Abstracts for Oral Presentations at the 37th National Nutrient Databank Conference
April 19, 2013

8:40-9:10 am

Title: Food Composition Data: Keeping Pace with Emerging Trends in Research and Database Applications.

Author: Holden, J.M. Nutrient Data Laboratory, ARS, USDA (retired)

Abstract:
A healthy population is a key resource for any country. To assure the health of a population scientists in government, academia, and industry conduct research to monitor national food (and dietary supplement) consumption patterns and to assess the impact of dietary patterns on health status. Current and accurate composition data for foods and supplements are an essential tool in these areas of nutrition research and food manufacturing.

Over the last 50 years food supplies have become more complex and dynamic, with the increase in multi-ingredient processed products, including restaurant foods, to complement animal and plant–based commodities. Foods have continued to evolve with advances in industrial technology, global ingredient supplies, and immigration.

Scientific interest in dietary components continues to expand. To keep pace with changes in food composition in light of emerging trends in research and consumption database developers must continue to track nutrients and other dietary components in foods and supplements that reflect the changing marketplace. Also, knowledge of food chemistry and production technology is essential to setting priorities for new or updated data entries. Guidelines for calculations must also be reconsidered. Scientists from industry, government, and academia must work together to contribute new composition data for foods and dietary supplements to public databases.

Key words: food composition data, dietary supplements, emerging trends, database applications,

Funding disclosure (if applicable): None

9:20-9:40 am

Title: Development of a Database of Fortified Foods in WWEIA/NHANES 2007-2008 to Model Nutrient Intakes Under Proposed Revisions to the Daily Values

Authors: Mary M. Murphy, MS, RD;[1] Judith H. Spungen, MS, RD;[1] Leila M. Barraj, DSc;[1] Regan L. Bailey, PhD, RD;[2] Johanna Dwyer, DSc, RD.[3]

[1]Exponent, Inc., Washington, DC; [2]Office of Dietary Supplements, Bethesda, MD; and [3]Jean Mayer USDA HNRC on Aging, and Schools of Medicine, Tufts University, Boston, MA.

Abstract:
Background: The Daily Values (DVs) on the Nutrition Facts Panel will be evaluated and potentially updated to represent current Dietary Reference Intakes. There is debate about which reference values should be used to update label DVs: population-weighted (w) or highest (h) values of the current EARs or RDAs. To help inform decisions in revising the DVs, nutrient intakes by the US population ages 4+ years were modeled assuming potential DV scenarios for contributions of vitamins and minerals (V/M) from fortified foods using WWEIA/NHANES 2007-2008 data. In each scenario, levels of fortified V/M were adjusted to maintain the current % DV in fortified foods, keeping levels of other nutrients constant.

Objective: Since fortified foods are not systematically identified in WWEIA, the objective was to develop a database of foods fortified with the V/M so potential changes in intakes could be assessed.

Description: The database of fortified foods was constructed using USDA's Food and Nutrient Database for Dietary Studies 4.1 and related files. A total of 279 fortified foods or representative composites of fortified and non-fortified foods were identified. Many of these fortified foods were also ingredients in mixtures. Fortified ready-to-eat (RTE) cereals accounted for more than half of the fortified foods (52%), followed by fortified fruit/fruit juice drinks (8%), and fortified bars (7%). Fortified foods accounted for 28% of vitamin C intake; 20-23% of intakes of folate, vitamin B6, and iron; 8-19% of intakes of vitamins B12 and A, thiamin, niacin, vitamin D, riboflavin, zinc, calcium, and vitamin E; and ≤1% of magnesium and potassium intakes.

Conclusion: The database we developed identifies fortification practices reflected in the USDA nutrient data files, therefore allowing estimation of representative intakes of fortified foods by the US population and corresponding nutrient intakes under each DV modeling scenario.

Key words: Fortification, Daily Values, modeling

Categories: Database Issues Involving Food Labeling and Front of Pack Labels

Funding disclosure (if applicable): Supported by the Fortification Committee of The International Life Sciences Institute, North America

9:40-10:00 am

Title: Identification of Sentinel Foods for Monitoring Sodium Intake of the U.S. Population, What We Eat In America, NHANES 2007-2008.

Authors: Katherine Hoy, EdD RD[1]; Donna Rhodes, MS RD[1]; Joseph Goldman, MA[1]; Carrie Martin, MS RD[1]; Rhonda Sebastian MS[1]; Jaspreet Ahuja MS[2]; David Haytowitz, MS[2]; Pamela Pehrsson, PhD[2]; Molly E. Cogswell, DrPH RN[3]; Alanna Moshfegh, MS RD[1]; [1]Food Surveys Research Group and [2]Nutrient Data Laboratory, Agricultural Research Service, USDA; [3]Centers for Disease Control

Abstract:
Background: Monitoring the sodium intake of the population was a key recommendation identified in the 2010 Institute of Medicine report "Strategies to Reduce Sodium Intake in the United States". In response, a monitoring plan has been developed by the U.S. Department of Agriculture, Agricultural Research Service Food Surveys Research Group and Nutrient Data Laboratory in close collaboration with the Centers for Disease Control and the Food and Drug Administration.

Objective: Describe the identification of Sentinel Foods to be tracked as primary indicators and subsequently used to assess change in the sodium content of foods and population sodium intake.

Description: Day-1 dietary intakes of all individuals excluding breastfed children (n=9118) in What We Eat In America (WWEIA), NHANES 2007-2008, weighted to reflect the population were used to identify the foods that contributed substantially to sodium intake of the population. In addition to potential for sodium reduction, criteria for selection of the Sentinel Foods included sodium density (mg/100gm), level of sodium per report and frequency of consumption. The identified Sentinel Foods (n=125) accounted for approximately 35% of total sodium intake of the population and included commercial/packaged (75%) and restaurant (25%) items. About 70% total sodium intake was accounted for by mixed dishes (30%), meat, poultry, fish items (21%), and bread/grain products (19%). Of the sentinel foods, 37 were mixed dishes (macaroni and cheese, chili, pizza), 23 were meat, poultry, fish items (deli ham, fried chicken, fish sticks) and 20 were bread/grain products (bread, flour tortilla, read-to-eat cereal).

Conclusion: Regular tracking and analysis of Sentinel Foods is critical for monitoring sodium intake of the population and evaluating effectiveness of sodium reduction initiatives.

Key words: Nutrition monitoring, sodium, sodium intake

Categories: Nutrition monitoring to meet goals for government projects such as changing sodium levels in foods and diets in a timely fashion.

Funding disclosure (if applicable): Supported by U.S. Department of Agriculture, Agricultural Research Service

10:00-10:20 am

Title: Lutein & Zeaxanthin Dietary Assessment

Author: Elizabeth Johnson, Jean Mayor USDA Human Nutrition Research Center on Aging, Tufts University

Abstract:
The carotenoids, lutein and zeaxanthin, selectively accumulate in the center or the retina (known as the macula), where they may protect against the development of age-related macular degeneration . The presence of lutein and zeaxanthin in human blood and tissues is a result of the ingestion of food sources of these carotenoids. Because the distribution of lutein and zeaxanthin differ within the macula, with a higher ratio of zeaxanthin to lutein centrally but a lower ratio eccentrically, there is discussion on their individual associations in eye health. Of the two, lutein predominates in fruit and vegetables. Accurate assessment of individual intakes of lutein and zeaxanthin are crucial in the evaluation of their individual associations in eye health. This is difficult given the limited information in current dietary databases which provide combined levels of lutein and zeaxanthin. Furthermore, there is there is little information on corn and egg products, with the exception of one recent publication. This is of interest given that these foods are substantial sources of these carotenoids for many individuals. Corn stands apart from other vegetables in that the relative amount of zeaxanthin is greater than for other vegetables commonly consumed by the US population. Eggs and egg products are of interest because of the high bioavailability of lutein from eggs. Therefore, a dietary assessment tool was developed for a quick, accurate, and inexpensive quantification of individual intakes of lutein and zeaxanthin providing information on fruits and vegetables as well as corn and egg food products. Dietary assessment using individual estimates of lutein and zeaxanthin intakes are needed for determination of their individual associations with eye health.

Key words: food composition data, database applications

Categories: Advances in Using Food Composition Data for Dietary Assessment

Funding disclosure (if applicable): None

10:40-11:00 am

Title: Measuring the Water Footprint of Dietary Consumption

Author: Marissa Cloutier, MS, RD; Harvard School of Public Health, Department of Nutrition

Abstract:
One of the most serious aspects of global climate change is its effect on the global water cycle. With an uncertain climate future, attention must be given to the use of fresh water resources. Agriculture is the largest sector of fresh water resource use. Hence, it is indicative that food consumption patterns are measured in terms of their impact on global water resources. This discussion reviews the Water Footprint concept as it pertains to food, and how a Water Footprint food database can be compiled. Research challenges in doing so will also be discussed.

Key words: Water Footprint

Funding disclosure (if applicable): None

11:00-11:20 am

Title: Using U.S. Department of Agriculture and Propriety Databases to Compare Processed and Home Recipe Foods

Authors: Mary K. Muth, PhD, Shawn A. Karns, and Michaela C. Coglaiti (RTI International), Kiyah Duffey, PhD (Virginia Tech), Carolyn Dunn, PhD, RD (North Carolina State University), Helen Jensen, PhD (Iowa State University), and Christian Gregory, PhD (Economic Research Service)

Abstract:
Objective: Develop a database of food values including price, nutrients, food groups, shelf-life, preparation time, cooking time, and food safety concerns for processed and home recipe foods to populate a web-based application.

Materials and Methods: Foods with a home recipe version in the USDA Food and Nutrition Database for Dietary Studies (FNDDS) or the USDA National Nutrient Database for Standard References (SR) were selected to represent a range of commonly consumed entrees, baked goods, side dishes, fruits, vegetables, desserts, and beverages. Multiple databases were used to create the values: FNDDS, SR, and Gladson Nutrition Database for nutrient values using equivalent serving sizes across food forms; USDA MyPyramid Equivalents Database for food groups; Center for Nutrition Policy and Promotion Food Prices Database and Nielsen Homescan for prices per serving; popular cookbooks for preparation and cooking time; and extension publications and package use-by dates for shelf-life and food safety concerns. The proprietary Gladson Nutrition Database linked to the Nielsen Homescan data was used to fill gaps in nutrient values and prices in the USDA data while adjusting for moisture losses and gains. For foods without preparation times in cookbooks, we prepared the foods to estimate times.

Results: Per-serving and per-100 gram values were constructed for 108 unique foods with a home recipe and one or more processed forms. The data were incorporated into a web-based application allowing users to compare individual foods or a daily diet constructed from foods in the database.

Significance: Nutrition educators can use the populated web application to advise individuals in selecting foods to consume to meet dietary guidelines while taking into consideration cost, preparation time, food preparation skills, and individual preferences.

Key words: food values, processed foods, home recipe foods, nutrition education

Categories: Advances in Using Food Composition Data for Dietary Assessment, Third party databases

Funding disclosure (if applicable): ILSI North America

11:20-11:40 am

Title: Dietary Supplement Label Database for Research

Authors: Johanna Dwyer D.Sc.RD[1], Karen W Andrews BS[2], Richard Bailen MBA[1], Regan L Bailey PhD[1], Joseph M Betz PhD[1], Vicki L Burt MSc[3], Hua Florence Chang MS[4] , Rebecca B Costello PhD[1], Nancy J Emenaker PhD RD[5], Jaime J Gahche MPH[3], Jeanne Goshorn MS [4] Constance J Hardy MS,RD[6], Pamela R Pehrsson PhD[2], Janet M Roseland MS, RD[2], Leila G Saldanha PhD,RD[1] 1ODS, NIH [2] ARS, USDA, Beltsville, MD, [3] NCHS, CDC, Hyattsville, MD, [4] NLM, NIH Bethesda MD [5]NCI NIH Bethesda, MD , [6]CFSAN, FDA, College Park, MD

Abstract:
Background: Assessment of population groups at risk of nutrient inadequacy or excess must account for the contributions of dietary supplements (DS) since >50% of U.S. adults consume them.

Objective: To develop a publicly available dietary supplement label database (DSLD) of essentially all dietary supplements sold in the U.S.

Description: A dietary supplement label database (DSLD) with full label information and a web-based user interface has been developed for public use. It presents all nutrition related information printed on product labels including label images, and extending what is included in the Supplement Facts panel. The names and forms of all ingredients, amounts of active ingredients and information about label claims, warning statements, percent of Daily Value, and the manufacturer/distributor name are captured. The DSLD will include label information for products no longer on the market. Approximately 15,000 labels have been entered at present, and 1000 more per month are being added. Labels from the latest NHANES are included. The web-based interface has searchable fields by brand name, product, and ingredient. The calculator feature allows users to compare disparate nutrient units. Enhanced search options are planned to enable users to locate specific terms on aspects of a label using the browse and search and advanced search functions. Download capability and addition of terms from LanguaL, an indexing thesaurus for food ingredients including dietary supplement products and ingredients are under development.

Conclusions: DSLD provides researchers and other health professionals with a tool for on-line access to DS label data. Consumers as well as others in public and industry sectors can also obtain much useful information for research,quality assurance, quality control and regulatory enforcement. The DSLD can be accessed at http://dsld.nlm.nih.gov.

Key words: dietary supplements, label database

Categories: dietary supplement databases, new data for food components

Funding disclosure (if applicable): Office of Dietary Supplements and National Library of Medicine, National Institutes of Health, and Nutrient Data Laboratory, Agricultural Research Service USDA

11:40-12:00 am

Title: Sodium and sugar content of commercial baby and toddler foods.

Authors: Joyce Maalouf, MS MPH; Mary E. Cogswell DrPH, RN; Janelle P. Gunn, MPH; Sohyun Park, PhD; Robert Merritt, MA. National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, Georgia.

Abstract:
Objectives: Determine the sodium and sugar content of commercial baby and toddler foods sold in the U.S.

Methods: Gladson database was used to identify major brands of baby and toddler food products. Nutrition information from manufacturer websites and grocery stores (e.g. private label products) was used to develop a database. A total of 1115 food products were coded and categorized according to the main ingredient and food categories commonly used in the literature (Table). Serving sizes were converted to their Reference Amount of food Customarily Consumed (RACC) per eating occasion by age defined by the Food and Drug Administration. Mean sodium and sugar content was computed per RACC. Food products were assessed for high sodium (>210 mg/RACC) and high sugar (≥20% of total calories from sugar) content. Results: 77% of the products (n=860) had a high content of sodium or sugars. The mean sodium content of baby foods ranged from 1.8 mg/RACC in dry instant cereals to 75 mg/RACC in pasta-based baby dinner (Table). Toddler meals and savory snacks had the highest sodium content. The majority of the toddler meals (71%) exceeded 210 mg sodium/RACC, while some contained as much as 630mg/RAAC. Seventy-one percent of the baby and toddler products examined had high levels of sugars and some derive up to 80% of their total calories from sugars (pureed baby fruit, cereals, snacks and juices).

Significance: The majority of the baby and toddler foods had high sodium or sugar content. Ongoing monitoring of these products would inform if the content changes overtime. Product labels do not distinguish added sugars from naturally occurring sugars; the amount of total sugars displayed on the label was used to assess the sugar content of the foods.

Key words: sodium, sugar, baby foods, toddler foods, commercial

Categories: Nutrition monitoring to meet goals for government projects such as changing sodium levels in foods and diets in a timely fashion. Data for Special Population Groups (both by characteristics such as obesity or by demographics)

Funding disclosure (if applicable): Both Joyce Maalouf (the lead author) and a portion of the costs of this project were supported by the Oak Ridge Institute for Science and Education (ORISE) Research Participation Programs at the Centers for Disease Control and Prevention (CDC). CDC's participation in the ORISE program is made possible by an agreement between the Department of Energy and CDC.

Table: Sodium and sugar content in commercial baby and toddler foods (n=1115)

Food categories	n	RACC (g)	Sodium content		Sugar content	
			Mean mg/RACC	n (%) >210 mg/RAAC	Mean g/RACC	n (%) ≥20% total calories from sugars
Pureed Baby Dinner*	297					
Vegetable Based-Stage 1	43	60	12	0	2.7	40 (93%)
Vegetable Based-Stage 2	108	110	23	0	4.5	86 (80%)
Vegetable Based-Stage 3	22	170	44	0	5.5	10 (45%)
Meat Based-Stage 2	61	110	35	0	3.5	30 (49%)
Meat Based-Stage 3	36	170	53	0	4.2	11 (30%)
Pasta Based-Stage 2	8	110	75	0	3.7	5 (62%)
Pasta Based-Stage 3	18	170	55	1 (5%)	4.3	2 (11%)
Pureed Baby Fruit (Stages 1-3)	239	60-170	4.4	0	12.0	237 (99%)
Toddler Meals	90	170	369	64 (71%)	4.5	11 (12%)
Cereals						
Dry, instant	47	15	1.8	0	1.1	4 (8%)
Fruits & Grains, ready to serve	72	110	5.1	0	10.0	69 (96%)
Bars (for toddlers)	37	20	45	0	6.2	33 (89%)
Snacks						
Savory-small RACC	21	7	42	0	0.6	1 (5%)
Savory-large RACC (for toddlers)	4	20	184	2 (50%)	0.9	0
Sweet/Desserts	156	7	10	0	5.0	103 (66%)
Fruit snacks (for toddlers)	40	125	6.6	0	14.7	40 (100%)
Dairy Products	61	110	46	0	12.8	60 (98%)
Juices	51	120	11	0	14.2	51 (100%)

NOTES: g = gram; mg = milligram; RACC = reference amount customarily consumed

*Stage 1 baby foods (from 4-6 months): pureed solid food (rice cereal and finely pureed fruits and vegetables); Stage 2 baby foods (from 7-8 months): strained foods; Stage 3 baby food (from 9-12 months): partially strained, with small, tender chunks of food

1:50 - 2:10 pm

Title: A Tribute to Nevin Scrimshaw: His Food Composition Legacy

Author: Barbara Burlingame, John Klensin, Ute Ruth Charrondiere, Food and Agriculture Organization of the United Nations, Rome, Italy

Abstract:
In the early 1980's, Nevin Scrimshaw convened a group of scientists to discuss one of the most glaring gaps in nutrition – food composition. With some notable exceptions, food composition, as data generation, compilation and dissemination, was being neglected globally. At the same time, in almost every corner of the world, dietary surveys were being conducted, nutrition and food policies were being developed, nutrient-based and food-based dietary guidelines were being formulated, therapeutic diets were being fed to patients, nutrient panels were printed on food labels; yet the essential data underpinning all these activities were exceedingly poor or non-existent. Moreover, without good data, the role of agriculture in solving the problems of malnutrition focused solely on dietary energy, while industry provided supplements, fortificants, RUTF, etc., to address the problems of micronutrient malnutrition. Most, but not all, in attendance at these early meetings agreed that something must be done, and through the efforts of Scrimshaw, renewed attention and resources were given to food composition. One of the important outcomes was INFOODS, the International Network of Food Data Systems, founded in 1983-84 under the auspices of UNU. Through INFOODS, Scrimshaw established a worldwide network of food composition experts based on a Regional Data Centre model, he initiated consultations and publications to promote international standards for food composition, he established the Journal of Food Composition and Analysis, and he provided resources to scientific institutions in developing countries to undertake more and better food composition work. All continue to function today. In honor of his contribution to food composition, the Nevin Scrimshaw award was created in 2009. It is presented at the biannual International Food Data Conference to an awardee judged to have made important contributions to the field of food composition, with an emphasis on developing countries. Nevin Scrimshaw, deservedly, was its first recipient.

Key words: Nevin Scrimshaw, INFOODS, food composition

Funding disclosure (if applicable): N/A

2:10-2:30 pm

Title: Development of a Nutrient Composition Database for Ghanaian foods

Authors: Seth Armah[1] MPhil; Husein Mohammed [1,2] MPhil; Shibani Ghosh [3,4] PhD; and Fred Vuvor, MPhil[1]

1. Department of Nutrition and Food Science, University of Ghana, Legon
2. School of Allied Health Sciences, University of Ghana, Legon
3. Nevin Scrimshaw International Nutrition Foundation, USA
4. Tufts University, Boston, USA

Abstract:
Background: A comprehensive nutrient composition database is key in nutritional epidemiology for assessing intakes of nutrients and for informing policies looking at improving nutrition. Unfortunately, the existing Ghanaian food composition tables lack information on some micronutrients, particularly amino acids and some vitamins.

Objective: To develop a nutrient database for analyzing Ghanaian foods for their macro and micronutrient compositions. Description: As part of a large clinical trial conducted in a peri-urban community in the Greater Accra Region, we developed this new database using field survey data, the USDA nutrient database for standard reference, and the Ghana Food Composition tables. For individual foods, the nutrient compositions were obtained from the USDA nutrient database matching the protein and energy content to foods in the existing Ghana Food composition tables. For composite foods, data were collected on the ingredients used in their preparation and their respective quantities. For each composite food, the nutrient composition of the raw ingredient was obtained from the USDA nutrient database. These nutrients were summed up (based on relative proportions of each component) to determine the total nutrient composition for each composite food. Total nutrient composition obtained for each food was compared to values in the Ghanaian food composition tables to ensure that the two sets of values were reasonably close, particularly for the macronutrients. Additional functions namely dietary diversity score, food variety score, contributions of animal and plant foods to total protein intake, and the contributions of different macronutrients to energy intake were incorporated into the database as measures of diet quality.

Conclusion: A comprehensive nutrient database of Ghanaian foods was developed which is vital tool for nutrition assessment of individuals and populations in Ghana.

Key words: Macronutrients, micronutrients, food composition, Ghana.

Categories: New Data for Foods and Food Components

Funding disclosure (if applicable): Ajinomoto Company

2:30-2:50 pm

Title: Food Composition Database for Bangladesh (FCDB)

Authors: Nazma Shaheen[1], Abu Torab MA Rahim[1], Md. Mohiduzzaman[1], Latiful Bari[2], SM Mizanur Rahman[3], Cadi Parvin Banu[1], Avonti Basak[1] and T Longvah[4]
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[4]National Institute of Nutrition, Hyderabad-500007, AP India

Abstract:
Objective: To develop updated and comprehensive FCDB in response to long-term change in food chain including emergence of high-yield variety (HYV) and limitations of current Food Composition Table lacking in reliable and valid compositional data for a considerable number of food items as well as nutritionally significant constituents.

Method: Primary compositional values for twenty key foods (KFs), prioritized on the basis of recent consumption-composition and consumption frequency (HIES, 2010), were generated using AOAC and FAO-recommended procedures. Secondary compositional data were collected from all relevant institutions and possible sources followed by a careful scrutiny for reliability, suitability and adequacy. Finally, all the data generated and collected were compiled using INFOOD compilation tool 1.2.1.

Results: Key foods for Bangladesh were identified and ranked using their composition-consumption frequency. A complete archival databank for foods, containing approximately 2575 entries, was constructed for the first time in Bangladesh. A comprehensive and updated FCDB was developed that provides primary analytical data for 20 prioritized key foods analyzed during last one year of research and secondary data on about 626 foods generated during the last three decades. Nutrients in the main table included proximate, SFA, MUFA, iron, calcium, sodium, potassium, zinc, magnesium, copper, vitamins C, B1, B2, B6, folate, niacin eq., vitamin A, retinol eq., ß-Carotene while other nutrients and bioactive compounds viz. fatty acids, amino acids, antinutrient factors (phytate and oxalate), bioactive compounds (phenol, DPPH), heavy metals, total sugar, free sugar etc in the annexes. FCDB also included information on the inedible portion of numerous indigenous foods thereby increasing its usefulness in evaluating the food consumption of Bangladeshi population.

Significance: FCDB provides detailed information on nutrient composition of local foods and will serve as a basic tool for achieving sustainable nutrition security through supporting the government of Bangladesh in improving food and dietary planning.

Key words: Key foods, composition-consumption frequency, compositional data, food composition database

Categories: Data generation, secondary data collection and compilation

Funding disclosure (if applicable): The technical support from National Food Policy Capacity Strengthening Programme (NFPCSP), Government of Peoples Republic of Bangladesh and Food and Agriculture Organization of the United Nations (FAO); Funded by EU and USAID

2:50-3:10 pm

Title: Is it Time to Revise Atwater Energy Values of Some Foods?

Authors: Edward Farnworth, PhD; Private Consultant, Ottawa, Canada; Karen Lapsley, PhD ; Almond Board of California, Modesto California

Abstract:
Background: Atwater determined energy values for various foods over 100 years ago with studies on a small number of human subjects. Atwater factors are still generally applied to individual foods and food ingredients to determine their caloric content by using compositional data – protein, fat, carbohydrate (by difference) and correcting for digestibility. The belief that for most applications the Atwater factors "are good enough" has hindered any major revision of energy values. While health experts are recommending greater consumption of plant-based foods, many of these foods may have overestimated caloric values. Improved knowledge on the effect of food structure on digestibility and compositional analyses, especially for carbohydrates, indicate that some energy values should be revised.

Objective: To demonstrate that there is enough new scientific data to support the revision of energy values for almonds and other plant foods.

Description: The accuracy of values for the digestibility of certain higher fiber cereals, nuts and legumes may be impacted by advances in composition analyses and human clinical trial design. For example, recent almond data question the traditional Atwater-based energy values. Microscopy analysis reveals that not all almond cell walls are broken during mastication, and not all lipid in the cells is available during digestion. A recent USDA clinical trial showed that the traditional digestibility value may be overestimated. Advanced fiber analyses of a variety of plant foods, such as oats and pulses, indicate that the energy contribution previously reported as total carbohydrate also needs to be revised.

Conclusion: It may be time to officially revise the energy values of some foods using new composition and digestibility data. Already, Health Canada has acknowledged that the energy factor for "carbohydrate" does not apply to dietary fibre, opening the way for the revision of many foods; a decision that should be copied elsewhere.

Key words: Atwater, energy value

Categories: Database Issues Involving Food Labeling and Front of Pack Labels; Industry and Other Initiatives Impacting Databases

Funding disclosure (if applicable): Funded by the Almond Board of California

3:10-3:30 pm

Title: Update of Selected Nutrients in U.S.-grown Peanuts

Authors: Ronald B. Pegg, PhD; Ronald R. Eitenmiller PhD; Eui-Cheol Shin; Department of Food Science & Technology, The University of Georgia

Abstract:
Objective: Determine the nutrient composition of present-day U.S.-grown peanuts and their commercially-relevant cultivars across two harvest years.

Methods: Proximate analyses of U.S. peanuts (n = 221), based on a well-designed sampling plan that provided cultivars representative of those in current production, were performed. Lipid extracts were further investigated for their fatty acids profile as well as contents of tocopherol isomers and phytosterols.

Results: The macronutrient content of U.S. peanuts had overall means of 5.55, 2.32, 23.7, and 47.5% for moisture, ash, crude protein, and total lipids, respectively. Variations in these levels were noted against type and cultivar. GC-FID revealed oleic/linoleic ratios to be 1.93±0.30, 5.25±1.1, and 16.9±5.2 for normal, mid-, and high-oleic peanut lipids, respectively. Vitamin E in normal, mid- and high-oleic peanuts was quantified by HPLC. No significant ($P > 0.05$) differences were noted in total tocopherol levels in normal (22.4 mg/100g), mid- (23.9 mg/100g), and high-oleic (22.4 mg/100g) Runner peanuts; however, α-T levels did vary significantly among the Runner cultivars classified by their oleic acid content (mid 11.7 mg/100g; normal 10.9 mg/100g; high 9.8 mg/100g). The phytosterols in U.S. peanuts were quantified by a newer methodology involving a combination of acid hydrolysis and alkaline saponification steps followed by GC-FID and GC-MS analysis of the TMS derivatives. Free and esterified phytosterols accounted for ~80% of the total sterols; the remainder was attributed to steryl glucosides. Total phytosterol contents were significantly higher than those reported in the literature because of the steryl glucosides.

Significance: The findings provide up-to-date nutrient contents of peanuts for inclusion into the USDA National Nutrient Database for Standard Reference. For example, the mean α-T level in Runner peanuts was 10.5±1.5 mg/100g, which is 26.7% greater than the imputed value for peanuts, all types (NBD No. 16087) provided by the Database, now making peanuts an excellent source of vitamin E.

Key words: Peanuts, nutrient profile, fatty acids, vitamin E, phytosterols

Categories: New Data for Foods and Food Components; Data Quality, Variability and Bioavailability

Funding disclosure (if applicable): Supported in part by a grant from the Georgia Food Processing Advisory Council (FoodPAC) of Georgia’s Traditional Industries Program for Food Processing.

3:45-4:05 pm

Title: Identification and Quantification of Food Flavonoids

Authors: Julia J Peterson PhD,[1] Johanna T Dwyer DSc,[1-2] Paul F Jacques PhD,[1-2] James A Harnly PhD[3]
[1]Friedman School of Nutrition Science and Policy, [2]Jean Mayer USDA Human Nutrition Research Center on Aging, Tufts University, Boston, MA, [3]Food Composition and Methods Development Laboratory, Beltsville Human Nutrition Research Center, Agricultural Research Service, USDA, Baltimore Avenue, Beltsville, MD

Abstract:
Background: To investigate the role that food flavonoid intake may play in prevention certain chronic diseases, it is critical to accurately identify and quantify individual flavonoids.

Objective: This presentation describes the principles, history and advances in current analytical methods for identifying and quantifying dietary flavonoids.

Description: Among the key chemical analytic developments is the better identification of flavonoids. Analytical methods for identifying flavonoids involve extraction, separation, and characterization (detection, identification). Extraction methods continue to change to reduce flavonoid loss from samples and to reduce the time and cost of extracting the compounds. Separation can be done with or without prior hydrolysis. If glycosides are not important to the analysis, hydrolysis is done to simplify the separation and quantification. High performance liquid chromatography remains the most robust separatory technique. Characterization involves both detection and identification with ultraviolet (UV) the most common initial detector. Retention time and spectra (UV, NMR, MS) are used to identify individual compounds. Remaining advances involve better quantification. Recent developments of interest include: 1) Availability of standards (although those are expensive). 2) Use of one standard compound to quantify several similar compounds (one anthocyanidin glycoside standard for several anthocyanidin glycosides). 3) Development of extractable chromatograms from certain MS systems that can quantify compounds. 4) UV molar relative response factors. The analytical idiosyncrasies of each flavonoid class will be discussed and practical examples will be described.

Conclusion: Databases are improving thanks to changes over time in flavonoid chemical analyses that have been applied to more foods, which has affected the completeness and precision of the databases, and thus their utility for studies of flavonoid intake and health.

Key words: Flavonoids, analysis, HPLC, quantification

Categories: Analytical methods

Funding disclosure (if applicable): None

4:05-4:25 pm

Title: Executing a collaborative nationwide study to update beef data in the USDA database, 2007 to 2013

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Abstract:
Background: A comprehensive beef research study was designed and conducted through collaboration between Nutrient Data Laboratory (NDL) and meat scientists at Colorado State University, Texas A & M University, and Texas Tech University, with support from National Cattlemen's Beef Association.

Objective: The objective was to develop a comprehensive research protocol for updating nutrient and composition data for retail beef cuts in USDA's National Nutrient Database for Standard Reference (SR).
Description: Sample collection and analyses were conducted in three phases, grouped by primal: chuck and brisket; rib and plate; loin and round. A statistical sampling plan was used to obtain 72 beef carcasses (per phase) with nationally representative quality grade, yield grade, gender and genetic type from packing plants in six US regions. Retail cuts were fabricated, cooked according to protocols, and dissected to obtain component weights for separable lean, fat, and waste. Nutrient values were determined by validated laboratories using approved methodology and quality assurance procedures.

Results: To date, full nutrient profiles for 32 retail cuts have been included in SR. This study introduced new omega-3 fatty acids, vitamin D3, and 25-hydroxy-vitamin D values for beef. Furthermore, new data for cooking yields were derived from these cuts. For example, the cooking yield for roasted rib eye (76%) was significantly lower ($p<0.0001$) than for grilled rib eye (85%), or for either chuck eye grilled (80%) or roasted (84%). A total of 45 beef items were included in USDA's new cooking yields table (http://www.ars.usda.gov/nutrientdata). Additionally, datasets for 19 retail beef cuts were released for vendor use in meeting new labeling regulations.

Conclusion: This research demonstrates the impact of multifaceted research protocols to provide up-to-date beef data in SR, databases linked to SR, and retail meat labels. New cooking yield data are valuable for developing nutrient estimates for foods. The retailer datasets help vendors meet labeling requirements.

Key words: Beef, nutrient data, composition

Categories: Data Quality, Variability, and Bioavailability; or Analytical Methods and Food Sampling

Funding disclosure (if applicable): Supported in part by a cooperative agreement with the National Cattlemen's Beef Association

4:25-4:45 pm

Title: Updating USDA's Key Foods List for NHANES 2009-2010

Authors: Haytowitz, David.B, Nutrient Data Laboratory, USDA/ARS

Abstract:
Background: The Nutrient Data Lab (NDL) has used the Key Foods approach to select and prioritize foods for nutrient analyses since the mid-1980s. This allows NDL to concentrate analytical resources on those foods that contribute significant amounts of nutrients of public health interest to the diet and is a major aim of the National Food and Nutrient Analysis Program (NFNAP).

Objective: The Key Foods list is updated every two years with each NHANES—What We Eat in America data release, in this case for 2009-10. Materials and Methods: The Key Foods approach uses food composition data from the USDA National Nutrient Database for Standard Reference (SR24, 2011) for 17 nutrients of public health significance as identified in the 2010 dietary guidelines, intake data from NHANES 2009-10, and the USDA Food and Nutrient Database for Dietary Studies (FNDDS 5.0, 2012) to connect food composition and food consumption data. For each food in SR reported as consumed, the nutrient content was multiplied by the grams consumed and then ranked by percent and divided into quartiles.

Results: The Key Foods list based on NHANES 2009-10 contains 574 food items, while that based on 2007-08 contains 538. There were 9 food items in the 1st quartile, 35 in the 2nd, 93 in the 3rd, and 437 in the 4th. Various milks comprise 4 of the items in the 1st quartile, due t vitamin D contribution, as well as many other nutrients. There were minor shifts in the number of foods in each quartile and the relative ranking of each food.

Significance: Nutrient values are continuously updated in SR and the FNDDS so periodic updates of the Key Foods list are essential. Key Foods, along with other inputs, provides NDL with essential tools to select and prioritize foods and nutrients for analysis and thereby supports current, representative data for researchers, policy makers, the food industry, and consumers.

Key words: Food Composition, Nutrients, Prioritization

Categories: Analytical Methods and Food Sampling

Funding disclosure (if applicable): USDA

4:45-5:05 pm

Title: Diet Quality of Americans in 2001-02 and 2007-08 as Measured by the Healthy Eating Index-2010 (HEI-2010)

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Abstract:
Objective: HEI-2010 scores were estimated for 2001-02 and 2007-08. The HEI-2010 measures compliance with the 2010 Dietary Guidelines. It has 12 components: Total Fruit; Whole Fruit (forms other than juice); Total Vegetables; Greens and Beans (dark green vegetables and beans and peas); Whole Grains; Dairy (all milk products and soy beverages); Total Protein Foods; Seafood and Plant Proteins; Fatty Acids (ratio of poly- and monounsaturated fat to saturated fat); Refined Grains; Sodium; and Empty Calories (calories from solid fats, added sugars, and alcohol beyond a moderate level). For most components, higher intakes result in higher scores; however, for Refined Grains, Sodium, and Empty Calories, lower intake levels result in higher scores because lower intakes are more desirable.

Methods: HEI-2010 scores were estimated using data from the National Health and Nutrition Examination Survey, 2001-02 (N=9,033) and 2007-08 (N=8,529). Intakes of energy, fatty acids, sodium, and alcohol were calculated using the Food and Nutrient Database for Dietary Studies. Food group intakes for 2001-02 were calculated using the MyPyramid Equivalents Database; for 2007-08 an addendum to that database was used. Average daily, long-term intakes were estimated using the population ratio method.

Results: In 2007-2008, HEI-2010 scores were below the maximum for all components, except Total Protein Foods. Scores for Whole Grains; Greens and Beans; Sodium; and Empty Calories were below 50% of their maximums. Scores for remaining components were also substantially below their maximums (57%-74%) in most cases. Between 2001-02 and 2007-08 scores declined significantly ($P<0.05$) for Sodium (from 51% to 43%), but improved for Whole Fruit (68% to 82%) and Empty Calories (43% to 49%). The total HEI-2010 score did not change significantly between 2001-02 (54%) and 2007-08 (55%).

Significance: The diet quality of Americans needs substantial improvement to ensure adequate nutrient intake and to reduce the risk of chronic diseases.

Key words: Dietary assessment, diet quality, Healthy Eating Index

Categories: Advances in Using Food Composition Data for Dietary Assessment

Funding disclosure (if applicable): N.A.