NUTRIENT COMPOSITION LABORATORY UPDATE

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INTRODUCTION

The staff of the Nutrient Composition Laboratory has several responsibilities. These include, (a) developing new and improved measurement systems for quantifying nutrients and other health related components in foods; (b) developing statistically sound sampling strategies for selecting foods in the United States for analysis, and (c) analysis of foods for selected nutrients and important components. The criteria for identifying those nutrients which require improvement of the measurement system and for those foods which should be sampled on a nationwide basis have been presented.(1) Briefly, nutrients or food components selected for the development of new or improved analytic methodology generally meet the following criteria (a) the nutrient is involved or implicated in a public health problem; (b) the measurement system for the nutrient is considered inadequate, and (c) analytic data for the nutrient are weak, contradictory or non-existent. Selection of a food for extensive (nationwide) sampling also should meet three criteria. These include, (a) the food is a major contributor of a nutrient(s) to the diet of Americans; (b) the measurement system for quantifying the nutrient(s) in a variety of foods is substantial or adequate, and (c) existing data for the nutrient(s) of concern is inadequate or non-existent. The evaluation and selection of nutrients and foods for methods development as well as for analysis is a continuous process and influenced by such factors as generation of new food composition information, changes in food production and processing practices and results from epidemiological studies which associate specific foods and/or nutrients with public health concerns.

Time and space does not permit a detailed elaboration of all of the activities of the Nutrient Composition Laboratory. However, selected activities that may be of interest to the nutrient data bank community at this time are outlined below.

ANALYTIC METHODS

Fiber. Analytic procedures for the measurement of dietary fiber in foods have undergone dramatic changes during the past five years. The generally accepted procedure in the United States for quantifying total dietary fiber was developed by Prosky and his colleagues (2) and has been approved as an official AOAC procedure.(3) Although this is a very useful and much needed procedure, it is long, has several enzyme digestion steps and the results are somewhat dependent on the technique of individual analysts. Li and Andrews have carefully evaluated this procedure and discovered that several steps could be removed, including an enzyme digestion step, without significant loss of accuracy or precision.(4) These modifications do not substantially shorten the technique, but the reduction in the number of steps reduces the probability of analyst error and permits other laboratory activities to be integrated with fiber analyses.

Dr. Li and her staff are currently developing techniques for quantifying the soluble and insoluble fractions of dietary fiber in foods. Although there are many components of food carbohydrates and fiber which require analytic attention, from a public health perspective, the soluble and insoluble fractions of fiber are receiving the most attention at this time. Moreover, there are substantial data from the analysis of foods using the neutral detergent fiber (NDF) method. It would appear that the NDF procedure approximates insoluble fiber in a number of food types; verification of this equality must await the analytic scrutiny of the

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FOOD SAMPLING AND NUTRIENT DATA

Selenium. Scientists at the Nutrient Composition Laboratory and the Nutrient Data Research Branch, HNIS are conducting a multi-phase collaborative project to improve information on the selenium content of foods. The published data on the selenium levels in foods have been carefully scrutinized, collated and presented in table format.(9) This survey demonstrated that several foods which contribute substantial selenium to the diet of Americans had inadequate analytic data. In addition, inadequate data were also available to assess the variability of selenium in foods across the United States. As a result, a vigorous program was begun to address these deficiencies.

Eighty-eight foods were sampled in three cities during 1985-1986, analyzed by scientists at the Vitamin and Mineral Nutrition Laboratory, USDA and the results used to validate existing data and develop additional sampling and analysis studies. Thus during 1986-1987, seventy foods were sampled in 3 to 5 cities and 4 foods (cottage cheese, eggs, white bread and beef steak) were sampled in 9 cities. These four foods contribute substantial selenium to the diet of Americans and were selected as representative foods to assess the variability ofselenium in the food supply. All of these foods have been analyzed by a commercial analytical laboratory and the data are being reviewed.

Currently, seventy additional foods are being sampled in 3 to 5 cities and six foods in 9 cities. Several additional foods, i.e., some with unique distributions and some from other analytical studies, will also be included in this sampling. These foods will also be analyzed by a commercial laboratory for selenium.

Data from these studies will be presented in the form of scientific papers, provisional tables and incorporated into the Handbook No. 8 series and the associated electronic media. A recent abstract has reported on the selenium content of several foods grown on ranches in a seleniferous area of South Dakota and compared it with data from foods purchased in stores in nearby cities.(10)

Copper. Analytic data on the copper content of over 200 foods have been carefully evaluated, collated and presented in table format.(11) These procedures were similar to those applied to selenium data (9) and also resulted in mean, minimum and maximum values as well as confidence codes for the data for each food. A research publication containing these data is being prepared for the Journal of Food Composition and Analysis.

Retail beef. Recent reduction in the amount of fat trim on beef cuts at the retail level has prompted a nationwide study. In an effort to reduce fat and increase beef sales, retail stores have begun to market beef cuts with less than the traditional one-half inch fat trim. This reduction of trim greatly affects the total fat content of beef cuts. As a result, a joint study between USDA, National Livestock and Meat Board, National Cattlemen's Association and Texas A&M University has been initiated. The study consists of surveying the fat trim grade and several other parameters of beef in stores in twelve cities. In addition, selected cuts will be shipped to Texas A&M University where they will be dissected and total fat measured chemically. Results from this study will be used to make appropriate modifications of data on the food consumption survey tapes as well as in Agriculture Handbook AH-8-13.

Eggs. The adverse health related publicity of cholesterol, and changes in production practices which may have lowered cholesterol levels of eggs has stimulated a collaborative study between USDA and several trade groups representing egg production (Egg Nutrition Center, American Egg Board, United Egg Producers). The study will focus primarily on the cholesterol and fat content of eggs as produced in the United States; vitamins and minerals will also be evaluated in selected samples. In an attempt to obtain representative sampling, eggs from the 200 largest egg packers in the United States will be composited into

about 25 samples and analyzed for specific nutrients. Data from these studies will be used to update handbooks and data tapes as soon as possible.

SUMMARY

The improvement of data on the nutrient content of foods is multi-faceted and dynamic. The development of new or improved analytic procedures, which occupies considerable efforts of the staff of the Nutrient Composition Laboratory, is only one facet. A second important activity is the analysis of foods using sound sampling strategies and reliable analytic methods. Due to the magnitude of this activity, the collaboration of the staffs of the Nutrient Data Research Branch, HNIS, several trade organizations and several universities has made it possible to quickly generate data on several public health related nutrients, and upgrade and maintain nutrient databases. Comments, suggestions and critiques from the nutrient database community are always welcome.

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