is sufficiently abundant and convincing to warrant a recommendation to the public to consume fish, particularly fatty fish, twice a week.

Dr. Nettleton cited three reasons for expanding dietary advice to include regular fish consumption in the *Dietary Guidelines*. First, the current *Dietary Guidelines* fall short of ensuring adequate and desirable intakes of long-chain omega-3 polyunsaturated fatty acids, or PUFAs, because they are barely mentioned in the *Dietary Guidelines*. Second, the proposed revision would make the *Dietary Guidelines* more effective for women of childbearing age and most adults. Seafood is the major dietary source of an essential fatty acid for fetal and infant development, and the omega-3 long-chain PUFAs found in fish are associated with significant reductions in the risk of cardiovascular disease and mortality. Third, regular consumption of fish would help offset the potentially excessive intake of omega-6 PUFAs, whose high levels compete with omega-3 PUFAs for the same metabolic pathways and have been shown to be pro-atherogenic in large amounts.

Dr. Nettleton stated that, in contrast to the recent DRI report, the Institute believes the evidence indicates that current intakes of omega-3 PUFAs are inadequate. The need for omega-3 long-chain PUFAs is best fulfilled by the consumption of long-chain PUFAs; that is, those with 20 carbons or more. These are the most biologically active forms of omega-3s in cardiovascular health and, in some cases, the only active forms.

The allotted time ran out before Dr. Nettleton completed her testimony.

Dr. Margo Wootan, Center for Science in the Public Interest, focused her remarks on six main points. First, the Center believes that it is critical to provide clear advice about energy balance throughout the *Dietary Guidelines*, including clear advice about why and how to choose sensible portions.

Second, the *Dietary Guidelines* should place greater emphasis on saturated fat and should expand and strengthen the *Dietary Guidelines'* advice about *trans* fat. That advice should be motivational as well as scientifically accurate. The fat guideline should encourage people to consume no more than 20 grams of saturated and *trans* fat, combined. The advice about limiting dietary cholesterol intake should be maintained.

Third, given rising sugar intakes, calorie intakes, and obesity rates, the word "moderate" should be replaced with clear advice to limit intake of refined sugars. A simpler guideline could read: "Consume fewer soft drinks and sweets."

Fourth, the separate guideline on fruits and vegetables should stress the quantity of fruits and vegetables to consume. The supporting text should encourage eating a variety of fruits and vegetables and provide advice about choosing healthy options.

Fifth, the current grain guideline should be changed to something similar to: "Choose whole grains whenever possible." Many grain products are leading sources of saturated fat, *trans* fat, and refined sugars. Americans need to consume different grains, not more grains.

Finally, the sodium guideline should state more clearly that manufacturers and restaurants, not consumers, are responsible for most added salts. That guideline also should include quantitative recommendation for sodium intakes consistent with the daily values on food labels.

Dr. Greg Miller, National Dairy Council, prefaced his remarks by stating that the Council is funded by dairy farmers. The Council believes that dietary guidance should be food-based. Dairy foods make calories count by delivering a variety of important nutrients that help reduce the risk of chronic diseases and aid in weight management. Evidence indicates that three to four servings of dairy foods might play a role in weight management efforts, when coupled with a balanced, reduced-calorie diet.

The DASH trials and other studies have clearly demonstrated that a balanced diet containing at least three servings of dairy foods a day is useful in controlling blood pressure. This benefit is twice as great in African-Americans.

Dairy foods are also important for bone health. Calcium intakes for bone health are most likely to be met in a diet that provides three to four servings of dairy foods a day. A review of USDA's technical reassessment of the Food Guide Pyramid showed that several key groups of people would not get sufficient calcium without increasing the number of dairy servings. The Committee should evaluate the potential negative impact of supporting fortified, high-calcium sources that have fewer nutrients than dairy products. The nutrient bioavailability of these products also is a concern.

In closing, Dr. Miller stated that dietary guidance should be food-based because that is how people consume their nutrients. Choosing foods wisely to provide balance, variety and moderation should remain the cornerstone of the dietary guidance for the general population.

Dr. Charles Baker, The Sugar Association, Inc., stated that the Sugar Association represents U.S. sugar cane and sugar beet growers and processors. It was established in 1943 to monitor nutrition science and educate consumers.

The Association supports sugar as a safe, useful, and important food ingredient, based on the totality of scientific evidence. Dr. Baker stated that the Association shares the health community's alarm about the rising rates of obesity, especially among children, and that it wished to address the growing momentum to connect negative health outcomes such as obesity and nutrient displacement with the consumption of added sugars.

During the debate of the 2000 dietary guideline on sugars, the Sugar Association, along with many in the food industry, called for an independent review of the complete body of scientific literature of sugars to be undertaken by the National Academy of Sciences. The NAS Report concluded that there is inadequate evidence of health risks to establish an upper intake level for either total sugars, or added sugars. The IOM review found that displacement was evident with some micronutrients, but only in some population groups, and then only after intake of added sugars exceeded 25 percent of daily calories. Dr. Baker noted that the U.S. average intake of added sugars is 16 percent.

The IOM panel concluded that there is no clear evidence or consistent association between increased intake of added sugars and BMI. Experts acknowledge obesity occurs from energy imbalance. The current emphasis on cutting carbohydrates and eliminating sugars only obscures the significance of the caloric balance message.

Dr. Baker stated that our grandmothers' advice to "eat a little bit of everything and then go outside and play" recognized the central importance of moderation, portion control, and daily

activity and healthy lifestyles.

In conclusion, Dr. Baker stated that the Association respectfully asks the Committee to maintain the scientific integrity of the *Dietary Guidelines for Americans* by de-emphasizing the inordinate focus on added sugars prevalent in the 2000 Edition.

Ms. Mary Young, National Cattlemen's Beef Association, prefaced her remarks by noting that the Association is funded by beef farmers and ranchers. She stated that the industry has responded to public health recommendations by providing leaner cuts of beef. Beef is now 20 percent leaner than it was 14 years ago. At least 19 cuts of beef meet government guidelines for lean. Twelve of these cuts have, on average, one more gram of saturated fat than a skinless chicken breast.

Ms. Young stated that the fatty acid profile of beef is commonly misunderstood. Half of the fatty acids in beef are monounsaturated. One-third of the saturated fat is stearic acid, which has been shown to have a neutral or cholesterol-lowering effect. A study in the *Archives of Internal Medicine* showed that lean beef is interchangeable with lean chicken and fish on blood cholesterol levels. Beef provides nutrients that are beneficial for health through all life stages. It is the number one food source of protein, zinc and vitamin B-12 in American diets, the number two source of vitamin B-6, and the number three source of iron and niacin.

Ms. Young cited a CSFII analysis showing that those who eat 3.6 ounces of beef each day are more likely to meet 100 percent of the daily value for protein, iron, zinc and B vitamins. They are also more likely to rate high on variety scores and to consume the recommended number servings of vegetables.

Ms. Young concluded by stating that lean beef, like fruits, vegetables, whole grains, and low-fat dairy, is a nutrient-dense food. She stressed that dietary guidance that promotes naturally nutrient-rich foods can be an insurance policy for future health.

Mr. Paul Weller, Apple Processors Association (APA), stated that APA and its member firms support the 2000 *Dietary Guidelines* and the Food Guide Pyramid, which highlight the importance of fresh fruits and vegetables, as well as 100 percent processed fruits and vegetables, in a balanced diet. He noted that APA provided supporting research for its testimony in written comments that were previously submitted to the Committee.

Mr. Weller stressed that it is important to distinguish 100 percent fruit products from fruit sugar or fruit fat-blended products.

Mr. Weller noted that recent articles have urged caution in feeding fruit juice to children, suggesting that high intakes of juice may contribute to childhood obesity. The preponderance of research has found no relationship between children's juice intake and short stature or overweight. He encouraged the Committee to base its recommendations on national food consumption data rather than small, non-representative clinical studies to determine the relationship between 100 percent fruit juice, and fruit product consumption in childhood obesity.

Finally, Mr. Weller noted that fresh fruits and vegetables are not always convenient or affordable. National recommendations should include processed fruit products and 100

percent juices, which are shelf-stable alternative sources of vitamin C, folate, potassium, and, in some cases, calcium in fortified fruit products.

Ms. Kathy Means, Produce Marketing Association, noted that her organization represents and is funded by produce marketers. Ms. Means stated that the Committee should maintain and strengthen the guideline on fruits and vegetables and should specify that consumers should eat five to ten servings of fruits and vegetables a day. In addition, the Committee should integrate and reinforce actionable messages based on credible sound science and consistent messages about fruit and vegetable consumption throughout the *Dietary Guidelines* wherever possible.

Ms. Means then urged the Committee to encourage consumers to eat fruits and vegetables instead of foods that are high in calories, sodium and added sugars to gain health benefits and control weight. The *Dietary Guidelines* should stress consumption of whole foods and should specify that whole fruits and vegetables, rather than food supplements, offer health benefits from the synergy of each unique combination of nutrients and phytonutrients that we know about, and those we have yet to discover.

She stated that the *Dietary Guidelines* should encourage consumers to feed children fruits and vegetables to encourage good eating habits that will last a lifetime, fight childhood obesity, and reduce long-term healthcare costs for the future.

Finally, Ms. Means urged the Committee to develop a strong communications program that will help get the word out to consumers about the *Dietary Guidelines*, particularly with regard to increased fruit and vegetable consumption through consumer messages that are simple, well understood, specific and actionable.

Ms. Nancy Chapman, Soyfoods Association of North America (SANA), noted that her organization is a trade association of soyfarmers, soymanufacturers, processors, chefs, and educators. She commended the 2000 edition of the *Dietary Guidelines* for acknowledging the cultural diversity in American food choices and presenting plant-based foods, such as soyfoods, as a good source of several key nutrients. She stated that providing more examples of soyfoods would make the *Dietary Guidelines* more practical for many Americans.

Ms. Chapman noted that, in addition to providing important nutrients, such as calcium, iron, fiber, and high quality protein, soy has also been linked with lowered risk of heart disease and, possibly, other chronic diseases. Soyfoods have been identified as an important dietary factor in decreasing the risk for cardiovascular disease by lowering LDL cholesterol, as well as increasing arterial compliance. Emerging evidence, which has been submitted to the Committee in the form of written comments, indicates that soyfoods may also have a beneficial effect on bone health, diabetes, hypertension, prostate and breast cancer, weight control, and menopausal symptoms.

Soyfoods from whole beans have become a fast growing part of the American diet. In 2003, one in six Americans incorporated some form of soy in their diet at least once a week, according to the United Soybean Board. In closing, Ms. Chapman recommended that the *Dietary Guidelines* should include a wide variety of soyfoods from both traditional and modern processing.

Dr. Jeffrey Blumberg, Wyeth Consumer Health Care and Tufts University, noted that nutrition status surveys and national nutrition monitoring efforts consistently reveal that a significant portion of the American population fails to meet the RDA for several key vitamins and minerals. In addition to large segments of the population that are particularly vulnerable, the general population falls short of micronutrient goals due to typical American dietary patterns.

Dr. Blumberg stated that while getting Americans to follow the *Dietary Guidelines* established by this Committee should remain the top priority for nutrition policy, a daily multi-vitamin, multi-mineral supplement could be an effective safety net to ensure that Americans are meeting the recommended levels of micronutrients.

A growing body of research reveals an inverse association between inadequate micronutrient intake and the risk of some birth defects and several chronic diseases. The benefits of folic acid on neural tube birth defects and of calcium and vitamin D on osteoporosis are widely recognized. In other cases, the data are still emerging, but the promise is clear.

Dr. Blumberg stated that the revised *Dietary Guidelines* should recommend a daily multi-vitamin supplement. In 2000, the Committee saw fit to recommend specific vitamin and mineral supplements for certain at-risk populations. The recommendation of a daily multi-vitamin for the population at-large in 2005 is simpler to communicate, easier to comply with, less expensive, and more effective in ensuring that all Americans meet all of their micronutrient requirements.

Ms. Lynn O'Brien Nabors, Calorie Control Council, prefaced her remarks by noting that the Calorie Control Council is an international association of manufacturers of low-calorie and reduced fat foods and beverages, including the manufacturers of a variety of sweeteners, fat replacers, and low-calorie ingredients used in these foods.

The 2000 Dietary Guidelines Advisory Committee acknowledged that intense sweeteners are low in calories and the usefulness of these products, as well as fat-free and low-fat dairy products, and hopes the 2005 Committee will include a similar statement.

Ms. Nabors cited the Council's 2000 Light Survey, which found that 180 million adult Americans use low-calorie, sugar-free, and reduced-fat products. Almost eight out of ten of these consumers say that they would like additional light products. She stated that all sweeteners and fat replacers that are currently available have been thoroughly reviewed by the FDA. Although their safety is well documented, a great deal of misinformation about these ingredients circulates widely.

The American Diabetes Association (ADA) has stated that the FDA-approved, low-calorie sweeteners underwent rigorous scrutiny and were shown to be safe for the public, including diabetics and pregnant women. ADA has also stated that the FDA provides assurance that current fat replacers are safe to use in foods. Including similar statements in the 2005 *Dietary Guidelines* would greatly assist in minimizing consumer concerns related to sweeteners and fat replacers.

Dr. Edward Siguel stated that he specializes in essential fats, a term he coined to represent the omega-3 and omega-6 families of fatty acids. Using a method he invented to accurately

measure essential fatty acid deficiency, Dr. Siguel found that about 30 percent of adult Americans are deficient in omega-6 fats, and about 70 percent are deficient in omega-3 fats, using samples from the Framingham Heart Study and several other populations.

Dr. Siguel stated that he has found that there is no scientifically valid study regarding the nutritional requirements for essential fatty acids. All the studies he has reviewed have incorrect data because they do not accurately measure the different kinds of essential fatty acids.

Dr. Siguel stated that the recommendations pertaining to *trans* fats, saturated fatty acids, and cholesterol should be discarded. The emphasis should be on total calories, grams per day of essential fatty acids, and eating enough of other nutrients.

Dr. Amy Lanou, Physicians' Committee for Responsible Medicine (PCRM), began her presentation by proposing several changes in the way Americans eat. She recommended increasing consumption of plant-based foods, including fruits, vegetables, grains, and legumes; reducing reliance on highly processed foods; and limiting or avoiding products of animal origin.

Dr. Lanou then offered several recommendations that PCRM believes would strengthen the *Dietary Guidelines*. First, PCRM recommends replacing the guideline, "Let the Pyramid guide your food choices" with a more direct message, "Choose a diet built from plant foods." Dr. Lanou stated that science clearly shows that diets built from plant foods, vegetarian diets and vegan diets reduce the risk of cancer, heart disease, hypertension, and diabetes, among other medical conditions.

Second, PCRM recommends that the Committee make dairy products optional and highlight the full range of calcium-containing foods in the U.S. food supply. Dr. Lanou noted that many non-dairy calcium sources have the advantage of being low in saturated fat and high in fiber.

The allotted time ran out before Dr. Lanou completed her testimony.

Mr. Robert Guenther, United Fresh Fruit and Vegetable Association, stated that the association is the produce industry's oldest national trade association and public policy advocate for producers, wholesalers, distributors, brokers, and processors of fresh fruits and vegetables.

Mr. Guenther noted that fruit and vegetable consumption remain below the recommended levels included in the last edition of the *Dietary Guidelines*. His association strongly urges the Committee to put forth new enhanced recommendations in this area. Such guidelines should promote much needed behavior change based on the scientifically based health benefits of a diet rich in produce.

Mr. Guenther briefly commented on three important issues that his association believes should be considered as part of the revised *Dietary Guidelines*. First, the *Dietary Guidelines* should more clearly acknowledge the scientific findings that support fruit and vegetables as a vital foundation of optimal health. Second, the *Dietary Guidelines* should include a measurable range of five to ten servings of fruit and vegetables per day, which is consistent

with USDA's proposed revision of the Food Guide Pyramid and provides consumers with concrete guidance. Finally, the *Dietary Guidelines* should help to promote behavior changes that will support optimal health.

Dr. Mary Enig, Weston A. Price Foundation, recommended abandoning the current Food Pyramid concept and returning the *Dietary Guidelines* to a plan that stresses high-quality foods from four basic groups. She stated that the *Dietary Guidelines* should urge avoidance of processed foods containing refined and partially hydrogenated vegetable oils; highly sugared foods, especially those foods containing high fructose corn syrup; and refined, highly processed protein isolates. The *Dietary Guidelines* should encourage use of beneficial, unprocessed, unrefined saturated and monounsaturated fats and oils. Also the *Dietary Guidelines* should limit added sugars to no more than 10 percent of daily caloric intake.

Dr. Enig stated that using the Pyramid to select foods results in a diet that is very high in carbohydrates and very low in natural fat. The carbohydrates that are selected invariably are refined, and the fats and oils are partially hydrogenated, high *trans* fats, and/or very high omega-6 and missing omega-3. She noted that diets high in refined carbohydrates lead to diabetes. Diets high in *trans* fat or with excessive omega-6 interfere with glucose and insulin handling and lead to vision problems in children and to increased asthma, immune dysfunctions, heart disease, and cancer. Adequate animal foods provide nutrients that are not found in diets devoid of them. Diets devoid of natural saturates interfere with omega-3 function.

The Foundation recommends eating high quality, unprocessed foods from each of the following four groups: animal foods; grains and legumes; fruits and vegetables, preferably fresh or frozen; and fats and oils. The Foundation also recommends limiting intake of sweets, white flour products, soft drinks, processed foods, polyunsaturates, and partially hydrogenated vegetable fats.

Dr. Esther Meyers, American Dietetic Association (ADA), noted that the Association is the world's largest association for food and nutrition professionals. Her presentation focused on three points that were included in the ADA's written testimony.

First, ADA suggested that some of the controversy and confusion regarding the fat and sugars guidelines might be avoided by replacing the current guidelines with a guideline on nutrient density, such as, "Foods that supply energy, but few nutrients, should be used sparingly in the diet." This type of guideline would limit the confusion regarding the high fat or high sugars foods and help clarify issues surrounding energy balance and moderation.

Second, ADA recommended that the *Dietary Guidelines* continue to focus on food and the whole diet rather than specific nutrients. Some at-risk populations may require attention to specific nutrients and supplements, but most people can achieve nutrient adequacy via a balanced diet.

Finally, ADA emphasized the importance of consumer-friendly messaging. The practice of consumer testing the guidelines prior to publication should continue and should include both qualitative and quantitative research. Public education on the *Dietary Guidelines* is essential. The *Dietary Guidelines* should be harmonized with the other nutrient education tools, such as the USDA Food Guide Pyramid, the Nutrition Facts label, and the American Diabetes

Association Exchange List. For example, the Pyramid serving size for juice is three-fourths cup, while the label says one cup, and the Exchange List indicates one-half cup.

Dr. Alex Hershaft, Farm Animal Reform Movement (FARM), noted that FARM is a national non-profit organization advocating plant-based eating since 1976. It is funded by individual contributions and has no food industry affiliation.

Dr. Hershaft stated that the nation's diet is shaped less by the science-based guidelines of this Committee than by the profit-based advertising claims of the food industry and the politically based subsidy and regulatory programs of the USDA. He cited three areas where he felt the Committee could correct this situation.

First, Dr. Hershaft suggested that government nutrition programs, such as the National School Lunch Program, should be improved by encouraging them to comply with the *Dietary Guidelines*.

Second, he suggested that the Committee should respond to diet crazes that can have life-threatening consequences by appointing a team to advise consumers of the long-term consequences of violating the *Dietary Guidelines*.

Third, Dr. Hershaft urged the Committee to consider developing a special edition of the *Dietary Guidelines* for children. This edition should be geared to children's nutritional needs, be graphically designed to appeal to children, and should impress on food manufacturers, parents, school administrators, and government officials their responsibilities for our nation's health.

Dr. Diana Zuckerman, National Center for Policy Research for Women and Families, recommended that, in addition to focusing on the scientific issues, the Committee should focus on how to influence Americans' eating and exercise habits. She suggested that changing how serving sizes are measured would make the Guidelines more accessible to consumers. It would also be helpful if the Food Pyramid and Nutrition Facts labels were consistent with each other, and with reality. Dr. Zuckerman suggested creating a black box around calories on the nutritional label, in an effort to get people to pay attention to the calorie information.

Dr. Zuckerman stated that the food intake patterns should be specified for sedentary individuals, as well as for those who exercise. Presenting the two patterns side-by-side would create an incentive for people to exercise more. A public information campaign that is easy to understand, remember, and follow is also needed.

Mr. Clay Hough, International Dairy Foods Association, stated that IDFA is a trade association with over 500 members who supply 85 percent of the milk, cheese, yogurt, and frozen desserts sold in the United States. He presented new research findings that reinforce the need for the *Dietary Guidelines* to recommend dairy foods as part of a healthy diet.

Mr. Hough stated that emerging evidence indicates that dairy products help burn fat and enhance weight loss. Numerous studies confirm that people who consume more dairy products are less likely to be overweight or obese. These benefits of dairy calcium products have been demonstrated in people of different ages, genders, and races. Dairy calcium also

impacts body composition, maintaining muscle mass while lowering body fat, and the DASH study has shown it can help reduce hypertension. For these reasons, the *Dietary Guidelines* should recommend at least three servings of dairy a day.

Mr. Hough noted that studies have shown that people diagnosed with lactose intolerance can comfortably eat yogurt and cheese, and drink milk in moderate amounts.

Mr. Hough stressed that non-dairy foods, such as soy beverages, are not substitutes for dairy. Soy beverages are not natural sources of calcium, and the bioavailability of calcium in soy beverages has been found to be inferior to that in milk. These foods also lack the overall nutrient profile of milk.

The current *Dietary Guidelines* suggest that individuals between 18 and 50 years of age need two servings of milk daily. According to the Institute of Medicine, the adequate intake of calcium for men and women between ages 18 and 50 is 1,000 milligrams a day. In order to achieve this, a person would have to consume three servings of dairy per day. IDFA therefore strongly urges that the *Dietary Guidelines* recommend at least three servings of dairy a day for all people.

Dr. Gil Wilshire, Carbohydrate Awareness Council, Inc. (CAC), informed the Committee that the CAC is a newly incorporated member organization that is active in organizing the sector of the food industry that produces controlled-carbohydrate foods.

Dr. Wilshire began by stating that the current *Dietary Guidelines* and the Food Pyramid are based on flawed data. Virtually every population-based or other comparative study has failed to account for bias or the confounding variables of *trans* fat and carbohydrate consumption.

Dr. Wilshire cited recently published, randomized control trials demonstrating that the increased intake of natural dietary fats in the context of a normal caloric diet improves the surrogate markers of atherosclerotic disease. Low-carbohydrate diets produce lower insulin and higher growth hormone levels in the blood, which has been shown to aid in the maintenance of bone and muscle mass in the elderly, and the promotion of lipolysis in individuals who are overweight. Low-carbohydrate diets also delay the onset of type 2 diabetes, improve the adverse effects of the metabolic syndrome, and ameliorate symptoms of polycystic ovary disease in women.

Dr. Wilshire stated that generous amounts of dietary protein have never been proven to be harmful in persons with normal kidney and liver function. He also stated that there is no dietary requirement for carbohydrates. The beneficial nutrients found in grain and potato products are more easily derived from lower-carbohydrate food sources, such as non-starchy vegetables, berries, and some fruits.

Dr. Wilshire stated that converging evidence from numerous sources strongly suggests that proteins and naturally occurring fats and oils are the indispensable components of a healthy diet and should constitute the majority of the foodstuffs consumed by the general population. He therefore recommends reversing the low-fat, high-carbohydrate recommendations that are reflected in the current Food Pyramid.

Dr. Rui Hai Liu, Produce for Better Health Foundation and Cornell University, focused his presentation on the dietary benefits of the fruits and vegetables that contain significant amounts of bioactive compounds. He stated that these foods may provide desirable health benefits beyond basic nutrition, including reducing the risk of chronic diseases such as cancer, cardiovascular disease, Alzheimer's disease, and diabetes. There is strong scientific evidence to support a recommendation to consume five to ten servings of a wide variety of fruits and vegetables.

Dr. Liu stated that prevention is a more effective strategy than treatment of the chronic disease. It is estimated that one-third of all cancer deaths in the United States could be avoided through dietary modifications, such as increased consumption of fruits and vegetables.

Dr. Liu stated that whole foods provide additional benefits that cannot be obtained from dietary antioxidants. Current evidence indicates antioxidant nutrients alone cannot explain observed health benefits of diets rich in fruits and vegetables, because taken alone, the individual antioxidants studied in clinical trials do not appear to have consistent preventive effects. Laboratory studies show that fruit and vegetable phytochemical extracts exhibit strong antioxidant and anti-cancer activity.

Fruits and vegetables eaten in the recommended amounts are safe. Dr. Liu therefore believes a recommendation to eat five to ten servings of a variety of fruits and vegetables daily is a proper strategy to reduce the risk of chronic disease and to meet nutrient requirements for optimum health.

Dr. Nathaniel Clark, American Cancer Association, American Diabetes Association, and American Heart Association, noted that the three organizations chose to present comments together due to the huge toll that cancer, diabetes, heart disease and stroke take on the American public. Mr. Clark stated that these diseases are largely preventable through healthy diets, physical activity, and maintenance of a healthy weight, and he presented the organizations' recommendations.

First, while dietary patterns are important, the quality of food choices within each food group should also be emphasized and attention should be given to the concept of energy density.

Second, the Committee should make a strong statement about the relationship between weight control and chronic disease risk. Portion control should be emphasized throughout the *Dietary Guidelines*. Messages to limit refined grains and foods high in fat and added sugar should be explicit. The *Dietary Guidelines* must acknowledge that both physical activity and calorie reduction are necessary for successful weight loss and management.

Third, increasing scientific evidence indicates that the type of fat in the diet plays more of a role than the total amount of fat when it comes to reducing the risk of chronic disease. Therefore, messages to eat a diet low in saturated fat remain appropriate. Messages to reduce total fat intake should be made in the context of calorie control.

Fourth, legumes and starchy vegetables should be shifted from the vegetable and fruit group to the grain group.

Fifth, the *Dietary Guidelines* should emphasize the importance of physical activity in promoting good health and preventing chronic disease for both youth and adults.

Mr. Clark concluded by stating that the organizations encourage the Committee to develop a complimentary document for policymakers that would articulate policy changes that can help support implementation of the *Dietary Guidelines*.

Ms. Cynthia Reeser presented her own independent recommendations. She noted that she is a member of the ADA and is actively involved in the work of the Vegetarian Nutrition Dietetic Practice Group. Ms. Reeser stated that the *Dietary Guidelines* are having a marginal impact on addressing the growing number of adults and children who are overweight or obese and proposed that the Committee take a new approach.

Research has revealed that consumers want to know how they will benefit from the food choices the *Dietary Guidelines* recommend and that their primary concern is weight management. In 2004, the recommendations of many diets are more popular than the *Dietary Guidelines*' conservative approach.

Ms. Reeser suggested revising and updating the "Aim for a healthy weight" guideline to more clearly convey the short- and long-term health and nutrition benefits and motivate consumers. The *Dietary Guidelines* should also provide clear, simple, and specific directions regarding strategies and techniques that consumers can use to make changes.

Ms. Reeser stated that the guidelines, "Choose sensible portion sizes" and "Control portion size" presume that people know what sensible portions are and how to control them. She recommended visual portion references and noted that she had provided specific suggestions in her written testimony.

Ms. Reeser closed by urging the Committee to encourage increased consumption of whole plant foods, possibly by creating a new guideline, "Build your meals around whole or unrefined plant foods." She stated that beans, seeds, and nuts deserve their own place on the Pyramid that is distinct from the Meat group and that soyfoods also deserve more emphasis.

Dr. Frances Taccone, International Five-A-Day Federation, introduced her testimony by stating that approximately 30 countries are now conducting fruit and vegetable promotions like the U.S. Five-to-Nine Program. The leaders of these national nutrition programs have formed an international network called The Five-A-Day Federation. In 2003, the Federation launched a collaboration with the World Health Organization to develop a global fruit and vegetable initiative as one strategy to reduce the burden of non-communicable diseases and obesity.

Dr. Taccone stressed that the decisions of this Committee have far-reaching global impact, especially in countries beginning their Five-A-Day type programs. She therefore urged the Committee to make the strongest possible recommendation regarding the daily intake of fruits and vegetables. Specifically, she urged the Committee to set a new U.S. guideline, increasing the number of servings of fruits and vegetables each day to five to ten.

Dr. Taccone noted that this recommendation would put U.S. nutrition policy in synchrony with other developed nations and the global health movement. The global health trend is to

recommend the goal, rather than the baseline. This strategy sends a strong, clear message that a healthy diet is based upon ample, not minimal, servings of fruits and vegetables.

Dr. Taccone concluded by stating that neither the U.S. nor the world can wait until all the research is finished and all the evidence is evaluated. Assertive nutrition policy that promotes preventive and self-health care measures is needed now.

Dr. Katherine A. Beals, U.S. Potato Board, focused her presentation on the limitations of a glycemic index, with particular emphasis on data that had not been presented by Drs. Krauss, Hu, and Slavin.

Dr. Beals noted that the glycemic index was originally conceived as an inherent property of a carbohydrate-rich food as opposed to a metabolic response of an individual to a carbohydrate-rich food. Theoretically, the glycemic index of a given carbohydrate should be constant from person to person. In reality, the glycemic index can vary considerably, depending on factors such as processing, preparation, variety, and origin. She stated that the glycemic index of potatoes can vary significantly, depending on where they were grown.

Dr. Beals stated that the glycemic index was originally developed to describe the rate of carbohydrate digestion and absorption into the plasma. However, the blood glucose concentration of plasma after carbohydrate consumption represents the balance of both the entry and removal of glucose from the blood. She cited a study conducted at the University of Texas at Austin that compared the plasma glucose kinetics of a low-glycemic index bran cereal to a high-glycemic index corn flake cereal.

The allotted time ran out before Dr. Beals completed her testimony.

Mr. Dan Snyder, Ms. Stephanie Fu, and Mr. Ken Buraker presented recommendations for graphic changes in the Food Guide Pyramid. The objectives of the proposed changes were to emphasize the healthiest choices in each food category, to show how all foods can fit, and to engage consumers through technology.

Mr. Snyder first turned the Pyramid on its side so that all food groups touch the base of the Pyramid, or the foundation of the diet, and continue vertically to the top. Gradations in shading were used within each vertical band, with darker colors toward the base, where the most nutrient-dense would be placed, and gradually lighter colors going up toward the apex, indicating foods that are less nutrient dense.

Mr. Buraker also proposed an interactive website, FoodPyramid.Gov. Moving the cursor over certain band areas within the Pyramid would show foods at various levels of nutrient density. The allotted time ran out before the team completed its testimony.

Dr. Richard Black, International Life Sciences Institute of North America (ILSI N.A.), prefaced his remarks by stating that ILSI N.A. is a non-profit 501(c)(3) organization that seeks to bring scientists together from industry, academia, and government to solve issues of mutual concern to the public health. The majority of its funding comes from industry. Dr. Black noted that ILSI N.A. had submitted written comments and that he would restrict his comments to three key points: evaluation of the science; utilization of other expert reports; and food safety.

Dr. Black encouraged the Committee to continue to take a rigorous, evidence-based approach in evaluating the science and determining the conclusions that can and cannot be made from the evidence. He also noted that while nutrition is a relatively young science that is still evolving, consumers do not want nutrition advice to change. This presents challenges for the Committee, which must defend its recommendations, and for nutrition communicators, who must educate consumers about the new advice.

Dr. Black encouraged the Committee to use contemporary expert reports, such as the DRI report, as much as possible, rather than reinventing the wheel.

Finally, Dr. Black urged the Committee to include the important issue of food safety in the *Dietary Guidelines*. He noted that while nutrition has long-term benefits for health, food safety can have an immediate impact on morbidity and mortality. The objectives are easy to define, they are relatively easy to implement, and the messages can be targeted to specific at-risk groups.

Dr. King thanked each individual who took time to prepare the information that they shared with the Committee and assured them that the Committee appreciated their perspectives and insights. She stated once again that public commentary was a continuous process and that additional written comments could be sent to the address in the *Federal Register* notice.

General Discussion of Overarching Issues

Dr. King noted that the eight Subcommittees would present their reports on the second day of the meeting. She proposed that the Committee use the remainder of the first day to discuss overarching issues that go beyond the work of the Subcommittees.

Dr. King stated that the official charge to the Committee—to come up with dietary guidelines for reducing the risk of chronic disease—contained two additional endpoints: how to manage body weight, and nutrient adequacy. She noted that there were three aspects to weight management: maintaining current weight, losing weight to achieve appropriate body weight, and sustaining a weight loss. She asked whether the Committee wanted to consider all three of those aspects—and, if so, why—or whether there were some aspects that should not be considered in the report.

Dr. Pate stated that while he would not speak against any of the three aspects, the most unique contribution that the Committee could make would be to emphasize prevention of excessive weight gain.

Dr. Caballero agreed that the Committee should focus on one aspect, while trying to look at the common elements among the three. He noted that many of the issues that had been discussed during the day—including energy density, portion size, and physical activity—were related to avoiding excess weight gain and to maintaining weight loss. In his opinion, it would be difficult for the Committee to give more specific guidance for weight loss. There are many ways to lose weight in the short term. The real difficulty is to maintain that weight loss once the weight loss strategies are stopped.

Dr. Pi-Sunyer agreed that the most important aspect for the Committee is prevention of weight gain. The American public tends to gain weight every year, and prevention is particularly important for children, adolescents, and young adults. He noted that significantly more is known about prevention of weight gain than about the other two aspects.

Dr. Clydesdale agreed with what had been said. However, he thought it would be important to recognize that consumers are confronted with many different approaches for losing weight. He felt the Committee might be remiss if it did not at least comment about weight loss, including the fact that the mechanism for weight loss is not well understood.

Dr. Bronner supported the position of prevention, especially given the epidemic in children. She suggested that the Committee could look at the preventive mechanisms for each life stage that can be found in the literature.

Dr. Kris-Etherton agreed that the major focus should be weight control, but that it would be important to comment on weight loss.

Dr. Lupton agreed that prevention of weight gain should be the primary focus. However, having chaired and defended the Macronutrient Report, which did not deal with weight loss, she now believes that it would be important to have a section that addresses how to best lose weight, especially since the mechanisms for weight loss and prevention may not be the same.

Dr. Nicklas agreed with Dr. Lupton that the methods for preventing weight gain could be very different than the methods for weight loss. She noted that the statement would have to be worded carefully and that comments about diets should be made within a positive context.

Dr. King noted that in 2000, the Committee stated: “If you need to lose weight, do so gradually.” She asked if the Committee should go further than that.

Dr. Caballero thought that even a rudimentary evaluation of all the ways to lose weight would be beyond what people could absorb, but that the Committee could say more than, “Do it gradually.” He suggested that rather than emphasizing the differences between weight loss and weight maintenance, the Committee should emphasize the commonality, which is energy balance—physical activity, combined with low- energy density food, healthy snacks, and portion size.

Dr. Kris-Etherton noted that the American Dietetic Association’s website has guidelines for healthy weight loss, or criteria for evaluating a healthy weight loss plan. She suggested that something like that would be very helpful for consumers.

Dr. Bronner cited research at Cornell that demonstrated that failure to lose weight following pregnancy was associated with increased BMI. She suggested that a discussion of the impact of lifecycle transitions on weight might be an important knowledge-based component to include in the report.

Dr. Pate stated that while he favored emphasizing prevention, he agreed that the Committee could be perceived as having overlooked the other two aspects if it did not at least comment on them.

Dr. Pi-Sunyer stressed that the Committee's report must be evidence-based. He noted that most dieters come back to baseline within at least three years. There is much more data with regard to prevention than there is with regard to weight loss.

Dr. Kris-Etherton responded that the Committee could give some guidance about the importance of making sure that a weight loss diet is nutritionally adequate. There may be some other commonalities, such as physical activity.

Dr. King asked whether Dr. Kris-Etherton was suggesting that the report should contain general comments about the adequacy of the diet and the role of physical activity, rather than getting into specifics regarding certain proportions of calories coming from carbohydrate or fat. Dr. Kris-Etherton agreed that this was what she was proposing.

Dr. Caballero agreed that there is scarce evidence about which approach works for long-term weight loss and maintenance. But he noted that many studies have shown that those individuals who maintain an active lifestyle after they lose weight are much more likely to maintain that weight loss than people who just rely on diet. Advice about physical activity would be important throughout the *Dietary Guidelines*.

Dr. Clydesdale stated that it would be important to stress to consumers that calories do count and that no combination of foods will reduce the number of calories that those foods contain.

Dr. Camargo noted that there seemed to be a consensus that what makes a diet effective is that people eat fewer calories. He suggested stating that as a shared property of all effective weight loss plans, without specifically mentioning brands, names, or celebrities. For primary prevention and weight maintenance, the message would emphasize energy balance.

Dr. King summarized the discussion by stating that this section of the report would focus on prevention of excessive weight gain. In the weight loss section, the report would continue to state, "If you need to lose weight do so gradually," while also emphasizing the importance of physical activity, energy balance, and the fact that calories do count in achieving a healthy weight loss pattern. She noted that Committee members had suggested focusing on common elements that pertain to all three aspects of weight management. She cited physical activity as one common element and asked for other examples. Suggestions from the Committee included nutrient density, energy density, portion size, and satiety.

There was some discussion regarding the relative importance of nutrient density and energy density. Dr. Nicklas noted that the Nutrient Adequacy Subcommittee would address that issue in their report.

Dr. King noted that portion sizes had come up several times during the day and that this issue affects both nutrient adequacy and the risk of chronic disease. She asked whether there was adequate scientific evidence to show that increased portion sizes have contributed to the rise in obesity. Dr. Kris-Etherton cited a study by Barbara Rolls that found that people who are given larger portion sizes tend to eat more. She noted there is also evidence from short-term studies showing that people don't compensate by eating less—they eat above what their calorie needs are for weight maintenance. Dr. Nicklas cited two studies with children that had similar findings, and an epidemiologic study that showed that portion sizes have increased over time. She stated that it is not clear whether people over-consume in one meal, or

compensate less at other meals, and she agreed that scientific literature on portion size and BMI is lacking.

Dr. Caballero noted that while some people can compensate for overeating over time, others find it more difficult to maintain energy balance. He recalled that at its first meeting, the Committee agreed that the individual should not bear the entire burden. It is also important to create more favorable conditions for people who are not genetically lucky to regulate their energy balance, and portion size may play a role in this.

Dr. Weaver asked what the Committee could do about portion size, beyond recommending that they be based on measurements. She asked Dr. Hentges whether the Committee could make recommendations about labeling. Dr. Hentges emphasized that the Committee's recommendations must be evidence-based. He agreed with Dr. Weaver that statements mandating the size of food packages would be beyond the Committee's purview. He suggested that guidance on effective portion sizes should be part of an implementation strategy that would include industry and other partners.

Dr. Camargo proposed that part of the educational mission of this guideline would be to teach consumers that serving sizes have changed for many foods, perhaps with graphics showing how size and caloric content have increased over time.

Dr. King reminded the Committee that in 2000, the committee said, "Choose sensible portion sizes," with some guidance for how to do that. Dr. Pate suggested that the Committee consider a much stronger statement. He stressed that the statement should be based on the scientific evidence and that the Committee would need to complete the literature review. Dr. Clydesdale proposed a statement such as, "To reduce caloric intake, reduce portion size."

Dr. Pi-Sunyer suggested that the concept might be easier to understand if portion size differences could be equated with physical activity expenditure. Dr. Kris-Etherton suggested that the Committee look at the "Portion Distortion" quiz on the website of the National Heart, Lung, and Blood Institute, which shows how portion sizes have increased over the years and what that means in terms of physical activity.

Dr. Pate cautioned that such an approach could have a negative impact when trying to communicate the value of physical activity. He noted that the daily mismatch between intake and expenditure when one is looking to prevent future weight gain is not very great; therefore, the dose of physical activity that could help to address that is not very great. He was concerned about sending a message that you could never perform enough physical activity to balance the extra intake of a larger portion.

Dr. King asked whether portion size had any impact on nutritional adequacy or any other endpoints, or if it was just an energy balance issue. Dr. Camargo replied that portion size would have impact on nutritional adequacy if the portion sizes were growing only in the realm of the foods which were least nutritious—which, unfortunately, appears to be the case. Dr. King noted that this was related to the issue of energy density, or nutrient density, and she asked Dr. Weaver if her Subcommittee would discuss nutrient density in its report. Dr. Weaver stated that the Subcommittee had identified this as one of the topics that they would pursue next.

Dr. Bronner suggested that it might be helpful to use household measures and bring the serving size recommendations more in line with what people understand. Dr. King agreed that this would make sense. She then asked whether satiety was an issue that needed to be addressed in the report, and if so, how.

Dr. Weaver noted that the Nutrient Adequacy statements might include a message to increase consumption of nuts and seeds and legumes in light of recent studies showing the satiety value for nut consumption. Dr. King noted that the Energy Subcommittee was going to look at the issue of satiety with regard to breakfast.

Dr. Clydesdale stated that he would like to see the literature, if any, on people who override the satiety of an energy-dense food. He expressed concern that a message to eat more nuts would only be helpful for those who do not have a weight problem.

Dr. King asked if any of the Subcommittees had addressed the issue of nuts and satiety. Dr. Weaver said the Nutrient Adequacy Subcommittee would address this issue. Dr. Lupton stated that the Carbohydrates Subcommittee had a literature review on satiety in fiber and fiber nuts.

Dr. Appel noted that the issue of satiety was relevant to many aspects of the diet and that it should either be considered as a whole or not at all. He also expressed concern about increasing the workload of the Subcommittees.

Dr. King asked whether it would be possible to do a review of all of the factors in the diet that could have an effect on satiety. Several Committee members were in favor of conducting such a review. Dr. Pi-Sunyer noted that the satiety literature was particularly difficult. He was concerned that the Subcommittees would be asked to review a large number of studies that would not provide sufficient evidence for a specific recommendation.

Dr. Rattay noted that Dr. Barbara Rolls was one of the experts who would present at the next meeting and suggested that she could discuss the issue of satiety at that time. Dr. Appel expressed concern about the lack of evidence-based studies regarding satiety and suggested that it might be preferable to ask Dr. Rolls to focus on energy density.

Review of Second Day Agenda

After ascertaining that the Committee had no further comments regarding weight management, Dr. King briefly reviewed the agenda for the second day of the meeting. She noted that the Committee would focus on energy and the macronutrients in the morning, and would discuss nutrient adequacy, ethanol, the lifecycle, food safety, and fluid and electrolytes in the afternoon. At the end of the day, the Committee would discuss specific tasks that would need to be done prior to the next meeting in March in order to move from nutrient-based scientific reviews to food-based conclusive statements focused on reducing the risk for chronic disease.

Dr. King thanked the speakers for their presentations and recessed the meeting.

(Recessed: 5:14 p.m.)

Thursday, January 29

(8:40 a.m.)

Dr. Janet King, DGAC Chair, welcomed the Committee and observers to the second day of the meeting. She stated that each of the Subcommittees would be presenting the findings of their work to date to the full Committee for discussion and consideration.

Dr. King noted that when the Subcommittees began their work, they identified research questions that could serve as the basis for formulating dietary guidance to promote health. The research questions were then categorized for clarification. “A” questions were important questions for which summary tables already existed from other authoritative reports. “B” questions were important questions for which summary tables did not exist. These questions were then prioritized by the subcommittees in order of importance and summary tables were developed for those of top priority. “C” questions were those for which there were either very limited data, which the subcommittee knew to be insufficient to support science-based changes in the guideline, or the question required an evaluation of either published or publicly available data. The Subcommittee reports would review the status of these research questions.

Dr. King then turned the floor over to Dr. Pi-Sunyer for the Energy Balance presentation.

Energy Balance Presentation and Discussion
X. Pi-Sunyer, Lead

Dr. Pi-Sunyer introduced the other members of Energy Balance and Weight Maintenance Subcommittee, which included Dr. Appel, Dr. Caballero and Dr. Pate. He stated that the Subcommittee would discuss three of the nine research questions during this session. The remaining questions were still being reviewed.

Dr. Pi-Sunyer reviewed the Subcommittee’s research questions, indicated their category, and noted which questions would be discussed during this presentation:

1. Is there a level of habitual physical activity that can be recommended for prevention of weight gain? Many people may require more than the recommended 30 minutes per day to prevent weight gain and the question is, how much more. Does this differ by age, gender, race and ethnicity, pregnancy and lactation? (Category A, to be discussed by Dr. Pate)
2. How does a high-carbohydrate, low-fat diet compare to a high-fat, low-carbohydrate diet for maintaining weight in people with normal BMIs? (i.e., does the population maintain weight better by eating a diet composed of 40 percent fat compared to a diet composed of 20 percent fat?) How does a high carbohydrate, low fat diet compare to a high-fat, low carbohydrate diet for weight loss (in people with higher than normal BMIs)? (Category A, to be discussed later in the day)
3. What is the relationship between fruit and vegetable consumption and BMI? (Category A, to be discussed by Dr. Appel)

4. What is the best pattern for calorie consumption throughout the day? (i.e., three meals a day, or six meals a day? Is breakfast critical to prevent weight gain?) (Category B, literature review in progress)
5. How much physical activity is required to maintain weight loss? (Category A, to be presented by Dr. Caballero)
6. What is the relationship between energy density and BMI? (Category A or B, literature review in progress, to be discussed in March with Dr. Barbara Rolls as an expert witness)
7. Is there a level of activity below which one cannot regulate appetite? (Category B, literature review in progress, to be discussed in March)
8. Does portion size effect total energy intake? (Category A or B, literature review in progress, to be addressed in March)
9. What is the most commonly reported leisure time physical activity modes for those who report less than 150, 150 to 300, or greater than 300 minutes of leisure time/physical activity? What is the typical physical activity pattern for individuals in these three categories? (Category C, being evaluated from NHANES data)

Dr. Pi-Sunyer turned the floor over to Dr. Pate to discuss Question #1: Is there a level of habitual physical activity that can be recommended for prevention of weight gain?

Dr. Pate noted that, after extensive discussion, the Subcommittee had concluded that it should continue to work on this issue through the March meeting, for two reasons. First, the Subcommittee identified an expert who will speak at that meeting about current efforts to review and update the prevailing adult physical activity recommendation. Second, an expert panel recently met under the auspices of the Centers for Disease Control and Prevention (CDC) to consider recommendations on physical activity for children and adolescents. The panel's draft report is expected prior to March meeting.

Dr. Pate noted that the 2000 *Dietary Guidelines* endorsed or incorporated the then-prevailing adult and youth physical activity recommendations. The Subcommittee felt it would be important to hear from those groups regarding the progress on potential modification or updating of the current recommendations.

The central question is whether the *Dietary Guidelines* should recommend something more than 30 minutes daily of moderate intensity physical activity for the specific purpose of preventing excessive weight gain. There is considerable literature on this issue that has been reviewed extensively by other groups and expert panels. The Subcommittee is reviewing individual studies as well as those consensus documents to determine whether or not the conclusions of those panels are sufficient for the basis of a recommendation.

Dr. Pate stated that the tentative thinking of the Subcommittee is that there is at least substantial, if not definitive, evidence to suggest that many persons need more than 30 minutes of physical activity daily to prevent excessive weight gain. The issue that needs to be resolved prior to the March meeting is whether or not some specific number of minutes of

moderate to vigorous physical activity per day can be pointed to as particularly important for the prevention of excessive weight gain.

Dr. Pi-Sunyer thanked Dr. Pate for his summary and called on Dr. Caballero to address Question #5: How much physical activity is required to maintain weight loss?

Dr. Caballero stated that there is a great deal of evidence in this area. A number of studies have information on individuals who have lost weight and have been followed for up to five years. Their final outcome in terms of body weight was related to patterns of activity, as well as diet and other factors. The literature and consensus statements of the past several years are less contradictory than for never-obese individuals.

Two important conclusions emerged from the review of the literature and consensus statements. First, the contribution of physical activity to the weight loss process is relatively modest. However, once an individual has achieved a weight loss, the inclusion of a physical activity program, or the existence of a physical activity pattern during the following months or years is consistently associated with better maintenance of the post-obese weight.

The Subcommittee believes that two factors are responsible for these findings. First, the level of physical activity helps the individual maintain a negative energy balance and does not result in weight gain. Second, the routine of physical activity also helps in other aspects of maintaining weight, such as watching your diet. In general, individuals who have a more structured approach after they lost weight are more successful in maintaining that weight.

Dr. Caballero noted that there is also general consensus that the amount of activity required to maintain weight in a formerly obese person is higher than for an individual who was never obese. After reviewing the literature, the Subcommittee tentatively reached the conclusion that an individual who has reduced his or her weight would require 60 to 90 minutes a day of moderate activity in order to avoid weight gain. He also pointed out that in many of the follow-up studies, the differences in diets, or energy intake, were not substantial; therefore, the main factor in weight maintenance after weight loss is physical activity.

Dr. Pi-Sunyer thanked Dr. Caballero and turned the floor over to Dr. Appel, who addressed Question #3: What is the relationship between fruit and vegetable consumption and BMI?

Dr. Appel noted that this question was also a work in progress. There are many observational studies associating weight with BMI, but most of these are cross-sectional studies; there are very few longitudinal studies. To date, four clinical trials have attempted to identify whether increased consumption of fruits and vegetables leads to weight loss among individuals who are overweight. Unfortunately, most of those trials do not isolate fruits and vegetables from other changes in behavior. Dr. Appel stated that it may be difficult to isolate a specific effect of fruits and vegetables on BMI, but he hoped to be able to expand on this at the next meeting.

Dr. Pi-Sunyer turned the floor over to Dr. King for open discussion.

Discussion

Dr. King opened the discussion by asking Dr. Pate and Dr. Caballero to clarify whether the 30-minute recommendation for physical activity was for weight loss or preventing weight

regain. Dr. Pate stated that this recommendation evolved from a collaborative project conducted by the CDC and the American College of Sports Medicine (ACSM). It was included in the Surgeon General's report in 1996 as well as the report of an NIH conference around the same time. In all cases, the panels concluded that 30 minutes of at least moderate intensity activity daily was appropriate. However, those reviews focused largely on the prospective epidemiologic studies looking at chronic disease outcomes and not prevention of weight gain. The IOM macronutrient panel that made the 60-minute recommendation specifically considered prevention of weight gain. Dr. Pate noted that the challenge is to balance the two considerations, so that whatever recommendation is included in the *Dietary Guidelines* is appropriate and is stated in a manner that is not confusing to the public.

Dr. Caballero reminded the Committee of the difference between a recommendation and a requirement. The requirement could be 60 minutes, but the *Dietary Guidelines* could recommend that the goal for the next five years is at least 30 minutes for the majority of the population. He stated that panels that endorsed the 30-minute recommendation acknowledged that more activity provides more benefits, but 30 minutes was considered to be a reasonable goal for the majority of the population. Dr. Pate concurred that the 30-minute recommendation was selected because it has been consistently found to provide benefit. It has never been presented as a minimum or optimal level of physical activity, nor has been presented as a limit. He expected that the effort to update the 30-minute recommendation may highlight the fact that there is additional benefit associated with higher levels of activity, in terms of both total dose and intensity.

There was some discussion among Committee members as to whether the recommended amount of physical activity could be accumulated in short bouts. Dr. Pate stated that the CDC-ACSM recommendation did sanction accumulating physical activity in bouts as short as 10 minutes in duration, based on the experimental exercise training literature. More recent studies have found the same physiologic effects with bouts as short as five minutes, accumulating to 30 minutes. He noted that there is a need for better clarification of the baseline upon which the 30 minutes sit. Most experts would say that is on top of normal, day-to-day physical activity associated with the normal American lifestyle.

Dr. King asked if the Subcommittee anticipated coming up with a suggested range for physical activity somewhere between 30 to 90 minutes, with a graphic showing the benefit of exercise at different levels. Dr. Pi-Sunyer said they would certainly come up with a range, with or without a graphic.

Dr. Clydesdale asked if any literature existed regarding how best to make recommendations in order to elicit optimal behavior change. Dr. Pate acknowledged that the health communication aspect was complicated but essential. He stated that a group at CDC was working on ways to communicate these messages to the public, but the issue of how to effect behavior change remains elusive. Physical activity behavior in this country has not changed very much, despite the effort that has been invested in encouraging those changes.

Dr. Go asked whether the Subcommittee would put the energy requirement or intakes as the numerator or denominator in relation to physical activity. Dr. Pate replied that while the Subcommittee's primary concern is energy balance, it was not interested in energy balance at a very low-level of energy turn over. He expected that the Subcommittee would endorse energy balance based on a level of physical activity that is consistent with good health.

Dr. Caballero noted that the Subcommittee had defined energy requirements as the level of energy that maintains a stable healthy body weight and a level of physical activity consistent with good long-term health.

Dr. Weaver asked if there was evidence suggesting that monitoring weight or activity levels influences behavior. Dr. Pate said that monitoring is supported by the intervention literature to a certain extent. There was some evidence that pedometers lead to better adherence to increased physical activity, though he did not think the Subcommittee would be that specific in its recommendations.

Dr. King asked if the Subcommittee was proposing 30 minutes of physical activity every day, most days, or some days. Dr. Pate replied that the data suggests that it should be at least 30 minutes each day, averaged over the week. He noted that the CDC-ACSM guideline was phrased, “preferably all days of the week,” to communicate that physical activity should be a regular part of one’s life. The CDC has operationalized that to mean five or more days per week.

Dr. Appel noted that moderate and vigorous activity had been grouped together and asked whether the recommendation would be modified for those whose activity level was already quite high. Dr. Pate replied that it would make sense to indicate that the minutes required would be fewer if the activity is more vigorous and that the modification to the earlier CDC-ACSM Guideline would probably attempt to make such a distinction.

Dr. Camargo raised the point that it is more difficult for people to keep track of how much exercise they are getting when moderate physical activity is considered acceptable. Dr. Pate agreed that moderate activity is more difficult to measure and that it is also difficult to communicate the difference between moderate physical activity, which has been shown to have health benefits, versus light activity, for which the evidence is not clear.

Dr. King reminded the Committee that it had agreed to address the issue of preventing excess weight gain and to make some general comments about how to lose weight if that is necessary. She asked if physical activity was an effective way to lose weight. Dr. Pi-Sunyer replied that it was not. Dr. Pate stated that physical activity as a part of a weight loss regimen may make a modest contribution, but it is not a major factor. Dr. Caballero stated that physical activity was more important in the maintenance phase. He suggested that those who exercise while they lose weight establish a routine and increase their capacity to exercise. Dr. King noted that the recommendations should include a comment that it is important to establish a pattern of physical activity as part of a weight loss regimen.

Dr. Pate stated that there was fairly consistent literature indicating that those who exercise as a part of a weight loss regimen tend to lose less lean weight than those who diet only. During the maintenance phase, the greater lean weight would contribute to a higher basal metabolic rate and overall greater energy expenditure.

Dr. Pi-Sunyer emphasized the Subcommittee’s belief that physical activity must be a major part of the communication effort regarding the *Dietary Guidelines*, whether as part of the Pyramid or through another mechanism. Dr. King agreed and assured the Subcommittee that the report would include a strong statement to that effect.

Dr. King thanked the Subcommittee members for their work and congratulated them on their progress. She reminded the Subcommittee that they had been given the additional task of including some discussion of an appropriate plan for losing weight, in a general context. She then turned the floor over to Dr. Kris-Etherton and the Fatty Acids Subcommittee.

Fatty Acids Presentation and Discussion

P. Kris-Etherton, Lead

Dr. Kris-Etherton introduced the other members of the Subcommittee, which included Dr. Camargo, Dr. Go, and Dr. Nicklas. She stated that the presentation would include a summary of the Subcommittee's research questions and the priority assigned to each; review of a sample summary table for the research relative to metabolic syndrome; the status of the literature search; the areas in which the Subcommittee had requested additional analysis; and a discussion of next steps.

Dr. Kris-Etherton began with a review of the Subcommittee's "A"-ranked questions. The Subcommittee identified two research questions related to cancer: What is the relationship between fat and cancer? What is the relationship between fatty acids and the fatty acid ratio in different cancers? Dr. Kris-Etherton noted that the Subcommittee was gathering that information from the National Cancer Institute.

The next question identified by the Subcommittee was: What is the effect of total fat to carbohydrate ratio on cardiovascular disease? The Subcommittee hoped to make a contribution by determining whether the fatty acid ratios, taking into account dietary protein, and physical activity play any role.

The Subcommittee determined that *trans* fatty acids needed investigation. The *trans* questions are: What is the effect of sources of *trans* fatty acids (naturally occurring, man made, CLA) on lipids and cancer? Dr. Kris-Etherton stated that that information appears in the DRI report.

Another topic of importance was omega-3 fatty acids. The question was: What is the effect of sources of omega-3 fatty acids on bioavailability and blood lipids? Dr. Kris-Etherton stated that a report on "Effects of Omega-3 Fatty Acids on Cardiovascular Risk Factors and CVD" is pending from the Agency for Healthcare Research and Quality in the U.S. Department of Health and Human Services.

The Subcommittee identified several important "B"-ranked questions on which it was gathering information. They were particularly interested in how fat and fatty acid ratio comes into play with respect to these research questions, because very little had been done in this area.

The first question was: What is the effect of total fat to carbohydrate ratio on metabolic syndrome? Dr. Kris-Etherton stated that she would go over the table that the Subcommittee prepared and summarize the studies they had reviewed to date relative to this question.

The second question was: What is the effect of total fat to carbohydrate ratio on overweight and obesity? Dr. Kris-Etherton stated that a new Subcommittee would be formed to address the issue of macronutrients.

The third question was: What is the effect of total fat to carbohydrate ratio on cancer? The Subcommittee was working with NCI on that topic.

The fourth question was: What is the effect of total fat to carbohydrate ratio on nutrient adequacy? The Subcommittee requested data on this from USDA.

The fifth, and final, question in this category was: What is the effect of the total fat to carbohydrate ratio on diabetes? The Subcommittee believed that these data were in the IOM DRI Report.

Dr. Kris-Etherton then discussed the status of the Subcommittee's data analysis pertaining to the effect of total fat to carbohydrate ratio on metabolic syndrome. The Subcommittee feels that it has a robust database to look at this question. It reviewed six observational studies published between 1999 and 2003 for a total of 12,270 subjects and 18 clinical trials reported between 1992 and 2003 on 797 subjects. The studies were conducted in Australia, China, Denmark, Finland, France, Italy, Spain, Sweden, the United Kingdom, and the United States, providing a global perspective on the issue. More than half of the clinical studies were published in the past three years. The template prepared by the Subcommittee to review the clinical trials included the citation, the design, populations, groups, outcomes, duration, baseline level for the different endpoints, results, and relevant comments.

Given that the IOM has recommended 20 to 35 percent of calories from fat, and given that a guiding principal of the Committee is to achieve nutrient adequacy, the Subcommittee wants to look at variations in food patterns that would meet nutrient adequacy at various levels of fat within the recommended range. The Subcommittee is also asking how the omega-3 and omega-6 ratio, ALA levels, and EPA and DHA levels relate to different food patterns relative to different amounts of total fat. Dr. Kris-Etherton noted that data pertaining to these questions are forthcoming from USDA.

Dr. Kris-Etherton stated that the Subcommittee would develop a base diet by removing all added fat and then manipulating other food groups to see what could be achieved in terms of nutrient adequacy. The ultimate goal is to come up with a variety of nutritionally adequate food patterns that meet macronutrient goals and fatty acid targets.

Dr. Kris-Etherton identified a number of additional questions that are being considered by the Subcommittee:

- What happens when we try to plan diets that have 35 percent calories from fat? Can they be planned without exceeding calorie needs? What dietary changes would be needed to accomplish this, while maintaining energy balance and meeting all nutrient needs and fatty acid targets?
- What is the impact on nutrient and calorie intake of increasing nut consumption?
- What is the impact on other nutrients in the diet if the food patterns incorporate two servings of fish per week?

Dr. Kris-Etherton stated that the Subcommittee feels it can make two definitive conclusions at this point: First, *trans* fat, saturated fats, and cholesterol raise the total to HDL cholesterol

ratio. Second, recommending moderate fat within the 20 to 35 percent of calorie range is consistent with the DRIs for macronutrients.

She also noted that many questions still remain for the Food Guide Pyramid. First, USDA has questions about what should be classified as solid fat. In particular, it is unclear whether soft margarines should be classified as solid fat, or if their fatty acid profile would justify classifying them as a liquid fat. The issue of total fat relative to total fat across the lifecycle is important. The Committee needs to decide whether to make specific quantitative recommendations regarding saturated fat, *trans* fat, and cholesterol (Dr. Kris-Etherton pointed out that the IOM stated that these should be kept as low as possible, but did not make specific recommendations). A benchmark is needed for diet planning and for nutrition labeling. There is the issue of whether the cholesterol recommendation should be made in terms of a set amount (i.e., less than 300 milligrams a day) or in terms of amount per 1,000 calories. And many questions remain regarding types of fats and fatty acids—in particular, what recommendations should be made for omega-3 fatty acids, including EPA and DHA, omega-6 fatty acids, and monounsaturated fatty acids.

Dr. Kris-Etherton then opened the floor for discussion.

Discussion

Dr. King asked Dr. Kris-Etherton to expand on what the Subcommittee's conclusive statements might be. Dr. Kris-Etherton stated that they would be consistent with the current *Dietary Guidelines*. That is, to decrease saturated fatty acids and cholesterol. The Subcommittee might want to include a statement to decrease *trans* fatty acids, within the context of a diet that is moderate in total fat.

Dr. Appel asked whether the total cholesterol to HDL cholesterol ratio or LDL should be used as the benchmark. He noted that studies are coming out that show high carbohydrate diets reducing HDL, but that research tends to focus more on LDL. Dr. Kris-Etherton stated that the Subcommittee had used the total to HDL ratio because it was new, but she recognized that LDL was the established standard used for national cholesterol education programs.

Dr. Kris-Etherton asked other Subcommittee members to comment on the conclusions. Dr. Nicklas stated that the Subcommittee had looked at potentially adopting the DRI recommendation that *trans* fatty acids should be as low as possible, with the caveat that it should be within the context of the recommended food patterns. The Subcommittee also considered the question of whether cholesterol should be adjusted for energy intake, similar to macronutrients. Cholesterol recommendations have been less than 300 milligrams. However, a very low percentage of children's diets exceed 300 milligrams, simply because they do not eat the same amount of calories as adults. The Subcommittee will consider this. The Subcommittee will discuss these issues and other questions pertaining to food patterns with the Nutrient Adequacy Subcommittee.

With regard to the issue of solid fats, Dr. Nicklas noted that soft margarines are combined with oils in the food patterns. The Subcommittee asked if it was appropriate to group margarines that contain *trans* fatty acids with those that are made with canola oil or other unsaturated fatty acids. Many companies are replacing the *trans* fatty acids in stick

margarines with stearic acid. The Subcommittee needs more information on the extent to which this is occurring before it makes a recommendation as to how to classify margarines.

A final issue was the fact that the DRIs included two ranges for percentage of calories from fat—20 to 35, or 25 to 35, depending upon age and gender. Dr. Nicklas stated that the Nutrient Adequacy and Fatty Acid Subcommittees would consider whether the *Dietary Guidelines* should include two separate ranges or whether a single range could be recommended.

Discussion ensued as to whether 20 percent fat could be considered moderate, or whether that should more accurately be considered a low-fat diet, especially for younger age groups. Several Committee members suggested that the *Dietary Guidelines* could simply present an acceptable range, without describing it as a low, high, or moderate amount of fat.

Dr. Caballero stated that it was his understanding that more and more products have reduced or eliminated *trans* fatty acid. He was concerned about placing too much emphasis on something that represents a small percentage of daily calories when there are so many important messages that must be included in the *Dietary Guidelines*. Dr. Kris-Etherton replied that in developing benchmarks and possible numbers, the Subcommittee would need to decide whether to put saturated fats and *trans* together, or whether to establish a separate recommendation for each type of fat.

Dr. King stated that if the *trans* fat content of the diet is shifting downward, a specific recommendation might be out of date before the report even comes out. She suggested that it might be more reasonable to recommend keeping it as low as possible, without stating a number.

Dr. Pi-Sunyer asked how the Subcommittee proposed to deal with monounsaturates. He expressed concern that recommendations to increase consumption of energy-dense foods such as nuts and olive oil would result in higher energy intake. Dr. Kris-Etherton replied that this issue would be clarified when the Subcommittee examines the food patterns that USDA is developing for various levels of fat. She stated that the Subcommittee would follow the recommendation of the National Cholesterol Education Program that monounsaturates should not exceed 20 percent.

Dr. Kris-Etherton noted that when people think of low energy dense diets, they automatically think of low-fat diets. While that can be the case, a moderate fat diet that is high in fruits and vegetables, plus good fats, can be low in energy density.

Dr. Lupton returned to the subject of stearic acid. She noted that the hypothesis had always been that although it is a saturated fatty acid, stearic acid is non-atherogenic. However, she believed that the literature was fairly divided. She suggested that it would be appropriate to revisit the literature now that stearic acid is becoming more prevalent in the food supply. Committee members had differing views regarding that suggestion. Dr. Kris-Etherton stated that in addition to looking at the market share for stearic acid, it would be important to look at the point of comparison because stearic acid raises cholesterol compared to linoleic acid but has a neutral effect compared with carbohydrate.

Dr. King stated that this section of the report seemed extremely complicated and asked how the Subcommittee would present all of the information to the public. Dr. Kris-Etherton stated that they were planning to develop different food patterns that would allow a great deal of flexibility in diet choices.

Dr. King asked Dr. Nicklas to clarify her concept of the cholesterol/energy ratio. Dr. Nicklas reiterated that children do not consume enough calories to exceed the 300 milligram recommendation. There has been some discussion as to whether cholesterol should be adjusted for energy intake as other macronutrients are. The Subcommittee will be examining this.

Discussion ensued as to whether it was important for children to limit their cholesterol intake. Dr. Nicklas stated that there are a number of nutrients that may not be applicable for the younger age groups or for the elderly and proposed to address that issue in the Nutrient Adequacy presentation. Ultimately, it would be important for the food patterns to be consistent with the recommendations and provide nutrient adequacy.

Dr. King reminded the Committee that the goals for the *Dietary Guidelines* are: (1) to manage body weight; (2) to achieve nutrient adequacy; and (3) to reduce the risk of chronic disease. If there are some important issues around the cholesterol intake of children with regard to one of those three goals, the Committee should make a definitive statement.

Dr. Appel raised the issue of omega-3 and asked whether there was sufficient evidence to support a recommendation to increase consumption of fish. He noted that there are some clinical trials of omega-3 with regard to secondary prevention, but only observational data when it comes to primary prevention. Dr. Kris-Etherton replied that all but one of the studies the Subcommittee had reviewed showed health benefits of about 500 milligrams a day with regard to prevention of heart disease. The Subcommittee would work with the food patterns being developed by USDA to see what impact fish consumption would have on the total diet. She noted that there is a growing database showing health benefits of ALA. Food sources of ALA include walnuts, canola oil, flax seed, and soybeans.

Dr. King asked if the Subcommittee thought it would be necessary to make a comment about the type of dairy products that are chosen, in terms of fat content. Dr. Kris-Etherton replied that the food patterns are based on the lowest-fat choices within the different foods groups, with a daily allotment for fats within calorie levels to maintain energy balance. There will be a budget for both calories and fat. The fat budget can be used for higher-fat foods in any food group. The most flexible way of presenting it is to start with the lean and decide where to add.

Dr. King asked Dr. Clydesdale whether he had any food safety concerns regarding the recommendations of two servings per week of fish. Dr. Clydesdale stated that the Subcommittee was taking its lead from the FDA's Food Advisory Committee. That body recently recommended that there be no warnings put on fish until we learn more about the specific types of mercury and in what species that mercury exists. He noted that limiting or eliminating fish could have the unintended consequence of removing a good source of many other nutrients.

Dr. King commended the Fatty Acid Subcommittee for doing an excellent job delineating a vast array of issues.

(Break, 10:15-10:30)

Carbohydrates Presentation and Discussion

J. Lupton, Lead

Dr. Lupton acknowledged the members of the Subcommittee—Dr. Clydesdale, Dr. Pate, and Dr. Pi-Sunyer—and thanked the staff, including lead staff member, Joan Lyon, and Dr. Pamela Pehrsson, who helped with review of fiber literature.

Dr. Lupton informed the Committee that she had organized the Subcommittee's nine research questions into five categories: 1) carbohydrate intake and obesity; 2) whole grains versus refined grains; 3) the significance of added sugars to health; 4) carbohydrate intake and disease—specifically coronary heart disease and diabetes, and the related issue of glycemic response; and 5) the overall significance of fiber in the diet.

Category 1 included two research questions: What is the relationship of carbohydrate intake to obesity? Is one ratio of carbohydrate to fat to protein better able to sustain a healthy BMI than another? Dr. Lupton noted that these issues would be taken over by a new subcommittee on macronutrient ratio, which would include members of the Carbohydrate Subcommittee. The findings of that Subcommittee would be discussed at a future meeting. Dr. Lupton stated that the Carbohydrate Subcommittee had identified a number of consultants to address certain issues, including Dr. Slavin, Dr. Krauss, and Dr. Hu.

Category 2 included one research question: Is there a measurable difference to human health between whole grain consumption and refined grain consumption? Dr. Lupton noted that Dr. Slavin had addressed that issue in detail during her presentation.

Dr. Lupton stated that Category 3—the health effects of added sugars—was probably the most contentious area. The Committee would need to document any proposed changes to the recommendations in the strongest fashion with evidence-based research. The first question, was: Is there a way to quantify the level at which added sugar consumption may negatively impact human health? Specifically, the Subcommittee wanted to determine if there was any evidence that added sugar consumption was associated with decreased micronutrient intake or increased weight. The Subcommittee added another question that may or may not prove relevant: What is the relationship of fructose intake to human health?

Category 4 included two research questions: What is the relationship of carbohydrate intake to diabetes and heart disease? How does the glycemic response relate to disease, if it does?

Category 5 included the two remaining questions: Does consumption of high fiber foods affect satiety? Should specific types of fibers be recommended to improve laxation?

Dr. Lupton stated that she would review the five categories and their associated questions, with a focus on the status of research in each area, the Subcommittee's thoughts in that area, and directions for future work. She requested input from the Committee as to whether the Subcommittee was on the right track.

Dr. Lupton noted that the Subcommittee made several discoveries at the outset of their work. The first was that the literature on definitions of carbohydrates is especially confusing.

Definitions differ from one paper to another, and some papers do not specify what is included in the definition. As a result, it is difficult to determine the ramifications of carbohydrate level in the diet. Dr. Lupton recommended that the report include a glossary that would define specific attributes of carbohydrates.

The issue of glycemic carbohydrate versus available carbohydrate was also confusing. The Food and Agriculture Organization recommends glycemic carbohydrate, which it defines as providing carbohydrate for metabolism. Others have a different definition.

Dr. Lupton noted that there are also various definitions of dietary fiber. Some researchers specify fiber that is intact from foods, while others include fiber that is synthesized in the laboratory. The issue of whole grains versus refined grains versus enriched grains is another area where greater clarity is needed.

Dr. Lupton stated that when the Subcommittee began its literature review it quickly discovered that its research questions needed to specify the type of carbohydrate. The question of whether carbohydrate intake affects obesity then becomes a series of questions: Do sugars affect obesity? Do starches—or fiber, or whole grains versus refined grains, or high glycemic foods versus low glycemic carbohydrates affect obesity? The various types of carbohydrates need to be treated as separate entities, because sugars and fiber can have the opposite effects.

Dr. Lupton stressed that, when looking at weight gain and obesity, the rest of the diet is as important as the type of carbohydrate, if not more so. This comes back to the issue of carbohydrate to fat to protein ratio, which will be addressed by the new subcommittee on macronutrients.

Dr. Lupton shifted the focus of her presentation to the ultimate goal of the Subcommittee's work, which is to determine whether the existing *Dietary Guidelines* need to be modified. She noted that half of the existing *Dietary Guidelines* could be affected by the Subcommittee's decisions regarding carbohydrates. These include:

- Aim for a healthy weight,
- Let the Pyramid guide your food choices,
- Choose a variety of grains daily, especially, whole grains,
- Choose a variety of fruits and vegetables daily, and
- Choose beverages and foods to moderate your intake of sugars.

Dr. Lupton then provided an overview of the Subcommittee's literature search in Category 1, which was the relationship of carbohydrate intake to obesity. To research the first question in this category (the relationship of carbohydrate intake to obesity), the Subcommittee searched Medline from 1999 to the present (1999 was the cut-off from the previous *Dietary Guidelines* report). The search excluded upfront animal in-vitro studies and review articles. The search produced 94 articles, of which 27 were retained. After reading the articles, 24 were retained. Articles were not retained if carbohydrates were not the intervention.

Nine of the articles that were retained involved carbohydrate to protein to fat ratio and weight loss. The new subcommittee on macronutrients will deal with those. The remaining articles

were divided into two categories: specific carbohydrate interventions; and high glycemic versus low glycemic carbohydrate, intake and satiety factors.

With respect to the issue of carbohydrate intake and obesity, Dr. Lupton asked the Committee to comment on whether the Subcommittee should base its conclusions on type of carbohydrate, and whether it had specified the right categories for type of carbohydrates. She also asked for input as to whether the Subcommittee should focus exclusively on the final outcome, or BMI, or if it should look at intermediate endpoints, such as satiety, insulin response, or post-prandial blood glucose concentrations. She noted that these are two different literature bases.

The second research question in Category 1 was whether there is a measurable difference to human health between whole grain consumption and refined grain consumption. The literature search found 81 abstracts pertaining to whole grains and human health, of which 67 were retained as being relevant to this topic. Dr. Lupton was pleased to find that the abstracts they retained were the same ones that Dr. Slavin had cited in her presentation. The Subcommittee is in the process of reviewing these studies.

Dr. Lupton asked the full Committee whether whole grains should be the driving force of a carbohydrate recommendation for the *Dietary Guidelines* if the review of the literature confirms that whole grains have a significant beneficial effect on human health. Alternatively, should the Subcommittee attempt to determine how much of the health benefits are due to the whole grain itself, and how much are due to its fiber content? Dr. Lupton noted that fiber is the major component that is lost when grain is refined and is not present in enriched grain products. As a result, many would argue that fiber is responsible for the benefits of whole grain. Dr. Lupton also asked whether recommending whole grain as a proxy for fiber would place too great an emphasis on grain products at the expense of other fiber sources such as fruits, vegetables, and legumes.

Dr. Lupton returned to the subject of added sugars because it was a complicated issue. The Subcommittee had two research questions in this area. The first was whether it is possible to quantify the level at which added sugar consumption might negatively impact human health. Dr. Lupton noted that there might be more than one mechanism involved, each of which would need to be investigated. One hypothesis is that sugar in the diet can lead to a dilution of micronutrients among people who reduce their intake of other foods to compensate for the extra calories in the sugar. Another possible outcome of added sugar could be weight gain among those who consume the sugars on top of their normal diets. These are two separate literature bases. Another issue that the Subcommittee proposed to research was the relationship of fructose to human health.

Dr. Lupton noted that the issue of added sugars was covered extensively in the IOM Macronutrient Report, which recommended that added sugar should be no more than 25 percent of total calories. The recommendation was based on added sugar intake data that was combined with nutrient intake data. She presented a table from the Macronutrient Report showing that, in general, as added sugar intake goes up, the intake of micronutrients goes down. At 25 percent of added sugar intake, there was a depression in the intake of specific micronutrients. Dr. Lupton stated that while the Food and Agriculture Organization/World Health Organization stated that the level should be lower than 25 percent, she was unaware of any arguments for increasing the limit.

To complicate matters further, Dr. Lupton cited a recently published study that suggested the outcome can vary depending on the food to which the sugars are added. Added sugars in sweetened dairy products were positively associated with calcium intakes, and added sugars in breakfast cereals increased the likelihood of children and adolescents to meet the recommendations for calcium, folate, iron, and dairy products. On the other hand, added sugars in sweetened beverages, sugars and sweets, and sweetened grains decreased the likelihood of meeting the DRIs for calcium, folate and iron. And, the only children whose mean calcium intake met the AI were those who did not consume sugar-sweetened beverages.

Dr. Lupton raised the question of whether it is possible to meet 100 percent of the DRIs for all nutrients without exceeding recommended energy intake levels. After reviewing the proposed food patterns, she discovered that the maximum amount of discretionary calories after meeting the DRIs for all nutrients would be 13 percent of intake—and that level would only be valid for those at the highest end of the scale (active males, with proposed intake of 3,200 K-cals). Those at the lowest end of the scale (sedentary adult males and females, children from ages four to eight, females aged 51 to 70, and adults over age 70, with proposed intake of 1,200 to 1,600 K-cals) would have only six percent of their calories available for discretionary intake, including added sugars. Given that information, Dr. Lupton asked whether the ability to meet 100 percent of the DRIs at a specific energy intake level is a justifiable and reasonable approach. Should the concept of nutrient density be considered instead of specifying added sugars? Would it be preferable to talk about discretionary calories that could be used in a variety of ways, to stress the need for nutrient density?

Dr. Lupton turned to the fourth category of questions—the relationship of carbohydrate intake to diabetes and heart disease. She stated that the IOM Macronutrient Committee found that there was very little literature on the role of carbohydrates, per se. The Macronutrient Committee also concluded that there was insufficient evidence on which to base a recommendation regarding the glycemic response. With regard to heart disease, the only carbohydrate included in the Macronutrient Report was fiber. The report includes a number of tables on the relationship of dietary fiber to heart disease. Dr. Lupton noted that, for the first time, there is now an AI for dietary fiber. She asked the Committee if it agreed with the recommendations from the Macronutrient Report in this area.

The fifth category was the overall significance of fiber in the diet. Dr. Lupton noted that the Subcommittee's research questions in this area—and many others—could be answered by the Macronutrient Report. As such, these questions would fall into category "A." She asked the full Committee if there were any specific questions on fiber that need to be answered that were not covered by the Macronutrient Report? Most importantly, she asked if fiber intake should form the basis of the food related recommendations, or if the *Dietary Guidelines* should recommend a particular food source for fiber.

Dr. Lupton opened the floor to discussion, noting that she would repeat the Subcommittee's questions for the full Committee in the order that she had just presented them. She began by asking for the Committee's comments on the relationship of carbohydrate to weight.

Discussion

Dr. Pate noted that the Committee had decided to emphasize prevention of weight gain rather than weight loss, per se. He asked Dr. Lupton if the Subcommittee had reviewed any epidemiological studies. Dr. Lupton noted that they had only found one such study, but that they might find others when they do subsequent searches by type of carbohydrate.

The Committee concurred with Dr. Lupton that glycemic index should not be reviewed further. Dr. Kris-Etherton suggested that it might be worth looking at the literature on glycemic response if time allowed. Dr. King noted, and others agreed, that glycemic response and other intermediate endpoints might vary with BMI. Committee members suggested that the Subcommittee review the literature for both normal and overweight individuals to determine if certain associations were limited to people who are sedentary or overweight. It was noted that it might be difficult to construct a summary table about intermediate endpoints such as satiety, insulin resistance, response, or post-prandial glucose, since well-accepted clinical outcomes in these areas are lacking.

Committee members noted that foods such as fruits, vegetables, and legumes should be added to the list of types of carbohydrates for the purposes of the literature review. Dr. Lupton expressed concern that more subcategories would result in fewer studies, which in turn would weaken the evidence base for recommendations.

Dr. Caballero noted that it would be important to acknowledge that millions of Americans appear to be listening to a number of prominent nutrition experts who have gone on record blaming the increase in obesity in the United States on the recommendation to reduce fat intake. It will be important to have a very solid evidence base because the *Dietary Guidelines* will have to address that issue one way or the other.

Dr. Pate asked whether there was any literature that addressed specifically sugar beverage intake and weight or obesity issues. Dr. Lupton deferred discussion of that question. She then asked for the Committee's input as to whether whole grains should be the driving force behind a carbohydrate recommendation.

Dr. Weaver supported a flexible approach that would allow individuals to choose foods to meet fiber needs. Dr. Clydesdale raised a concern about addressing the need to improve food labeling regarding whole grains, which might entail changing some of the laws. There was general agreement among Committee members that fiber should be considered the primary factor in the health benefits of whole grains. Dr. Weaver noted that the food patterns include grains partly because of their contribution of micronutrients, as well as fiber.

With regard to the issue of added sugar, there was general discussion—but no consensus—about whether it would be possible to justify aiming for 100 percent of DRIs at each energy level. The Committee noted that many variables were involved, including the amount of fat and protein in the diet. The importance of flexibility was stressed once again.

Dr. Pate raised the issue of added sugars in beverages, which is a food item that is understood very well by the public. Dr. Lupton replied that the Subcommittee would present the result of their review in this area at the next meeting. Dr. Caballero stated that it might be important to ask Barbara Rolls to comment on whether the ability to regulate and compensate for liquid

calories is different than solid calories. Dr. Lupton agreed that discussion of this topic should be deferred until the facts were available. She noted that the question of whether nutrient density should be considered instead of specifying particular foods, like added sugars or added fats, was emerging as an overarching issue.

Dr. Lupton turned to the issue of the relationship of overall carbohydrates to disease. She noted that the relationship between fiber and coronary heart disease was a well-documented endpoint and asked whether the Committee supported accepting the DRI recommendation for fiber. Dr. Nicklas suggested looking at a range of fiber intake, particularly for younger children, to see how that affects the food patterns. She noted that decreasing the number of servings from legumes would provide additional flexibility regarding sources of fiber. Dr. Lupton noted that the DRI report did contain transition recommendations for fiber in children.

In response to a question from Dr. King, Dr. Lupton confirmed that the IOM Macronutrient Committee had developed the range of recommended fiber intake by assuming 14 grams of fiber per 1,000 K-cal intake. Those at the higher end of the calorie intake have a higher requirement for fiber because they are eating more calories. Dr. Nicklas asked if recommendations took into account the diminished capacity of the elderly to absorb vitamins and minerals. Dr. Lupton replied that fiber levels for the elderly were lower because their calorie needs were lower. The IOM Committee determined that there should not be an upper level of intake for fiber, especially in light of laxation concerns among older people. She noted that mineral balance studies with fiber were no longer being conducted, so there would be no additional evidence in that area.

Dr. Lupton thanked the Committee for their input and turned the floor over to Dr. King. Dr. King congratulated the Subcommittee for an excellent piece of work and for clarifying all of the issues that need to be addressed under the general area of carbohydrate. She noted that the presentations on fatty acids and carbohydrates underscored the need for a macronutrient subcommittee. She asked Dr. Lupton and Dr. Kris-Etherton to serve on that subcommittee, along with Dr. Pi-Sunyer, Dr. Caballero, and Dr. Weaver.

Additional Areas for Further Discussion

Dr. King called the Committee's attention to a list of additional areas for further discussion, and that the list had been compiled after reviewing the 2000 *Dietary Guidelines* in order to help in the transition from nutrient-based analysis to food-based recommendations. The following Subcommittees agreed to address each issue:

- The proportion of cereals that should be whole grains (Nutrient Adequacy, Carbohydrates)
- The number of servings as fruits and vegetables (Nutrient Adequacy, Energy, Carbohydrates)
- Guidance about the intake of added sugars (Carbohydrate, Energy; possibly Nutrient Adequacy)
- Choose and prepare foods with less salt (Fluid and Electrolytes)
- Guidance on amounts of fats, types of fats, and cholesterol (Fatty Acids, Macronutrients)

- Guidance about alcohol intake (Ethanol, Energy; possibly Macronutrients)

Dr. King proposed waiting until after the presentations from the remaining Subcommittees before determining which ones would address issues related to dairy foods, nutrient density, nuts and legumes, and the foundation of the diet.

(Lunch: 12:00-1:10)

Nutrient Adequacy Presentation and Discussion ***C. Weaver, Lead***

Dr. Weaver noted that she had been working with Dr. Nicklas, Dr. Bronner, and Dr. Go. The Subcommittee chose to adopt the DRIs as a standard and the proposed food patterns in the *Federal Register* developed by USDA staff as a starting point.

The Subcommittee's priority issues for research were to determine whether there were any nutrients for which the DRI set a requirement that were not met by the food patterns, and how much flexibility was available in the patterns to accommodate special needs.

The Subcommittee identified three priority research issues:

1. The proposed Food Guide Pyramid patterns did not meet vitamin E recommendations from the DRI. Can we make dietary suggestions for meeting the requirements? Is the evidence sufficiently strong to merit recommendations that ensure meeting the RDA?
2. How much flexibility is there in meeting nutrient adequacy of the diet by specifying minimal servings of a specific food or group of foods?
3. Are there special considerations for meeting nutrient needs throughout the lifecycle beyond the DRIs, especially for the elderly?

The Subcommittee classified the first question as level "A" because of the IOM Report that relates vitamin E and disease and discusses how the RDA was set. The second and third questions were classified as level "C," as it was not possible to develop summary tables and the Subcommittee required input from outside experts.

To address the first question, the Subcommittee asked vitamin E researcher, Dr. Maret Traber, who served on the IOM Panel that developed the RDAs for vitamin E to provide them research for their consideration. They asked her to address a number of questions: What advice would you give consumers on how to meet the new vitamin E requirements? Are there different recommendations for different populations? How strong is the scientific evidence on the effects of vitamin E on the prevention of chronic disease? Is there a particular form of vitamin E other than alpha-tocopherol that may be beneficial? And, how accurate are the alpha-tocopherol values in the national nutrient databases?

One example for meeting the vitamin E recommendations through foods was to consume one ounce of almonds, plus one ounce of sunflower seeds, plus two tablespoons of peanut butter daily. The Subcommittee found this to be far too prescriptive and asked the staff to identify food sources of vitamin E, including the vitamin E concentration per serving and the

contribution of that category of that food in the typical American diet. It was found that foods that were high in vitamin E were not often consumed in significant amounts. It would be important to consider consumption patterns when making recommendations.

With regard to health, there is a study that showed increased consumption of nuts led to increases in alpha-tocopherol blood plasma levels, suggesting it might be reasonable to advocate that including nuts in your diet as a rich source of vitamin E has this health effect.

Dr. Weaver stated that, according to the DRI Report, there is very little evidence suggesting that vitamin E plays a role in the prevention of chronic disease. The Subcommittee determined that the study that was used as the basis for the RDA was not worthy of extraordinary measures to recommend getting 100 percent of the RDA. Dr. Weaver noted that since the IOM Report was issued, the HOPE Trial came out stating that there was no harm or benefit in all-cause mortality associated with supplementing the diet with vitamin E.

The Subcommittee was also interested in vitamin E bioavailability with fortified foods or supplements. A recent study on fortified cereals showed that fortified cereals raised plasma vitamin E levels. One explanation may be because vitamin E is on the surface of the food and therefore absorbed quite readily. Some research indicates that bioavailability can be compromised on a low-fat diet.

The form of vitamin E appears to be important. The RDA is based on alpha-tocopherol, because it is the only form that has been shown to reverse vitamin E deficiency symptoms. There is insufficient evidence that gamma-tocopherol can be a substitute.

Dr. Weaver noted that it is difficult to estimate the vitamin E intakes of the population. Food composition databases remain a barrier, but capturing accurate survey data on what people eat, especially amount and type of fat, is an even greater weakness.

The Subcommittee's conclusion at this point with regard to a vitamin E requirement is not to alter the proposed Food Guide Pyramid patterns in an attempt to specifically meet the RDA for vitamin E. However, the text should point out sources of vitamin E so that consumers could try to increase their intake. Dr. Weaver noted that the proposed Food Guide Pyramid patterns are moving toward improved vitamin E intake.

Dr. Weaver then addressed the issue of how to make recommendations for food choices as flexible as possible and still meet nearly 100 percent of the RDAs for the different nutrients, aside from vitamin E. To date, the Subcommittee has focused on the grains and cereals group. All of the twelve food patterns recommend that half of the servings in this group should be whole grains. The Subcommittee asked whether nutritional adequacy would be compromised if enriched grains were omitted from the diet. An analysis conducted by USDA showed that some patterns would have shortfalls in folate, calcium, magnesium, iron, and fiber.

USDA helped the Subcommittee identify two strategies to achieve 100% of the nutrients in that category. The first was to replace enriched grains serving-for-serving with whole grains. The second was to replace each serving of enriched grains with dark green vegetables and legumes (one cup of each per serving of enriched grains on an 1,800 calorie food pattern).

Dr. Weaver reminded the Committee that the goal of the food patterns was to meet the nutrient requirements and appropriate energy balance with the fewest changes from the typical or current American eating habits. She referred to Dr. Hentges' presentation on the first day, which showed that the proposed food patterns were already asking Americans to make dramatic changes in their intake of certain types of foods compared to what they are currently consuming. She asked the Committee to keep that in mind before proposing any additional "what if" scenarios.

Dr. Weaver noted that it would be possible to offer further flexibility for individuals' eating preferences. Interactive educational tools would be helpful in that regard.

The Subcommittee discussed placing soft margarine with solid fats, rather than with oils, because of their *trans* fat content. They felt this was an overarching issue and deferred discussion on that question.

Dr. Weaver noted that the Subcommittee had discussed a unique position for legumes, seeds, and nuts. In the end, they decided against that, because removing them from the Meat group would leave no plant-based alternatives in that group, while removing them from the Vegetable group could send a message to consume fewer vegetables.

The Subcommittee invited Dr. Johnson to address the nutritional needs of the elderly. Dr. Weaver stated that the Subcommittee would consider several of Dr. Johnson's suggestions, including supplementation for vitamin B-12 for that group, and would have further discussions regarding vitamin D.

Dr. Weaver noted that Dr. Bronner had asked the Subcommittee to address the role of dairy products in youth, not only for building peak bone mass but for offsetting or reducing risk of osteoporosis and chronic diseases later in life. Dr. Weaver stated that the Subcommittee would address that question.

Dr. Weaver asked the Committee whether there were any other questions about flexibility of food groups, or emphasis on food groups to meet nutrient recommendations that the Subcommittee should consider. She stated that her Subcommittee was particularly interested in the nutrient density aspect of that question, and she noted that USDA staff had prepared an analysis of the nutrients by food group in one food pattern. Dr. Weaver felt this was an important first-step in addressing the issue of nutrient density. It also paved the way for designing interactive tools for consumer use. For example, if a person disliked the deep yellow vegetables that provide 40 percent of their vitamin A, the computer could provide additional choices for obtaining that nutrient.

Dr. Weaver opened the floor for discussion.

Discussion

Dr. Clydesdale asked whether the discussion about replacing enriched grains also involved fortified whole grains. Dr. Weaver replied that some fortified foods were included, but others were not.

Dr. King asked Dr. Weaver to clarify the Subcommittee's proposal that it would be acceptable to recommend food patterns that do not meet the RDA for vitamin E. Dr. Weaver stated that the lowest amount of vitamin E in the proposed food patterns is 50 percent. The Subcommittee felt the evidence did not support making a stronger recommendation, other than to provide a list of good sources of vitamin E in the text. Dr. Appel cautioned that the Committee would have to defend very carefully a recommendation to meet only half of the RDA, even if the RDA was based on a bad study.

Dr. Lupton asked if this would be the only instance where the Committee would go against the DRIs. She noted that the best way to phrase it might be to say that we acknowledge the DRI, but it is not easy to meet that level through food choices. In that case, the Committee could go as low as 50 percent and provide the evidence that this would not be harmful. Dr. King concurred, and she added that it would be important to include information on how to meet the vitamin E RDA so that if individuals chose to go that way, they would know how to do so.

The discussion returned to the issue of whether the food patterns need to meet 100 percent of the RDA. Dr. King noted the RDA is set to meet the nutrient requirements of 97.5 percent of the population. She asked whether the Committee should be using the RDAs, or if it should be using the EAR, which meets the needs of 50 percent of the population. Dr. Lupton pointed out that there is no EAR for nutrients that have AI levels, and she asked what comparable number would be used for nutrients that do not have an RDA.

Dr. Pate noted that an attempt was made in the food patterns to adjust for activity level and asked if the Subcommittee's considerations were based on the sedentary food patterns. Dr. Weaver replied that they had looked at all twelve proposed patterns. A discussion ensued regarding what level would be used for the *Dietary Guidelines*. There was a secondary discussion about how to reconcile the descriptive terms for levels of physical activity in the CDC report and the DRIs. Dr. Weaver expressed concern that specifying one pattern would remove much of the flexibility that exists when there are twelve patterns. The current Pyramid expresses this flexibility by providing a range of servings within each food group.

Dr. King stated that the Food Guide Pyramid incorporates two very important things in diets and nutrition. One is the pattern of the food groups, and the second is the quantity within the food groups. She stated that the Committee appeared to be struggling with how to integrate those two things, because quantity is directly tied to energy needs, and the pattern is related to nutrient adequacy. She asked Dr. Hentges if USDA had ever envisioned a graphic that would deal with nutrient adequacy by showing people what food groups they need to include in their diets every day, with some non-quantitative, but qualitative information on amounts, possibly with different levels of energy intake as a sub-graphics.

Dr. Hentges replied that this would be part of the consumer testing, but the technical, science-based parameters for the guidance would need to be developed before they could adequately develop the messages and graphic imaging to convey that guidance.

A lengthy discussion ensued. Dr. Pate stated that it seemed the most consistent to target both the activity and the dietary recommendations at the same healthy lifestyle. Dr. Nicklas stated that it would be important to consider how to incorporate needs for different age groups when selecting physical activity and energy levels.

Dr. Bronner stated that it was her understanding that the Committee agreed that no one table would fit the lifecycle and reflect the complexity of the population. Rather, it would develop one model around which many of the messages could be communicated, and individuals could customize this model based on their activity level and energy needs.

Dr. King asked if the Subcommittee was looking at several different patterns to address nutrient adequacy, independent of energy needs. Dr. Weaver replied that they were working with all 12 patterns simultaneously. Any proposed iterations were done across all 12 patterns. In coming weeks, the Subcommittee would be examining the issue of nutrient density by looking at the contribution of different foods within the 12 patterns, nutrient-by-nutrient, in order to be able to generate information regarding flexibility of food choices.

Dr. King asked Dr. Weaver whether she thought the relationship of dairy food intake and bone health in the young and the risk of osteoporosis later in life was an issue that needed to be addressed. Dr. Bronner stated that this question had come out of her thinking about how to communicate messages around nutrient needs at different points in the lifecycle. One of the clearest examples of that was calcium. Calcium intake is crucial for building bone in the early years, and then is protective of disease, disability, and health care costs at a later point in life. Dr. Bronner would be reviewing the evidence and would present her findings at the next meeting. The Committee concurred that this would be an important message to include.

Summarizing the discussion, Dr. King stated that the Subcommittee would not have to go back and try to meet the vitamin E RDA, but the rationale for that decision would have to be developed carefully. The Subcommittee would review food patterns at different levels of fat, looking at different combinations that promote nutrient density. Finally, the Subcommittee would review the literature with regard to dairy food consumption, bone health, and risk of osteoporosis, and incorporating this into the activity patterns.

Dr. Nicklas added two additional items. The Subcommittee would look at fiber ranges at the younger ages and see how that alters the food patterns. The Subcommittee would also look at different subgroups of fruits and vegetables and see how that alters the patterns, and it would also look to see if it might be necessary to make separate recommendations for fruits as a whole versus fruits and juices.

Dr. Bronner stated that she would not need to make a separate presentation, since the Nutrient Adequacy Subcommittee would now be addressing lifecycle issues.

Dr. King turned the floor over to Dr. Clydesdale and the Food Safety Subcommittee.

Food Safety Presentation and Discussion
F. Clydesdale, Lead

Dr. Clydesdale stated that his colleagues on this Subcommittee were Dr. Camargo and Dr. Weaver and thanked the staff for their support. He noted that his presentation would consist of a review of what the experts had said, plans for future investigations, recommendations to date, and possible future recommendations.

The Food Safety Subcommittee had three level “B” research questions. The first question, and also the Subcommittee’s top priority, was: What acts or activities are most likely to cause food safety problems, such as food borne illness? And try to prioritize these acts. The Subcommittee wanted to make sure that these activities would be addressed in the recommendations in the appropriate detail and the appropriate manner. The Subcommittee met via conference call with several experts, because there was no comprehensive table already developed in the scientific literature or otherwise.

The second question was: What data are there regarding effectiveness of hand washing, including use of bacterial cleansers in preventing food borne illness? The Subcommittee’s third research question was: How do people view the recommendations on food safety and do they change their behavior? What makes them change their behavior? Dr. Clydesdale stated that the Subcommittee had reviewed the data on questions one and two. Question three was addressed to some extent by one of the scientific speakers, but the Subcommittee is still investigating this area.

To address the first research question, the Subcommittee consulted with Dr. Mike Doyle from the University of Georgia; Dr. Lydia Medeiros from Ohio State University; and Dr. Isabel Walls from the International Life Sciences Institute, Risk Science Institute.

Dr. Doyle ranked ordered the activities as: improper hand washing; failing to keep foods cool at proper temperatures; failing to avoid cross-contamination; and inadequate cooking. He referred the Subcommittee to a 1988 paper, which he said reviewed the literature fairly well in this area. That paper included the same activities, with improper cooling ranked as the major cause of food borne illness, followed by improper hand washing.

Dr. Clydesdale stated that the advice to clean, separate, cook, and chill—which is the “Fight Bac!” message, is still applicable and critical for consumers. The Subcommittee would recommend keeping that message, with the addition of another chill step before cooking. The revised advice would be to clean, separate, chill, cook, and chill. He stressed that consumers need to be told in exquisite detail exactly what to do.

A paper by one of the Subcommittee’s other consultants, Dr. Medeiros, emphasized the primary importance of using a thermometer to cook foods thoroughly. (Dr. Clydesdale noted that the Subcommittee would like to retain the thermometer graphic that appears in the current *Dietary Guidelines*.) That paper also listed hand washing, avoidance of cross-contamination, and avoidance of certain foods likely to be contaminated as important actions to prevent food borne illness. In another paper that focused on consumer education, Dr. Medeiros cited hand washing, adequate cooking, and avoiding cross-contamination as the three primary messages, with secondary messages of keep food safe to eat, and avoid foods from unsafe sources.

The Subcommittee’s plans for future investigation are to expand its discussion of high-risk categories; to determine methods and recommendations for cleaning fresh fruits and vegetables; and to continue its evaluation of mechanisms for behavior change.

Dr. Clydesdale listed the high-risk groups as “the three Ps”: people (special needs groups); pathogens (listeria and others); and products, especially ready-to-eat products. The special needs groups identified in the current *Dietary Guidelines* are pregnant women; young children; older persons; and people with weakened immune systems or certain chronic

illnesses. The Subcommittee is looking at others, including people with diabetes, people on steroids, and people with chronic suppression of gastric acids and immune compromise. The Subcommittee will ask the full panel to comment on whether these should be included in the *Dietary Guidelines*.

Dr. Clydesdale presented data from a paper by Dr. Medeiros and others that showed the food handling behaviors and specific pathogens of importance to pregnant women, infants, and young children. He noted that listeria is a major pathogen in ready-to-eat products. While the normal healthy population appears to be at very low risk for listeria, there is a very high mortality rate among those in high-risk groups. Dr. Clydesdale emphasized the importance of letting consumers know that there are certain foods they should avoid under certain situations.

Dr. Clydesdale noted that there have been recent outbreaks of food borne infections from fresh produce. The Subcommittee prepared a list of proper procedures for cleaning various types of fruits and vegetables and would continue to review the literature, particularly with regard to root tubers and fragile fruits. The Subcommittee would like to include detailed instructions in the Guidelines.

Dr. Clydesdale reported that the Subcommittee would make a quantitative recommendation on hand washing with soap and water; it would expand the advice on cleaning refrigerators and counter-tops to avoid cross-contamination and the risk of pathogens; it would keep the “Fight Bac!” message, with the addition of a second chill step; and it is considering the methylmercury fish recommendation. The Subcommittee would also expand the advice about throwing out unsafe food.

The Subcommittee conducted a literature review and prepared summary tables on hand washing. The findings included: 1) Alcohols have very poor activity against bacterial spores; 2) Ingredients used in hand-based gels for retailer food service must be approved for food additives; and 3) Retail and food service work involves high potential for wet hands contaminated with proteinaceous material, but the research questions the efficacy of alcohol on moist hands and hands contaminated with proteinaceous material.

The FDA and CDC both recommend washing hands with soap and water, when it comes to food handling. The CDC recommends washing for 15 to 20 seconds, or long enough to sing the “Happy Birthday” song twice. The Subcommittee proposes to include detailed handwashing instructions in the *Dietary Guidelines*.

The rationale for keeping the “Fight Bac!” message is the fact that awareness of any campaign about safe food handling was up to 46 percent in 1999, versus 39 percent in 1997 when the Partnership for Food Safety Education started. And surveys of consumers in two cities where a concentrated “Fight Bac!” education effort took place showed a higher awareness of general food safety principles, when compared to national averages. The literature also showed large improvements in consumer food safety practices between 1993 and 1998, and a 2001 survey found that these gains were maintained or improved.

With regard to methylmercury, Dr. Clydesdale noted that the FDA Food Advisory Committee recently recommended maintaining current dietary advice. The FDA’s dietary advice specifically states that fish and shellfish can be an important part of a healthy diet. In the absence of sufficient information on the forms of methylmercury in each species of fish, the

Subcommittee would go along with the FDA Food Advisory Committee's recommendation and would not propose any new messages in this area.

Dr. Clydesdale opened the floor for discussion.

Discussion

Dr. Kris-Etherton asked if the Subcommittee would be dealing with issues such as PCBs in fish, hoof-and-mouth disease, and mad cow disease that are hot buttons for consumers. Dr. Clydesdale replied that while the Subcommittee acknowledged the level of public concern, it felt that it would be more important to emphasize the big risks that they can do something about than to fill them with fear about things that are much smaller risks.

In response to questions from Dr. Appel, Dr. Clydesdale stated that the Subcommittee would prepare detailed information on how to avoid contamination in specific foods, including deli meats. He emphasized that the Subcommittee does not want its recommendations to have the unintended consequences of eliminating foods that are convenient for people to eat.

Dr. King congratulated the Subcommittee on its work to date. She informed the Committee that at the end of the day she would like to have each of the Subcommittee leads give a mini-report of what key conclusions they had come to as a result of the day's discussions, what conclusive statements and rationale they would be able to give to Dr. Suitor in early February to start drafting the report, and what key things they would be working on between now and the March meeting.

(Break; 2:30-2:45)

Ethanol Presentation and Discussion ***C. Camargo, Lead***

The Ethanol Subcommittee consisted of Dr. Camargo, Dr. Kris-Etherton, and Dr. Appel. Dr. Camargo prefaced his presentation by acknowledging that alcohol is a contentious issue and people have strong feelings about it. He then provided an overview of the relevant advice in the 2000 *Dietary Guidelines*, which were the starting point for the Subcommittee's work.

The ethanol recommendation in the 2000 *Dietary Guidelines* was, "If you drink alcoholic beverages, do so in moderation." There were three supporting statements for this recommendation: Alcoholic beverages supply calories, but few nutrients. Alcoholic beverages are harmful when consumed in excess, and some people should not drink at all. If adults choose to drink alcoholic beverages, they should consume them only in moderation, and with meals to slow absorption.

"Moderation" was defined in the 2000 *Dietary Guidelines* as no more than two drinks per day for men, and no more than one drink per day for women. The *Dietary Guidelines* stated that drinking in moderation may lower risk for coronary heart disease, but mainly among men over age 45, and women over age 55. And another highlight of the last iteration was the statement that even one drink per day can slightly raise the risk of breast cancer.

The Subcommittee felt that the advice in the 2000 *Dietary Guidelines* was accurate and did not require modification. Through their discussions, the Subcommittee identified several new issues. Dr. Camargo thanked HHS, USDA, and the National Institute on Alcohol Abuse and Alcoholism (NIAAA) for assistance. He stated that the NIAAA's State of the Science Report was an excellent document that summarized the last few years of literature. Dr. Camargo noted that, in many respects, the NIAAA report supports leaving the guideline largely intact because the latest data has largely confirmed what was known at that time.

The first additional issue that the Subcommittee discussed was the need to state clearly that abstention is an option and to recognize that 35 percent of adult Americans do not drink alcohol. The Subcommittee would propose adding this to the guideline.

The second issue was the possibility of lowering the drinking limit for older men. The Subcommittee had data tables drawn up so it could review the data to see whether the mortality benefit was the same in older Americans. The data were largely consistent with what is seen in other adults. After further research, the Subcommittee determined that body composition arguments might support lowering the drinking limit for older men to one drink per day, though the evidence was not compelling. A discussion with experts at NIAAA indicated that this may no longer be a critical issue because as Americans are aging better, they are losing less lean body mass.

Dr. Camargo noted that the Subcommittee also discussed racial and ethnic differences in alcohol metabolism. It was the consensus of the group that these were not significant at the moderate drinking level.

The Subcommittee felt that it would be important to emphasize variability of calories from alcoholic beverages, specifically noting that some alcoholic beverages, like dessert wines or mixed drinks, can have almost three times as many calories as those beverages are listed in the current *Dietary Guidelines*.

The Subcommittee also wanted to mention "designer drinks," which are newer alcohol products that tend to target young adults and, possibly, underage drinkers.

The Subcommittee thought that the discussion of adverse impacts should be broadened. In particular, references to "cirrhosis" should be changed to "liver damage," since lower levels of alcohol intake can result in liver function abnormalities short of cirrhosis.

The Subcommittee considered whether to change the "drink with meals" advice to "drink with food." However, the foods that are generally consumed with alcohol, apart from a meal, are generally not the sort of snack foods that the Subcommittee wanted to promote. They also reviewed compelling data showing how the quantity and volume of a meal could slow the absorption of alcohol. As a result, the Subcommittee proposed keeping the current language.

Dr. Camargo stated that the Subcommittee was in the process of looking at associations between alcohol intake and a variety of nutritional diet parameters, such as BMI, calories, physical activity, macronutrients, micronutrients, and diet quality. To date, they have prepared a data table on alcohol and BMI. As expected, the literature was quite inconclusive. There was not a strong association between consuming one or two drinks a day and weight. With respect to macronutrients and micronutrients, the Subcommittee's preliminary impression was

that one to two drinks a day would not be associated with any deficiency. With respect to diet, the Subcommittee asked the USDA to do an analysis of some national datasets looking at the Healthy Eating Index of people at different levels of alcohol intake in the moderate range.

Dr. Camargo stated that he would favor putting some comment about alcohol in the graphic of the Food Guide Pyramid. He noted that the comment would need to specify that the advice be for adults. Dr. Camargo requested input from the full Committee regarding this question.

One area where the Subcommittee thought it might change the current Guideline was to separate out some compelling, temporary reasons to not drink alcohol, such as when planning to drive, operate machinery, or take part in activities that require attention, skill, or coordination. In the current *Dietary Guidelines*, these are lumped together with larger reasons not to drink, such as personal history of alcoholism or being underage.

The Subcommittee also recommended adding breastfeeding to the list of temporary reasons to not drink. Dr. Camargo emphasized that it would be important to dispel myths about alcohol as a lactation aid. Recent data indicates that alcohol consumption while breastfeeding has adverse effects on the infant's feeding and behavior. Dr. Camargo suggested that the advice could also state that if a breastfeeding woman does choose to drink in moderation, she should do so after feeding her infant so that the alcohol could be absorbed before the next feeding.

The Subcommittee recommended maintaining the emphasis on the hazards of heavy drinking, but without specifying the exact level of pattern of consumption.

The Subcommittee also proposed adding information on why alcohol should not be consumed by adolescents, with an emphasis on the risk of traumatic injury and death, which is the number one cause of death in that age group. The animal data on the effect of alcohol on brains could also help to illustrate why drinking is inappropriate for adolescents. The Subcommittee also discussed the fact that in some other cultures teenagers can drink and not have the binge drinking experience that we have in this country. They concluded that it would be beyond the scope of the *Dietary Guidelines* to attempt to change the cultural milieu.

Dr. Camargo noted that there are some demonstrated benefits of drinking. Studies conducted around the world with different age groups—including older adults—consistently show that alcohol can have a favorable impact on total mortality.

Dr. Camargo stated that there also continues to be papers talking about beverage-specific effects. The Subcommittee felt that while laboratory findings suggested that red wine might have some extra health benefits, this finding did not translate into the epidemiologic data. They found examples of populations who consumed largely beer, and others who consumed largely distilled spirits enjoyed the mortality reduction. Dr. Camargo thought that the primary ingredient was ethanol. He opened that up to the larger group.

Dr. Camargo concluded his presentations with several recommendations aimed at changing the culture around alcohol. The first was to put a simple label on alcoholic beverages that shows their caloric content (though not nutrients). The second recommendation was to ban alcohol advertising when and where it might encourage underage drinking. The final recommendation was to consolidate authority about alcoholic beverages under one federal agency.

Dr. Camargo thanked the Committee and opened the floor to discussion.

Discussion

With regard to the issue of breastfeeding, Dr. Weaver expressed concern that the concept of “safe timing” may be seen as an endorsement for lactating women to drink. She also noted that it would be unrealistic, given the difficulty of predicting when an infant will want to feed. Dr. Camargo replied that the statement would have to be worded carefully. While he agreed that the Subcommittee should not endorse drinking for breastfeeding women, it should not ignore the fact that many women believe that drinking can aid lactation. He also stated that it would be unrealistic to expect women to avoid drinking any alcohol during a one-year breastfeeding period. He noted that the Subcommittee would retain the current Guideline for pregnancy, which is zero tolerance. Dr. Bronner supported including lactation in the literature review in order to see what the metabolic process is.

Dr. Pate asked if the Subcommittee would highlight DUI-related deaths and injuries to a greater extent than in the previous *Dietary Guidelines*. Dr. Camargo replied that one way to do that would be to list reasons why the group that is at highest risk of traumatic injury—i.e., adolescents—should not drink. Another way would be to go beyond the *Dietary Guidelines* to target situations that lead to drinking-related deaths and injuries, which could be suggested in the data section of the technical report.

Dr. King asked whether the liver disease that is seen with high intakes of alcohol was a greater problem among obese individuals who are also prone to fatty liver. Dr. Pi-Sunyer stated that was not the case. Although people who have fatty livers tend to be obese, these individuals generally do not drink much alcohol. Dr. Camargo noted that one of the problems in this area is that many studies in which moderate drinking is associated with a variety of negative outcomes, actually define moderate drinking as three or more drinks. The effects on the liver are minimal at the level defined in the existing guideline, which clearly defines a maximum of one drink per day for women and two drinks per day for men.

Dr. King asked the Committee to comment on the possibility of including alcohol in the Food Guide Pyramid. Dr. Pi-Sunyer was concerned that some consumers might understand this to mean that alcohol consumption was recommended. Dr. Caballero noted that it would make sense in a culture where wine was part of the typical dietary pattern. Dr. Camargo stated that he understood those views, but he also felt that including alcohol in the Pyramid would present an opportunity to teach Americans about sensible drinking as they are learning about nutrition. Dr. Kris-Etherton suggested that alcohol could be included in the top of the Pyramid, along with added sugars and added fats. Dr. Nicklas noted that if alcohol were included, there would need to be a separate Pyramid for adults and children. Dr. Clydesdale agreed that including alcohol in the Pyramid could give adolescents more license to drink. Dr. Caballero noted that it would be one of the only restrictive messages in the Pyramid, which on the whole is designed to emphasize positive messages.

Dr. Lupton asked if the Subcommittee had considered addressing the link between heavy drinking and impaired judgment regarding sexual behavior, especially among younger people. Dr. Camargo noted that the Subcommittee had, in fact, considered that as another argument to try to discourage underage drinking. He noted that this message could support efforts to

prevent sexually transmitted diseases and unwanted pregnancy, which are often associated with underage drinking.

Dr. Caballero expressed concern about including animal data in the report. While he did not question the evidence, he thought this would be inconsistent with the rest of the *Dietary Guidelines*, which generally did not quote animal data. Dr. Camargo clarified that the animal studies would be included as supporting data in the technical report and would not be quoted in the consumer guide. He noted that animal studies had been used very effectively to promote a zero-tolerance position for drinking during pregnancy.

Dr. Pi-Sunyer asked if the alcohol recommendation should be modified for older adults. Dr. Camargo replied that after reviewing the data, the Subcommittee decided to maintain the existing guideline. This decision was supported by the conclusions of the NIAAA report, which stated: “Although elderly drinkers reach higher blood alcohol concentrations (BACs) with lower levels of consumption than the younger counterparts, their level of impairment at any given BAC level does not differ from that of younger drinkers.”

Fluid and Electrolytes Presentation and Discussion

L. Appel, Lead

Dr. Appel began his presentation by stating that the Fluid and Electrolytes Subcommittee consisted of himself, Dr. Caballero, Dr. Pate, and Dr. Weaver. Michael Sawka, U.S. Army Research Institute of Environmental Medicine, served as a consultant on water, and Kim Stitzel is the staff person for the committee.

Dr. Appel noted that he served as chair of IOM Report on Fluid and Electrolytes, which looked at water, salt (sodium chloride), potassium, and sulfate. The report had not been released as of this meeting. He stated that the Subcommittee would only be dealing with water, salt, and potassium; it would not address sulfate.

Dr. Appel stated that the Subcommittee had five level “A” research questions related to sodium and potassium for which evidence tables were available: What is the relationship between salt intake and blood pressure? What is the relationship between salt intake and cardiovascular disease? What is the relationship between salt intake and osteoporosis? What is the relationship between potassium intake and blood pressure? And, finally, what is the relationship between potassium intake and cardiovascular disease, parallel to the last three questions?

Dr. Appel noted that the Subcommittee would not be in a position to discuss the level “A” questions until the IOM report was released.

Dr. Appel reported that the Subcommittee was in the process of conducting science-based reviews for two of its level “B” questions: Does potassium intake modify the relationship between salt intake and blood pressure (and vice versa)? And, what is the relationship between potassium intake and osteoporosis?

The Subcommittee considered additional “B” questions for which it probably will not do evidence-based reviews. These were: Does race influence the relationship between salt intake and blood pressure? Does race influence relationship between potassium intake and blood

pressure? Does calcium intake influence the relationship between salt intake and blood pressure? And, does calcium intake influence the relationship between potassium intake and blood pressure?

Dr. Appel stated that the Subcommittee's major discussion of these questions would occur at the March meeting.

Dr. Appel noted that none of the prior *Dietary Guidelines* had dealt with what healthy Americans should do with regard to consumption of water. The Subcommittee had extensive discussions as to whether and how it should tackle this issue, especially since the Committee needed some external expertise in this area. The Subcommittee decided that there should be a guideline for water consumption in the general population, given the highly prevalent pattern of water consumption. The Subcommittee decided not to cover the health effects of caffeinated beverages.

Dr. Appel opened the floor for discussion.

Discussion

Dr. Camargo asked if the Subcommittee had considered recommending that Americans should drink water with meals, as opposed to sugar-laden beverages, which would make more calories available for nutrient-dense foods. Dr. Appel stated that although the Subcommittee had not considered that rationale for drinking water, it would be a reasonable strategy for achieving energy balance.

Dr. Go asked if the Subcommittee had considered the liquid content of fruits and vegetables, which is generally between 50 to 80 percent. Dr. Appel stated that this was an excellent point. He noted that while roughly 80 percent of total water consumption comes from water in beverages, 20 percent comes from food, including fruits and vegetables. Fruits, and particularly fruit juices, are obviously important components of that 20 percent.

Dr. King asked if it would be important to include water in the Food Guide Pyramid. Dr. Appel replied that the Subcommittee did not have an answer to that question. Dr. Weaver noted that the expert who was consulted by the Subcommittee did not distinguish fluid water versus water from food. Dr. Caballero stated that it would depend on whether the Subcommittee decided to make a specific recommendation for water. There would be no reason to include water in the Pyramid if it was not associated with a recommendation.

Dr. Caballero asked whether needs for electrolytes and water remain relatively constant through various levels of physical activity, except at the very high or competitive level. Dr. Appel stated that the body seems to be able to auto-regulate the amount of losses, at least in the range of exertion that the Committee would be recommending. With high sodium and potassium intakes, sweat losses of those electrolytes are high, while sweat losses are greatly reduced at lower levels of intake. Dr. Pate noted that sweat losses of water would probably be proportional to the overall activity level. Dr. Appel and Dr. Pate both thought it would be appropriate to ask the Subcommittee expert to address this question.

Dr. Pate asked if there was any evidence that those who consume more glasses of water per day displace other forms of beverage intake. Dr. Caballero stated that the thirst mechanism is

similar for sweetened beverage or pure water. Dr. Appel noted that the addition of almost any solute to water increases thirst, whether that solute is flavoring or salt.

Dr. Nicklas asked if the Subcommittee had considered whether magnesium played a role in blood pressure. Dr. Appel replied that nutrients such as magnesium and calcium were outside of the Subcommittee's charge. However, he noted that clinical trials show no effect of magnesium on blood pressure. While magnesium may have a small effect at high doses, he would not recommend it to reduce blood pressure.

Dr. King asked if there was any health risk associated with caffeinated beverages. Dr. Appel replied that the findings of the observational studies with which he was familiar were inconsistent. He stated that the caffeine literature was not strong and that reviewing it would divert the Subcommittee's attention from more important topics.

Dr. King thanked the Subcommittee for its presentation.

Review of Meeting, Assignments, and Next Steps

J. King

Dr. King asked the Committee to return to the list of additional areas for discussion that it had looked at briefly before lunch and asked the members to determine which Subcommittees would work on each question.

- Guidance on amount and type of dairy foods (Nutrient Adequacy)
- Nuts as a vehicle for the delivery of omega-3 fatty acids (Nutrient Adequacy, Fatty Acid)
- Methods for developing the food guide patterns (USDA staff)

Dr. King deferred discussion of the foundation of the diet until some of the overarching issues were resolved. She then asked each Subcommittee to identify: the conclusions it had reached as a result of the discussions at this meeting; the statements it could give to the writer by February 6; and a brief list of its next steps.

Energy Balance

The Subcommittee would prepare statements regarding the amount of physical activity to prevent excessive weight gain and the amount of physical activity required to maintain weight, with a goal of having them ready for the writer by February 6. However, the Subcommittee would not have final concluding statements regarding these questions until it heard from the CDC experts in March. The Subcommittee might also have a statement on fruits and vegetables and BMI by February 6.

The question of the carbohydrate to fat ratio would be transferred to the new Macronutrient Subcommittee. Between this meeting and March, the Subcommittee would work on the issues of breakfast, energy density, the level of activity regulating appetite, portion sizes, and leisure time physical activity modes.

Fatty Acids

This Subcommittee had some preliminary conclusions. They would recommend a total fat level that is consistent with the IOM AMDR for fat. They would recommend reducing saturated fatty acids, *trans* fatty acids, and dietary cholesterol, because they increase LDL.

The recommended level for unsaturated fats required further discussion. The recommendation would depend in part on the menu modeling exercises that USDA was preparing.

Before the next meeting, the Subcommittee would look at the literature and develop recommendations for monounsaturated fat and polyunsaturated fat, including omega-3s and omega-6s. They would evaluate the fatty acid composition of fats and oils and margarines, using existing food composition analyses. Additional information from USDA and others would help determine how to categorize solid fats and liquid fats.

The Subcommittee would conduct a literature search on the impact of stearic acid on health outcomes and would pursue the menu modeling exercise, looking at the impact on nutrient adequacy of different fat levels, 20, 25, 30, and 35 percent. They would also obtain information from NCI about fatty acids and cancer risk.

Carbohydrates

The Subcommittee would soon provide the writer with information on the efficacy of whole grains and human health. The statement on whether fiber should drive the recommendations was close to completion. They would also put together a glossary of the key terms for carbohydrates.

The Subcommittee determined at this meeting that glycemic index and glycemic load were not appropriate targets for research.

The Subcommittee's next tasks would be to conduct an expanded search for the effect of carbohydrates on weight, to include grains, fruits, vegetables, milk, and so forth. The ratio of carbohydrate to fat to protein, and its effect on weight management would be a subject for the Macronutrient Subcommittee.

The questions pertaining to added sugars require additional analysis. The Subcommittee would work on those issues with the Nutrient Adequacy Subcommittee.

Nutrient Adequacy

The Subcommittee would recommend food patterns where the goal is to meet the RDAs where possible, or AI where there is not an RDA for nutrients and appropriate caloric needs. Although the specific food patterns were still being developed, the Subcommittee could state that their recommendations would call for changes in the current eating patterns of Americans, including increased green vegetable consumption, increased orange vegetables, increased legumes, decreased starchy vegetables, increased whole grains, decreased enriched grains, increased fruits, increased dairy, decreased total fats, especially solids, decreased added sugars, and decreased calories for many groups.

The Subcommittee would state that it is difficult to meet the RDA for vitamin E.

The Subcommittee would recommend that half of the grain servings in each food pattern category come from whole grains. They would provide flexibility within this group by specifying alternative sources for the nutrients currently provided by enriched grains.

The Subcommittee decided not to recommend a unique group for nuts, seeds, and legumes because that would leave no plant food in the Meat group, it would have an unfavorable appearance of recommending a decrease in vegetable consumption, and there is no unique nutrient to those foods, although some may be recommended as healthful choices.

Going forward, the Subcommittees would: 1) work with USDA to generate tables of nutrient contributions for each of the various food types for each of the patterns so that it could formulate alternative strategies for any one individual nutrient; 2) review the literature on the contribution of dairy and calcium and physical activity in early life; 3) consider whether decreasing the recommendation of fiber in the younger age group would alter the ability to meet the DRI for other nutrients; 4) look at what flexibility or specificity is needed within the fruits and juices group; 5) make iterations to the food patterns to address special needs identified at this meeting, such as individuals who do not eat legumes, are lactose intolerant, or are vegetarians; 6) consider supplements for the elderly with regard to B-12 and vitamin D, in particular; and 7) look at the rest of the nutrient DRI achievement after the iterations from the Fatty Acid Committee, looking at 25, 30, and 35 percent of the calories as fat.

Food Safety

The Subcommittee would submit two recommendations to the writer: keep the “Fight Bac!” message, with an additional “chill” step, and add a quantitative recommendation on hand washing. The Subcommittee would also develop recommendations regarding the at-risk populations and the at-risk foods. The Subcommittee would recommend that the language regarding fish should not be changed.

Going forward, the Subcommittee would look at the steps for cleaning fruits and vegetables, including pre-packaged salads, and it would continue to search the literature regarding behavior changes.

Ethanol

The Subcommittee concluded that the 2000 guideline on alcohol recommendations are sound. It proposed to add abstinence as an option, to emphasize calories and the fact that they can be highly variable, and to mention the diversity of alcohol products without specifying brands.

The Subcommittee would separate out temporary reasons not to drink, including before driving and use of heavy machinery, and during pregnancy. It would add breastfeeding to that category. The Subcommittee recognized that it would need to discuss the wording to make sure that risk is minimalized.

The Subcommittee would expand the “no drinking” list that is already in the *Dietary Guidelines* to include data regarding hazards to adolescents. It would mention the animal

study data in the technical report. It would broaden the hazards by expanding “cirrhosis” to “liver damage.”

Going forward, the Subcommittee would review data about alcohol and diet associations, including how alcohol at moderate levels relates to macro- and micronutrients, and an analysis of how moderate levels of intake relate to the Healthy Eating Index. It would also work on the wording of a summary statement and consider different ways to include alcohol in the recommendation for the Food Guide Pyramid.

Fluid and Electrolytes

The Subcommittee’s work is on hold until the IOM report is issued.

Macronutrient

The members of the new Subcommittee include Dr. Caballero, Dr. Kris-Etherton, Dr. Lupton, Dr. Pi-Sunyer, and Dr. Weaver.

Closing Remarks

Dr. King noted that the Committee had accomplished a great deal. She stated that it would be important that the new Macronutrient Subcommittee meet fairly soon via conference call. She thanked the Committee for making her job easy.

Dr. King adjourned the meeting at 4:15 p.m.