"Keeping Pace with a Changing Food Supply"
23rd National Nutrient Databank Conference
April 16, 1999 - Washington, DC

Program

8:30 AM	**Welcome** Joanne Holden, USDA-ARS, Riverdale, Maryland
8:45 - 9:30 AM	**Keynote Address**: Flavonoid Databases Joanna Dwyer, Tufts University, Boston, Massachusetts
Session I	The New National Nutrient Data Bank **Chair**: David Haytowitz, USDA-ARS, Riverdale, Maryland
9:40 - 10:05 AM	National Nutrient Databank - Past and Future Joanne Holden, USDA-ARS, Riverdale, Maryland
10:05 - 10:30 AM	New Solutions for Managing Data Quality Pamela Pehrsson, USDA-ARS, Riverdale, Maryland
10-30 - 10:55 AM	Partnerships for Developing New Databases Kathy Elwood, USDA-ARS, Beltsville, Maryland
10:55 - 11:30 AM	**Break** **Posters can be viewed**
Session II	Compilation of Nutrient Data for Analysis of Food Frequencies **Chair:** John Himes, Nutrition Coordinating Center, Minneapolis, Minnesota
11:30 - 12:30 PM	• Gladys Block, University of California, Berkeley, California • Amy Subar, National Cancer Institute, Bethesda, Maryland • Alan Kristal, Fred Hutchinson Cancer Research Center, Seattle, Washington
12:30 - 2:00 PM	**Lunch Break**
Session III	Composition and Consumption of Supplements and Novel Constituents **Chair:** Won O. Song, Michigan State University, East Lansing, Michigan
2:05 - 2:25 PM	Research application of vitamin/medicine data files in NHANES III: 1988-94. Yikyung Park,Michigan State University, East Lansing, Michigan
2:25 - 245 PM	Industrial use of the vitamin/medicine data files in NHANES III:1988-94. Cynthia Schweitzer, Ph.D., Henkel Corp.
2:45 - 3:05 PM	Dietary supplements reference database and research opportunities through Office of Dietary Supplements,NIH. Rebecca B. Costello, Ph.D., Deputy and Acting Director of ODS
3:05 - 3:30 PM	**Break** **Posters can be viewed**

Session IV	Impact of Public Policy on Food Composition and Consumption **Chair:** Judi Douglass, Environ Corp., Arlington, Virginia
3:35 - 4:00 PM	Food Industry Perspective J. Collins, Monsanto
4:00 - 4:25 PM	Codex/EU Developments Jim Heimbach, Environ Corp., Arlington, Virginia
4:25 - 4:50 PM	Combined US Food Consumption Surveys • Alanna Moshfegh, USDA-ARS, Riverdale, Maryland • Ronette Briefel, DHHS-CDC-NCHS, Hyattsville, Maryland
4:50 - 5:00 PM	INFOODS Update Barbara Burlingame, FAO, Rome, Italy
5:00 - 5:15 PM	Conference Wrap-Up and Adjournment Catherine Champagne, Pennington Biomedical Research Center, Baton Rouge, LA

This program has been approved for up to 6 hours of Continuing Professional Education credits.
Abstracts
Poster Abstracts

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ABSTRACTS

Models for Food Composition Database Development in the 21st Century: Flavonoids. Johanna Dwyer DSc, RD and Julia Peterson MS, Tufts University School of Nutrition Science and Policy and Jean Meyer USDA HNRC on Aging at Tufts with the assistance of Kerstin Kennedy MEd

This presentation focuses on what flavonoids are in foods, their possible impacts on health and disease, and flavonoid database development. It addresses alternatives for appropriate food composition database development models for the next century and policy issues involved. It concludes with recommendations for needed actions on food composition databases to keep pace with a changing food supply.

Flavonoids are found predominantly in fruits, in vegetables, and in beverages and products made from these foods. Possible associations with decreased risk of heart disease, cataract, and some cancers make flavonoids a current health interest. Development of a flavonoid database consists of locating, validating, standardizing, reviewing, ranking and then using food composition data of sufficient quality to produce provisional food tables.

Lingering problems make flavonoid database development difficult. First, the flavonoid analytical data are preliminary, fragmentary, and variable in their quality, requiring expert review before they can be included in databases. Second, food science, the regulatory climate, the marketplace, and consumer attitudes demand information on many compounds. Third, potential users are not willing to pay for the analyses that need to be done; some regard it as a responsibility of government, but federal and state funds for such work are limited. Therefore other models must be explored. The financial model that should be used to fund future food composition database development has become a major issue.

We propose that a federal/private sector/academic/university partnership for database development makes the most sense for various functional food constituents. What actions need to be taken to make such a tripartite partnership a reality and to speed database development in the future?

First, Congress must recognize that the federal government has the responsibility not only for ensuring that our food supply is safe, but also for leadership in convening consortia that can describe its chemical composition, as it is relevant to health.

Second, our federal national capacity for database work and national food composition laboratories at USDA must be models for the world. We also need greater advocacy by the land-grant colleges and universities, industry, and nutrition professional associations including the IFT, ASNS, ASCN, ADA, and others if food composition analyses and database development is to become ongoing realities.

Third, industry needs to assume responsibility for performing or paying for some food composition analyses. It makes basic market sense for marketers and manufacturers to know the nutrient content of what they are selling.

In conclusion, as we enter the 21st century, if we are going to be able to keep pace with a changing food supply, our national food science and nutrition community needs to more fully develop its advocacy and educational role with respect to food analyses and composition studies. A tripartite coalition of industry, academe, and government is the most satisfactory model given financial realities. We also need to work collaboratively with our international colleagues to harmonize our efforts with those in other countries.

Acknowledgements: Massachusetts Department of Public Health Breast Cancer Research Program and the Tea Council

AIM_NDBS: A New Database Designed for the Future. J.M. Holden and R. Cutrufelli. Nutrient Data Laboratory, BHNRC, ARS, USDA, Riverdale, MD

USDA=s National Nutrient Databank System (NDBS) is the repository of composition values and related documentation for nearly 8,000 foods and up to 81 nutritional components. In addition to nutrient values the NDBS contains systematic and common food names, source information, and information about analytical methods. The development of representative food composition values involves the acquisition, documentation, evaluation, and aggregation of food composition data compiled from a wide variety of sources. These sources include scientific literature, food industry, academia, other government agencies, and contracts sponsored by the Nutrient Data Laboratory. The NDBS was developed and implemented in 1985 and is located on USDA=s Kansas City mainframe. NDBS products include the USDA Nutrient Database for Standard Reference and the Primary Nutrient Data Set for USDA Nationwide Food Surveys.

Since 1985, NDL has taken on additional research activities in support of its mission. NDL now requires a flexible computing environment to handle data and makes extensive use of computers for data and label information entry; for storage and retrieval; for data review and analysis; for statistical aggregations; for calculating recipes, formulations, and nutrient retention factors; and for other custom applications. NDL currently performs these functions using a number of separate software applications. To consolidate these various systems NDL

initiated a phased project to design and develop the Architecture and Integration Management_Nutrient Data Bank System (AIM_NDBS). AIM_NDBS will provide an integrated system to facilitate data acquisition, evaluation of data quality, data compilation, and data dissemination. As part of this redesign process all NDL policies and procedures are being reviewed to address current understanding of the scientific principles involved.

During Phase I, NDL staff developed database requirements, a data model, and a data dictionary. Phase II involved the development of platform requirements and the evaluation of technical architecture options. Phase III includes the purchase, testing, and installation of hardware and software; system design; software development; migration of existing data from the Kansas City mainframe and all in-house modules; testing and implementation of the new AIM_NDBS. A fourth Phase will involve development of an integrated data quality evaluation system and testing. It is expected that by February 2000 the AIM_NDBS will be fully developed and operational.

New Solutions for Managing Data Quality in Food Composition Research. P. Pehrsson, D. Haytowitz, J. Holden, C. Perry, and D. Beckler. Nutrient Data Lab, BHNRC, ARS, USDA, Riverdale, MD and National Agricultural Statistics Service, USDA, Fairfax, VA.

Research linking nutrients, foods and health coupled with the dynamic nature of the U.S. food supply demands continuous monitoring of food composition data quality. To meet this challenging task, NDL has initiated the National Food and Nutrient Analysis Program (NFNAP), designed to develop robust estimates of the mean nutrient content of 1,000 important foods in the USDA National Nutrient Data Bank. Under this program, USDA-sponsored contracts and collaborations with the food industry and select government agencies will improve the quality of USDA=s food composition data. The program objectives are: 1) identification of Key Foods and nutrients for analysis; 2) evaluation of the quality of existing data; 3) development of nationally based sampling plans; 4) chemical analysis of samples; and 5) compilation and calculation of representative estimates of food components. Development of the sampling plans is critical to the success of NFNAP. The US is divided into four regions and within regions, three strata; divisions are based on nearly equal-sized populations. Generalized Consolidated Metropolitan Statistical Areas (gCMSAs) are selected in each strata. Foods are purchased in 24 retail outlets (2 in each of the 12 selected gCMSAs); specific brands are selected based on current market share data. Samples are composited across the outlets and sent to qualified laboratories for analysis. Coordination and technology among USDA, labs preparing the composites, and labs analyzing the samples ensures accurate analyses and the transfer of critical information. Analytical results are then rated through an expert system in the USDA Databank and assigned data quality indicators, which are important in larger scale aggregations and data releases. This system is being developed as the framework for all food sampling and analysis as part of the ongoing food composition research at the Nutrient Data Lab. To date, NDL has analyzed about 130 foods, including margarine and spreads, many high-consumption commercially prepared mixed dishes, water, and folate-fortified grain-based products. Preliminary results will be discussed.

Partnerships For Developing New Databases. Kathleen C. Ellwood, Ph.D., National Program Staff, ARS, USDA, Beltsville, MD

The USDA National Nutrient Data Bank as a recognized authority is committed to ensuring the validity and accuracy of the data. It is widely used by industry, government agencies, researchers and consumers. The acquisition, evaluation and compilation of food composition data values is a continuous and daunting process. USDA does not have dedicated intramural analytical laboratories to support the National Nutrient Data Bank. Limited data are provided by ongoing research programs within ARS. Thus, to meet user needs the Nutrient Data Laboratory is dependent on partnerships outside the Agency. There are several roles that the food industry, government agencies and universities can play in updating and maintaining this valuable data bank. These can consist of providing verifiable information about new food products, providing food samples for analysis, conducting sample analysis, providing data, and direct funding. The current funding for the Nutrient Data Laboratory is insufficient to meet the challenge of acquiring new data to reflect changes in the food supply and to continuously update existing data. Therefore, it is imperative that the National Nutrient Data Bank is supported by its numerous partners.

Nutrient Data for Food Frequency Questionnaires: The Revised Block-98 Database. Gladys Block, Ph.D., School of Public Health, University of California, Berkeley

Availability of NHANES III and CSFII 1994-96 data make it possible to identify critical nutrient contributors in the recent U.S. diet, to aid in the design of food frequency questionnaires. They were also used to determine the nutrient content most appropriate for application to food frequency questionnaires. Data will be presented on nutrient contributors, and on use of these datasets as well as other information to determine nutrient content. A revised approach to portion size in the 1998 Block questionnaire will also be described.

An Evaluation of Alternative Approaches to Constructing a Nutrient Database for Food Frequency Questionnaires. Amy F. Subar, PhD, MPH, RD, Douglas Midthune, MS, Martin Kulldorff, PhD, Charles C. Brown, PhD, Frances E. Thompson, PhD, Victor Kipnis, PhD, Arthur Schatzkin, MD, DrPH.

Nutrient databases are needed to produce nutrient intake estimates from food frequency questionnaires (FFQs), but the various methods for constructing such databases have not been closely evaluated. We categorized 5,261 individual foods reported on 24-hour recalls by 10,019 adults (from USDA=s 1994-96 Continuing Survey of Food Intake by Individuals) into 170 food groups consistent with line items on a FFQ. We generated 10 potential nutrient databases for a FFQ which varied by: 1) using means or medians, 2) calculating estimates with or without considering age, 3) incorporating collapsing strategies for small age-gender-portion size cells, 4) including or excluding outliers in a regression, and 5) using weighted median nutrient density times age-gender-portion size specific median gram weights (Block method). Mean error, mean squared error, and mean absolute error were calculated and compared by method, with error being the difference in total observed and total estimated intake for each respondent=s 24-

hour recall data for seven nutrients. Mean methods were superior to either median or Block approaches for all error measurements. Among the mean methods, no single variation, such as including age, using regression, or collapsing was consistently better.

Nutrient Databases for Food Frequency Questionnaires. Alan R. Kristal, Dr.P.H. Ruth E. Patterson, Ph.D., Ann S. Shattuck, M.S., R.D., Nancy C. Vizenor, Ph.D. Nutrition Assessment Shared Resource, Fred Hutchinson Cancer Research Center

Nutrient analysis of food frequency questionnaires (FFQ) is deceptively simple. For each food or food group (typically about 100), one multiplies the frequency of consumption times a vector of nutrient content. These are summed over all foods to obtain an estimate of usual nutrient intake. It is complex, however, to define the vector of nutrients that characterizes each food or food group. For each FFQ, we select foods items based on cognitive coherence, nutrient content, and research objectives, and give portion sizes in commonly-consumed household units. We then develop a spreadsheet that defines precisely the food or foods in each FFQ item and their portion sizes, based on food consumption data, recipes, knowledge of food preparation, and familiarity with study populations. A nutrient vector for the defined portion of each item on the spreadsheet is extracted electronically from a comprehensive nutrient database, and these are combined into a matrix of nutrient values for each FFQ item. We do not include all values included in comprehensive nutrient databases (e.g., the over 120 fields included in the University of Minnesota Nutrition Coordinating Center database) because they cannot be validity measured using food frequency methods. Lastly, we examine results carefully for face validity. This system requires a substantial initial investment in computer programming and nutritionist support; however only modest effort is needed to maintain nutrient databases or develop additional databases for new FFQs.

Introduction (Consumption of what? Diet, foods, supplements or what else?). Won O. Song, Ph.D, MPH, RD., Food and Nutrition Database Research Center, Michigan State University.

Along with increased public awareness and interest in the relationship between diet and health, use of nutritional supplements has become prevalent in the U.S. in the past years. The public interest and trends require reactive and proactive plans and concerted efforts of policy makers, public health officers, nutrition and health educators in the government, food and supplement industry, and academia, in order to promote and protect national health.

In April 1998, NCHS released vitamins/medicines data files for NHANES III (1998-1994), the first of its kind. The data files as a part of NHANES III offer significantly important data and opportunities for researchers. They also offer challenges with needs for continued and coordinated efforts needed in the future.

The three speakers in this session will share what information and opportunities are currently available, how they are using the information, what the challenges they face, and what their suggestions for the future are.

With continued and concerted efforts of government, industry and academia, we hope to advance scientific knowledge on the accuracy to assess dietary supplement use, biomarkers and active ingredients of various type of nutritional supplements, complete food and dietary supplement composition database, characteristics of supplements and their bioavaliablilty as muticonponents, and so on..

Research Application of Vitamin/Medicine Data Files in NHANES III: 1988-94. Yikyung Park, MS., Jean Kerver, MS, RD, Won O. Song, Ph.D, MPH, RD. Food and Nutrition Database Research Center, Michigan State University.

Vitamins/medicines data files released with NHANES III in April 1998 (CD-ROM; Series 11, No.2A, ASCII Version), include data on types and amount of dietary supplement use by individuals, dose of specific ingredients in each supplement, and specific product information. The data files can be merged with previously released NHANES III data such as adult and youth household questionnaire, health examination, and laboratory data files.

Utilizing NHANES III data files, we assessed 1) nutritional status of folate in childbearing-age women who did vs. did not use nutritional supplements containing folate; 2) nutritional status of carotenoids in the U.S. population; 3) estimated intake of individual carotenoids through merge with USDA-NCC carotenoid database(1998); and 4) comparision of data resulted by USDA vs. NCC food composition data files. These studies were conducted using SAS and SUDAAN considering sample weights, and variances estimated from the complex sampling scheme. The presentation will include findings of our carotenoid study. We estimated total b-carotene intake from diet alone (non-users of supplements with b-carotene, 2,596_66 ug/d) vs. diet plus supplements (users of supplements with b-carotene, 9% of U.S. population; 5,362_247ug/d), and their relationship to biomarkers such as serum b-carotene concentrations.

Industrial Use of the Vitamin/Medicine Data Files in NHANES III, 1988-1994. Cindy Schweitzer, Ph.D., Yikyung Park, M.S., Won O. Song, Ph.D., MPH, RD. Food and Nutrition Database Research Center, Michigan State University.

Several studies characterize that nutritional supplement users tend to be highly educated, female, high socioeconomic status, consume better quality diets than supplement non-users. Total daily intake studies of supplement users and nonusers indicate that nutritional supplements make a significant contribution to the nutritional intakes of Americans and U.S. subgroups. Supplements do not replace healthy diets and lifestyles, and appropriate use helps individuals meet their recommended intake of specific nutrients.

Utilizing the vitamin/medicine data files, we evaluated vitamin E consumption from foods and nutritional supplements. Vitamin E is commonly taken in supplement forms for its reported unique health benefits resulting from high doses. The high dose intake can be easily attained from healthy diets aided by vitamin E supplements, but not from diet alone. We found that 1) average daily intake of vitamin E is 75.9 mg alpha-tocopherol equivalents (TE) among vitamin E

supplement users compared to 9.5 mg TE from consumers of foods only; 2) mean vitamin E intake from foods was higher among supplement users than that of supplement non-users.

This type of information is important for the supplement industry to identify existing and potential consumers, to formulate products that meet consumer's needs, to inform and educate consumers about products, to plan effective and efficient marketing of products to target subgroups, and have a good understanding of consumer market situation. Recommendations for future efforts will be presented.

Dietary Supplements Reference Database and Research Opportunities Through the Office of Dietary Supplements. Rebecca B. Costello, Office of Dietary Supplements, NIH

Public Law 103-417, the Dietary Supplements Health and Education Act (DSHEA) of 1994 created the Office of Dietary Supplements (ODS) Ato establish standards with respect to dietary supplements.@ In its first two years, the ODS has addressed its congressional mandates and begun to fulfill the purposes and duties defined in the DSHEA. A strategic plan for the ODS was released in September 1998 identifying five equally weighted scientific goals that form the cornerstone of its programs. Each goal addresses a pivotal role for the ODS. The objectives listed with each goal represent specific scientific areas that were identified by the ODS staff and ad hoc advisers as scientific priorities for the next three to five years. These goals and objectives were selected for their relevance to dietary supplements and the likelihood that they would produce successful outcomes. In this presentation, several ODS goals and their objectives will be highlighted, as well as the program activities that have been initiated to support them.

Impact of Public Policy on Food Composition and Consumption. Janet E. Collins, Ph.D., R.D., The Monsanto Company

The use of food composition and food consumption databases by the food industry is not new. These resources have been used since the data collections were initiated so many decades ago The contribution of foods, food ingredients, food categories and more recently food supplements to the overall character and quality of the diet can be assessed with meaningful exploration of the CSFII and the NHANES consumption data. In order to assess the dietary effect of ingredient or process alterations, the food industry has made use of comparative data from the compositional databases.

The food industry has consistently contributed meaningful analtyic data about its products for inclusion in the compositional databases so as to improve the degree of marketplace representation with which data can be assessed. Processed foods, by definition, are combinations of elements which can be altered to meet rational specifications for a variety of functional and nutritional purposes. Consumer interest in, for example, lower fat and non fat food alternatives has spawned industry interest in producing and marketing such foods. The relative contribution of such foods to diet quality as well as variety in food choice is an area that has been explored within the industry over the past couple of years. During the Tufts University Dialogue on Fat Substitutes in 1998, a good example of meaningful use of survey data on

inclusion of fat substituted foods in the US diet as compared with Ausual= or typical American diets (using CSFII data with USDA food composition databases) was provided by scientists to scientists for informed discussion, to regulators for better informed policy deliberations and to industry representatives for marketing considerations.

Understanding the potential uses of the data sources would help resolve some of the limitations that currently exist in the databases; more deliberate reflection on data inputs and requirements would strengthen the data sources and increase the usefulness to and support from a wide variety of audiences. The usefulness of the statistical interpretations permitted by evaluating such data should be underscored.

What is this Codex, Who is this EU, and Why Are They Causing Havoc in my Nutrient Database? Regina Hildwine, Director, Food Labeling and Standards, National Food Processors Association

In recent years, Codex Alimentarius standard setting activities, and policies in the European Union (EU), have produced impacts which are reflected in potential changes to nutrient composition databases world-wide. The presentation will explain the standard setting process in Codex Alimentarius and will elucidate the importance of Codex texts in international trade. Some discussion will focus on European Union directives and related documents, along with an explanation of process and precedents in international disputes. The environment set, the presentation will illustrate examples of standards elaborated either in Codex or the EU that have the potential to modify the components in nutrient composition databases both in the United States and in other nations.

National Food and Nutrition Survey: Integration of the National Health and Nutrition Examination Survey (NHANES) and the Continuing Survey of Food Intakes by Individuals (CSFII). Alanna Moshfegh, Agricultural Research Service, USDA and Ronette Briefel, National Center for Health Statistics, CDC, DHHS.

The National Nutrition Monitoring and Related Research Act of 1990 called for a coordinated program for nutrition monitoring that would improve the quality of national nutrition and health status data and stimulate research to develop uniform methodologies, technologies, and procedures for nutrition monitoring. In April 1998 the National Center for Health Statistics (DHHS) and the Agricultural Research Service (USDA) signed a memorandum of understanding to integrate the CSFII and NHANES to form one national food and nutrition survey beginning in the year 2000. The joint survey will provide a larger annual sample size and maximize coverage of the low-income population and major race-ethnic groups to better meet data needs. A common automated data collection method and nutrient data base will be used to collect 24-hr dietary recalls. Plans for survey integration (including the time line, 1998 expert panel recommendations, core sociodemographic, nutrition, and health variables, and research on in-person and telephone dietary recall data collection methods) will be described.

POSTER ABSTRACTS

COMPARISON OF TWO NUTRIENT DATABASES WITH DIRECT FOOD ANALYSIS FOR ESTIMATING THE PHYLLOQUINONE (VITAMIN K_1) CONTENT OF METABOLIC DIETS. Nicola McKeown, Helen Rasmussen, Kathleen McGann, Brian Kaszynski, Richard Wood, Sarah Booth. Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University, 711 Washington St., Boston, MA 02111.

Food and nutrient databases continually evolve to fulfill a wide variety of purposes, ranging from designing diets for metabolic studies to establishing diet-disease associations in epidemiologic studies. The purpose of this study was to determine if current nutrient databases that include phylloquinone (vitamin K_1) can be used to design diets for vitamin K metabolic studies. The phylloquinone content of six diets were calculated using (1) the Nutrient Data System for Research (NDS-R; version 4.0) and (2) the USDA provisional table for vitamin K. The phylloquinone content of these diets was verified by analysis of homogenates using high performance liquid chromatography (HPLC). The mean " sd phylloquinone content of the six diets was 28.0 " 32.2 mg (range: 10.4 to 93.1 mg), as determined by food analysis. Compared to food analysis, the phylloquinone contents of the six diets was underestimated by a mean " sd of 2.7 " 5 .5 mg (range of differences: -12.5 to +3.6 mg) using the provisional table, and by 4.3 " 6.0 mg (range of differences: -13.2 to +1.7 mg) using the NDS. For diets with a target phylloquinone content of <10 mg, the nutrient databases underestimate by as much as 60%. The mean " sd difference in phylloquinone content between the provisional table and the NDS was 1.6 " 3.2 mg. When designing metabolic diets for vitamin K studies, direct food analysis and verification of sources of vitamin K food composition is important for confirmation of actual phylloquinone intake.

DEVELOPMENT OF A NUTRIENT DATABASE FOR FRESH VEGETABLE AND FRUIT JUICES. Newman VA, Rock CL, Zoumas C, Faerber S, UCSD Cancer Prevention and Control, La Jolla, CA 92093-0901.

To augment the limited nutrient composition data available on fresh vegetable and fruit juices, a database was created, which includes the nutrient composition for 33 fresh vegetable and 17 fresh fruit juices. The associated software calculates the nutrient composition of any combination of juices found in this database. Nutrient composition of each juice in the database was calculated from the metric weight of raw produce required to produce 8 fl oz of juice adjusted for nutrients likely in the discarded pulp. The nutrient content of the raw produce was obtained from Nutrient Data System (NDS 2.92, University of Minnesota, Minneapolis, MN), augmented with an associated program to obtain updated carotenoid content (USDA-NCI carotenoid food composition database). The amount of fresh produce required to make a cup (8 fl. oz.) of juice was derived by weighing using a gram scale calibrated to the nearest 0.10 gram using two different juicer brands (Omega and MJ1000). Produce was weighed and juiced on three separate occasions using a standard protocol, and the mean weights were used. This study resulted in the development of a database and associated

software that calculates the nutrient content of 50 fresh juices, or any combination of these juices.

MISCELLANEOUS VEGETABLES: UPDATED COMPOSITES IMPROVE NUTRIENT CONTRIBUTIONS TO THE FOOD SUPPLY. Bente, Lisa MS and Gerrior, Shirley PhD, United States Department of Agriculture, The Center for Nutrition Policy and Promotion, Washington D. C. 20036

The U.S. Food Supply Series is a historical data series beginning in 1909. It measures the amount of food and nutrients available for consumption in the United States. This study uses USDA=s Nutrient Database for Standard Reference 12 to calculate accurate and complete food supply nutrient estimates from miscellaneous vegetables. Historically, nutrient estimates for the miscellaneous vegetables did not represent the vegetable mix in the food supply, were calculated using a spreadsheet and subject to entry errors, and had no direct link to PDS codes. To make appropriate adjustments to the food supply nutrient file, canned and fresh vegetable composites were reviewed for their vegetable mix, PDS links, and nutrient estimates for food energy, iron, vitamins A and C, and folate. The new composites use a more representative mix of vegetables, and link each vegetable component to its appropriate PDS code. Revised estimates are different for some nutrients due to the change in the vegetable mix. For revised miscellaneous canned vegetable composites (1940-94) vitamin A is higher and iron is higher or the same for all years except 1965 and 1969, vitamin C is higher for 1970-94, and both food energy and folate are lower for 1940-94. For miscellaneous fresh vegetable composites vitamin C is lower for 1970-94 and folate is higher for 1909-94 reflective of new methods used to determine folate in foods. Other nutrients show little change during the period 1909-94. This study shows that the food supply nutrient estimates are improved by these updated vegetable composites.

ACCOMMODATING UNIQUE RECIPES: THE NDS-R USER-RECIPE FEATURE. Lisa Harnack, Priscilla Goldstein, Mary Stevens, Nancy Van Heel, Gordon Weil, Nutrition Coordinating Center, Division of Epidemiology, University of Minnesota

Nutrition Data System for Research (NDS-R), a new Windows-based nutrient analysis program for personal computers, includes a user-recipe feature which allows the user to enter unique recipes for use and re-use in dietary records. The food and nutrient database linked with NDS-R includes commonly eaten foods prepared from recipes. Ingredient variables for such recipes may be selected during data entry to provide further specificity (e.g. ground beef percent fat). The NDS-R user-recipe feature allows for entry of recipes not included in the database such as recipes specific to various regions of the US; recipes modified for dietary interventions; and recipes that are unique due to ingredient adjustments. The user-recipe feature guides data entry with prompts for complete food descriptions and food preparation methods. Automatic conversion of ingredient amounts from raw-to-cooked values; ability to enter the portion with or without refuse; algorithms for fat and sodium uptake according to preparation method; and options for entering amounts in food-specific units and food shapes in addition to common units of volume and weight expedite entry of ingredients. A food group assignment may be selected for the recipe to assist in food group analysis. User-recipes may be analyzed

individually or as part of other dietary records and may be recalculated in subsequent database versions to obtain nutrient updates. In addition to output files in ASCII text format, recipe reporting options include nutrient totals, nutrient values per individual ingredient and comparisons with Recommended Dietary Allowances and Daily Values for Nutrition Labeling.

DEVELOPMENT OF A NATIONWIDE SAMPLING PLAN FOR THE NATIONAL FOOD AND NUTRIENT ANALYSIS PROGRAM. P Pehrsson, D Trainer, D Haytowitz, J Holden, J Evans, C Perry, and D Beckler (SPON: G. Beecher). Nutrient Data Lab, BHNRC, ARS, USDA, Riverdale, MD and National Agricultural Statistics Service, USDA, Fairfax, VA.

The National Food and Nutrient Analysis Program (NFNAP) is a five-year research program designed to significantly improve the quality of food composition data in the USDA National Nutrient Data Bank. NFNAP consists of five Aims: 1) evaluation of existing data; 2) identification of foods (Key Foods) and nutrients for analysis; 3) development of nationally based sampling plans; 4) analysis of samples; and 5) calculation of representative estimates for components. For Aim 3, the US was divided into four regions, with nearly equal populations; each region was divided into three strata of nearly equal population. Generalized Consolidated Metropolitan Statistical Areas (gCMSAs) were selected in each stratum proportional to population size and supplemented with contiguous counties when the gCMSA contained less than 10 grocery stores. Grocery store lists were obtained through Trade Dimensions (Wilton, CT) for selection of primary and alternate outlets for food pickups. Individual brands and varying package sizes were selected using current market volume share data (as pounds consumed). Additional samples for determination of serving to serving variation were collected where considerable variation was expected for certain nutrients. The NFNAP sampling plan represents substantial advancements in providing more accurate, representative, and statistically robust estimates for components of important foods in the US food supply. Details of the study design and food composition data for selected foods are presented. Work supported by an USDA-NIH interagency agreement.

DEVELOPMENT OF REPRESENTATIVE NUTRIENT DATA FOR MARGARINE AND SPREADS UNDER THE NATIONAL FOOD AND NUTRIENT ANALYSIS PROGRAM. P. Pehrsson, J. Evans, D. Trainer, D. Haytowitz, J. Holden, C. Perry, and D. Beckler (SPON: G. Beecher). Nutrient Data Lab, BHNRC, ARS, USDA, Riverdale, MD and National Agricultural Statistics Service, USDA, Fairfax, VA.

The National Food and Nutrient Analysis Program (NFNAP) is a five-year research program designed to significantly improve the quality of food composition data in the USDA National Nutrient Data Bank. This involves evaluation of existing data, identification of foods (Key Foods) for analysis, development of nationally based sampling plans, analysis of samples, and calculation of representative estimates for components. Previously, margarines and spreads were identified as the leading contributors of fat in the US diet. However, major changes in product formulations emphasized the need for new composition data. Within the past decade, new products include those with fat levels that range from near 0 to 80%, and tremendous variation in the types of oils used, level of hydrogenation, moisture content, and physical form (soft tub to hard stick). Recently, NDL sampled selected margarines and spreads according to

the population-based sampling plan for NFNAP; samples were picked up in each of 12 Generalized Consolidated Statistical Areas, across four regions of the US and three strata within each region. In order to sample these products, individual brands were categorized by fat range (fat-free, 10-30%, 37-50%, 52-65%, 70%, and 80%). Multiple nationwide composites by fat range and brand were developed; then analyzed for proximates, individual fatty acids, vitamins and minerals. Preliminary data are presented for these foods. Work supported by an USDA-NIH interagency agreement.

ISOFLAVONE DATABASE FOR FOODS. G. R. Beecher. S.Bhagwat. J. M. Holden. D. Haytowitz and P. A. Murphy. Beltsville Human Nutrition Reseach Center, ARS, USDA, Beltsville, MD 20705 and Department of Food Science and Human Nutrition, Iowa State University, Ames, IA 50011

Isoflavones, well known phytonutrients of soybeans and soy-containing foods, have low- and/or anti-estrogenic as well as antioxidant properties. However, they have not been directly linked with risk of chronic diseases for lack of a database of food values. We have developed such a database. About 30 scientific papers were identified which contained data on the isoflavone content of soy-based and a few other foods. Also, isoflavone data were generated from an extensive sampling of soy-containing foods in the U.S. Data for daidzein, genistein, glycitein and their glucosides were critically evaluated (Mangels et al., J Am Diet Assoc. 93:284-296, 1993). Total aglycone values of each isoflavone were calculated by converting glucoside forms into aglycones based on molecular weight ratios and adding them to their respective free aglycone values. Acceptable data for each isoflavone/food combination were combined to generate mean values for aglycone forms and total isoflavone content. The number of values used to calculate the mean, standard errors of the means (SEM) and Confidence Codes (reliability indicator) also were determined. Data for about 140 foods, including soy ingredients, were tabulated and assigned USDA Nutrient Database codes. The source of data for each food is shown and all references are listed. The database is available at http://www.nal.usda.gov/fnic/foodcomp. Partially funded by U.S. Army.