



*Nutrition and Your Health:  
Dietary Guidelines for Americans*



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*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*  
**Holiday Inn Washington-Georgetown**  
**Washington, DC**  
**March 30-31, 2004**

*Meeting Summary*

*Tuesday, March 30*

(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:** Ms. Carter Blakey, Dr. Eric Hentges, Dr. Carol Suitor

*Welcome and Introductions*

**Dr. Janet C. King, Chair, Dietary Guidelines Advisory Committee,** welcomed Committee members, staff, and observers to the third meeting of the Advisory Committee and summarized the Committee's work since its first meeting in September. She noted that Committee members had worked extensively since the January meeting to draft a wide range of conclusive statements, including the rationale and scientific support for each. She acknowledged the help and input provided by scientific writer, Dr. Carol Suitor, who reviewed and edited the draft statements for consistency and clarity.

Dr. King noted that the purpose of this meeting was to discuss the work of the Subcommittees in order to come to an agreement regarding the major scientific conclusions and how to translate them into specific recommendations. She urged Committee members to challenge each other to ensure that the conclusions are based on the strongest possible science.

Dr. King stated that the full draft of the Committee's report would be reviewed and refined at the fourth and final meeting in May and that the Committee was on schedule to submit the report to the HHS and USDA Secretaries in June 2004. She thanked the Committee for its hard work and the staff for their strong support.

Dr. King then reviewed the agenda for the day. In the morning session, the Committee would hear two expert presentations on energy density and another expert presentation on physical activity and the new recommendations from the Centers for Disease Control and Prevention (CDC). In the afternoon, the Committee would discuss the conclusive statements developed by three Subcommittees (Carbohydrates, Fatty Acids, and Macronutrients). Dr. King hoped there would be time at the end of the day for a general discussion of overarching issues, the format of the final report, and next steps. The second day of the meeting would be devoted to discussion of conclusive statements drafted by the remaining Subcommittees. Dr. King's goal for the meeting was for the Committee to reach agreement on the scientific conclusions by the end of the meeting.

Dr. King concluded by reminding the Committee that the role of outside experts was to help the Committee and the Subcommittees understand the scientific context of a particular issue, and that it was the Committee's responsibility to develop recommendations based on the scientific evidence.

***Presentations and Discussion: Energy Density***  
***B.J. Rolls and R. Mattes***

Dr. King thanked Dr. Rolls and Dr. Mattes for coming to the meeting. She noted that there would be time for discussion after both speakers had made their presentations. Dr. King then introduced the first speaker, **Dr. Barbara J. Rolls, Professor of Nutritional Sciences at the Pennsylvania State University**. Dr. Rolls is a specialist in the controls of food and fluid intake, especially as they relate to obesity, eating disorders, and aging. She has served as a member of the Advisory Council of the National Institute of Diabetes and Digestive and Kidney Disease (NIDDK) and was also a member of NIH's National Task Force on Obesity.

Dr. Rolls stated that her presentation would address four important dietary issues related to weight management: portion size, energy density, the role of fruits and vegetables, and maintenance of weight loss.

Dr. Rolls began by noting that portion sizes have increased steadily since the mid-1970s and cited data from two large epidemiological studies showing that people are consuming larger portions, both at home and when eating out. She pointed out that these studies did not examine the relationship between portion size and Body Mass Index (BMI) and that studies were needed in that area.

Dr. Rolls presented an overview of several studies conducted at Pennsylvania State University, all of which found that increasing the portion size increased the amount that people consumed. In one study, increasing the portion size of a restaurant entrée at lunch resulted in increased intake of all components of the meal, including side dishes. The subjects felt that the original and larger portions were equally appropriate.

Another study found that the effects persisted when portion sizes of all foods for all meals were increased over two days. On average, women consumed an additional 530 calories each day, for a cumulative total of 1,000 calories over two days; men consumed an additional 800 calories per day, for a cumulative total of 1,060 calories. There was no decrease in the effect over time. Dr. Rolls noted that she and her colleagues were currently conducting longer-term studies, in which the increased portion sizes would be maintained over a longer period.

Dr. Rolls stressed that advice to eat less is not effective for weight management because portion size is only one variable; the other variable is energy density (energy per unit weight). She presented a study in which three different portion sizes were served of high-energy dense and low energy-dense casseroles. The study found that increased portion size and increased energy density were both associated with increased intake. Moreover, the effects of portion size and energy density were additive.

Another study, which is undergoing peer-review, found that eating a large, low-calorie solid first course was associated with lower energy intake for the whole meal, while a large, high energy-dense first course was associated with higher energy intake. Dr. Roll noted that these findings indicate that the interactions between portion size and energy density are complex.

Dr. Rolls prefaced her discussion of energy density by discussing dietary fat. Referring to the 1998 National Heart, Lung, and Blood Institute (NHLBI) *Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity*, she noted that while lower-fat diets led to reduced energy intake, lower-fat diets combined with caloric reduction produced greater weight loss than lower-fat diets alone. Dr. Rolls posited that while the reduced intake associated with low-fat diets could be due to lower palatability or greater satiety, it could also be due to the decreased energy density of those diets.

Dr. Rolls stated that a number of studies had indicated that the daily amount of food consumed was more consistent than energy intake. She presented data from a 1983 hospital-based food intake study, which showed that people on an ad-lib diet tended to consume a consistent weight or volume of food, regardless of the energy density of the food.

Dr. Rolls pointed out that water has the greatest impact on energy density, yet it had been overlooked in most food intake studies. Using the example of raisins and grapes, she noted that adding water reduces energy density, even of high-fat foods.

Dr. Rolls cited a study in which researchers varied the energy density of a mixed dish by varying the portion of vegetables in order to determine whether energy density, independent of macronutrient content, could affect how much people eat. The study found that while people consumed the same amount of food, by weight, those who ate the low-energy dense dish consumed 30 percent fewer calories than those who ate the high-energy dense dish. Dr. Rolls stated that numerous studies had confirmed that decreasing fat content and holding

energy density constant produced no effect on ad-lib energy intake, while decreasing energy density and holding macronutrients constant was associated with reduction in intake.

Based on that evidence, Dr. Rolls stated that decreasing the energy density of the diet produced satisfying portions for the same number of calories. She cited fruits, vegetables, whole grains, lean protein, broth-based soups, and water-rich foods as the key ingredients for manipulating energy density and presented several studies that supported a role for energy density in weight management. She noted that it was difficult to separate the effects of fat from those of energy density in most studies.

Dr. Rolls stated that while more controlled studies were needed, there is sufficient data to show that fruits and vegetables are an important element of weight management. They help people avoid feelings of deprivation, they enhance satiety, and they allow positive messaging about what people should be eating rather than what they cannot eat. She cited studies showing that individuals on a reduced-fat diet who consumed additional fruits and vegetables lost more weight than those on the reduced-fat diet alone. Citing a study with children and parents, she noted that positive messages to eat more fruit and vegetables were associated with significantly greater weight loss than restrictive messages to eat less fat and sugar.

Dr. Rolls acknowledged that maintaining weight loss was more challenging than losing weight and that it was especially difficult without reinforcement. She cited a study showing that cognitive-behavioral therapy and enhanced food monitoring in combination were more effective than either approach alone. Adding instruction on low-energy dense foods to those treatments provided the best maintenance of weight loss over 6 months. She also presented preliminary findings of an ongoing clinical trial in her lab comparing reduced-energy density diets to reduced-fat diets.

Given the difficulty of maintaining weight loss, Dr. Rolls emphasized the importance of establishing eating and activity patterns that can be sustained and of reinforcing positive messages during maintenance periods. She recommended a reduced-fat, reduced-energy density eating pattern that encouraged consumption of vegetables, fruits, whole grains, and lean protein. Because this eating pattern could also prevent weight gain, Dr. Rolls suggested that it should be introduced in childhood.

Dr. Rolls concluded by stating that balance, variety, and moderation were especially important for those on a calorie-restricted diet. She stressed that emphasizing quality rather than quantity would help consumers make nutritious choices and eat appropriate amounts, and she reiterated the need to learn more about how to control hunger and promote satiety while managing calories.

Dr. King thanked Dr. Rolls for her presentation and introduced **Dr. Richard Mattes, Professor of Foods & Nutrition at Purdue University**. She noted that Dr. Mattes also serves as Associate Professor of Medicine at the Indiana University School of Medicine and is an Affiliated Scientist at the Monell Chemical Senses Center. He has conducted extensive research on hunger and satiety, regulation of food intake in humans, food preferences, human cephalic phase responses, and taste and smell.

Dr. Mattes began by stating that energy density was not a reliable basis for establishing dietary guidelines. He proposed that energy density should be defined in terms of mass rather than volume, because volume is transient while mass is constant, and because volume affects only the cognitive and gastric aspects of eating and has very limited influence from the intestinal phase through the post-ingestive phases. He cited a study that manipulated both the volume and the energy density of food, which found that while high-volume foods were associated with greater suppression of hunger and greater fullness ratings, volume was not related to food intake at a subsequent meal or to daily food intake. Energy density was associated with intake at the test meal, but it had no effect on daily food intake. Dr. Mattes concluded that volume appeared to have a greater impact than energy density on appetite, where cognitive factors are involved, but less impact on actual intake.

Dr. Mattes stated that while there could be some residual effects of volume once a food is ingested, it was unlikely that the stomach played a key role in regulating appetite. He cited studies with gastrectomized subjects, which found that the appetitive responses and food intakes of individuals with no stomach were nearly identical to those of control subjects, and studies of patients with balloons inserted in their stomachs reveal the short-term effects of volume on appetite were lost over time.

Dr. Mattes then turned to the question of whether energy density was a reliable predictor of a food's dietary impact. He considered this from four perspectives: dietary experience, satiation mechanism, energy metabolism, and dietary compliance.

To illustrate common dietary experience regarding energy density and dietary impact, Dr. Mattes presented studies that compared intake following a test meal of liquid versus solid foods. Dr. Mattes asserted that beverages should be included in such analyses because they now contribute over 25 percent of energy intake, including in the form of liquid meal replacements. A meta-analysis of 42 similar studies found that while semi-solid or solid foods were associated with reduced intake at a subsequent meal or over the day, there was no dietary compensation following the intake of clear energy-yielding fluids. A four-month intervention trial that compared intake following daily consumption of a 450-calorie solid carbohydrate or liquid found precise dietary compensation and not significant change of body weight following the solid food while there was no compensation for the energy load and an increase of body weight when the calories were consumed as a liquid. A database analysis, which compared meals with various types of beverages (diet and regular sodas, coffee, alcohol, milk, and juice) to meals without beverages, found that increased caloric intake was primarily due to the contribution of the beverages.

Dr. Mattes showed a table summarizing 16 preload studies involving a manipulation of protein content that demonstrated consistent effects on appetite and food intake when the protein was in a solid food whereas there was little effect when the protein was consumed as a liquid. He noted that while there was compelling evidence that protein produced greater satiety than other macronutrients its satiating power was greatly diminished when consumed in liquid form. Long-term data showed that daily caloric intake among adolescents increased in proportion to soft drink consumption, and David Ludwig's data on children showed that for every serving of beverage included in the diet, there was a quarter-unit increase in BMI within the study population. Dr. Mattes concluded that, in contrast to the prediction about

energy density and energy intake, a very energy dilute food, such as a beverage, could be problematic in terms of maintaining energy balance

Dr. Mattes then reviewed research findings on nuts to address the dietary impact of energy-dense foods. He cited numerous epidemiological and clinical studies that found an inverse association between frequency of nut consumption and BMI. Dr. Mattes concluded that high energy-dense foods do not necessarily pose a threat to energy balance. Based on several lines of evidence, Dr. Mattes suggested that this could be due to the strong satiety value of selected energy dense foods, the possibility that they may promote elevated energy expenditure, or differences in the absorption efficiency of their macronutrients. He noted that the Atkins diet, which is extremely energy-dense, is very effective for promoting weight loss in the short term, though he acknowledged concerns about its long-term safety and efficacy.

Turning to a discussion of energy density and satiety, Dr. Mattes stated that numerous published reports suggest that people tended to eat a consistent amount of food, by weight. This led to the notion that energy-dilute foods would be beneficial in curbing appetite and controlling intake. Development of the Volumetric Diet stemmed from this work. However, Dr. Mattes noted that the while subjects on a volumetric diet lose weight and are not more hungry than self-reports at baseline, compliance with the diet was poor. This was because individuals indicated they were not willing to spend more for fresh fruits and vegetables and did not have time to shop more often for fresh produce, prepare such items or clean-up after preparing them. The Volumetric Diet could not be considered effective if people would not follow it.

Dr. Mattes also noted that positive energy balance, as the result of an energy-dense diet, was inconsistent with data that intake increases with portion size. Presumably energy dense foods promote high levels of energy intake because the portion size is not reduced to offset the high energy density (i.e., a set weight is consumed) whereas the concern with increasing portion sizes is that intake is proportional to portion size (i.e., a variable weight is consumed). He suggested that these diametrically opposed findings could indicate that food intake was regulated by cultural definitions of appropriate portion size and not by a physiological mechanism. To test that hypothesis, Dr. Mattes conducted a study that compared intake of unnecessary small versus customary portion sizes of low-energy dense and high-energy dense foods. This study found that subjects still consumed a constant amount of food, by weight, so that overall caloric intake varied with the energy density of the food. However, it is possible the experimental manipulation of presenting a novel portion size to disrupt culturally defined standards may not have been effective. Dr. Mattes stated that while it appeared that energy density had a greater impact on regulating intake than volume, he did not consider either to be an appropriate standard for dietary guidance.

Addressing the issue of energy metabolism, Dr. Mattes refuted the general assumption that all calories are used comparably. He presented data from a review paper showing that protein had a higher thermogenic property—and hence a lower energy contribution—than carbohydrate or fat. Dr. Mattes also noted that fats of different saturation were oxidized differentially. He presented data showing that when monounsaturated fats were substituted for saturated fats without changing caloric content, there was a significant reduction in body weight and body fat, presumably due to the differential oxidation of the different fatty acids. He noted that it would be important to determine whether these findings were true over time.

The final issue addressed by Dr. Mattes was the relation between energy density and dietary compliance. Data from one study showed that a moderate fat diet (hence, energy dense) was associated with a much higher retention of participants as well as unexpected improvements in the quality of the diet, because people were willing to eat more vegetables if they could also have some fat, such as salad dressing. A study from the current issue of the American Journal of Clinical Nutrition found that while energy density was a significant predictor of energy intake for a meal or over the course of a day, it was not a good predictor of intake over time. Energy density was not a better predictor of energy intake than other factors, such as meal patterning, how many people the individuals actually ate with, palatability, hunger or variety. Dr. Mattes noted that in the real world, people can compensate for the effects of a particular food or meal by balancing their intake of high- and low-energy dense foods.

Dr. Mattes stressed that cognition was an important factor in satiety and energy intake. He cited a study in which both lean and obese people reported more hunger when they thought they had eaten a low-calorie food, regardless of the actual calorie content of that food. In another study, subjects reported a greater level of satiety for warm apple juice served in a bowl as “apple soup” than for the same juice served cold in a glass.

Dr. Mattes concluded his presentation by stating that energy density was not a reliable predictor of appetite response or energy balance. He noted that energy-dense foods may contribute to nutritional quality and they may play an important role in dietary compliance.

### *Discussion*

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

Dr. Pi-Sunyer asked Dr. Rolls to comment on sugar as an energy-dense food. Dr. Rolls stated that there were a number of good reviews regarding the contribution of different components of food to energy density. She chose to focus on beverages, since Dr. Mattes had addressed them in his presentation and stated that it was sensible to approach the issue of beverages from a scientific basis. Dr. Rolls noted that she was reviewing the CSFII adult data and looking at different ways of calculating energy density to determine the relative contribution of food alone, food plus different types of beverages, and food and all beverages to overall energy intake.

Based on her analysis, Dr. Rolls felt that the best way to determine the energy density of the diet and its impact on BMI was to look at food alone. Examination of intra-individual and inter-individual coefficients of variation indicate that energy density values calculated based on food and all beverages as well as food and caloric beverages exhibit little variability. With little variability in estimates of energy density based on these calculation methods, it will be difficult to find significant associations with other variables.

Dr. King asked whether there were any standards to define low versus high energy density. Dr. Rolls replied that since data on energy density was not available when she began work on her first book, she divided foods into four categories. As it turned out, those categories made sense when looking at large datasets, and other researchers had continued to use them. She acknowledged that the categories could be revisited.

Dr. Clydesdale asked Dr. Rolls to clarify whether she was stating that solid foods alone provided the best data for correlating energy density with BMI. She replied that the study was examining variance of energy density calculation methods based on the inclusion or exclusion of different types of beverages, by gender. She noted that including beverages had a disproportionate effect on energy density. Energy density calculated based on food alone provided data with considerably more variance than data based on food and all beverages as well as food and caloric beverages. A preliminary analysis indicated that the energy density of total diets declined with increasing age and was higher in men than in women. Dr. Rolls stated that a report on methodological issues pertaining to the calculation of energy density in free-living individuals would soon be submitted for CDC clearance.

Dr. Rolls noted that many of the studies she reviewed did not include a definition of energy density or a description of what they counted as “food.” She stated that she classified soup as a food and considered juice, milk, and alcohol as beverages. The allcaloric beverages group included soft drinks and similar liquids.

Dr. Lupton asked Dr. Mattes if his statement that beverages accounted for 25% of calories included alcohol. He replied that the percentage would be higher if alcohol or newer types of caloric beverages were included. He noted that the impact of alcohol on energy intake was a complex issue, because moderate drinkers did not generally weigh more than non-drinkers.

In response to another question from Dr. Lupton, Dr. Mattes stated that he did not know of any metabolic issues related to how carbohydrate calories are dissipated that would explain why different types of carbohydrates did not appear to have an impact on BMI, as with proteins and fats, despite their clear association with increased energy intake.

Dr. King asked Dr. Mattes to comment on the effect of ghrelin on appetite. Dr. Mattes replied that attempts to identify a single gut hormone that reliably impacts hunger in humans have been unsuccessful to date because the mechanism was complex. Dr. Rolls agreed and stated that this complexity was why intake could be influenced by so many different factors, including volume, portion size, and palatability. She reiterated the consistent finding across many studies that people tend to eat a consistent amount of food.

Dr. Appel noted that the PREMIER study had shown that fruits and vegetables led to only slight reduction in weight compared to other weight loss interventions. From a review of the literature, it can be surmised that, while the data are not definitive, there is an indication that higher consumption of low-density foods is associated with persistent weight loss, and vice versa. Dr. Rolls stated that she had not dismissed any studies, but that data on fruit and vegetable consumption and body weight could be difficult to interpret because studies did not always indicate the kinds of fruits and vegetables, when they were consumed, and how they were prepared. Often juice was considered along with whole fruit or vegetables. She noted the need for more systematic data on fruits and vegetables and energy density.

Dr. Kris-Etherton noted that while Dr. Rolls had recommended a low-fat, low energy-dense diet, Dr. Mattes had shown that participants on a moderate fat diet tended to consume more fruits and vegetables, which could lower the overall energy density of the diet. Dr. Rolls replied that the McManus study cited by Dr. Mattes was the only study that was commonly



used to argue for a higher-fat diet for weight management. She agreed that the greater fruit and vegetable consumption was probably responsible for weight loss on this diet, but she noted that the number of subjects retained throughout the study was low. She stressed the importance of informing people that portions would be smaller on higher-fat diets unless they bulk up the diet with low-energy dense foods and recommended a total fat intake of 20 to 30 percent of calories, possibly as high as 35 percent. Dr. Mattes agreed that this would be a reasonable range, but he stated that it was more important to focus on the overall diet than on specific nutrients, because lifestyles and metabolisms vary. He also noted that a study with children had shown no relationship between fruit and vegetable intake and BMI.

Dr. Kris-Etherton asked if the speakers could suggest how to implement advice to increase intake of fruits and vegetables or decrease the energy density of foods. Dr. Rolls noted that there were no differences in attrition rates in her current study between the low-energy dense group and the reduced-fat group, and that researchers were able to reduce the energy density of mixed dishes by a third without affecting palatability. She stated that small changes that allowed people to eat modified versions of their favorite foods were the easiest to sustain. She suggested that the restaurant and the food industries could help by making low energy-dense foods more affordable, attractive, and available so that it would be easier to incorporate them into the diet.

Dr. Pi-Sunyer asked Dr. Rolls to comment on the role of fruits and vegetables as a vehicle for added fats, such as salad dressings. She reiterated the importance of increasing the availability of lower-fat options and noted that participants in her studies rated low-fat salads similar in palatability to more energy-dense dishes.

Dr. Caballero noted the need to consider the impact of the environment in which people choose foods in order to understand whether the results of a controlled study could be sustained over time. Dr. Rolls stated that the objective of her ongoing methodological study was to establish standard definitions for energy density so that large datasets could be analyzed to determine the types of food people were choosing and how it affected their body weight. She noted that energy density had been overlooked until recently and that research was just beginning in this area.

Dr. Nicklas noted that some foods that were moderately energy-dense were very nutrient dense and asked if there were any studies that looked at levels of energy density and their impact on dietary quality or adequacy. Dr. Mattes agreed that many energy-dense foods, such as nuts and cheese, were important sources of nutrients and expressed concern that the focus on energy density would lead to foods being identified as “good” or “bad” foods. Dr. Rolls stated that energy density should be used as a guide for determining appropriate portion size.

Referring to Dr. Mattes’ remarks regarding metabolism and energy density, Dr. Go asked if physical activity would affect metabolism and intake. Dr. Mattes stated that the literature showed that people who exercised more had better appetite control and that positive messages regarding activity were very important.

Dr. Weaver asked Dr. Mattes whether the fact that people did not compensate for calories consumed in beverages was because the physiological need for hydration was stronger than the mechanism for appetite control. Dr. Mattes replied that, from an evolutionary perspective,

caloric beverages were a recent development and that the means by which those calories escaped satiety mechanisms has not been studied.

Dr. Camargo suggested a study in which one group of children would be encouraged to drink water with meals, while another group would be encouraged to drink soft drinks and asked the speakers to comment on the potential long-term effect of the soft drinks on BMI. Dr. Mattes stated that a study he conducted found that subjects who added soft drinks to their diets gained weight. He reiterated his earlier statement that fluid calories add to the diet rather than reducing other calories. In his opinion, increased intake of fluid calories would lead to positive energy balance and weight gain. He was less convinced that consuming water with a meal would lower the caloric intake of that meal. Dr. Rolls stated that people do not eat less when they drink water with a meal, but that studies with various caloric beverages indicate that calories from beverages consumed at a meal are not compensated for and add calories to the meal. She noted that the literature was complex, especially regarding the distinction between liquid and solid foods.

Dr. Lupton asked about the potential impact on energy intake of drinking two glasses of wine per day. Dr. Mattes stated that while the wine would lead to a higher caloric intake, it would not necessarily result in weight gain. Dr. Rolls agreed, based on her reading of the epidemiological studies. Dr. Camargo noted that some older studies found moderate intake of alcohol was associated with weight loss. Dr. Rolls commented that there was little distinction in the literature between types of alcohol or patterns of foods consumed with alcohol. She cited a need for better studies.

Dr. Weaver agreed that there was a need to determine the impact of various types of beverages, in light of proposed conclusive statements regarding consumption of dairy products and alcohol. She asked whether there was evidence that other beverages, such as juices or soft drinks, were correlated with increasing weight. Dr. Mattes replied that one study suggested every soft drink serving was associated with the equivalent of a quarter-unit increase in BMI. Dr. Nicklas noted that while other studies had shown a relationship between sweetened beverages and weight gain, this explained only three percent of the variance in overweight status.

Dr. Bronner asked whether the speakers could provide any advice for people in environments with a high prevalence of energy-dense foods, such as inner cities. Dr. Rolls recommended avoiding “value meals” and increasing consumption of fresh fruit and vegetables. She reiterated the need for education and the importance of making high quality fruits and vegetables more affordable and available. Dr. Mattes agreed and stated that the food supply should be adjusted to fit the lifestyle of the population, not vice versa.

Dr. Clydesdale asked about how to address consumers’ avoidance of processed or frozen foods that could potentially provide better diets. Dr. Rolls replied that studies had shown that when some people were told that a food was healthier or more nutritious, they liked it less. She agreed that attitudes toward technology further complicated the issue. Dr. Mattes noted that while consumers complain about processed foods, they expect them to be available because they fit their lifestyle. He stressed that the food industry has a role to play and should work with consumers to address the problem.

Dr. King asked whether fiber might account for differences in satiety in the studies cited by the two speakers. Dr. Rolls replied that there was good evidence that fiber affects satiety, but that energy density and protein also played a role. Dr. Mattes stated that while fiber was a factor in satiety, its contribution is likely over-estimated. He expressed concern that clinical studies did not reflect how people normally consume fiber. Dr. Rolls added that choosing low-energy dense, high-fiber foods was a better approach to satiety than using the glycemic index.

Dr. King thanked the speakers for their contributions and adjourned the meeting for a short break.

(Break: 10:35-10:55)

### ***Welcoming Remarks from Dr. Beato***

Dr. King announced that Dr. Beato would be unable to attend the meeting and that she had asked her colleague, Ms. Carter Blakey, to deliver her remarks to the Committee.

Ms. Blakey expressed Dr. Beato's sincere regrets and thanked the Committee on Dr. Beato's behalf for their hard work and for volunteering their time to develop dietary guidelines for the American people. She reminded the members that this was a Federal Advisory Committee meeting and, as such, it operates under the Federal Advisory Committee Act (FACA). She noted that responsibility for chartering the Committee rotated between HHS and USDA. Any questions for the Committee must be referred to the Designated Federal Officer, Ms. Kathryn McMurry at HHS.

She reminded the Committee and observers that written comments about the *Dietary Guidelines* would be accepted throughout the public comment process, and she thanked those who had already submitted their comments. She reminded observers that any comments must be addressed to the Committee as a whole and submitted through the staff so that all Committee members would have access to the same information. Observers were not to approach Committee members to discuss the *Dietary Guidelines*.

Dr. Beato also reminded Committee members that their charge was to independently review the scientific evidence and make recommendations about what constitutes a healthy diet that would best help Americans promote their health and reduce their risk of chronic diseases. She noted that their conclusions might be very different from current eating patterns, but that they were to recommend what they felt was the most health-promoting diet.

She reminded the Committee that the *Dietary Guidelines* are the foundation for government nutrition policy and that many education initiatives and activities were based on this guidance. She urged the Committee to aim high and provide the best science-based advice that would enable the HHS and USDA to make any necessary changes to the nation's eating environment and food supply and to develop educational messages that would help Americans make healthy choices. She reiterated her appreciation for the Committee's hard work and stated that the departments looked forward to the outcome of their deliberations.

Dr. King thanked Ms. Blakey for delivering Dr. Beato's comments and expressed the Committee's appreciation of the support that HHS and USDA had provided the Committee in carrying out its task.

***Presentation and Discussion: Physical Activity***  
***H.W. Kohl, III***

Dr. King introduced Dr. Harold W. Kohl, III, Lead Epidemiologist and Team Leader of the Physical Activity and Epidemiology Surveillance Team, Division of Nutrition and Physical Activity, CDC. She noted that Dr. Kohl had worked in the field of physical activity and health since 1984, including research, developing and evaluating intervention programs for adults and children, and developing and advising on policy issues.

Dr. Kohl stated that the objectives of his presentation were to review CDC activities in the area of physical activity recommendations and to provide answers to five questions posed by the Committee regarding the physical activity recommendations and their relation to health and health outcomes.

Dr. Kohl noted that CDC had worked extensively to develop physical activity recommendations for public health. Recent activity included an expert panel on youth physical activity recommendations (convened, with the assistance of CDC, in January 2004); revision of the 1995 CDC/American College of Sports Medicine (ACSM) Recommendations for Physical Activity and Public Health; and development of physical activity recommendations for older adults, which was currently underway. Dr. Kohl stated that the youth activity recommendations and revised CDC/ACSM recommendations had been drafted and that he could share those recommendations with the Committee.

The primary objective of the expert panel on youth recommendations was to develop evidence-based physical activity recommendations for healthy school-aged children and adolescents. The panel's goal was to develop evidence-based recommendations that could be uniformly adopted by public health and clinical agencies and organizations. Dr. Kohl stated that it was extremely important to develop uniform guidelines to replace the disparate and often diverging recommendations in this area.

The panel reviewed the most current data available in a broad range of topics related to health and health outcomes for children and adolescents, including academic performance, injury, and overweight and obesity. Based on that evidence, the panel recommended that children and adolescents of school age should participate in 60 minutes or more of moderate to vigorous physical activity daily. The physical activity should consist of a variety of enjoyable age- and developmentally appropriate activities.

Dr. Kohl then addressed the physical activity recommendations that were being developed for older adults (age 60 and above). The primary objective of these recommendations would be to reduce sedentary living. They would be based on the physical activity recommendations for adults, with several modifications. First, intensity would be defined relative to the individual's fitness level. Second, balance exercises would be recommended for individuals at increased risk of falls, and there would be an explicit flexibility recommendation. Third, the recommendations would emphasize moderate intensity physical activity and participating

in all recommended types of activity (endurance, strength, balance, and flexibility). They would stress a gradual approach to increasing physical activity for those who are inactive, with an explicit goal of reducing sedentary living. Finally, the recommendations would incorporate risk-management strategies for injury prevention. Dr. Kohl expected that 30 to 60 minutes of moderate-intensity physical activity would be recommended as a reasonable target.

Dr. Kohl noted that the most recent U.S. public health recommendations, issued in 1995 by the CDC/ACSM, were that every adult should accumulate at least 30 minutes of moderate-to-vigorous physical activity on most, and preferably all, days of the week. This guidance was consistent with the Surgeon General's report of 1996 as well as recommendations developed by the American Heart Association, the World Health Organization, and others.

Dr. Kohl stated that developing physical activity recommendations was a complex issue, because the relationship between physical activity and risk of disease differed by disease. He presented a chart showing that while risk for most diseases decreased with moderate physical activity, high levels of activity may be associated with increased risk for musculoskeletal injury, osteoarthritis, and stroke.

Dr. Kohl highlighted the key points from the recent revision of the 1995 CDC/ACSM recommendations. He noted that the revised recommendations would reiterate the public health importance and low prevalence of physical activity and would clarify and reaffirm that 30 minutes of physical activity per day, five days per week, was a minimum, not maximum, recommendation. They would clarify and reaffirm the dose-response relationship, emphasizing that "more is better," and they would specifically address the role of physical activity in weight maintenance and prevention of weight gain.

Following this overview, Dr. Kohl reviewed the draft text of the revised recommendations:

- "To promote and maintain good health, all U.S. adults should accumulate at least 30 minutes of moderate-intensity physical activity on five or more days each week, or vigorous-intensity physical activity amounting to at least 20 minutes on three or more days each week." Dr. Kohl noted that these would be base, or minimal, levels of activity.
- "In addition to routine activities of daily living, physical activity of moderate intensity (equivalent to a brisk walk) can be accumulated in 8-10 minute periods of time toward the 30-minute goal. Vigorous activity (equivalent to a jog) is also recommended." Dr. Kohl noted that this section clarified key terms, such as "moderate" and "vigorous."
- "In addition to physical activity on 5 or more days each week, muscle strengthening and endurance exercises (such as lifting weights or similar resistance exercises) should be performed at least two days each week in order to promote and maintain muscular and skeletal health and function." This provision would affirm the importance of muscular strength and endurance exercises in addition to aerobic activity.

- “Participation in physical activity above the minimum recommendation provides additional health benefits and results in higher levels of physical fitness. Adults who wish to further reduce their risk for chronic conditions such as cardiovascular disease, obesity, type 2 diabetes mellitus, some cancers, osteoporosis, and depression should exceed the minimum recommendation for physical activity.” Dr. Kohl noted that this provision clarified and affirmed the dose-response relationship.
- “Because current scientific evidence indicates that risk of chronic conditions is incrementally lower with more physical activity, physical activity above the minimum recommendation is likely to result in additional health benefits. For example to help prevent unhealthy weight gain, some adults may need to participate in physical activity for more than 30 minutes each day to a point that is individually effective, taking into account diet and other factors affecting body weight.”

Dr. Kohl then turned his attention to the five questions that the Committee had asked him to address:

Question 1: Is there a level of habitual physical activity that can be recommended for the prevention of weight gain in persons with normal BMI? Many people may require more than 30 minutes per day to prevent weight gain—how much more? Does this differ by age, gender, race/ethnicity, and pregnancy/lactation? Does this differ depending on whether the person is normal weight, overweight or obese?

Dr. Kohl stated that the level of physical activity (energy expenditure) that would help prevent weight gain was that which was required to perfectly balance energy intake. It would include consideration of individual factors, such as body mass, resting metabolism, and genetic variation. He noted that the Institute of Medicine (IOM) had estimated that 60 minutes of moderate-intensity physical activity, seven days per week would be necessary to prevent weight gain, based on the findings of a doubly labeled water study with weight-stable people. However, he also noted that there was no outcome data specifically related to a level of physical activity that might prevent weight gain. Moreover, some behavioral experts had stated that 60 minutes of activity, seven days per week would be ineffective as a public health recommendation and could result in injuries for some individuals.

Dr. Kohl stated that the Committee should consider what recommendations would be effective, in terms of both communication and agreement. He noted that while surveillance data showed that the prevalence of normal-weight individuals had decreased since 1988, the prevalence of inactivity had actually declined during the same period. This would suggest that the growing rates of obesity were not due to inactivity. Dr. Kohl proposed that 30 to 60 minutes of moderate physical activity on most days, or a roughly equivalent amount of vigorous physical activity, would assist in providing the caloric balance required to maintain body weight.

Question 2: How much physical activity is required to avoid weight gain in formerly obese persons?

Dr. Kohl replied that there were several sources of data pertaining to this question. Data from the National Weight Control Registry indicated that the most effective dose would be one hour or more. A clinical trial found that 75 to 90 minutes of activity was required to sustain weight loss over time. Dr. Kohl suggested that for some people, the amount of activity to prevent weight regain would probably be 60 to 90 minutes of moderate physical activity, or an equivalent amount of vigorous activity.

Question 3: How much and what types of physical activity are recommended for optimal bone health? How does this differ by age and gender?

Dr. Kohl noted that the key indicators of osteoporosis were changes in bone mineral density. He stated that there was little evidence that physical activity protects against the development of osteoarthritis and no evidence that light or moderate physical activity increases risk of osteoarthritis. While there was fairly convincing data that large amounts of heavy, prolonged physical activity, such as occupational exposure over many years, could increase the risk of osteoarthritis in the knee and hip, clinical data indicated that moderate physical activity was an effective treatment for osteoarthritis of the knee. Dr. Kohl noted that similar data was not available regarding osteoarthritis of the hip.

Dr. Kohl stated that osteogenesis appeared to respond to loading from either gravity (impact, or weight bearing exercise) or muscular contraction. He noted that peak bone mass was reached early in life and could be increased with physical activity during that period, though there were gender and age differences. Dr. Kohl stated that there was strong evidence from randomized clinical trials that physical activity in pre-menopausal women could maintain or increase bone mass, and other studies found that physical activity in post-menopausal women could slow the rate of bone loss in some cases. Dr. Kohl noted that while the dose-response for osteogenesis was unknown, light-to-moderate activity appeared to be insufficient; he suggested brisk walking as a minimum.

Dr. Kohl emphasized that the effects of muscle strengthening and impact activities appeared to be site-specific. For example, walking would increase bone strength of the lower back, while upper body exercises would strengthen bones in the shoulder and forearm. He noted that the literature in this area was complex because exposures varied among studies, making it difficult to compare data.

Question 4: What are the health benefits, if any, of being physically active only 30 minutes each day?

Dr. Kohl noted that it was difficult to answer this question because the data from existing studies was often presented in terms of caloric expenditure or quantiles rather than specific amounts of time. However, there was overwhelming evidence from both clinical trials and epidemiological studies to support the 30-minute recommendation in the Surgeon General's report. He cited a long-term epidemiological study of Harvard male alumni, which showed a 20 percent reduction in the risk of all-cause mortality corresponding to expending 1,000 to 2,000 calories per week in leisure time physical activity. He presented data from other studies

showing that moderate physical activity equivalent to 30 minutes per day, most days of the week, was associated with reduced risk of Type 2 diabetes incidence and cardiovascular disease death. Dr. Kohl noted that new data regarding dose-response relationships had become available in recent years as clinical trials became more sophisticated, which was one factor in the CDC's decision to update its recommendations.

Question 5: How do the new CDC/ACSM and youth recommendations compare/differ from the 2000 *Dietary Guidelines for Americans*? What is the rationale for any differences?

Dr. Kohl stated that, while the youth recommendations were consistent with the existing guideline on physical activity, they would enhance the Committee's deliberations because they were based on a thorough review of the existing recommendations and the scientific evidence. Moreover, the youth recommendations were consistent with the Committee's emphasis on consistency because they were designed to harmonize multiple recommendations so that public health and clinical groups could speak with one voice. Dr. Kohl also noted that the document included specific examples and strategies for implementing the recommendations.

The revised CDC/ACSM recommendations would place a greater emphasis on the dose-response relation between physical activity and health and would stress that 30 minutes of activity per day was a minimal goal.

Dr. Kohl summarized his presentation by reiterating the following points:

- Moderate-to-vigorous physical activity was associated with many health outcomes and was causal in several.
- For adults, 30 minutes of physical activity per day, five days per week, was as a necessary and sufficient minimum, not maximum, level to promote and maintain health. Higher levels of physical activity were associated with improved health outcomes. For individual health outcomes, including weight control, some people may require more physical activity than the minimum recommendation.
- Children and adolescents of school age should participate in 60 minutes or more of moderate-to-vigorous physical activity daily.

In Dr. Kohl's view, a single guideline related to physical activity would be inadequate, given the complexity of the science related to physical activity and health outcomes. He noted that the CDC would recommend a separate Guidelines process pertaining to physical activity and health.

In conclusion, Dr. Kohl stated that a healthy United States adult population would be characterized by a variety of physical activity levels, with all adults participating in at least 30 minutes per day of moderate-intensity physical activity.

### ***Discussion***

Dr. King thanked Dr. Kohl for his presentation and opened the floor for discussion.



Dr. Pate noted that the new CDC/ACSM recommendation appeared to reaffirm the 30-minute guideline, while stressing the value of more and emphasizing the dose-response relationship, whereas the IOM recommended 60 minutes of daily activity. He asked whether the Committee would be consistent with the updated recommendation from CDC/ACSM if it were to recommend a range of 30 to 60 minutes of daily physical activity. Dr Kohl replied that such an approach would be a useful strategy to harmonize the CDC/ACSM recommendation with the findings of the IOM and other groups. He noted that the data would support such a range and reiterated the importance of striving for consistency, where possible.

Dr. Pi-Sunyer expressed concern that it would be inconsistent and confusing to state that 30 minutes of activity five days a week would be sufficient, while also stating that higher levels could lead to better health. Dr. Kohl replied that the CDC/ACSM panel found that the most consistent threshold in existing literature was approximately 30 minutes a day of physical activity. However, the panel also believed that it was increasingly important to convey a dose-response message, which had not been emphasized in the original recommendations. Dr. Kohl stated that he would be satisfied if the 35 percent of the population that was currently inactive were able to achieve the 30-minute level.

Dr. Caballero agreed with Dr. Pi-Sunyer that there was a conflict between the 30-minute recommendation and the dose-response relationship, but he could accept 30 minutes as a target for the next five or ten years. Referring to the correlations that Dr. Kohl had presented between physical activity and various health risks, Dr. Caballero stated that obesity should not be grouped with other chronic conditions. He noted that dose-response conclusions regarding levels of physical activity required to reduce risk of chronic disease were based on survey data from epidemiological studies, while conclusions regarding the energy balance necessary to address obesity were based on experimental data. Dr. Caballero also described the methodology of the doubly labeled water study that served as the basis for the IOM recommendation on physical activity.

Dr. Pate noted that it was challenging to communicate physical activity recommendations without confusing the public and asked if CDC had any experts who could provide guidance in that area. Dr. Kohl replied that one of the major differences between the recommendations issued in 1995 and the updated version was the involvement of a communications team that worked on ways to harmonize and communicate the recommendations. The communications specialists conducted focus groups with consumers to gather data that would help shape the messages, as well as focus groups with opinion leaders in the popular media regarding ways to package and disseminate those messages.

Dr. Camargo stated that he would not support the creation of separate physical activity guidelines. In his view, it was important to integrate physical activity and diet in order to harmonize recommendations and emphasize the concept of energy balance. He asked Dr. Kohl for his opinion of pedometers as a means of estimating daily caloric expenditure and motivating people to exercise. Dr. Kohl replied that pedometers were useful behavioral tools because they were inexpensive and unobtrusive. He noted that research was needed into the role of pedometers in helping people meet the physical activity recommendations and mentioned that CDC had launched a project to determine how many steps were required to meet the minimum recommended level of physical activity.

Dr. Appel asked how focus groups had responded to the IOM recommendation of 60 minutes of activity. Dr. Kohl stated that the focus groups did not include questions regarding specific levels of activity, but they did ask about participants' understanding of the dose-response message. Focus group participants clearly understood the "More is better" message, and those who were physically active felt that 30 minutes was not enough activity. Dr. Appel noted that in a focus group he had conducted, some people perceived shopping to be physical activity. He asked whether that was an isolated finding or if it reflected problems in communicating with people at the lower end of the physical activity spectrum. Dr. Kohl replied that people tended to underestimate the intensity and duration of activity that was required to meet the recommendations. He acknowledged the need to more clearly define terms such as "moderate intensity" and to clarify what would count as ten minutes of physical activity.

Dr. Pi-Sunyer asked Dr. Kohl to explain why he stated that recommending 60 minutes of physical activity for older adults could be confusing or dangerous. He noted that Dr. Kohl had stated there was no evidence that exercise could lead to osteoarthritis, and he cited studies that showed numerous benefits of exercise for older adults. He also noted that older adults have the most time available for physical activity. Dr. Kohl replied that, while there was no data, there was a concern that unsupervised physical activity could lead to increased risk of injury among older adults who could be at risk for falls. He acknowledged the importance of physical activity among older adults and noted that the oldest age group in the BRFSS data had shown the greatest decline in inactivity over the past 17 years. While he did not intend to single out any groups, he stated that it was important to acknowledge that physical activity could pose a risk in some cases and that the upper limit for physical activity may be different for some individuals.

Dr. King addressed the issue of the recommended amount of activity for children. She noted that California schools were mandated to provide 100 minutes of physical activity per week, which was generally met through physical education and recess. She expressed concern that children in unsafe neighborhoods might not have opportunities for physical activity outside of school and asked Dr. Kohl to clarify the rationale for the recommendation. Dr. Kohl first clarified that the youth recommendations were developed by an independent expert panel and not by the CDC. He stated that the expert panel had considered the fact that activity levels naturally decline with age and chose to set the bar higher, with the goal of establishing healthy levels of physical activity at an early age. The recommendations were designed to take into account the intermittent nature of children's physical activity. Dr. Kohl acknowledged that children would not be able to get all of the activity they need at school and stressed the need for environmental changes that would promote activity, such as walking to school.

Dr. Appel noted that the *Dietary Guidelines* would have a regulatory impact in some areas, such as WIC and other federal nutrition programs, and asked if adopting the 60-minute recommendation could potentially lead to changes in the physical activity guidelines for schools. Dr. Pate replied that there were numerous initiatives underway to communicate the importance of this issue to policymakers and institutions. He stated that the Committee's recommendations would be influential, but they would have no legal impact.

Dr. Pate noted that physical activity affected many aspects of health in addition to obesity and asked if Dr. Kohl could help the Committee decide how inclusive its recommendations should be. Dr. Kohl replied that focusing too closely on individual outcomes would limit the literature that could be cited as a rationale for recommendations. He noted that the scientific basis for specific benefits was less solid and suggested that a global recommendation that could be substantiated by heterogeneous studies would be more appropriate for public health guidance.

Dr. Camargo noted that 30 minutes was a healthy amount of physical activity, yet it represented less than two percent of a person's available time. He suggested that it might be preferable to focus on what types of activities people were engaged in the rest of the day. Dr. Kohl replied that the literature had evolved from observational studies of occupational exposure conducted in the 1950s and that data was now available from clinical trials on the impact of accumulated moderate activity, including some activities of daily living.

Dr. King thanked the speaker for his presentation and adjourned the meeting for lunch.

(Lunch: 12:15-1:10 p.m.)

### ***Discussion of Conclusive Statements and Rationale***

Dr. King reconvened the meeting and stated that the first part of the afternoon would be devoted to discussing conclusive statements drafted by three subcommittees: Carbohydrates, Fatty Acids, and Macronutrients. She noted that each subcommittee would present its conclusive statements, and that the Committee would discuss each statement before moving to the next. She emphasized that the Committee should evaluate each statement according to five criteria: strength of the evidence; temporal characteristics; consistency of results; specificity of results; and whether the statement was biologically plausible.

Dr. King then turned the floor over to Dr. Lupton to present the conclusive statements of the Carbohydrates Subcommittee.

#### ***Carbohydrates Subcommittee Conclusive Statements and Discussion J. Lupton, Lead***

Dr. Lupton stated that the Subcommittee members included Drs. Clydesdale, Pate and Pi-Sunyer and acknowledged the USDA staff members who had provided support to the Subcommittee. She noted that the Subcommittee was moving from carbohydrate-based to food-based recommendations. This entailed collaboration with other subcommittees because some items that were originally "carbohydrate" issues were now seen in a broader context. The issue of carbohydrate/fat/protein ratios in the diet was now being addressed by the Macronutrient Subcommittee, and the Fruits and Vegetables Subcommittee was reviewing the role of fiber in those foods.

Dr. Lupton presented an overview of the status of the Subcommittee's conclusive statements. She noted that the Subcommittee had drafted a statement regarding dietary fiber and carbohydrates and was in the process of drafting a statement regarding dietary fiber and

laxation, a statement on whole grains and their contribution to health, and a statement on carbohydrates and diabetes. The Subcommittee was also considering the new issue of “added sugars” as discretionary calories, in collaboration with the Macronutrient Subcommittee chaired by Dr. Caballero.

#### *Dietary Fiber and Decreased Risk of Coronary Heart Disease*

The Subcommittee had drafted the following conclusive statement: “Diets rich in dietary fiber can reduce the risk of coronary heart disease.” The implications for the general population were that 14 grams of fiber per 1,000 calories should be consumed each day.

Dr. Lupton stated that this recommendation was based on a complete review of the dietary fiber and carbohydrate literature in the IOM Macronutrient report, updated by a review of any new literature that had been published since that report was issued. The evidence supporting the recommendation consisted of prospective epidemiological studies, a large number of small clinical intervention trials with LDL cholesterol or blood pressure as the endpoint, and cross-sectional data.

Dr. Lupton noted that the three large-scale epidemiological studies reviewed by the Subcommittee (Health Professionals Follow Up Study, Nurses’ Health Study, and Finnish Men’s Study) all showed a decrease in relative risk of coronary heart disease for the highest versus the lowest quintile of fiber intake. Subjects in the highest quintile of these studies consumed an average of 14 grams of fiber per 1,000 calories, which the IOM established as the AI for dietary fiber.

Dr. Lupton presented a chart that illustrated the recommended amount of fiber, based on calorie intake for each gender and for each age group. She noted that fiber intake would be lower for women than for men as well as for younger children.

Dr. Lupton pointed out that the Subcommittee had changed the draft statement distributed to the Committee in the following ways: it added the IOM report to the references; it deleted a phrase stating that dietary fiber may lead to increased insulin sensitivity; it added examples of high fiber foods; and it modified the table by adding references, clearly delineating the end point of each study, and noting the type(s) of fiber in the study, if specified in the literature. Dr. Lupton then opened the floor for discussion.

Dr. Appel expressed concern that the data on fiber in the epidemiological studies could be over reported because the questionnaires had not been designed to study fiber, and he asked if there was any data to validate the IOM’s recommendation on fiber. Dr. Lupton replied that all three studies had shown the same effect, but she acknowledged that there was no validation of the specific amount of fiber that was required for that effect.

Dr. Nicklas was concerned that most of the IOM recommendations had been based on adult studies and that the proposed recommendations for children were extrapolated from adult recommendations. She asked if the Subcommittee’s report would include a statement addressing fiber in children. Dr. Lupton replied that the Subcommittee would include a statement about the need to increase fiber intake for children gradually over time, based on a review of the extensive literature that was now available in that area.

Dr. Nicklas asked if the Subcommittee would address different types of fiber in its recommendation. Dr. Lupton stated that the beneficial effects in most studies were due to high-fiber foods rather than a particular type of fiber. She noted that the report would discuss the benefits of various types of fiber where possible, but the recommendation was based on total fiber intake.

Dr. King asked how fiber would benefit children, who are not generally at risk for coronary heart disease. Dr. Lupton stated that adequate fiber intake in children had two potential benefits: establishing healthy eating habits at a young age, and improved laxation.

Dr. Pate noted that the smooth dose-response relationship between fiber and coronary heart disease provided no clear threshold and stated that the Committee might confront this issue in other areas. He asked whether the recommendation was based on a level that would reduce risk, or a level that would minimize risk. Dr. Lupton replied that the recommendation was based on fiber intake in the highest quintile in the three epidemiological studies, which was associated with a statistically significant reduction in the risk of coronary heart disease. She acknowledged that it could be difficult to specify a threshold in some cases, but she noted that while some studies had shown a gradual reduction of risk as fiber intake increased, others had shown no effect until a high level of fiber intake had been reached.

#### *Fiber and Laxation*

Dr. Lupton stated that the Subcommittee was proposing a second conclusive statement on the overall benefits of fiber because it did not seem appropriate to include laxation in the same statement as coronary heart disease. She noted that while the effect of fiber on laxation was well documented, there was no quantitative data upon which to base a recommendation for a specific amount of fiber. She asked the Committee for advice as to what the statement should include and the type of documentation that would be needed for the recommendation to be scientifically valid.

Dr. Weaver noted that increased laxation could be due to physical activity as well as fiber. Dr. Lupton replied that some studies had found that increased physical activity was associated with greater constipation, which was contrary to assumptions that fiber and physical activity would both improve laxation and would therefore be protective against colon cancer. She asked Dr. Pate to comment on this issue. He stated that while he was not familiar with the literature on physical activity and laxation, studies of physical activity and colon cancer were compelling, though the underlying mechanism was not well understood. Dr. Lupton noted that there was no evidence in the literature to support a recommendation on dietary fiber and colon cancer.

Dr. King asked Dr. Lupton to clarify a point on her slide that indicated that this statement would target pregnant women, the elderly, and children. Dr. Lupton stated that while the statement would not be directed only to these groups, they were highlighted because they represented transition phases introducing different levels of fiber intake.

Dr. Nicklas noted that absorption rates and laxation seemed to increase from childhood to adulthood and then decline with age and recognized that it could be challenging to draft a

statement that would address those variations. Dr. Lupton replied that the Subcommittee had not intended to develop a recommendation based on different age levels, but it seemed appropriate to include information pertaining to pregnant women, the elderly, and children because laxation had been identified as a concern for those groups.

Dr. Lupton asked the Committee if there was a need to develop a consensus statement regarding any other effects of fiber.

Dr. Weaver stated that it was more important to focus on implementing the IOM recommendations in the context of the whole diet, combined with physical activity. She expressed concern that while there was dose-response data regarding quantities of specific sources of fibers, such as whole grains, there were no studies comparing the benefits of whole grains versus fiber from other sources, such as vegetables or legumes. Dr. Lupton agreed that this was a limitation and that data regarding specific types of fiber was only available in the literature on laxation. Dr. Appel questioned whether a second conclusive statement would be justified without sufficient data.

Dr. King asked about the benefits of fiber for colon cancer. Dr. Lupton replied that four large-scale studies had been conducted, but none had shown a protective benefit of fiber. The Subcommittee decided it would not be appropriate to base a recommendation on these studies.

Dr. Bronner asked what the recommendation would be for introducing fiber to children. Dr. Lupton replied that the statement had not been drafted, but it would probably recommend a gradual increase over time.

### *Whole Grains*

Dr. Lupton stated that the Subcommittee's conclusive statement on this issue would probably state: "Diets rich in whole grains can reduce the risk of coronary heart disease." The implication of this statement for the general population would be that whole grains should be substituted for refined grain foods wherever possible. The Subcommittee was still considering whether there was sufficient evidence to recommend a specific amount.

Dr. Lupton noted that this recommendation was supported by many studies showing an inverse association between intake of whole grains and total mortality as well as CVD-specific mortality. The recommendation was also supported by the literature on fiber, since whole grains were an important source of dietary fiber.

Dr. Lupton stated that the Subcommittee's statement would also provide information on the benefits of whole grains, aside from fiber; it would define whole grains and show how they differ from refined grains, and it would define good sources of whole grains and provide information on how to find them on food labels. She then opened the floor for discussion.

Dr. Nicklas asked whether a product consisting of 51 percent whole grains would be considered a whole grain product. Dr. Lupton clarified that this percentage pertained to the requirements for the health claim that is allowed for whole grain products.

### *Carbohydrates and Diabetes*

Dr. Lupton noted that Dr. Pi-Sunyer was in the process of drafting a conclusive statement to address this issue.

### *Added Sugars and Discretionary Calories*

Dr. Lupton noted that the Macronutrient Subcommittee was reviewing the issue of discretionary calories. The question of whether added sugars would be treated as potential sources of discretionary calories or as a separate issue was still unresolved. The Carbohydrates Subcommittee recommended that information on added sugars be conveyed in the discussion of discretionary calories.

Dr. Lupton reminded the Committee that “added sugars” were defined as sugars and syrups that are added to foods during processing or preparation. Lactose in milk or fructose in fruit would not count as added sugars. Major sources of added sugars include soft drinks, cakes, cookies, pies, fruit punch, dairy desserts, and candy. She noted that added sugars supplied calories, but no other nutrients. This raised concerns that added sugar could result in weight gain if it caused caloric intake to exceed energy requirements, or it could lead to micronutrient dilution if the calories replaced more nutrient-dense foods.

Dr. Lupton noted that the Subcommittee reviewed data pertaining to three issues: added sugars and weight gain, added sugars and micronutrient dilution, and levels of added sugar compatible with a healthy diet.

Dr. Lupton stated that most studies on added sugar and weight gain found that added sugar intakes resulted in increased energy intakes. However, many cross-sectional studies found a negative correlation between added sugar intake and BMI. The only exception was a single longitudinal study, which found a positive association between sugar-sweetened beverages and BMI.

The evidence was more consistent regarding micronutrient dilution. Dr. Lupton noted that every study showed a decreased intake of at least one micronutrient with higher levels of added sugar intake. She presented data from one study, which showed that groups with the highest levels of added sugar intake had the lowest intake of several important micronutrients.

Dr. Lupton noted that the IOM recommendation that intake of added sugars should not exceed 25 percent of calories was based on an analysis of NHANES III data. However, the NHANES data also showed that the best level of added sugars for macronutrient intake was five to ten percent, and not zero. This was consistent with a recent study, which found that sweetened dairy products were associated with increased calcium intake for children ages 4 to 8, and presweetened breakfast cereals increased the likelihood of children and adolescents meeting recommendations for calcium, folate, iron, dairy products. Dr. Lupton stressed that these findings would suggest that a recommendation to eliminate added sugars from the diet might not be desirable.

Addressing the issue of levels of added sugars compatible with a healthy diet, Dr. Lupton noted that the USDA food guidance system promoted a “total diet” concept by considering

proportionality and moderation by accounting for all foods consumed. The proposed food intake patterns were designed to meet close to 100 percent of the Dietary Reference Intake (DRI) values from foods that were typically consumed by assigning specific numbers of servings to each of five food groups. Dr. Lupton noted that the food patterns were based on foods in their lowest fat form without added sugar.

Dr. Lupton explained that discretionary calories could be determined by subtracting the calories required to meet 100 percent of nutrient needs, or DRI, from the calories required to meet energy needs, based on age, sex, and calorie level. She pointed out that while added sugars or alcohol were potential sources of discretionary calories, the extra calories could also be used for foods such as hamburger, chicken with the skin on, or dairy products other than non-fat milk.

At the Subcommittee's request, the USDA's Center for Nutrition Policy and Promotion analyzed the food patterns to determine the discretionary calories that would be available for females and males of various age groups and activity levels. Not surprisingly, the analysis found that more discretionary calories were available at higher activity levels, and very few were available for low-active or sedentary individuals. The maximum amount of discretionary calories would range from six percent, based on a 1,200 to 1,600 calorie food pattern, to 13 percent, based on a 3,400 calorie food pattern. Dr. Lupton noted that these calculations supported a strong, positive message that if you are more active, you have more discretionary calories.

Dr. Lupton proposed three steps for putting the concept of discretionary calories into use: calculating the maximum discretionary calories for each gender and age level, recommending good food choices for discretionary calories, and recommending increasing physical activity to "buy" more discretionary calories.

Dr. Lupton suggested that foods and nutrients that could be considered discretionary calories might include added sugars, fat (both intrinsic and extrinsic), ethanol, and even starch. She noted that starch was a significant portion of the typical diet, but it was primarily a source of glucose.

In response to a question from Dr. King, Dr. Lupton clarified that the calculations were based on food patterns with 30 percent of calories from fat. She agreed that there could be more discretionary calories if fat intake were lower.

Dr. Appel asked if the cross-sectional studies that showed no association between added sugars and BMI were stratified by physical activity. He noted that the only prospective study had shown the type of association that was anticipated and stated that the cross-sectional studies should not prevent the Subcommittee from drawing inferences that otherwise make sense, based on calorie intake. Dr. Lupton believed that most of the cross-sectional studies had been stratified, but she would review them once again. Dr. Clydesdale stated that it would be inadvisable to draw an inference either way, without supportive evidence. Dr. Appel clarified that the issue was the relative weakness of data from cross-sectional studies and asked whether calories would be a valid surrogate for observational data. Dr. Clydesdale noted that data on caloric intake that relied on recall would also be questionable.



Dr. Camargo noted that reporting biases were common when overweight subjects were asked what they eat, especially discretionary foods. He stated that longitudinal studies were much more valid and that he knew of at least one other prospective study that showed an increased weight gain with added sugars. He agreed with Dr. Appel that the Subcommittee should not be overly concerned about the three negative cross-sectional studies.

Dr. Caballero expressed concern that the term “discretionary calories” could be misleading because they were necessary to adjust for the difference between the low-fat foods on which the food patterns were based and the types of food that were typically consumed. Dr. Lupton agreed that there was a need to be more transparent about the foods that were included in the food patterns and to clarify what was meant by “discretionary.”

Dr. Pate stated that the Subcommittee’s efforts to link discretionary calories with activity level was an appropriate way to integrate physical activity into dietary recommendations. He stressed the need for internal consistency throughout the report as to how physical activity levels were defined and quantified. Dr. Lupton clarified that the USDA had used the physical activity levels presented in the IOM report. She noted that some nutritional requirements also increased with activity, making the issue of discretionary calories more complex.

Dr. Caballero noted that the IOM report was the first to link physical activity requirements to energy needs rather than body weight or BMI. The proposed food patterns reflected the nutritional and energy requirements for each activity level. As a person became more active they would not simply have additional discretionary calories; rather, they would move into the next category, which would provide additional nutrients as well as extra calories.

Dr. Bronner noted that basing the food patterns on low-fat foods could make it difficult for some people to follow the recommendations unless they made adjustments for the types of foods they normally consumed. Dr. Caballero reiterated his concern that the concept of discretionary calories should be considered as an internal tool to adjust the food patterns to the typical diet rather than a tool for consumers.

Dr. Camargo stated that the concept of discretionary calories would help people make more sense out of their diet. He suggested that redrawing the graphic based on typically consumed foods would clarify the fact that most people would have few, if any, discretionary calories. Dr. Appel asked if it would be feasible to revise the graphic. Dr. Hentges replied that this could be done, but he noted that low-fat foods were the basis of the traditional model, and that this model could be modified to reflect individual choices. Dr. Weaver stated that the Committee did not wish to challenge the food guide patterns, but it would be useful to illustrate the impact of actual intake.

Some Committee members suggested that “hidden calories” or “choices” might be better terms than “discretionary calories.” Dr. Go proposed including an explicit message that more choices are available if you increase your physical activity.

Dr. Nicklas suggested that the Subcommittee’s report should include references to two additional cross-sectional studies that showed no association between added sugars and BMI. She supported the inclusion of studies showing that added sugars in more nutrient dense foods actually enhanced micronutrient intake. Dr. Nicklas then asked if Dr. Lupton could

clarify what she meant by “non-nutrient dense foods.” Dr. Lupton stated that while there was no consensus in the literature regarding nutrient density, the Subcommittee had used this term to refer to foods that were high in calories and low in nutrient value. Dr. Lupton accepted Dr. Nicklas’ suggestion that “less nutrient dense” would be a more accurate term.

Dr. Appel stated that he could provide the Subcommittee with an older prospective study showing that individuals who decreased their consumption of sweets had greater weight loss.

#### *Text of the 2000 Dietary Guidelines Concerning Carbohydrates*

Dr. Lupton stated that the Subcommittee’s conclusive statements were pertinent to four of the 2000 *Dietary Guidelines*:

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

#### *Expert Consultations*

Dr. Lupton concluded her presentation by acknowledging the experts who had advised the Subcommittee in several key areas, including Dr. Ronald Krauss regarding fat/carbohydrate ratios, Drs. Joanne Slavin, Michael McBurney, and Eric Rimm regarding whole grains, and Drs. Rachel Johnson, Maureen Storey, and Richard Forshee regarding added sugars. She also thanked the staff at the federal agencies for their assistance with definitions of whole grains and added sugars and with regulations concerning health claims, standards of identity, fortification, and enrichment.

Dr. King thanked Dr. Lupton for her comprehensive presentation. She stressed that the Subcommittee should continue to work on conclusive statements regarding laxation and fiber and on carbohydrates and diabetes. While some of these statements might not become guidelines, the issues should be addressed in the technical report. She also felt that it would be important to quantify the number of recommended servings of whole grains. Dr. Lupton replied that the Subcommittee would need to determine whether the science clearly supported making such a recommendation. She noted that many studies stated a number of servings without specifying the size of those servings, although some of the better studies were now specifying grams of whole grains.

Dr. Lupton asked if the Subcommittee should draft a separate conclusive statement regarding added sugars, or if they would be treated as discretionary calories. Based on input from several Committee members, King stated that the Subcommittee’s primary tasks in this area were to define the concept of discretionary calories and clarify how many discretionary calories would be available in a typical diet. Dr. Nicklas noted that it would be helpful for the Committee to have an opportunity to address the question of including starch under discretionary calories.

Dr. King turned the floor over to Dr. Kris-Etherton for a discussion of the Fatty Acids Subcommittee’s conclusive statements.

***Fatty Acid Subcommittee  
Conclusive Statements and Discussion  
P. Kris-Etherton, Lead***

Dr. Kris-Etherton noted that the members of the Subcommittee included Drs. Camargo, Nicklas, and Go. She stated that the Subcommittee had reviewed the literature in seven areas: total fat, saturated fatty acids, cholesterol, trans fatty acids, omega-6 polyunsaturated fatty acid (n-6 PUFA), alpha-linolenic ( $\alpha$ -linolenic) acid, and fish.

*Total Fat*

Dr. Kris-Etherton stated the Subcommittee's conclusive statement in this area: "Intake of total fat 20 to 35 percent of calories would be consistent with the IOM Macronutrient report." She noted that the Subcommittee had justified both the upper and lower end of this range. At the upper end, there was a risk of increased calorie consumption, as well as potential increased risk of cardiovascular disease. At the lower end there was a risk of nutrient inadequacy and increased blood triglycerides.

Dr. Kris-Etherton acknowledged that there was some concern that it could be difficult to meet some nutrient requirements within the 20 to 25 percent range. She stated that the recommended intake of linoleic and  $\alpha$ -linolenic fatty acids could be met at these levels by using certain oils and that USDA was conducting additional menu modeling to determine which oils should be used.

Dr. Kris-Etherton noted that the Women's Health Initiative study had shown that it was difficult to adhere to a diet with only 20 percent of calories from fat, but the Subcommittee chose to include this level because it would still be nutritionally adequate and some people were able to follow such a diet.

Dr. Kris-Etherton turned the floor over to Dr. Go for a discussion on the recommendations relative to cancer. She noted that Dr. Nicklas would discuss recommendations for total fat for children following Dr. Go's presentation.

Dr. Go stated that the Subcommittee's recommendation regarding total levels of fat was sound with regard to cancer prevention. He noted that he had reviewed data from the National Cancer Institute, the International Agency for Research on Cancer of the World Health Organization, and the American Institute for Cancer Research. Data from numerous epidemiological and prospective studies showed a positive association between breast and colorectal cancer and diets high in saturated fat. A large European prospective study on nutrition and cancer concluded that women who consume over 35 grams per day of saturated fat had more than a two-fold increased risk of developing breast cancer compared with those who consume less than 10 grams of saturated fat per day. Data regarding fat intake and prostate cancer was inconclusive. Dr. Go noted that it was not clear whether the reduced risk of cancer associated with reduced fat diets was due to lower total fat or increased intake of fruits and vegetables. However, the recommendation of 20 to 35 percent of calories from fat was consistent with the literature on cancer, particularly at the lower end of the range.

Dr. Nicklas prefaced her remarks on total fat in children by addressing several other aspects of the Subcommittee's conclusive statement. First, she reiterated that the Subcommittee had looked at the adequacy of nutrients at various levels of fat in the diet and had found that at 20 percent of calories from fat, few of the proposed food patterns met the recommended AI for linoleic and  $\alpha$ -linolenic acids. The AI for both of those fatty acids was met at the 35 percent level, but cholesterol levels were above 300 mg in the highest calorie food pattern. Dr. Nicklas noted that the Subcommittee's recommendations would include a list of recommended oils and food sources for important nutrients, based on modeling exercises that USDA was conducting. Dr. Nicklas also noted that intake of added sugars increased dramatically at lower levels of fat intake. She stated that the Fatty Acids Subcommittee would discuss this issue with the Carbohydrates Subcommittee.

Turning to the issue of fat intake for children, Dr. Nicklas stated that the Subcommittee felt it was advisable to start with a higher percentage of fat for children and work down, in order to ensure nutritional adequacy. Dr. Kris-Etherton noted that the IOM had established specific fat recommendations for different age levels. However, the Subcommittee had decided to simplify the guidance by stating that the recommended level for adults was 20 to 35 percent, and that diets for children should be at the higher end of the recommended range.

#### *Saturated Fatty Acids*

Dr. Kris-Etherton presented the Subcommittee's conclusive statement on saturated fatty acids: "There is a positive linear trend between saturated fatty acid intake and LDL concentration." She noted that there was no plateau effect in this relationship.

The recommendation for the general public would be that saturated fat consumption should be as low as possible while consuming a nutritionally adequate diet. Dr. Kris-Etherton noted that the Subcommittee had decided it would be important to quantify that recommendation. Dr. Camargo stated that the proposed goals for saturated fatty acid intake would be 10 percent of calories for adults whose LDL cholesterol was below 130, and 7 percent for adults with an elevated LDL cholesterol level. These goals were designed to harmonize existing recommendations. Dr. Kris-Etherton stated that the recommended goal for children would be less than 10 percent of calories from saturated fat. She then opened the floor for discussion.

Dr. Weaver expressed concern that restricting saturated fatty acids to 10 percent or less would limit flexibility in the food patterns by forcing lean choices. Dr. Go and Dr. Kris-Etherton defended the 10 percent level, though Dr. Go acknowledged that the level for adults with elevated cholesterol was much more stringent. This led to a discussion of whether the recommendation should specify a level for individuals with coronary heart disease or cardiovascular disease. It was noted that the Guidelines were designed to help healthy individuals reduce their risk for chronic disease, and that those with prior history of a chronic disease would receive appropriate advice from a physician. A consensus emerged that while it would be important to address this issue in the technical report, the Guidelines should be aimed at the healthy population.

#### *Cholesterol*

Dr. Kris-Etherton presented the Subcommittee's conclusive statement on cholesterol: "There is a positive linear trend between cholesterol intake and LDL cholesterol concentrations and, therefore, with risk of coronary heart disease." She asked Dr. Camargo to discuss the recommendations.

Dr. Camargo stated that the Subcommittee would recommend that cholesterol consumption should be as low as possible while consuming a nutritionally adequate diet. Specific goals would be less than 300 mg of dietary cholesterol per day for individuals whose LDL cholesterol was below 130, and less than 200 mg per day for those with an elevated LDL cholesterol. These goals were supported by evidence from the IOM and were consistent with the ATP-III. He noted that daily cholesterol intake in this country was currently 250 to 325 mg for adult men, and 180 to 200 mg for women.

Dr. Nicklas emphasized that these guidelines were intended for adults and were not based on studies with children. Dr. Camargo noted that there was nothing in the literature that addressed the question of how saturated fat, cholesterol, and blood lipids ultimately affect heart disease in children. Dr. Appel noted the importance of establishing healthy dietary patterns early in life and suggested that the report include a statement that the recommendations should be adopted by children.

#### *Trans Fatty Acids*

Dr. Kris-Etherton presented the Subcommittee's conclusive statement: "There is a positive linear trend between trans fatty acid intake and LDL concentration." This conclusion was consistent with the IOM report and several more recent publications.

Dr. Kris-Etherton stated that the Subcommittee felt that the recommendation should be quantified and was still attempting to determine appropriate limits of trans fatty acid intake. This task was complicated by the fact that different organizations had set different limits. For example, the Danish Nutrition Council recommended zero trans fats, the World Health Organization recommended less than one percent of calories, and the European Commission recommended less than two percent of total calories.

Dr. Kris-Etherton noted that Americans were consuming 2.6 percent of calories from trans fatty acids in the mid 1990s. More recent data had shown that the level of trans fats in the food supply had decreased appreciably, especially in certain foods and in certain fats.

Dr. Kris-Etherton stated that the Subcommittee would like to recommend that there be no industrial sources of trans fatty acids in the diet, but it acknowledged that there were natural sources of trans fatty acids, especially beef and cheese. The Subcommittee also recognized that conjugated linoleic acid (CLA) was a natural trans fatty acid that had some health benefits.

She noted that USDA was conducting some additional modeling exercises to determine the level of trans fatty acids that would remain in the diet if industrial sources were eliminated. She then opened the floor for discussion.

Dr. Lupton asked whether there were any benefits of trans fats from industrial sources that would be lost if those sources were eliminated from the diet. Dr. Kris-Etherton acknowledged that some cardiologists were advising patients to avoid some margarines that were widely recommended for reducing cholesterol because they contained low levels of trans fats in the form of hydrogenated soybean oil. Dr. Lupton stated that she would prefer to see a recommendation that was based on physiological effects rather than specifying industrial versus natural sources. Dr. Kris-Etherton proposed that the recommendation could be based on the specific fatty-acid composition of the trans fat.

Dr. Caballero felt that a reasonable goal for trans fats would be around one percent, which would represent a significant reduction from current intake. He questioned whether there was sufficient evidence regarding the health effects of CLA to make a specific recommendation regarding that fatty acid. Dr. Clydesdale stated that the isomers of CLA in foods were not particularly active. Dr. King noted that while the evidence from animal studies on CLA was fairly convincing, human studies were inconclusive.

Dr. Weaver asked if substitutes were available for hydrogenated oils in all categories of food. Dr. Clydesdale stated that substitutes existed for some, but not all, hydrogenated oils and that it was difficult to find acceptable substitutes for hydrogenated oils in baked goods. Dr. Weaver expressed concern that a recommendation to eliminate all industrial sources of trans fats would eliminate entire categories of commercially prepared foods.

Dr. Kris-Etherton noted that Committee members were questioning whether it would be feasible to eliminate all industrial sources of trans fats. Dr. Camargo stated that since the food industry had shown they were capable of and interested in eliminating trans fats, it might be desirable to set the limit for industrial sources at zero, while allowing small amounts from natural sources, including those that might be in processed foods.

Dr. Clydesdale noted that the problem in finding acceptable substitutes for trans fats in baked goods was the melting point. The European food industry had reduced trans fat levels by substituting tropical oils, but these were not acceptable to U.S. consumers. He stated that the food industry was making efforts to reduce trans fats and stressed that the Committee's recommendations should be realistic.

Dr. Go proposed setting the level for trans fat intake at less than one percent of calories, without specifying industrial or natural sources. He noted that this would represent a significant reduction from current intake. Dr. Kris-Etherton suggested adding a qualifying statement that would strongly encourage the food industry to eliminate trans fats.

Dr. Clydesdale stated that he could not respond to that proposal without data on the levels and sources of trans fats in the food supply. Dr. Kris-Etherton and Dr. Camargo stated that the main industrial sources of trans fats were baked goods (40 percent) and margarines (18 percent). Twenty-one percent were from animal sources.

Dr. Camargo noted that setting the level at less than one percent would make it essential to work with the food industry to help people achieve that goal. Dr. Nicklas noted that this might be another area in which flexibility could be offered. Dr. Camargo agreed that it might not be reasonable to set the level at zero at present, but that this would be an appropriate goal.

Dr. Clydesdale agreed that it would be appropriate to lower the level of trans fats, but he was uncomfortable about setting a specific goal at this point in time.

Dr. Lupton reiterated her concern about a conclusive statement that would make different recommendations for industrial versus natural sources of trans fats without providing scientific evidence for that distinction. In her view, the source of a trans fat was less important than the substance itself.

Dr. King reminded the Committee of Dr. Beato's charge to aim high. She stated that it might be important to recommend major changes in food industry practices if the Committee could justify those changes. Dr. Clydesdale stressed that it would also be important to acknowledge the difficulty of finding stable substitutes for trans fats.

#### *Omega-6 Polyunsaturated Fatty Acid (n-6 PUFA)*

Dr. Kris-Etherton stated that the Subcommittee accepted the IOM recommendation in this area. The conclusive statement would read: "High intakes of n-6 PUFAs have been associated with blood lipid profiles that are associated with low risk of coronary heart disease. An intake between 5-10% of energy confers beneficial effects on CAD mortality." Dr. Kris-Etherton noted that current intake was approximately seven percent.

Dr. Nicklas stated that the Subcommittee would recommend further research regarding the ratio of omega-6 to omega-3 (n-3) fatty acids.

#### *Alpha-Linolenic Acid*

Dr. Kris-Etherton stated that the Subcommittee was in the process of drafting its recommendation in this area. The Subcommittee was considering adopting the recommendation in the IOM report, but it was still examining research regarding specific levels that might provide health benefits.

The main question under consideration by the Subcommittee was whether to recommend one number or a range. The IOM report established an AI for alpha-linolenic acid of 1.1 grams for women and 1.6 grams for men. Recommendations from the World Health Organization and the European Commission were in the area of 1.2 percent of energy. A recent report from the Agency for Health Care Research and Quality (AHRQ) contained many recommendations regarding n-3 fatty acids and cardiovascular disease. Dr. Kris-Etherton noted that the IOM recommendations were based on appropriate levels to prevent nutrient deficiency, while the goal of *Dietary Guidelines* was to identify levels that would provide health benefits.

Dr. Nicklas added that the Subcommittee would recommend further research regarding the conversion factor of ALA to EPA and DHA, and also how omega-6 might interfere with that conversion rate.

#### *Fish*

Dr. Kris-Etherton stated that the Subcommittee would make a new recommendation that Americans should consume eight to nine ounces of omega-3 rich fish per week. This

recommendation was based on epidemiological and clinical data showing that omega-3 fatty acids reduce the incidence of cardiovascular disease. It was also consistent with the recommendations from the American Heart Association and the European Society for Cardiology.

Dr. Kris-Etherton noted that the recommendation would represent a doubling of current U.S. consumption of fish, according to USDA databases. She then opened the floor for discussion.

In response to a question, Dr. Kris-Etherton stated that the Subcommittee would prepare a table showing types of fish that were high in omega-3. The list would include several kinds of canned fish, which could help control costs.

In response to a question, Dr. Clydesdale stated that the Food Safety Subcommittee planned to address the Food and Drug Administration (FDA) advisory regarding consumption of fish by pregnant women and young children. He noted that the types of fish that should be avoided due to methylmercury and those that were safe to consume were consistent with the Fatty Acids Subcommittee's recommendations. Dr. Kris-Etherton noted that her Subcommittee would address the issue of PCBs in farm-raised fish.

Dr. Appel expressed concern that the Subcommittee was recommending a food source of a nutrient for which there was not a nutrient recommendation and suggested that it might be preferable to simply recommend two servings of fish, without making reference to omega-3. Dr. Nicklas and Dr. King agreed that the point was well taken, and Dr. Kris-Etherton stated that the Subcommittee would discuss the issue.

Dr. King asked what the Subcommittee would recommend for people who would not eat fish. Dr. Kris-Etherton suggested that vegetarians or people who do not eat fish could meet the recommendations through plant-based sources of EPA and DHA. Dr. Kris-Etherton noted that the conclusions regarding fish consumption and cardiovascular disease from epidemiological studies were based on fish consumption, but that similar results had been found in the Diet and Reinfarction Trial (DART) study, which provided supplements for people who did not eat fish. Dr. Appel noted that the DART trial was a secondary prevention study with individuals who had suffered myocardial infarctions and that there was no supplement study on a healthy population.

Dr. Clydesdale noted that plant sources of omega-3 tended to go rancid very rapidly and that it would be necessary to find a way to stabilize them before they could be added to foods.

Dr. King reminded the Committee of the importance of considering the needs of pregnant and lactating women when they were making their dietary recommendations. She noted that lipid levels changed dramatically during pregnancy and suggested that it might be important to state that some of the thresholds would not apply to pregnant women. Dr. Kris-Etherton confirmed that the proposed levels of fat intake would ensure adequate intake of vitamin B6, vitamin B12, and iron.



*Questions Still Being Reviewed*

Dr. Kris-Etherton stated that the Subcommittee would review the modeling exercises to come up with a quantitative recommendation for trans fatty acids and  $\alpha$ -linolenic acid. It would also be reviewing monounsaturated fatty acids, stearic acid, and CLA. Dr. Nicklas added that the Subcommittee would also discuss the question of a recommendation on EPA and DHA.

Dr. King reminded the Committee that the report would be making many recommendations that would be unfamiliar to the general public and that it would need to provide guidance on how to implement those recommendations in dietary planning.

*Expert Consultation*

The Fatty Acid Subcommittee consulted with Dr. Bill Harris of St. Luke's Lipid and Diabetes Research Center regarding fish oils and cardiovascular disease.

Dr. Kris-Etherton turned the floor over to Dr. King, who adjourned the meeting for a brief break.

(Break: 2:30-2:50)

Dr. King reconvened the meeting and noted that in January, the Committee had created a new Macronutrient Subcommittee to address the issue of the carbohydrate/fat ratio in the diet. She then turned the floor over to Dr. Caballero to present the Macronutrient Subcommittee's recommendations.

***Macronutrient Ratio Subcommittee  
Conclusive Statements and Discussion  
B. Caballero, Lead***

Dr. Caballero stated that the members of the Subcommittee included Drs. Kris-Etherton, Lupton, Weaver, and Pi-Sunyer, with additional input from Dr. King. He noted that the IOM macronutrient report had addressed the macronutrient ratio for the first time and had defined the concepts of acceptable distribution ranges for protein, carbohydrates, and fat. He noted that while there was no upper level in terms of absolute amounts of protein, fats had both a numerical quantitative amount recommended, as well as a recommended range in terms of percent of total calories from fat.

The Macronutrient Subcommittee reviewed the issue of the ratio of carbohydrates to fat in terms of maintenance of a healthy weight and weight loss. Dr. Caballero noted that this is a controversial issue..

Dr. Caballero stated that after reviewing extensive evidence, it had developed the following conclusive statement: "Total energy intake is more important for maintenance of a healthy body weight than the relative contribution of fat, carbohydrate, or protein. Similarly, reducing excess body weight requires a reduction in caloric intake and/or an increase in energy expenditure (physical activity)."

The Subcommittee found no consistent evidence from long-term studies in humans showing the advantage of either high-fat or high-carbohydrate diets for weight maintenance or loss. Ranges of 20 to 35 percent of calories from fat were well documented in studies cited in the IOM report. Dr. Caballero noted that the studies that the Subcommittee reviewed included little information on levels of physical activity.

Dr. Pi-Sunyer stressed that it was essential to emphasize the message about total caloric intake as opposed to any specific ratio of fat to carbohydrates. Dr. Pate noted that there was a broad public perception that changing this ratio could bring about weight loss. He suggested adding a corollary indicating that while modifying the ratio might be associated with weight loss, this benefit was probably due to reduced caloric intake.

Dr. Nicklas asked if the Subcommittee would recommend an appropriate amount of weight loss per week. Dr. Pi-Sunyer stated that this would be addressed in a separate section on weight loss in the Subcommittee's report. Dr. Caballero noted that this would be a general statement, along the lines of what was in the 2000 *Dietary Guidelines*.

Dr. King noted that this would be the first time that the Guidelines would propose a range of fat intake rather than a specific number and that the upper limit was higher than had been suggested in the past. Dr. Caballero added that the bottom end of the range would also be lower than in the past.

Dr. Appel noted that the upper range might be linked to higher caloric intake or higher activity levels. Dr. Lupton agreed that as the percentage of fat increased, fewer calories would be available for other macronutrients. In some food patterns there were no discretionary calories at fat levels of 35 percent. Dr. Caballero noted that the Subcommittee's report would need to include a statement that individuals with low total energy requirements would have to choose their foods carefully in order to avoid essential fatty acid deficiencies at the lower end of the fat intake range and to avoid excess calories at the higher end of the range. Dr. Nicklas suggested that the Subcommittee could reference the Fatty Acid Subcommittee's report, which would address the issue of potential deficiencies at low levels of fat intake.

Dr. Caballero stated that the Subcommittee was still reviewing the concept of discretionary calories to develop a definition, determine what macronutrient components would be included, and determine the message to be conveyed to the public regarding the link between discretionary calories and physical activity.

Dr. King asked for the Committee's input as to whether the concept of discretionary calories could be communicated effectively to the public. Dr. Caballero acknowledged that it would be difficult to explain how to calculate discretionary calories and expressed concern that the concept could be abused. Dr. Pate stressed the importance of including discretionary calories in the recommendations and noted that resources would be available to develop communications strategies.

Dr. Camargo noted that implementing the concept of discretionary calories assumed that people could determine their appropriate caloric intake, based on body size and activity level, and could keep track of what they were eating and how much exercise they were getting. He

made an analogy to balancing a bank account by keeping track of income and expenses and emphasized the importance of simple tools to help people measure intake and expenditure of calories, such as labeling foods with caloric content and encouraging the use of pedometers.

A brief discussion ensued regarding the impact of physical activity on discretionary calories. Dr. Pi-Sunyer proposed that consumer materials addressing this topic should include a simple message: “Sedentary people do not have discretionary calories; if you want them, you need to be active.”

Dr. King asked the Committee what types of foods would constitute discretionary calories. Responses included added sugar, added fat, and starchy foods. Dr. Caballero noted that discretionary calories could be any type of food.

Dr. Bronner emphasized that only a small proportion of the population followed the current food guidance. She expressed concern that people who did not understand the basic concepts of healthy eating would now be expected to understand their energy requirements. She stressed the importance of ensuring that people had the proper foundation to enable them to take the steps the Committee was asking them to make.

Dr. Caballero stated that BMI was a good indicator of whether a person was consuming the proper amount of calories. He noted that he was working on a computer application to help people determine their appropriate caloric intake. Dr. Pate added that it would be important to establish and define physical activity levels, including at least three categories above sedentary.

Dr. Lupton noted that a national campaign had been effective in raising awareness of HDL and LDL cholesterol and suggested a similar process to inform the public about discretionary calories.

Dr. Appel cautioned that people were generally resistant to counting calories. Dr. Weaver suggested that computer applications could help. Dr. Camargo noted that it could be difficult to gauge the calories in foods, but that the bank account model could work because people understand how to balance income and expenses. Dr. Pate noted that a campaign would have to take many forms. While only a small percentage of people were likely to implement the advice, he would consider the campaign to be effective if most Americans understood that they would have more flexibility in their diet if they were more active.

Dr. Bronner noted, and others agreed, that a simple bathroom scale was a useful tool for monitoring weight. Dr. Caballero noted that people are not always aware that they are gaining weight. Dr. Camargo acknowledged that a scale could help to identify the problem, but that the solution would be a greater focus on calories. He stressed a need for better information regarding calories in packaged foods and in foods served at chain restaurants. Dr. Caballero agreed that energy density and portion size were difficult to gauge and could be manipulated easily.

Dr. King asked the Committee to focus on what it would recommend to the Subcommittee. After some discussion, a consensus emerged that the Subcommittee should continue to refine the concept of discretionary calories and to consider what types of foods would be included.

Ms. McMurry reminded Committee members that their job was to determine which concepts would be important to convey and to provide scientific evidence for their recommendations. HHS and USDA would be responsible for developing a communications plan for the Guidelines.

### ***Overarching Issues***

Dr. King thanked the Macronutrient Subcommittee for its presentation. Turning to a discussion of overarching issues, she raised the question of whether the Committee wished to propose any alternatives to the term “serving size.” Dr. Weaver stated that the Nutrient Adequacy Subcommittee had used household measures, such as cups and ounces, to describe recommended amounts of food. Dr. Pi-Sunyer was concerned that consumers would not understand how to translate grams into specific amounts of food, such as fiber; Dr. King noted that food labels showed fiber content in terms of grams. There was general agreement that household measures would be preferable to the term “serving size.”

Dr. King then reviewed a draft outline for the section of the Committee’s final report that would translate the technical literature review into food-based dietary guidelines. The outline included four main sections:

1. Choose foods that provide nutrient needs
2. Aim for energy balance
3. Make dietary and lifestyle choices that reduce the risk of chronic disease
4. Keep food safe to eat

The first section would provide a list of foods that provide needed nutrients. It would also include discussions of Recommended Daily Allowance(RDAs) and upper limits; nutrient density and adequacy; vitamins, minerals, and electrolytes; and fluids. It would also discuss flexibility in food choices to meet nutritional goals, such as replacing whole grains with legumes or fruits and vegetables, and options for a nutrient adequate vegetarian diet.

The second section would include discussions of physical activity; energy density; BMI (including the impact of portion sizes, breakfast, and fruits and vegetables); and weight loss. Dr. King noted that discretionary calories could be addressed in this section.

The third section would discuss the major chronic diseases for which risk could be reduced by choosing a healthy diet, including cardiovascular disease, obesity, diabetes, and cancer. It would also include discussions of the role of carbohydrates such as fiber and fruits and vegetables in reducing the risks of heart disease; the risks of added sugars for diabetes; the role of various fats; the role of alcohol and chronic disease; sodium intake and hypertension; and the role of diet in bone health.

The final section of the report would present guidance for food safety.

Dr. King opened the floor for discussion.

Dr. Caballero suggested that, in light of the prevalence of obesity, the first section should address energy balance. Other Committee members stated that it was more logical to address nutrient adequacy first, because this was the focus of the *Dietary Guidelines*.

Dr. Nicklas and Dr. Camargo stated that the section on Nutrient Adequacy would include a discussion of the primary nutrients supplied by each food group.

Dr. Nicklas proposed that the third section should refer to choices that would prevent, rather than reduce, the risk of chronic disease, because the Guidelines would also address children. Several Committee members felt that it would be inadvisable to use the term “prevent.” Dr. King noted that establishing good dietary habits in children early in life would reduce their risk of disease later in life.

Dr. Bronner noted that bone health would be included in the overall discussion of calcium because the lifecycle components of bone health could not be distinguished in the literature.

Dr. Lupton asked whether the nutrient adequacy section would include a separate discussion of supplements, or if they would be discussed in those areas where the food patterns fell short of recommended levels. Dr. Weaver stated that the Nutrient Adequacy Subcommittee would discuss supplements in the context of specific vitamins for which the food patterns did not meet the requirements for certain groups. She noted that the Subcommittee was not working on a generic statement regarding supplements.

Dr. Kris-Etherton asked if the energy balance section would include a discussion of macronutrients. Dr. King noted that this was a good suggestion and acknowledged that the proposed outline was a first draft that would continue to evolve. She thanked the outside experts and the Subcommittees for their excellent presentations and reviewed the agenda for the following day.

Ms. McMurry informed the audience that the notebook for the meeting was available in the lobby and that copies of any of the materials would be available at her office, by appointment.

Dr. King adjourned the meeting at 5:15 p.m.

***Wednesday, March 31***

(8:40 a.m.)

Dr. King welcomed Committee members and observers to the second day of the meeting. She stated that the morning session would continue the review of the Subcommittee’s conclusive statements, the rationale for those statements, and critical discussion by the full Committee. She encouraged Committee members to challenge each other to ensure that they developed the best possible conclusive statements, based on the science.

Dr. King reminded the audience that they were welcome to submit comments regarding the Committee’s deliberations to Kathryn McMurry at HHS and explained that there was no time for public comments during this meeting. She emphasized that the Committee appreciated public input and considered all comments. Dr. King then turned the floor over to Dr. Pi-Sunyer and the Energy Balance Subcommittee.

***Energy Balance Subcommittee  
Conclusive Statements and Discussion  
X. Pi-Sunyer, Lead***

Dr. Pi-Sunyer noted that the members of the Energy Balance Subcommittee included Drs. Pate, Caballero, and Appel, with additional contributions from Dr. King. Dr. Pi-Sunyer and other Subcommittee members then presented the Subcommittee's conclusions and recommendations in seven areas: breakfast and BMI; physical activity and prevention of weight gain; physical activity and maintenance of weight loss; energy density and BMI; portion size and BMI; fruits and vegetables and BMI; and calcium/dairy and BMI.

*Breakfast and BMI*

Dr. Pi-Sunyer stated that after reviewing the literature regarding breakfast and BMI, the Subcommittee had drafted the following statement: "The effects of regularly eating breakfast on BMI are uncertain." He noted that the data regarding this relationship were inconsistent. One randomized clinical trial and two longitudinal studies showed no significant differences between groups who ate breakfast and control groups, while a number of cross-sectional studies had reported positive associations between skipping breakfast and adiposity in children. Information from the U.S. National Weight Loss Registry also indicated that eating breakfast was an important factor in maintaining weight loss over time. An analysis of data from the Nationwide Food Consumption Survey suggested that skipping breakfast lowered the nutritional quality of the diet of adults and the elderly

Dr. Pi-Sunyer opened the floor for discussion.

Dr. Clydesdale expressed concern that the statement could imply that eating breakfast was not important. Dr. Pi-Sunyer replied that the rationale would state that eating breakfast was likely to be of nutritional benefit, though its association with BMI was unclear.

Dr. Weaver asked if the statement could include a caveat that it would not only be nutrient adequate, but could also be helpful for performance, especially for school-age children. Dr. Pi-Sunyer replied that the Subcommittee's mandate had been to address breakfast and BMI; it had not been asked to address performance in school.

Dr. Caballero noted that the Subcommittee's mandate was to examine energy balance and that skipping breakfast would have an influence. Dr. Nicklas stated that many of the studies on breakfast had examined its impact on nutrient adequacy. She offered to provide summaries of those studies, as well a studies on performance.

Dr. King asked if there was any data on skipping meals other than breakfast. Dr. Pi-Sunyer stated that there was some data to suggest that eating more meals throughout the day was associated with lower BMI, but he cautioned that there were few long-term studies examining the effects of various eating patterns. Dr. Nicklas noted that some studies had implied that increased snacking could be a predictor of an increase in BMI, while the results of other studies were contrary to those findings.

Dr. Camargo suggested that the Subcommittee could state, “Breakfast has many proven benefits,” and could then cite the extensive literature in support of that statement. He recommended discussing breakfast in the context of the impact of energy balance on BMI. Dr. Pi-Sunyer reacted favorably to that suggestion.

#### *Physical Activity and Prevention of Weight Gain*

Dr. Pate stated that the Subcommittee had devoted considerable attention to the issue of how much physical activity might be recommended for prevention of excessive weight gain or obesity. While it was continuing to revise its message, it had reached consensus on key concepts. Its proposed conclusive statement was: “Thirty minutes of physical activity per day contributes importantly to maintenance of healthy weight and provides other important health benefits. More than 30 minutes of physical activity daily provides added health benefits, and many adults may require up to 60 minutes per day to prevent excessive weight gain.”

Dr. Pate noted that the Subcommittee had focused on crafting a conclusive statement that would draw together two types of background information: the recent CDC report, which confirmed the relevance of the 30-minute recommendation, and the IOM Macronutrient report and other recent consensus reports that indicated that many adults would require more than 30 minutes and possibly as much as 60 minutes of daily physical activity to prevent obesity.

Dr. Pate anticipated that the Subcommittee had discussed physical activity recommendations for children and proposed to recommend at least 60 minutes of physical activity per day, which is consistent with the CDC report. He then opened the floor for discussion.

In response to a question from Dr. King, Dr. Pate stated that the Subcommittee was still thinking about how to quantify the amount of physical activity, but that the recommended frequency would probably be five days per week for adults and seven days for children. He noted that recommendations had an impact on the way surveillance systems were developed and suggested that the Subcommittee would consider that fact when finalizing its report.

Several Committee members raised questions regarding the types of physical activity that would be recommended for children. Dr. Pate stated that some of the international consensus statements had developed good language indicating that children and youth can and should accumulate physical activity in age-appropriate ways. The Subcommittee was still considering how to integrate resistance and bone-loading exercise into the overall recommendations. Dr. Pate noted that the Subcommittee had requested an analysis of NHANES data to determine the most common forms of physical activity among U.S. adults and would use those lists as examples of the types of activity that could be used to meet the recommendations.

Dr. Weaver expressed concern about the lack of data regarding the relative benefits of aerobic activity versus resistance and bone-loading exercise. Dr. Pate replied that the 30-minute recommendation was based on caloric expenditure. He acknowledged that most forms of activity contribute to caloric expenditure, but he stressed that aerobic activity resulted in greater caloric expenditure than resistance and bone-loading exercise.

Responding to questions about recommendations for special groups, Dr. Pate agreed that it would be important to address the physical activity needs of the elderly and stated that the Subcommittee hoped to have an opportunity to review the forthcoming CDC report on that topic. The Subcommittee would also incorporate physical activity guidelines for pregnant women that had been developed by other groups.

Dr. Weaver asked how the Subcommittee would provide any guidance regarding how to get the recommended amount of physical activity. Dr. Pate noted that the 30-minute recommendation was for activity above and beyond normal light activity and acknowledged that communicating that fact to the public had been a challenge. He stated that the baseline of “light activity” on top of which the 30 minutes would be added was different than it might have been some years ago and expressed concern that there was little population data in that area. Dr. Weaver stated that she could provide a study on the amount of bone loading over the course of a day versus an hour of intentional exercise, and Dr. Camargo noted that there was a growing body of research on inactivity as a predictor of BMI. Dr. Pate agreed that it would make sense to allude to the impact of inactivity on BMI. He noted that several studies in children had shown that reducing TV watching and other forms of inactivity had a beneficial impact on BMI. Those studies did not show increases in measurable physical activity, which would suggest that sedentary time had been replaced by light activity, which was not detectable with the measures that were used in those studies.

Dr. Lupton noted that physical activity contributed to health in many ways and that it would be important to address its contribution in areas other than energy balance, such as bone health. Dr. Pate replied that the Subcommittee was considering how to address all elements of physical activity in the final report. One approach would be to address all of the benefits of physical activity in a dedicated section of the report. Another option would be to discuss the contribution of physical activity to energy balance in the section on energy balance, and to address other benefits elsewhere in the report.

Referring to the draft outline that had been reviewed the previous day, Dr. King stated that physical activity was listed in the section on risk of chronic disease because of its impact on obesity. She noted that it also played a role in energy balance and could potentially be relevant to other sections, such as nutrient adequacy. Other Committee members suggested that physical activity should be included in the discussion of discretionary calories.

#### *Physical Activity and Maintenance of Weight Loss*

Dr. Caballero presented the Subcommittee’s proposed conclusive statement: “While the contribution of physical activity to weight loss usually is modest, acquiring a routine of regular physical activity will greatly help an individual to maintain a stable body weight after successful weight loss. The amount of physical activity that formerly obese persons require to avoid weight regain is estimated to be from 60 to 90 minutes daily at a level of brisk walking. This amount is higher than the amount that never-obese persons usually require to maintain their weight.”

Dr. Caballero cited supporting evidence from two types of studies: epidemiological follow-up studies of six months to several years with individuals who had lost weight, and shorter-term studies in which doubly labeled water was used to measure the contribution of physical



activity to total daily energy expenditure. Consistent and compelling data from both types of studies indicated that individuals who had lost weight would require 60 to 90 minutes of daily physical activity to maintain a stable body weight, as opposed to 45 to 60 minutes of daily activity for those who were never obese.

Dr. Caballero noted that while physical activity might contribute less to weight loss than diet, there was some evidence that people who began a regimen of physical activity during the weight loss period appeared to be more likely to maintain a consistent level of activity following the weight loss and thus maintain a stable weight. He then opened the floor for discussion.

In response to a question, Drs. Caballero and Pate stated that they did not know of any data regarding the amount of activity that would be required for individuals who were slightly overweight but not obese to maintain a stable weight. Most studies regarding physical activity and BMI were on obese or formerly obese individuals.

Dr. Pi-Sunyer asked if there was any implication that persons who engaged in 60 to 90 minutes of physical activity could eat whatever they wanted. Dr. Pi-Sunyer stated that while the follow-up studies did not measure food intake, there appeared to be a positive relationship between the amount of physical activity and ability to regulate intake, though the mechanism was not clear. Dr. Caballero noted that subjects in those studies were on an ad libitum diet. Dr. Pi-Sunyer noted that individuals in the National Weight Loss Registry tended to eat a low-fat diet and tended to eat more than three meals per day.

Dr. Kris-Etherton asked whether it was possible to quantify how much weight someone would gain if they exercised for only 30 minutes. Dr. Caballero stated that the follow-up studies showed a dose response. Those who did not exercise regained the most weight, those who exercised for 30 minutes regained less weight, and those who exercised for 60 minutes or more regained little or no weight.

Dr. Appel asked whether 60 to 90 minutes was actually required to maintain weight loss, or if that level was simply associated with maintaining a stable weight. Dr. Caballero stated that the statement could be reworded to describe the association.

Dr. Lupton felt that it would be important to link post-weight loss physical activity requirements with energy intake and expressed concern that some people would assume that they could compensate for a higher level of physical activity by consuming additional calories. She suggested including a caveat to address that issue and asked the Subcommittee to clarify why formerly obese individuals would require more exercise than those who were never obese to balance similar energy intake levels. Dr. Pi-Sunyer stated that the difference could be due to changes in metabolic rate and caloric requirements following weight loss, but the mechanism was not well understood. Dr. Caballero noted that caloric intake was difficult to determine in follow-up studies. Although some studies did report caloric intake, the data was inconsistent due to differences in the method of calculating intake. Dr. King stressed the importance of providing a scientific rationale for the statement.

Referring to a study that showed a broad range of weight loss with twins who followed the same regimens, Dr. King noted that the process of weight loss was not straightforward and that differences in efficiency between people were not well understood.

Dr. Bronner asked whether the doubly labeled water studies provided any indication of the proportion of caloric expenditure that was attributable to intentional physical activity versus activities of daily living. Dr. Caballero noted that the doubly labeled water studies measured average daily energy expenditure but did not discriminate between types of activities. The survey questionnaires used for the follow-up studies provided data on types of activities, but did not provide exact calorie expenditures.

### *Energy Density and BMI*

Dr. Caballero also presented the Subcommittee's statement in this area: "Consuming high-energy density foods may facilitate excess caloric intake by packing more calories in a smaller volume of food and by delaying the sensation of fullness/satiety after a meal. Conversely, consuming low-energy density foods may help keep caloric intake under control. Evidence is not available to link the energy density of food intake to BMI. Considering the available evidence, however, it seems prudent to recommend that low-energy dense foods be used as a means to keep calories under control. This advice is consistent with the recommendation to consume a plant-based diet."

Dr. Caballero stated that short-term studies indicated that energy density affects caloric intake, but there was no solid data linking the energy density of foods with BMI. He then opened the floor for discussion.

Dr. Kris-Etherton and others stated that this issue should be presented in the context of the whole diet and overall energy balance. They noted that some energy-dense foods, such as fats and oils, were high in nutrient density and an important part of an overall low-energy dense diet, while some low-energy dense foods, such as beverages with added sugars, were nutrient poor. Dr. Pi-Sunyer agreed that these issues could be addressed in a discussion of strategies to achieve an overall low-energy dense diet. After some discussion, there was agreement that this statement should be used as supporting information for recommendations about the importance of energy balance within the diet and should not be treated as a major topic within the translation section of the report.

In response to a question, Dr. Caballero stated that the Subcommittee had used Dr. Rolls' definition of energy density, which was "calories per gram." He noted that there was no consensus definition, but it was much more difficult to calculate by volume than by weight.

Dr. Appel asked if any section of the report would address the issue that had been raised by Dr. Mattes regarding the apparent difficulty of regulating or compensating for intake of calories from beverages. Committee members suggested that this issue should also be considered as part of the overall discussion of energy balance. Dr. King suggested that the Committee should review the literature that had been presented the previous day and incorporate the references into the report.

Dr. Nicklas expressed concern that there were few long-term studies on regulation of energy intake. Dr. Caballero noted that the Subcommittee had requested an analysis of NHANES data to look at energy density of reported food intake. This data could be used to illustrate the practical aspects of energy density and to determine whether there was a trend toward greater consumption of energy dense foods. Dr. Nicklas suggested that total calories should be considered in the context of total nutritional intake.

#### *Portion Size and BMI*

Dr. Caballero presented the Subcommittee's conclusive statement: "The amount of food offered to a person influences how much he/she eats, and most studies have shown that more calories are consumed when a large portion is served compared with a small portion. The impact of portion size on energy intake is greatest for foods with high energy density."

Dr. Caballero stated that while the literature consistently showed that portion sizes and BMI had both increased over time, there was no clear evidence that those findings were associated. He noted that studies had shown the effect of portion size on intake in the short-term, but there were no long-term studies examining the impact of portion size on BMI. However, the Subcommittee felt it would be important to address this issue in the report.

Committee members agreed that it was extremely important to discuss portion size and that the statement had implications for both the food industry and the food service industry. Dr. Nicklas offered to provide additional studies. Dr. King stated that she understood the Subcommittee would have additional references beyond those that it had cited to-date.

#### *Fruits and Vegetables and BMI*

Dr. Appel stated that the Subcommittee had found limited evidence on the effects of increased fruit and vegetable intake in facilitating weight loss or maintaining healthy weight. Most of the data was observational. There were few prospective studies, and it was difficult to separate out the fruit and vegetable component of those studies. The larger studies tended to support increased fruit and vegetable consumption, but the evidence was not strong. There were no studies in which fruits and vegetables were the exclusive intervention.

Based on the limitations of the evidence, Dr. Appel suggested that this issue should be addressed in the context of the recommendation to consume a low-energy dense diet.

Dr. Go asked if there was any indication of the relative benefits of fruits versus vegetables. Dr. Appel noted that one study had shown increased intake of vegetables was associated with greater weight loss in boys. Dr. Nicklas stated that she could share a paper in which fruit was inversely associated with overweight.

#### *Calcium/Dairy and BMI*

Dr. King presented the Subcommittee's statement on this topic: "While the evidence is inconclusive that dairy foods help manage body weight, there is no evidence that consuming the recommended intakes of low-fat dairy foods increases body weight. Therefore, adults and children should not avoid dairy foods due to concern that these foods are 'fattening.' "

Dr. King described two weight loss studies that had shown a significant negative relationship between calcium or dairy product intake and body weight or fat. These findings suggested there could be some benefit of including dairy foods in a diet for weight loss; however, the studies were small and the methods were quite different between the two studies. The findings of longitudinal studies looking at dairy food consumption and body weight or body fat in children were mixed.

Dr. King stated that the lack of large scale, randomized controlled trials or controlled feeding studies that were explicitly designed to address the issue of dairy food consumption or calcium consumption and body weight or body fat made it difficult to make a conclusive statement regarding the intake of dairy foods and the management of body weight.

Dr. King noted that none of the studies had shown that dairy food consumption was associated with an increase in body weight. She stated that there was no need to avoid dairy foods for fear that they were fattening, as long as they were consumed within the recommended amounts, based on the proposed food patterns.

Dr. Go suggested, and Dr. King agreed, that this topic should also be discussed in the context of the larger discussion of energy balance. Dr. Nicklas suggested adopting the language similar to what had been drafted by the Energy Balance Subcommittee (“There is no conclusive evidence to suggest ... nevertheless, it seems prudent to recommend ...”) for the statements on fruits and vegetables and calcium and dairy. Dr. Clydesdale suggested that this language could be applied to the statement on breakfast and BMI.

Dr. Lupton asked if it was possible to separate studies that looked at calcium-rich foods from those that looked at dairy products. Dr. King said that would be easy to do.

Dr. Caballero stressed that it would be important to clarify what types of dairy products were recommended. Dr. Weaver noted that studies with children were not based on skim milk and that it may not be appropriate to imply that the relationship between dairy product intake and body weight was only true for low-fat products.

#### *Issues Still Being Addressed*

Dr. Pi-Sunyer noted that the Subcommittee was still drafting statements on weight loss advice and on eating disorders.

#### *Expert Consultation*

Dr. Pi-Sunyer acknowledged the contributions of Dr. Rolls and Mattes regarding energy density and portion sizes; Dr. Kohl regarding physical activity recommendations of other groups; and Dr. Cliff Johnson and Ms. Alanna Moshfegh regarding NHANES and CSFII data and energy intake, and regarding energy density and portion sizes.

Dr. King adjourned the meeting for a short break.

(Break: 10:10-10:30)

Dr. King reconvened the meeting and noted that Dr. Vernon Young had passed away the previous evening. She acknowledged Dr. Young's many contributions to the field of nutrition and then turned the floor over to Dr. Appel and the Fluid and Electrolytes Subcommittee.

***Fluid and Electrolytes Subcommittee  
Conclusive Statements and Discussion  
L. Appel, Lead***

Dr. Appel stated that the Subcommittee had drafted conclusive statements regarding water, potassium, and sodium and had considered the question of whether the Adequate Intake (AI) for potassium and sodium should be adjusted for calories. He noted that much of the Subcommittee's work was based on the recently issued IOM report on fluid and electrolytes.

*Water*

Dr. Appel stated that it was difficult to develop a single recommendation for water. Minimal daily water losses and production, exclusive of sweating, resulted in a net requirement of one to three liters, but high levels of physical activity or extreme environmental conditions could raise the requirement to as much as 12 liters. He noted that these figures were based on modeling and not empirical data.

Dr. Appel stated that the primary determinant of water requirements was not chronic illness, but maintaining adequate hydration, for which the best indicator was serum osmolality. NHANES data, stratified by deciles of total water intake, showed that serum osmolality was essentially identical at all levels. This would suggest that homeostatic mechanisms allow for proper hydration. Although the IOM panel found limited evidence associating high water intake with reduced risk of bladder or colon cancer, and some evidence that it could prevent kidney stones, the evidence did not merit setting a specific requirement for the general population.

The Subcommittee's conclusive statement, based largely on the IOM report, was: "The combination of thirst and normal drinking behavior, especially the consumption of fluids with meals, is sufficient to maintain normal hydration."

The Subcommittee would not recommend a specific intake level, such as eight glasses of water per day. However, the Subcommittee recognized that water intake should be deliberately increased with prolonged physical activity or exposure to heat stress. He then opened the floor for discussion.

Dr. Kris-Etherton asked if the Subcommittee had considered the needs of breastfeeding women. Dr. Appel replied that there was no group for which the IOM found a significant difference in hydration and that serum osmolality levels were actually slightly lower for lactating women.

Dr. Nicklas asked whether the definition of fluid intake included water from foods and from beverages other than water. Dr. Appel stated that fluid intake was based on water from all

sources. He noted that in the NHANES database, 80 percent of fluid intake was from beverages, and the balance was from foods.

Dr. Pi-Sunyer asked Dr. Appel to comment on the common perception that water could contribute to weight loss by inhibiting appetite. Dr. Appel noted that the Subcommittee had not addressed the issue of water and weight loss but that it could comment on it in its conclusive statement. The Subcommittee would also clarify that the conclusive statement was based on total water intake, including beverages and foods.

### *Potassium*

As background to the next conclusive statements, Dr. Appel presented information on the effects of potassium and sodium on blood pressure. He stated that there was a direct, progressive relationship between blood pressure and cardiovascular disease, with lower blood pressure directly associated with lower risk of cardiovascular mortality. Dr. Appel noted that the contemporary approach to blood pressure-related risks, based on epidemiological data, was not that people were either hypertensive or non-hypertensive, but that the relationship between blood pressure and risk of cardiovascular disease was graded and continuous. He presented data from a recent meta-analysis of the risk of stroke at various blood pressure levels to illustrate that relationship.

Dr. Appel stated that most hypertension experts believed that it was preferable for blood pressure to be as low as possible. He presented projections showing that slight shifts in the blood pressure levels in the general population could result in substantial reduction of risks for mortality in terms of stroke, coronary heart disease, or total mortality. Citing the Framingham heart study, Dr. Appel noted that the estimated lifetime risk of developing hypertension was approximately 90 percent.

Dr. Appel stated that potassium was one of many dietary factors affecting blood pressure. The effects of potassium on blood pressure were evidenced in both meta-analysis and controlled feeding studies.

Dr. Appel cited findings in several areas that supported a recommendation to increase intake of potassium. First, dietary patterns rich in potassium—such as the Dietary Approaches to Stop Hypertension (DASH) diet—had been associated with lower blood pressure, with much greater reduction among African Americans. Dr. Appel suggested that this finding could be helpful in addressing health disparities in this area. Second, potassium was found to reduce the effects on blood pressure of increased salt intake. Again, the response was greater among African Americans. Third, potassium intake was associated in observational studies with lower risk of developing kidney stones. Finally, observational, cross-sectional, and prospective data documented a direct relationship between potassium intake and bone mineral density. Dr. Appel noted the need for randomized clinical trials to test that relationship.

Based on this body of evidence, the IOM panel recommended 120 millimoles (mmol) per day as an adequate intake of potassium for adults. Dr. Appel noted that the recommended level was significantly higher than current median intake levels (84 mmol per day in men and 65 in women). He noted that African Americans would especially benefit from increased intake of potassium, given their relatively low intake of potassium and high rates of elevated blood

pressure and salt sensitivity. Dr. Appel stated that there was no upper limit for potassium intake. He acknowledged that increased potassium could be problematic for individuals who have impaired urinary potassium excretion as a result of drugs or medical conditions, such as diabetes and chronic renal insufficiency, but he noted that those individuals would not be included in recommendations for the general public.

Dr. Appel stated that, based on the evidence, the Subcommittee had drafted the following conclusive statement on potassium: “Diets rich in potassium can lower blood pressure, mitigate the adverse effects of salt on blood pressure, reduce the risk of developing kidney stones, and possibly decrease bone loss.” The implications of that statement for the general population were that most individuals should increase their intake of foods rich in potassium.

Dr. Appel noted that because current intake of potassium was substantially less than the recommended level, it might be reasonable to set interim goals that were somewhat lower than the adequate intake. He then opened the floor for discussion.

Dr. Lupton asked if the Subcommittee would recommend supplementation, since current intake of potassium fell so far short of the goals. Dr. Appel replied that the benefits for kidney stones and bones were strongest for potassium from foods and that there was insufficient research on which to base a recommendation regarding supplements. He noted that the Subcommittee would recommend research in many areas, including the effects of different forms of potassium.

Dr. Weaver expressed concern that “lifetime risk” of high blood pressure was a vague endpoint and that stronger evidence would be needed to justify a recommendation that would require major changes in eating patterns. Dr. Appel acknowledged that high blood pressure was an intermediate variable and that risk of stroke or coronary heart disease could vary. He suggested that modeling could be done to apply the estimated change in blood pressure associated with potassium intake to the change in risk of stroke or coronary heart disease associated with that change in blood pressure.

Dr. Lupton asked whether there was any subgroup that responded poorly or not at all to potassium and who may not need to make radical changes in their diet. Dr. Appel stated that while there were responders and non-responders in every group, there was insufficient data to make that distinction.

Dr. Nicklas asked if the Subcommittee had considered an early study on ethnic differences in urinary excretion of sodium and potassium. Dr. Appel replied that when the NHANES III data were stratified by race/ethnicity, African Americans were found to consume less potassium. He noted that this finding was of particular concern, because African Americans were more likely to benefit from increased potassium.

Dr. Nicklas asked whether information on the sodium/potassium ratio in foods would be a useful strategy to help consumers make appropriate choices. Dr. Appel doubted that would be feasible, since public awareness of the benefits of potassium was limited and food labels did not always include potassium content.

In response to a question from Dr. Caballero, Dr. Appel acknowledged that the benefits of potassium for African Americans was an important public health issue that the Subcommittee would most likely address in its report.

Dr. King noted that in spite of the strong evidence for the benefits of potassium, the Subcommittee's conclusive statement was somewhat guarded. She expressed concern that this was inconsistent with the Committee's charge to make recommendations based on the scientific evidence. She stated that if the Subcommittee's recommendation was different from what the evidence would suggest, it should provide a rationale. Dr. Appel replied that the qualifier was based on practical rather than scientific considerations. Dr. Weaver noted that the Subcommittee had recommended a significant increase and that placing too great an emphasis on potassium could restrict choices of fruits and vegetables. Dr. Appel stated that the Subcommittee would include a table of potassium-rich foods. Dr. King emphasized that it takes time to accomplish goals and that those goals should be stated clearly. Dr. Camargo suggested tempering the recommendation by citing feasibility considerations and stating the need for further research.

Dr. King noted that the statement did not address caffeinated beverages and asked whether they were a good source of potassium. Dr. Appel replied that tea was a good source of potassium.

### *Sodium*

Dr. Appel stated that there was extensive evidence regarding the effect of reduced sodium intake on blood pressure. The IOM had reviewed ten dose-response studies and three clinical trials, all of which showed that reduced sodium was associated with a decrease in blood pressure. The IOM panel focused on dose response relationships and on identifying indicators that were important from a health perspective.

Reviewing the findings of several dose response studies, Dr. Appel noted that reduced sodium intake was clearly associated with reduced blood pressure. Blood pressure reduction was greater for hypertensive individuals than for non-hypertensives, and for African Americans than for non-African Americans. More significantly, blood pressure reduction was greater for African Americans, in general, than for hypertensive individuals, in general. These findings were consistent across studies.

Dr. Appel stated that several groups appeared to be more sensitive to sodium than their counterparts, including middle age and older adults, African Americans, and individuals with hypertension, diabetes, and chronic renal insufficiency. He noted that these were the groups for whom a modified diet would have the greatest impact.

Dr. Appel cited other potential benefits of reduced sodium intake, including reduced urinary calcium excretion, reduced left-ventricular mass, and reduced risk of gastric cancer. He noted the need for clinical trials with hard outcomes for reduced calcium excretion, such as bone mineral density or osteoporotic fractures.

Dr. Appel acknowledged that some individuals and groups had argued against reduced sodium intake. Some were concerned about the lack of clinical trials testing the effects of



sodium reduction on clinical cardiovascular outcomes. Others argued that only those who are salt-sensitive should reduce their salt intake; that other factors such as weight, exercise, or potassium were more important in blood pressure reduction than sodium; and that the effects of sodium reduction on plasma renin activity, lipids, and insulin resistance could mitigate its beneficial effects on blood pressure.

The IOM panel defined adequate intake of sodium as 65 mmol per day, with an upper limit of 100 mmol. Dr. Appel noted that this was significantly lower than the current median sodium intake of 187 mmol per day for men and 126 mmol per day for women, according to NHANES III data. The rationale for the IOM recommendation was to ensure adequate intake of other important nutrients and to cover sodium sweat losses.

Based on the evidence, the Subcommittee drafted the following conclusive statement: “The relationship between salt (sodium chloride) intake and blood pressure is direct and progressive without an apparent threshold.” The implication for the general population was that individuals should reduce their sodium intake.

Dr. Appel stated that, in view of the substantial gap between current levels of sodium intake and an adequate intake level, the practical approach would be to set interim goals, with the eventual goal being the adequate intake level. He then opened the floor for discussion.

Dr. Weaver stated that it was important to keep the qualifier in this statement because it allowed flexibility and would send a message that there were options to achieve the goal. Dr. Appel stated that individuals who followed the DASH diet still had significant reduction in blood pressure. Dr. Nicklas noted that some aspects of the DASH diet differed from the proposed food patterns, especially in terms of fat intake.

Dr. King noted that while the DASH diet appeared to have the greatest impact for all groups, simply lowering sodium did not seem to have an impact, except for African Americans. Dr. Appel noted that the IOM report had stated that African Americans appeared to be more salt-sensitive, but he expressed concern about setting specific levels for certain groups. He noted that average sodium intake for most Americans was well above the recommended level.

Dr. Weaver stated that it would be easier to encourage people to try to get enough potassium and calcium than to reduce their intake of sodium, given the current food supply. She also acknowledged that the Committee could still recommend that industry consider ways to reduce sodium levels in foods. Dr. Appel replied that it was important to make recommendations that were consistent with health, while also recommending changes in the food supply. He noted that it would be difficult to achieve the upper limit for sodium without reducing the sodium content in foods.

In response to a question, Dr. Appel stated that while studies had been done to compare the effect of weight loss on blood pressure compared to reduced sodium or the DASH diet, the findings were not statistically significant. Dr. Appel noted that the study did lead to increased consumption of fruits and vegetables and dairy products, reduced fat intake, and increased exercise among participants, all of which were positive outcomes.

Dr. Nicklas asked whether salt sensitivity developed over time and, if so, whether sodium intake should be reduced in childhood to prevent high blood pressure. Dr. Appel stated that salt sensitivity was progressive over time and that blood pressure tracked from childhood to young adulthood, but there was little direct evidence from observational studies or clinical trials at those ages.

Dr. Clydesdale asked whether the Subcommittee had considered the possibility that older adults might compensate for a decreased sense of smell and taste by adding salt to foods. Dr. Appel stated that older adults in a large clinical trial sustained reduced sodium levels over three years, which would suggest that the taste of foods was not an issue.

Dr. Lupton asked whether there was any way to discuss the consequences of hypertension in and of itself. Dr. Appel replied that this was difficult because most people would not notice the effects of blood pressure that was within normal ranges. However, he noted no studies had identified any risk associated with lower blood pressure.

In response to Dr. Camargo, Dr. Appel said he reviewed three studies that had documented the role of potassium in blunting the effects of sodium on blood pressure.

Dr. King asked if the Subcommittee had evaluated the potential interaction of sodium reduction and iodide deficiency. Dr. Appel stated that the NHANES III data tracked iodide deficiency and that it was no longer a problem in the U.S. food supply. Dr. King stated that it would be important to address sources of iodide in the whole diet. Ms. McMurry noted that the 2000 *Dietary Guidelines* had stated that a quarter teaspoon of iodized salt would provide more than half of the recommended intake for iodide.

Dr. King asked whether the Committee would agree to setting a recommended intake for sodium that might not be achievable at present. Dr. Appel noted that the Subcommittee had debated that issue. He felt it was reasonable to set the AI, or 65 mmol, as the ultimate goal, with the upper limit, or 100 mmol, as the interim goal.

Dr. Bronner asked if the recommended intake would apply to the entire general population, or if there would be different recommendations for groups that were more sensitive to sodium, such as African American hypertensives. After some discussion, she suggested adding explanatory notes rather than specific recommendations for different groups. Dr. Appel noted that studies had shown salt sensitivity to be especially prevalent in non-hypertensive African Americans. He supported adding language to state that the recommended levels could be more important for African Americans.

Dr. Kris-Etherton noted that the DASH diet appeared to have a greater effect in blood pressure than reduced sodium alone. She suggested that the recommendation should promote an approach that combined weight control, potassium, sodium, and overall diet. Dr. Appel agreed that these were all important, but that the benefits of an overall diet were already addressed under nutrient adequacy.

Dr. Camargo proposed that language drafted by the Ethanol Subcommittee (“One can achieve X with sodium levels less than Y”) could be used to address the issue of an interim goal.

Dr. Weaver noted that the conclusive statement did not specify a recommended level of sodium intake. Dr. Dr. King noted that specific numbers were important for the food industry and for dietary planning for populations.

*Should the AI for Potassium and Sodium be Calorie Adjusted?*

Dr. Appel raised an additional issue, which was the fact that electrolyte intake varied with calorie intake. He noted that the AI for potassium and sodium developed by the IOM panel were based on clinical studies with the DASH diet at 1,600 calories. He suggested that allowing for increased electrolyte intake at higher energy levels would be more practical because it would provide greater flexibility for developing food patterns. Dr. Appel then opened the floor for discussion.

In response to a question from Dr. King, Dr. Appel confirmed that he was proposing to set targets for electrolytes in conjunction with energy intakes, while acknowledging that lower levels of sodium would be better.

Dr. Weaver clarified that while this approach would acknowledge that it might be necessary to exceed the goal at some calorie levels, it was not meant to imply that the goal for sodium intake should be lower than 65 mmol.

Dr. King noted that some Committee members were reluctant to accept the AI as the goal for sodium. She asked the Subcommittee to reconsider the data on sodium and to develop a good recommendation for the general population that would also address groups that were salt sensitive, such as African Americans.

Dr. Lupton reminded Committee members that they had agreed to accept DRI values and noted that several Subcommittees had made recommendations that would require changes from current patterns of consumption. Dr. King agreed that the recommendations should not deviate from the DRI without providing a strong rationale. Dr. Weaver acknowledged the importance of discussing mitigating factors when recommendations deviated from the DRI or AI. She noted that vitamin E, potassium, and sodium were the main nutrients for which current intakes differed greatly from the DRI.

Dr. Lupton noted that the discussion on trans fats had led to the need to consider other types of information, including food industry and public health considerations. Dr. Caballero stated that it was unlikely that alternative data could be found to support a higher level of sodium intake, but there were other reasons for the high level of sodium in the food supply. He stressed the need to consider the feasibility of making lower sodium foods available.

Dr. King noted that recommendations for the food industry would be appropriate for this section of the report and that the Subcommittee should not hesitate to make such recommendations if they were supported by the science. She thanked the Subcommittee for their work and adjourned the meeting for lunch.

(Lunch: 12:15-1:25)

Dr. King reconvened the meeting and turned the floor over to Dr. Weaver and the Nutrient Adequacy Subcommittee.

***Nutrient Adequacy Subcommittee  
Conclusive Statements and Discussion  
C. Weaver, Lead***

Dr. Weaver stated that the Nutrient Adequacy Subcommittee included Drs. Bronner, Go, and Nicklas, plus Dr. King, and with additional assistance from Dr. Lupton. She acknowledged the significant amount of assistance that USDA staff had provided.

*Recommendations for Nutrients and Vitamins*

Dr. Weaver stated the Subcommittee's recommendations for nutrients: "An RDA, or AI when an RDA has not been established, is the appropriate goal for a nutrient in making nutrient adequacy recommendations as part of nutritional guidance. The UL for each nutrient is the appropriate level to consider as the highest level of usual intake." She noted that the Subcommittee had spent the most time on nutrients for which this could be a problem.

She then stated the Subcommittee's recommendations for vitamins: "A number of vitamins are essential in the diet. They are recognized as necessary for various biochemical functions within the body, and ongoing low intake levels may result in deficiency symptoms. Dietary Reference Intake standards for adequacy (RDA or AI) have been determined for 14 vitamins."

Dr. Weaver noted that after considerable research and discussion, the Subcommittee had drafted a specific recommendation for vitamin E: "Intakes are low for all population groups in comparison to recommendations from the IOM. Proposed food patterns provided 50 to 90 percent of the RDA. This is a reasonable interim goal given that studies demonstrate no adverse effects of this level of vitamin E." She then opened the floor for discussion.

Dr. King noted that the proposed food patterns were based on typical food consumption and asked if the RDA for vitamin E could be met if consumption patterns were changed. Dr. Weaver replied that this would require an overly prescriptive diet and that the Subcommittee felt it would be sufficient to list good choices for sources of vitamin E. She noted that there was insufficient evidence regarding the health benefits or bioavailability of supplements and that further research to justify the RDA would be valuable.

In response to a question from Dr. Appel, Dr. Weaver acknowledged that the term "interim level" could be misleading, without reference to an ultimate goal. She clarified that the Subcommittee was accepting the amount of vitamin E that the proposed food patterns would provide and was not actually setting an interim goal. Dr. King recommended that the Subcommittee revise the wording.

Dr. Appel asked why the IOM had set the RDA at such a high level. Dr. Weaver replied that the RDA was based on the only study available on this topic. The food supply had changed since that study was conducted in the 1950s, but the RDA could not be challenged without additional data. Dr. Nicklas noted that it would be important to stress the evidence that there

were no adverse effects at the proposed level of intake and to emphasize the need for further research.

Dr. King asked if the food patterns would provide a higher level of vitamin E after the fats and oils had been changed to increase omega-3 levels and suggested that the Committee revisit this issue in May.

### *Recommendations for Specific Population Groups*

Dr. Weaver stated that the Subcommittee was developing recommendations regarding vitamins for specific groups, including vitamin B12 and vitamin D for the elderly. Based on expert consultation from Dr. Lynn Bailey, the Subcommittee had decided to adopt the IOM recommendation for folate and not make a conclusive statement. She turned the floor over to Dr. Go to present the Subcommittee's recommendations on vitamin B12 and vitamin D for the elderly.

#### Vitamin B12 for the Elderly

Dr. Go presented the Subcommittee's proposed recommendation on vitamin B12: "Elderly individuals (older than 50 years old) should consume food fortified with B12 or supplements to meet their RDA requirement."

Dr. Go noted that while older adults were consuming enough B12, blood levels of B12 were low due to reduced absorption. A recent study had found B12 deficiency in one in twenty adults between the ages of 65 and 74, and in one in ten adults over age 75. Prolonged B12 deficiency could lead to anemia or neurological problems.

Dr. Go noted that the Subcommittee would recommend the crystalline form of B12, per the advice of Dr. Marianne Johnson. Questions remained regarding the appropriate dose, because the evidence from current studies was inconclusive. He then opened the floor for questions.

Responding to a question from Dr. Appel, Dr. Go reviewed the clinical evidence regarding B12 and older adults.

Dr. King asked if reduced absorption had been the basis for the IOM recommendation of B12 supplementation for older adults and whether there were any clinical consequences of low levels of B12. Dr. Go confirmed that the IOM recommendation had been based on reduced absorption. He stated that there were no clinical measures to determine the levels or point in time at which signs of B12 deficiency would appear. Dr. Lupton clarified that the RDA for B12 was the same for all adults, but supplementation was recommended for older adults because they cannot absorb B12 from food. Dr. Go stated that newer data supported the IOM report.

Dr. King noted that older adults could meet this recommendation by eating foods fortified with B-12.

#### Vitamin D for the Elderly

Dr. Weaver noted that the Subcommittee had challenged the IOM report based on recent data that was more consistent with the recent NIH consensus conference. The Subcommittee's proposed recommendation stated: "Adequate vitamin D status, which depends on dietary intake and cutaneous synthesis, is important for optimal calcium absorption and can reduce the risk for bone loss. For the elderly, a vitamin D supplement containing 10 ug (400 IU) plus 2-3 cups of vitamin D fortified milk or equivalent is recommended."

Dr. Weaver stated that serum 25 hydroxy Vitamin D levels were the indicator for Vitamin D status. The elderly had reduced ability to synthesize cutaneous Vitamin D, for reasons that were not well understood. She summarized several dose response studies regarding intake of Vitamin D.

Dr. Weaver noted that fortified and natural dietary sources of vitamin D were limited and that there were few pharmacological choices for stand-alone vitamin D. This could be an area for recommendations to industry. She then opened the floor for discussion.

Dr. Nicklas asked whether calcium supplements that include vitamin D would be a good source. Dr. Weaver replied that it would depend on the bioavailability of the supplement, and she noted that individuals who met their calcium requirement through food would not necessarily take a calcium supplement.

In response to a question, Dr. Weaver stated that the Subcommittee had not yet defined the elderly for this recommendation, though studies suggested that it would be older than 50 years of age. She noted that there was no consensus for determining age in the literature and that the studies that were available had sampling problems. Dr. King stressed that the Subcommittee's statement should be consistent with other recommendations.

Dr. King asked whether the NIH meeting had identified any other groups that were at risk for vitamin D deficiency. Dr. Weaver replied that dark-skinned women of childbearing age and individuals with limited exposure to the sun could be at risk. She noted that while vitamin D was important for pregnant and lactating women in order to ensure adequate levels for the infant, there was insufficient data to make a dietary recommendation. There was also insufficient data to make a recommendation regarding vitamin D in chronically ill patients.

Dr. Weaver stated that there were emerging data regarding other health benefits of vitamin D. The Subcommittee would prepare a table of vitamin D related studies that had become available since the IOM report.

### *Minerals*

Dr. Weaver presented the Subcommittee's recommendations for minerals: "A number of minerals are essential in the diet. They are recognized as necessary for various biochemical functions within the body, and ongoing low intake levels may result in deficiency symptoms. Dietary Reference Intake standards for adequacy (RDA or AI) have been determined for 12 minerals."

Dr. Lupton noted, and Dr. Weaver agreed that, suboptimal health might be a more relevant endpoint for low intake levels than deficiency symptoms.

Dr. Weaver acknowledged that potassium and calcium were the minerals that presented specific issues. She stated that the Subcommittee would incorporate the Fluid and Electrolyte Subcommittee's statements on potassium.

The Subcommittee was still working on a consensus statement and evidence table regarding calcium and dairy products bone health, which would be ready for the next meeting. Dr. Weaver noted that the Subcommittee considered calcium and dairy together because both had been associated with bone health, and dairy products were the source of calcium in many studies. The Subcommittee would accept the IOM recommendation for intake of calcium. Dr. Bronner was examining lifecycle issues, with a focus on the implications of calcium and dairy intake in youth for bone health in later life. The Subcommittee was also examining current intakes by age and gender subgroups and the sources of calcium for those subgroups to determine what types of foods would be needed to meet the recommended intake. Dr. Weaver noted that it was impossible for the food databases to remain current with regard to the calcium content of fortified foods.

Dr. Kris-Etherton asked what the magnesium levels were in the proposed food patterns and whether the Subcommittee had reviewed the literature in that area. Dr. Weaver replied that the food patterns met the IOM recommended intakes for magnesium and that a literature review would only be warranted if the food patterns showed a deficiency.

Responding to a question from Dr. King, Dr. Weaver stated that the proposed food patterns met the requirements for iron in vegetarians, but that the Subcommittee was still reviewing the general issue of food patterns for vegetarians.

Responding to a question from Dr. Nicklas, Dr. Weaver stated that the Subcommittee would prepare a table showing non-dairy sources of calcium for individuals who were lactose intolerant as well as a list of low-lactose dairy foods.

### *Food Patterns*

Dr. Weaver presented the Subcommittee's two statements on this topic:

- "Food patterns based on commonly consumed foods with proportions and amounts altered to meet nutrient goals provide nutritional guidance that is realistic and practical for consumers."
- "Food patterns used in nutritional guidance that are flexible rather than prescriptive allow for individual choices in making food selections for nutrient adequacy."

Dr. Weaver stated that the Subcommittee started with the food patterns proposed in the *Federal Register* and analyzed the proportions of commonly consumed foods in each food group. To address concerns about flexibility, the Subcommittee asked USDA to develop special iterations of the food patterns to examine the impact of whole versus enriched grains and fruits versus juices, to develop vegetarian and lactose-free options, and to identify

alternative sources of nutrients provided by legumes. Other Subcommittees requested iterations to look at the impact of fat and other variables.

Dr. Weaver summarized the Subcommittee's recommended options to meet the nutrients provided by enriched grains in the current food patterns, which it had presented at the January meeting. She noted that the Subcommittee was still developing vegetarian and lactose-free options. She then presented the Subcommittee's recommendations pertaining to fruit juices versus whole fruits and alternatives to legumes.

### Fruits and Juices

After reviewing the models developed by USDA, the Subcommittee recommended that no more than 1/3 of the total servings of fruit should be from juice and no less than 2/3 should be whole fruits. Dr. Weaver noted that whole fruits were important sources of fiber and vitamin E, and juices provided folate and potassium. She then opened the floor for questions.

Dr. Clydesdale noted that, unlike whole fruits, juices were readily available and the quality was consistently high. Dr. Weaver replied that "whole fruits" would include frozen and canned varieties and that the recommendation was intended primarily to address concerns about consumption of fruit juices.

Responding to a question from Dr. King, Dr. Weaver stated that current consumption of frozen and canned fruit was very low, compared to fresh fruit or juice. Some Committee members noted that the variety of choices was more limited with frozen and canned fruits.

Dr. King asked whether there was strong evidence that excessive intake of juices was associated with higher BMI or other health problems. Dr. Weaver noted that juices were an important source of folate and potassium. Dr. Nicklas stated that the evidence was strong enough to lead the American Academy of Pediatricians to recommend that juices be avoided. Dr. King suggested adding a reference to the AAP recommendation.

### Legume Alternatives

Dr. Weaver stated that each half-cup of legumes in the proposed food patterns could be replaced by either two ounces of whole grains minus one-half ounce of enriched grains; or 1½ cups of dark-green vegetables; or two cups of other vegetables.

In response to questions, Dr. Weaver noted that the vegetables used to replace legumes would be in addition to those already included in the food patterns. She also noted that the proposed alternatives provided equivalent levels of all nutrients provided by legumes, including fiber.

Dr. Lupton noted that it would be important to consider amino acid profiles when developing vegetarian food patterns.

### Food Patterns and Flexibility

Dr. Weaver presented the Subcommittee's proposed statement regarding nuts, seeds, and legumes: "Nuts, seeds, and legumes are rich sources of trace nutrients, including vitamin E,



fiber, and phytonutrients. However, no required nutrient is unique to these foods. Increased consumption is recommended as part of the existing food groups rather than as a separate group, to maintain flexibility in food choices for nutrient adequacy.”

Dr. Weaver stated that the Subcommittee was concerned that creating a separate category for nuts, seeds, and legumes would appear to reduce the amount of vegetables that were recommended and would eliminate vegetarian sources of protein from the meat group.

Dr. Clydesdale proposed changing the term “phytonutrients” to “phytochemicals.”

Dr. Weaver presented the Subcommittee’s proposed recommendation regarding whole grains: “Food patterns with at least half of all grains as whole grains can meet nutrient adequacy goals for dietary fiber and other nutrients.” She noted that the Subcommittee had debated whether to state the recommendation in terms of half of a total amount, or to specify a number of servings.

Dr. Lupton stated that she would review the dose-response literature in this area.

#### *Issues Still Being Reviewed*

Dr. Weaver stated that the Subcommittee was still reviewing a number of issues, including: nutrient density and statements regarding vitamin E, vitamin B12, folate, vitamin D, calcium, and potassium. She asked Dr. Nicklas to report on the status of her work on nutrient density.

Dr. Nicklas cited evidence suggesting that consumption of low nutrient-dense, high energy-dense foods could displace nutrient-dense foods and could place individuals at risk of high-energy intake and marginal micronutrient intake. There was little evidence associating low nutrient-dense foods with BMI. Dr. Nicklas noted that there were no large, randomized clinical trials or controlled-feeding studies regarding energy density. Based on the findings of short-term studies, Dr. Nicklas stated that it would be reasonable to conclude that low-nutrient dense foods could be consumed if they did not displace needed nutrients and they did not exceed available calories.

Dr. Nicklas stated that she would like to address the importance of variety in dietary patterns. She suggested this could be accomplished by stating that while there were currently no criteria to distinguish between low- and high nutrient-dense foods relative to caloric content, eating a variety of foods from all of the major food groups would be an initial strategy for ensuring nutrient adequacy. She noted that the Subcommittee’s analysis of the nutrient contributions of each food group clearly demonstrated the importance of getting foods from all five food groups.

Dr. Kris-Etherton asked about the relative contribution of each food group and expressed concern about the potential hazards of popular diets that eliminated one or more food groups. Dr. Weaver referred her to the table in the notebook that illustrated the nutrient contribution of each food group. Dr. Nicklas noted that the Subcommittee’s analysis found that each food group was a major contributor of at least one nutrient.

Dr. King requested that the Subcommittee's report include a clear description of the methods used to develop the proposed food patterns and a discussion of the number of calories that would be associated with the recommended intake of nutrients within each pattern. She noted the diversity of the U.S. population and requested that the Subcommittee refer to cultural influences on eating patterns in its discussion of alternatives to meet nutrient adequacy.

#### *Expert Consultation*

Dr. Weaver acknowledged the expert advice provided by Dr. Lynn Bailey regarding folate supplementation in pregnancy and pre-pregnancy; Dr. Suzanne Murphy regarding use of RDA versus EAR; and Dr. Maret Traber regarding vitamin E.

Dr. King thanked the Subcommittee for its presentation and adjourned the meeting for a brief break.

(Break: 2:40 to 3:00 p.m.)

### ***Food Safety Subcommittee Conclusive Statements and Discussion F. Clydesdale, Lead***

Dr. King turned the floor over to Dr. Clydesdale and the Food Safety Subcommittee. Dr. Clydesdale noted that Subcommittee members included Drs. Camargo and Weaver and acknowledged the support of staff from USDA and HHS. He stated that the Subcommittee had drafted recommendations to keep food safe from bacteria and advice on methylmercury in fish.

#### *Keep Food Safe from Bacteria*

Citing recent data on illnesses, hospitalizations, and deaths due to foodborne diseases, Dr. Clydesdale stated that the Subcommittee would retain the four basic "FightBAC!" messages (clean—separate—cook—chill). He noted that "FightBAC!" was a campaign of the partnership for food safety education created by the USDA, HHS, the Department of Education, and ten food industry organizations. The "FightBAC!" messages were developed from a consensus of food safety experts and had been tested for consumer comprehension.

Dr. Clydesdale noted that the Subcommittee had reviewed the literature published since the 2000 *Dietary Guidelines* and consulted with experts to identify which consumer behaviors posed the greatest risk of foodborne disease and whether any of those behaviors should receive greater emphasis in this edition. Based on this background work, the Subcommittee proposed a number of additions to the guidance in the previous Guidelines:

- Increase the emphasis on the "chill" step and clarify that this step applies at any stage of food handling where raw foods are not being cleaned or cooked. Dr. Clydesdale noted that the Subcommittee would retain the existing graphic for temperature control.

- Emphasize the importance of cleaning refrigerators to avoid cross-contamination of foods.
- Add a detailed hand-washing protocol as recommended by the CDC, and add to the protocol guidance regarding drying hands using a clean disposable or cloth towel.
- Emphasize that potentially unsafe food should be discarded without tasting, even if it looks and smells fine. Dr. Clydesdale noted that the Subcommittee had developed a list of criteria specifying how long food should stay in the refrigerator and how it should be washed.
- Add a protocol for washing fresh fruit and vegetables.
- Expand guidance for those at high risk of foodborne illness, particularly listeria.
- Add guidance on pasteurized eggs.
- Add a separate message on listeria, including a list of high-risk foods. Dr. Clydesdale noted that while quite rare, listeria was fatal, particularly for pregnant women, young children, and the elderly.

Dr. Clydesdale noted that the Subcommittee would add a recommendation to not wash meat and poultry if it could find evidence to support that recommendation. A recent qualitative study conducted by the “FightBAC!” partnership found that failure to follow this recommendation was the most dangerous consumer behavior in terms of risk of cross-contamination. The Subcommittee had been unable to find any studies demonstrating that washing meat and poultry actually led to cross-contamination, but it was continuing to search for a reference.

#### *Methylmercury Advice*

Dr. Clydesdale stated that the Subcommittee would adopt the FDA’s advice regarding methylmercury in fish. Its recommendation would state: “Women who may become pregnant, pregnant women, nursing mothers, and young children should eat fish and shellfish lower in methylmercury.”

The Subcommittee’s recommendation would include detailed advice regarding the types of fish that should be avoided and those that were safe to consume as well as guidance pertaining to the safety of fish caught in local lakes, rivers and coastal areas.

Dr. Clydesdale suggested, and Dr. Kris-Etherton agreed, that this recommendation should be referenced in the section on fatty acids.

#### *Questions Still Being Reviewed*

Dr. Clydesdale stated that the Subcommittee was reviewing the literature to find data that would support a recommendation not to wash meat and poultry.

The Subcommittee was also considering whether to include a negative statement on mad cow disease. Dr. Clydesdale acknowledged that it could be necessary to reference this issue, but the risk should be kept in perspective. He asked for the Committee's input on this issue.

After some discussion, Committee members generally agreed that it would be appropriate to mention mad cow disease in the context of a scientific discussion of foodborne diseases in the technical document, but that it should not be emphasized in the public health guidelines. Dr. Clydesdale reported that in order to put mad cow disease into context, all potential dangers such as dioxins and acrylamide, would need to be referenced. Committee members agreed that since these dangers were uncontrollable by consumers' day-by-day actions, mad cow disease shouldn't be mentioned at all. Furthermore, Dr. Clydesdale pointed out that the list of such concerns is so large it would be impractical to include in the report.

### *Expert Consultation*

Dr. Clydesdale acknowledged the contributions of Dr. Michael Patrick Doyle of the University of Georgia, Dr. Lydia Medeiros of Ohio State University, and Dr. Isabel Walls of the International Life Sciences Institute.

Dr. King thanked the Subcommittee for its presentation and turned the floor over to Dr. Camargo and the Ethanol Subcommittee.

## ***Ethanol Subcommittee Conclusive Statements and Discussion C. Camargo, Lead***

Dr. Camargo stated that the Subcommittee members included Drs. Appel and Kris-Etherton and he acknowledged the support provided by staff. He presented the Subcommittee's conclusive statement on ethanol: "If you choose to drink, do so in moderation: consumption of up to one drink a day for women and two drinks a day for men." Dr. Camargo noted that this statement acknowledged the fact that many people choose not to drink, while also providing a quantitative definition of the term "moderation." The Subcommittee would accept the definition of what constituted one drink that appeared in the previous Guidelines.

The Subcommittee's recommendations would also differentiate between people who should not drink and situations where alcohol should be avoided. People who should not drink would include individuals who cannot restrict their drinking to moderate levels; children and adolescents; individuals taking prescription or over-the-counter medications that can interact with alcohol; and individuals with special medical conditions, such as liver disease. Situations where alcohol should be avoided would include women who may become or who are pregnant; women who are breastfeeding; and individuals who plan to drive, operate machinery, or take part in other activities that require attention, skill, or coordination.

Dr. Camargo stated that the rationale for the Subcommittee's statement was consistent with evidence from numerous studies that the risk of all-cause mortality declined with a low level of alcohol consumption and increased at higher levels of consumption. He noted that while the exact amounts of alcohol associated with reduced risk was debatable, the Subcommittee's proposed definition of one drink for women and two drinks for men was within that range.

Dr. Camargo presented a number of scientific conclusions pertaining to moderate drinking, based on the studies that the Subcommittee reviewed:

- Moderate levels of alcohol consumption did not increase risk for myocardial infarction or ischemic stroke and may have a protective effect. Dr. Camargo noted that this benefit was primarily important for older adults.
- There was no evidence that cognitive functioning was negatively affected by moderate alcohol consumption as one ages, and moderate levels were not associated with increased risk of dementia.
- Compared to non-drinkers, there was a slight increase in risk of breast cancer for women who consumed an average of one drink per day.
- Animal studies suggested that low-to-moderate drinking during pregnancy could have subtle behavioral or neurocognitive consequences. Heavy drinking during pregnancy could produce a range of behavioral and psychosocial problems, malformations, and mental retardation in the offspring.
- Alcohol ingestion by nursing mothers did not enhance lactational performance, and could actually decrease it.
- There was no evidence to associate moderate drinking with macro- or micronutrient deficiencies.
- There was no apparent association between moderate alcohol consumption and weight gain or obesity.

Dr. Camargo stated that the Subcommittee was still gathering data on the caloric content of alcoholic beverages, which was not reflected in the current literature. He noted that the Subcommittee felt it was important to provide that information, especially with the focus on discretionary calories.

Dr. Camargo thanked the National Institute on Alcohol Abuse and Alcoholism, USDA, and HHS for their support and opened the floor for discussion.

Dr. Caballero noted that physical activity could be accumulated over several days and asked whether the effects of alcohol were similar. Dr. Camargo replied that greater benefits were associated with more regular consumption. He stressed that the Subcommittee did not wish to encourage binge drinking and would specifically counsel, as the previous Guidelines did, against consuming many drinks at a time.

Dr. Pi-Sunyer asked if the Subcommittee planned to address binge drinking among young adults. Dr. Camargo stated that the Subcommittee would emphasize the risks of heavy drinking in its discussion and might encourage the types of public policy initiatives that had been discussed at the January meeting. He stressed that the Guidelines presented a unique opportunity to educate Americans about moderate alcohol consumption.

Dr. King asked if the observed benefits were attributed to specific types of beverages. Dr. Camargo stated that there were no substantial differences between types of beverages, other than calories. He noted that hydration was not a concern at lower levels of consumption.

Dr. Appel noted that there seemed to be a cluster of issues related to special groups, such as pregnant women or older adults. Dr. Camargo suggested that the report could include a special table of contents or index highlighting the relevant guidance for various groups.

In response to a question, Dr. Camargo stated that there was insufficient data to include a discussion of the effects of alcohol on brain atrophy. He noted that current literature suggested a benefit of moderate alcohol consumption against risk of dementia and cognitive function. He suggested that these were important areas for further study and that higher-level epidemiological research or animal models would be useful approaches for studying the effects of alcohol on brain functioning.

Dr. King thanked the Subcommittee for its good work and agreed that a table on the caloric value of different types of drinks would be a valuable addition to the report. She then turned to a review of the meeting and next steps.

### ***Review of the Meeting and Next Steps***

Dr. King turned the Committee's attention to issues to be considered for the full report. She proposed the following structure for the report:

- Executive Summary
- A. Introduction
- B. Methodology
- C. Technical Reviews
- D. Translation of Technical Reviews into Food-based Guidelines
- E. Research Recommendations

Dr. King noted that Dr. Suitor had drafted an introduction to the report that would include the purpose of and legislative mandate for the Advisory Committee, the reasons for concern about diet, and the uses of the Guidelines.

The methodology section would describe how the Committee members were appointed, how the Committee conducted its business, and the structure of its working groups, as well as a discussion of the process that the Committee had used to review and summarize the scientific evidence on which its conclusions and recommendations were based. It would also include a description of the modeling process that was used by several of the subcommittees to assist them in making decisions.

The technical section of the report would present the conclusive statements and rationales for those statements developed by each Subcommittee. It would include data on nutrient intake and food sources, plus a number of tables and charts.

Dr. King and other Committee members expressed concern about the amount of work that remained to be done to complete the literature reviews, revise existing conclusive statements

and, in some cases, draft new conclusive statements. This led to a discussion of whether the next iteration of the Subcommittee reports should be drafted by Committee members or by staff. Dr. King proposed that the first priority should be to address revisions to existing conclusive statements. She suggested that it would be helpful to have a list of the conclusive statements based on full literature reviews that still needed to be done.

The Macronutrient Subcommittee stated that it would hold a conference call the week of April 5 to determine how to address the issue of discretionary calories. Dr. Camargo offered to draft a statement on calories in alcoholic beverages that could be included in the discussion on discretionary calories and referenced in the ethanol section.

A question was raised regarding how to approach “sidebar” issues that were important to address but did not merit conclusive statements. Committee members suggested that these issues could be addressed as short paragraphs or footnotes in the conclusive statements and that pertinent information could be used in the translation section.

One Committee member noted that the Subcommittees’ conclusive statements were in different formats and suggested that it would be helpful to receive feedback from Dr. Suitor prior to finalizing the statements. Dr. Suitor stated that Committee members did not need to worry about the form in which they provided their input and that she would be responsible for making everything consistent. Dr. Lupton requested that documents for review be sent in MS Word. Dr. Camargo suggested that posting files on the Internet for download would be preferable to sending large e-mail attachments.

Returning to a discussion of the outline, Dr. King reminded the Committee that the translation section would have four major headings, as discussed the previous day: nutrient adequacy; energy balance; dietary and lifestyle choices; and food safety. She noted that the more clearly the technical section was written, the easier it would be to prepare this section of the report. Dr. Suitor would prepare the first draft of this chapter, with assistance from Dr. King and input from Committee members. Ms. McMurry noted that HHS and USDA would engage one or more contractors to begin looking at existing research on consumer messages, so that it would be ready to begin drafting consumer messages by the time the Committee submitted its report.

The last section of the report would be future research recommendations, cross-cutting issues, data gaps, emerging issues, and concerns regarding the food industry or nutrition policy. Dr. King asked each Subcommittee to develop a list of issues and recommendations that could be combined at the May meeting. Ms. McMurry advised the Committee that any policy-related concerns should be worded in terms of general intentions as opposed to specific actions to be undertaken by specific agencies.

Dr. King proposed that the technical report include a glossary to assist practitioners in the field who would be involved in translating the report into food-based recommendations. She asked each Subcommittee to submit a list of terms to Dr. Suitor, who would prepare an initial draft. A number of Committee members questioned whether a glossary was necessary or feasible. Several noted that studies in some fields, such as carbohydrates, used different definitions for similar terms. After considerable discussion, Dr. King agreed that the glossary could wait until the conclusive statements and the body of the report had been drafted.

The Committee agreed on the following timetable for remaining tasks:

- Revisions to existing conclusive statements: Submitted to Dr. Sutor by April 9
- Drafts of new conclusive statements: Submitted to Dr. Sutor by April 16
- All conclusive statements finalized: April 30
- Conclusive statements distributed for internal review: First two weeks in May
- First draft of the full report (including translation section and all conclusive statements): May 20

To streamline the process, Dr. King suggested that the Subcommittee chairs should first discuss outstanding issues with staff, and then with Subcommittee members. She noted that each Subcommittee's section should be reviewed by at least one Committee member who was not a member of that Subcommittee. She granted the Nutrient Adequacy Subcommittee an additional week to submit its conclusive statements and offered to assist the Subcommittee on some issues.

Dr. Camargo asked if the technical report would include a summary of public comments. Ms. McMurry stated that staff members were preparing a summary that would be included as an appendix to the report. They would aim to complete the summary by the May meeting so that the Subcommittee chairs could ensure that they had addressed all relevant issues.

Dr. King thanked the Committee and staff for a productive meeting and acknowledged the Committee's significant accomplishments to date. She adjourned the meeting at 4:42 p.m.