NUTRIENT DATASETS PRODUCED BY HNIS

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The Human Nutrition Information Service publishes Agriculture Handbook No. 8, "Composition of Foods," and other food composition tables. The data in these publications are also available on magnetic tape and, in some cases, on 5-1/4 inch diskettes. Data sets described are the USDA Nutrient Data Base for Standard Reference, Data Set 72-1, the USDA Nutrient Data Base for Individual Food Intake Surveys (Release 2), the Primary Nutrient Data Set for USDA Nationwide Food Consumption Surveys, the USDA Table of Nutrient Retention Factors, and the Recipe file for Release 2 of the USDA Nutrient Data Base for Individual Food Intake Surveys. Information is presented on number of foods included and nutrients covered in each data set, as well as other features of each data set.

IDENTIFYING FOODS CONSUMED AS INGREDIENTS OF MIXTURES

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Food intakes from food consumption surveys have traditionally included food mixtures in the food group of the main ingredient. For example, survey food items such as cheeseburgers have been classified in the meat, poultry, and fish group, and chicken noodle soup, in the grain group. Thus, non-meat foods such as cheese and bread from the cheeseburger have been represented in values of food intake provided by the meat, poultry, and fish group; similarly, non-grain foods such as chicken and vegetables have been represented in values for the grain group. A system under development to report intakes of food mixtures separated into ingredients has been tested using 1-day food intake records for women, 19 to 50 years of age, from the 1985 continuing survey of Food Intakes by Individuals (CSFII). This test also utilized two computerized recipe systems: one which generated the documentation of the ingredients of mixtures. Results showed that 38% of the weight of meat-based mixtures came from meat, poultry, or fish components, 26% from vegetables, and 13% from grains. Grain ingredients comprised 34% of the weight of grain-based mixtures; vegetables, 23%; milk and cheese, 12%; and meat, poultry, or fish, 9%.

MAINTENANCE OF THE U.S. DEPARTMENT OF AGRICULTURE FOOD CODES.

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The U.S. Department of Agriculture (USDA) Food Code for Individual Food Intake Surveys is used by the USDA for the Nationwide Food Consumption Surveys (NFCS) and the Continuing Survey of Food Intakes by Individuals (CFSII). It is also being used by the National Center for Health Statistics (NCHS) for the current National Health and Nutrition Examination Survey (NHANES), NHANES III. It includes complete food descriptions, common measures, and gram weights.

These Food Codes are maintained by USDA's Food Consumption Research Branch (FCRB) of the Human Nutrition Information Service (HNIS). Decisions regarding updates are made by an interdepartmental committee of staff from FCRB and representatives from NCHS.

When a food or quantity consumed by a survey respondent can not be coded with existing Food Codes information and is not covered by existing Coding Guidelines, a Request for Information (RFI) is forwarded to the committee. Each RFI is discussed by the committee, and a decision is made to 1) code with existing code(s) with no change or 2) to update the Food Codes and/or Coding Guidelines to accommodate the item. In addition to modifying the Food Codes in response to RFI's, the Food Codes are reviewed in detail prior to the start of new surveys.

Food Code updates typically involve the creation of a new code, the addition of an item to an existing code, or the addition of a common measure and corresponding gram weight. When an update involves gram weights, HNIS's Guidance and Education Research Branch provides this information. FCRB incorporates the updates into the Food Codes. Concurrently, HNIS's Nutrient Data Research Branch assigns nutrient values to new codes and incorporates them into the Nutrient Database.

INFLUENCE OF PHYSICAL TRAINING ON COPPER, IRON AND ZINC STATUS OF SWIMMERS.

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The nutritional status of 16 female and 13 male members of the University of North Dakota varsity swim team and 13 female and 15 male nontraining, age-matched controls was assessed before and at the end of a six month competitive season to determine the influence of physical training on copper, iron and zinc status. An analysis of seven-day dietary records of participants who consumed self-selected diets was calculated by GRAND nutrient database system. Mean daily energy, protein and carbohydrate intakes increased ($p < 0.05$) in the swimmers. Estimated intakes of copper, iron and zinc increased ($p < 0.05$) in the male swimmers and decreased ($p < 0.05$) in the male control subjects. Slight decreases in percent body fat in female swimmers (1.6%) and in male swimmers (1.9%) were observed. Fat free mass increased slightly in female swimmers (1.6 kg)and fat mass decreased (0.5 kg). No changes occurred in hematocrit or hemoglobin. Serum ferritin concentrations declined ($p < 0.05$) in the female controls over time and increased ($p < 0.05$) among male swimmers after training. Total iron-binding capacity decreased in female controls and swimmers, and male controls. Plasma copper, iron and zinc were within the ranges of normal and did not change. Erythrocyte superoxide dismutase, a copper and zinc containing enzyme, increased ($p < 0.01$) in the swimmers after training. In summary, our findings indicate that intensive swim training does not decrease copper, iron and zinc status of young adults when intakes are adequate and that an increase in erythrocyte superoxide dismutase activity is a functional adaptation to aerobic training.

AN AUTOMATED SYSTEM FOR DIETARY DATA QUERIES FOR CLINICAL TRIALS: THE MODIFICATION OF DIET IN RENAL DISEASE STUDY (MDRD)

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The MDRD Study is a multicenter clinical trial designed to determine whether restriction of dietary protein and phosphorous and/or reduction of blood pressure will reduce the rate of progression of chronic renal disease. The NCC is responsible for the research quality of processed dietary data and reports of actual nutrient intakes of study patients. Needed clarifications ("queries") of patients' dietary intakes are critical to this processing procedure. A unique automated system for capturing, communicating and reporting these queries has been developed for MDRD.

A key compound of this system is a "query" database. This database is linked to the dietary data entry system and allows direct entry of questions on required food detail and confirmation of unclear items (judgement calls). The "query" database archives data on the question type, the time and method for query transmittal, the dietary submitter, the NCC staff requesting the information, identifiers (Eg. food groups) for characterizing the questionable food item, and the text of the question and the query response.

Its time management feature tracks the status of queries. The computer searches daily for all new queries. It also locates any query not answered within the three day response period. These queries are then automatically sorted into a file to be sent via electronic mail. The system stores the query response date and the last date that a change was made for that item.

This automated system has provided important benefits to the MDRD Study: 1) General study reports and performance reporting to clinical centers can be tailored to target specific problem areas; and 2) It has also expedited data processing time, enabling timely release of patient reports.

IMPUTING AMINO ACID VALUES FOR INCORPORATION INTO A NUTRIENT DATABASE

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The nutrient database at the Nutrition Coordinating Center (NCC) was recently expanded to include data for eighteen amino acids. The primary data source for amino acid values was the USDA Database for Standard Reference, Release 6. USDA sources provided 54 percent of the amino acid values incorporated into the NCC nutrient database. When amino acid data could not be found in the USDA database, scientific journals were reviewed for analytical values. Other sources of information included manufacturers' data, other food tables and recipes or food formulas. When amino acid data were not available, values were imputed based on standardized procedures developed at the Nutrition Coordinating Center. Approximately 40 percent of the amino acid values in the NCC database were imputed by one of the following methods: 1) calculated from a different form of the same food, 2) calculated from a similar food having a similar protein source, 3) calculated from ingredient list or food formulary, 4) calculated from the major protein source in the food, or 5) assumed zero based on the type of food. The incorporation of the amino acid values into the database accommodates new and growing research interests and allows clinical studies to evaluate associations between amino acid intake and diseases related to amino acid metabolism.

USING COMPUTER ALGORITHMS TO ASSIGN FOOD EXCHANGES TO THE DAIRY GROUP IN THE USDA HANDBOOK NO. 8.

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The Food Exchanges have been a useful field tool for analyzing diets. The Exchanges were revised in 1987 to reflect current macronutrient content of foods found in food composition tables. The USDA Handbook No. 8 contains the nutrient content of almost 5000 foods. A CD-ROM software product containing the entire Handbook No. 8 was used as the database for this project. A series of algorithms were defined to have the computer search the CD-ROM database to exchange foods in the Dietary Group from Handbook No. 8 and assign the number of exchanges. The Dairy Group was chosen to test the algorithms because of its varied foods including milk, eggs, fruited yogurt, and cream. These foods would traditionally have been exchanged as milk, meat, fruit/milk, and fat respectively. Some basic assumptions had to be made in order to correctly exchange each food. A range of grams of protein, carbohydrate, and fat had to be defined to accommodate the specific amounts found in a food. Also, the calorie contribution by protein, carbohydrate, and fat had to match the total calorie content serving size of the food. Comparing the total calories to the number of exchanges served as a manual check on the accuracy of the exchange algorithm. Only whole or half exchanges were assigned because they can be dealt with realistically in a person's diet, but one quarter or one third exchanges cannot. The computer algorithms were generally successful in correctly assigning food exchanges to the Dairy Group. By renumbering the algorithms, the remaining USDA Food Groups will be exchanged.

A NATIONWIDE STUDY OF THE CHOLESTEROL, PROXIMATE, VITAMIN AND MINERAL LEVELS IN LARGE EGGS.

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A nationwide two-phase study of large eggs was conducted to determine mean levels of cholesterol, proximates, vitamins, and minerals. Eggs were collected at random from the top 118 U.S. egg handlers, representing approximately 60% of the retail egg market. During Phase 1 (July, 1988) 25 composites of egg yolks were prepared and analyzed for cholesterol, fat, and fatty acids. For vitamins and minerals, 12 composites of whole eggs were analyzed. In Phase II (February, 1989) 7 composites each of yolks and whites were prepared from eggs obtained from the same handlers as in Phase I. Cholesterol was extracted by direct saponification followed by quantification by gas chromatography. All analytical methods were validated and monitored by quality control materials throughout both phases of the study. Preliminary results indicate an average of 213 mg cholesterol/egg and contrasts with the previous value of 274 mg listed in USDA's Agriculture Handbook No. 8-1 (1976). The coefficient of variation for the composites for cholesterol was less than 5%, indicating low variability in the product. Values per egg for iron, (0.72 mg), folacin, (23 mg), and vitamin B 12 (0.50mg) were lower (20-50 %) than previous USDA data while riboflavin (0.25mg) and vitamin B 6 (0.07mg) were higher (23-63%) than data had indicated.