# COMMONALITIES AND DIFFERENCES
# ARE WE ALL SPEAKING THE SAME LANGUAGE?

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Each year this conference produces a new and longer listing of computerized nutrient data bases and systems. It is certainly not complete and perhaps never will be considering the fact that hardware of all kinds is very accessible; that software development has been greatly simplified; and that there is a burgeoning need for nutrition analysis in research, clinical applications, education, policy and program planning, and even the lay public. Nutrient data basic systems continue to proliferate in attempting to meet the needs. These activities are the basis for our common interests but we persist in speaking different languages as we separately pursue them.

Our contacts with users and developers of nutrient data base systems for a wide variety of applications have led to the production of a long list of knotty problems and questions. We, at Case Western Reserve University, attempt to deal with some; others we postpone in the hope that someone else will have a solution or answer sometime, perhaps at the next data bank conference. I would like to review some of them with you today. I do not have any solutions to propose, but bring them to you with the hope that together we can identify our commonalities and consider beginning to speak the same language.

## DOCUMENTATION OF COMPUTERIZED NUTRIENT ANALYSIS IN PUBLISHED RESEARCH

Comparisons between and among dietary intake research studies is highly desirable and indeed is frequently done. Valiant attempts are made to qualify the similarities and differences, however usually not enough information is available in the methods section or in the bibliography to allow sufficient evaluation of the nutrient data used.

To illustrate some of these problems, I have reviewed all of the research reports in which dietary intakes were analyzed using a computerized nutrient data base system and which were published in the American Journal of Clinical Nutrition and the Journal of the American Dietetic Association from January 1982 through June 1983. These journals were selected because they contain numerous dietary intake reports which, when compared with other reports scattered among other research journals, appear to be representative. Summarizing the information presented a real challenge. Forty-two articles were identified in which computer calculations were made for 1-27 nutrients. Five of these reported research which was conducted outside of the United States. Twenty of the analyses were made on unidentified systems apparently developed at the institution where the research was done. These authors indicated the sources of nutrient values but the citations are inconsistent and, in some cases, vague, e.g. "from the literature", "from industry", "plus added values", "Handbook 8 extension", "from research and industry". Twenty-two authors used nutrient data base systems which were developed elsewhere. In only two of these reports was the date of the edition or version of the system provided or referenced. Table I summarizes the variety of food composition sources mentioned or cited in the bibliographies.

Often several sources are mentioned with a single report. However for only a few reports would it be possible to construct a duplicate data base using the references provided. Primary sources for most are the various forms of USDA Handbook 8. Twenty-two indicated that they added data from other sources to USDA tables or to the identified system. Only three authors, using unidentified systems, indicated that they used a machine readable version of Handbook 8 or 456. They were referenced as "Handbook 8-1963 tape". "Handbook 456-1977 tape" and "Handbook 456-3, Release 2, 1980". Each release of a USDA tape has a unique identifying number and year of release which does facilitate documentation.

Table I. Summary of sources of nutrient data cited in dietary intake studies published in the American Journal of Clinical Nutrition, Journal of the American Dietetics Association, January 1982-June 1983.

| Sources mention or cited | Nutrient Data Base System: Unidentified n=20 | Identified n=22 |
|---|---|---|
| Bulletin 72 | 3 | 0 |
| Handbook 8, 1963 | 6 | 2 |
| Handbook 456 | 10 | 3 |
| Revised Handbook 8 | 5 | 0 |
| Bowes & Church | 5 | 1 |
| Literature | 6 | 5 |
| Industry | 4 | 2 |
| Laboratory analysis | 0 | 1 |
| Imputed | 1 | 0 |
| Other | 7 | 4 |
| None | 3 | 11* |

*Only two of these provided a date of the edition or version of the system.

A list of references will be supplied by the author on request.

For the other identified data base systems used, it might be expected that complete documentation of data sources would be provided by the developers. Thus this brief literature review illustrates that for purposes of comparability of dietary intake studies, identification of nutrient data sources is inconsistent at best and non-existent at worst. Editorial policies require scientific documentation for research methods and procedures but not for sources of nutrient information. Is it because nutrient data are unscientific or is it the absence of knowledge of the complexities of obtaining nutrient values for food?

## USDA FOOD COMPOSITION TABLES

Printed food composition tables are becoming more expensive, less accessible, and less complete. Handbook 8 revisions are still not being widely used, especially in clinical applications. The total cost of a set of the revised books to date is approximately $70; by the time all revisions are complete, a set may cost well over $250 and will be unwieldy to use. Practitioners are not acquiring them for their personal convenience; therefore, are continuing to use Handbook 456 or accessing or purchasing data acquired, compiled and computerized into analysis systems by others.

It must also be recognized that purchase of a USDA tape requires the development of software for accessing, summarizing and reporting nutrient analyses. The most desired and most requested information for clinical practice and research is in the largest data set, USDA Nutrient Data Base for Standard Reference. This data set cannot be accommodated on a microcomputer and requires programming to obtain an easily readable, printed output. In addition, this data set is the most complete compilation containing updated information for foods in sections which have not yet been revised. These data may never again be widely available in a printed form at a reasonable cost.

Our work with the USDA Standard Reference Tape revealed a number of interesting facts. Although the food composition group at USDA provides an explanation of what is on the tape, it does not provide complete information about how it differs from the previous releases. I received some surprises such as the presence of imputed values in many of the unrevised food groups. Nutrients published in the Provisional Tables produced between tape releases are generally not on the tape and a few nutrient values for food in unrevised food groups have been changed.

## INDUSTRY REPORTING OF FOOD COMPOSITION DATA

The food industry is generally quite cooperative in supplying nutrition information if it is available. However in trying to satisfy the diverse requirements of consumers' government regulations, dietitians and data bank developers, a variety of reporting formats appear. Consequently nutrient information may be received per portion, per 100 grams or per some other portion unit. Nutrient content may have been determined in the laboratory or calculated using unnamed versions of Handbook 8 or a combination of both and expressed as either absolute nutrient values or as per cent of U.S. RDA. As most data bases are constructed with nutrients per 100 grams, scaling of per portion values and translation of per cent U.S. RDA are then required. In addition to the opportunities for errors, we might question the practice of merging these data with the more precise values as expressed per 100 gram portion.

"Do you have brand name foods in your data base?" is one of the most frequently asked question of us. Yes we do, but it is not complete and completeness varies among the products. When we wish to examine dietary intake records comprised of both brand-name and conventional foods for a set of specific nutrients, do we fill in the missing values for the brand-name products? If so, what is the basis for the decision? Alternatively a conventional food or combination of foods with known nutrient values could be selected to replace the brand-name product. Again, how are the decisions made? These procedures also contribute to the problems of comparability between research studies.

Content of several nutrients and food components of current interest are defined and reported in a variety of ways. Among them are carbohydrates, starches, sugars, added sugars, refined sugars, dietary fiber, forms of Vitamin E activity and forms of Vitamin A activity. Members of the research community who design and review dietary intake studies define them their ways, the food industry reports them in a variety of ways and those of us who must reconcile them remain on the horns of many dilemmas. Again, we are speaking different languages.

## FOOD NAMES AND CODING

Naming and describing of foods in the American food supply is a dynamic process; it has become even more dynamic with the growing trend to compress data bases into even smaller spaces in computers. We can all agree that the better the description of the food item, the greater the validity of the nutrient calculations. This problem is a joint one between the data gatherer, or the menu or recipe writer and the nutrient analysis system. Because we cannot expect everyone involved to be food scientists or food technologists, we must recognize that there are many levels of qualification of attributes of food and use them with corresponding appropriate levels of quality of data entered into the system for computation. The variability of food coding decisions is one of the most important factors which interferes with comparability of analyses from different systems.

## NUTRIENT ANALYSIS OF RECIPES

An increasing use of nutrient data base systems is for analysis of recipes for the home, institutional food service or commercially prepared food service products. Standardized recipes for which all ingredients are precisely described, all procedures are controlled and for which all intermediate and final yields are determined will provide the most accurate calculated nutrient analysis. These conditions usually prevail for commercially produced products, much less frequently for institutional food production, and rarely in the home. We have found that nutrient calculations for some commercially prepared products have correlated very well with laboratory analysis. However, very close cooperation with the industry personnel was required to identify precisely all ingredients and yields. Of critical importance is the determination of cooked yields for the separate ingredients to obtain the best nutrient values for the finished product. USDA Handbook 102 is at present our best source of this information; however, it is far from complete.

## SPEAKING THE SAME LANGUAGE

A review of past data bank conference proceedings provides evidence that we are speaking the same language as we identify common concerns and issues. During my brief review of only a few concerns, I am sure that many of you have thought of others. The rate of growth of nutrient data base applications is far greater than the speed with which we are seeking resolutions. We have a good start; now we need to speed up the process.

References Cited
Table I

Jones, B.R., E. Barrett-Connor, M.H. Critique, and M.J. Holdbrook, 1982. A community study of calorie and nutrient intake in drinkers and non-drinkers of alcohol. Am. J. Clin. Nutrient. 35:135-139.

Farris, R.P., M.S. Hyg, G.C. Frank, L.S. Webber, S.R. Srinivasan and G.S. Berenson, 1982. Influence of milk source on serum lipids and lipoproteins during the first year of life, Bogalusa Heart Study. Am. J. Clin. Nutrient. 35:42-49.

Dwyer, J.T., W.H. Dietz, E.M. Andrews, and R.M. Suskind, 1982. Status of vegetarian children. Am. J. Clin. Nutrient. 35:204-216.

Kerr, G.R., E.S. Lee, M. Lam, R.J. Lorimor, E. Randall, R.N. Forthofer, M.D. Davis, and S.M. Magnetti, 1982. Relationships between dietary and biochemical measures of nutritional status in HANES I data. Am. J. Clin. Nutrient. 35:294-308.

Roaij, J.M.A. Van, M.B. Katan, C.E. West, and J.G.A.J. Hautvast, 1982. Influence of diets containing casein, soy isolate, and soy concentrate on serum cholesterol and lipoproteins in middle-aged volunteers. Am. J. Clin. Nutrient. 35:925-934.

Danford, D.E., J.C. Smith, and A.M. Huber, 1982. Pica and mineral status in the mentally retarded. Am. J. Clin. Nutrient. 35:958-967.

Freeland Graves, J.H., B.J. Friedman, W. Han, R.L. Shorey, and R. Young, 1982. Zinc supplementation on plasma high-density lipoprotein cholesterol and zinc. Am. J. Clin. Nutrient. 35:988-992.

Stein, E.A., J. Shapero, C. McNerney, C.J. Glueck, T. Tracy, and P. Gartside, 1982. Changes in plasma lipid and lipoprotein fractions after alteration in dietary cholesterol, polyunsaturated, saturated, and total fat in free-living normal and hypercholesterolemic children. Am. J. Clin. Nutrient. 35: 1375-1390.

Faust, H., 1982. Effects of drinking water and total sodium intake on blood pressure. Am. J. Clin. Nutrient. 35:1459-1467

Buzzard, M., M.R. McRoberts, D.L. Driscoll, and J. Bowering, 1982. Effect of dietary eggs and ascorbic acid on plasma lipid and lipoprotein cholesterol levels in healthy young men. Am. J. Clin. Nutrient. 36:94-105

Smith, M.P., J. Mendez, M. Druckenmiller, and P.M. Kris-Etherton, 1982. Exercise intensity, dietary intake, and high-density lipoprotein cholesterol in young female competitive swimmers. Am. J. Clin. Nutrient. 36:251-255.

Garry, P.J., J.S. Goodwin, W.C. Hunt, E.M. Hooper, and A.G. Leonard, 1982. Nutritional status in a healthy elderly population: dietary and supplemental intakes. Am. J. Clin. Nutrient. 36:319-331.

Posner, B.M., C.L. Borman, J.L. Morgan, W.S. Borden, and J. C. Ohls, 1982. The validity of a telephone-administered 24-hour dietary recall methodology. Am. J. Clin. Nutrient. 36:546-553.

McGee, D., G. Rhoads, J. Hankin, K. Yano, and J. Tillotson, 1982. Within-person variability of nutrient intake in a group of Hawaiian men of Japanese ancestry. Am. J. Clin. Nutrient. 36:657-663.

Jain, M.G., L. Harrison, G.R. Howe, and A.B. Miller, 1982. Evaluation of a self-administered dietary questionnaire for use in a cohort study. Am. J. Clin. Nutrient. 36:931-935.

Hak, L.J., M.S. Leffell, R.W. Lamanna, K.M. Teasley, C.H. Bazzarre, and W.D. Mattern, 1982. Reversal of skin test energy during maintenance hemodialysis by protein and calorie supplementation. Am. J. Clin. Nutrient. 36:1089-1092.

Picone, T.A., L.H. Allen, M.M. Schramm, and P.N. Olsen, 1982. Pregnancy outcome in North American women. 1. Effects of diet, cigarette smoking, and psychological stress on maternal weight gain. Am. J. Clin. Nutrient. 36:1205-1213.

Omdahl, J.L., P.J. Garry, L.A. Hunsaker, W.C. Hunt, and J.S. Goodwin, 1982. Nutritional status in a healthy elderly population: Vit. D. Am. J. Clin. Nutrient. 36:1225-1233.

Gibson, R.S., B.M. Anderson, and C.A. Scythes, 1983. Regional differences in hair zinc concentrations: a possible effect of water hardness. Am. J. Clin. Nutrient. 37:37-42.

Todd, K.S., M. Hudes, and D.H. Calloway, 1983. Food intake measurement: problems and approaches. Am. J. Clin. Nutrient. 37:139-146.

Baecke, J.A.H., W.A. Van Stoveren, and J. Burema, 1983. Food consumption, habitual physical activity and body fatness in young Dutch adults. Am. J. Clin. Nutrient. 37:278-286.

Kromhout, D., 1983. Changes in energy and macronutrients in 871 middle-aged men during 10 years of follow-up (the Zutphen Study). Am. J. Clin. Nutrient. 37:287-294.

Stuff, J.E., C. Garza, Smith E. O'Brian, B.L. Nicholas, and C.M. Montandon, 1983. A comparison of dietary methods in nutritional studies. Am. J. Clin. Nutrient. 37:300-306.

Hambidge, K.M., N.F. Krebs, M.A. Jacobs, A. Favier, Sci D. Pharm, L. Guyette, and D.N. Like, 1983. Zinc nutritional status during pregnancy: a longi-tudinal study. Am. J. Clin. Nutrient. 37:429-442.

Hunt, I.F., N.J. Murphy, A.E. Cleaver, B.Faraji, M.E. Swendseid, A.H. Coulson, V.A. Clark, N. Laine, C.A. Davis, and J.C. Smith Jr., 1983. Zinc supplementation during pregnancy: zinc concentration of serum and hair from low income women of Mexican descent. Am. J. Clin. Nutrient. 37:572-582.

Beaton, G.H., J. Milner, V. McGuire, T.E. Feather, and J.A. Little, 1983. Source of variance in 24-hour dietary recall data: implications for nutrition study design and interpretation. Carbohydrate sources, vitamins and minerals. Am. J. Clin. Nutrient. 37:986-995.

Dewey, K.G., 1983. Nutrition survey in Tabasco, Mexico: nutritional status of preschool children. Am. J. Clin. Nutrient. 37:1010-1019.

Yeung, D.L., J. Hall, M. Leuna, and M.D. Pennell, 1982. Sodium intakes of infants from 1 to 18 months of age. J. Am. Diet. Association. 80:242-244.

Van Staveren, W., J.G.A.J. Hautvast, M.B. Katan, M.A.J. Van Montfort, and H.G.C. Van O'osten-Van Der Goes, 1982. Dietary fiber consumption in an adult Dutch population. J. Am. Diet. Association. 80:324-330.

Johnson, C.C., M.H. Stone, A. Lopez-S., J.A. Hebert, L.T. Kilgore, and R.J. Byrd, 1982. Diet and exercise in middle-aged men. J. Am. Diet. Association. 81:695-701.

Salz, K.M., N.Z. Halgh, G.A. Chase, and P.O. Kwiterovich, 1982. Fat and cholesterol intakes of white adults in Columbia, Maryland. J. Am. Diet. Association. 81:541-546.

Lillian, L.J., A.M. Huber, and M.M. Rajala, 1982. Diet and ethanol intake during pregnancy. J. Am. Diet. Association. 81:252-257.

Sempos, C.T., N.E. Johnson, P.J. Elmer, J.K. Allington, and M.E. Matthews, 1982. A dietary survey of 14 Wisconsin nursing homes. J. Am. Diet. Association. 81:35-40.

Marshall, M.W., and J.T. Judd, 1982. Calculated vs. analyzed composition of four modified fat diets. J. Am. Diet. Association. 80:537-549.

Brown, E.K., E.A. Settle, and A.M. Van Rij, 1982. Food intake patterns of gastric bypass patients. J. Am. Diet. Association. 80:437-443.

Sawicki, M., and J. Endres, 1983. Energy and nutrient calculations using an Optical Character Reader System. J. Am. Diet. Association. 82:135-141.

Hutton, C.W., and R.B. Hayes-Davis, 1983. Assessment of the zinc nutritional status of selected elderly subjects. J. Am. Diet. Association. 82:148-153.

Domer, J.A., 1983. Nutrition in a private day care center. J. Am. Diet. Association. 82:290-293.

Carter, P., D. Carr, J. Van Eys, I. Ramirez, D. Coody, and G. Taylor, 1983. Energy and nutrient intake of children with cancer. J. Am. Diet. Association. 82:610-615.

Short, S.H., and W.R. Short, 1983. Four-year study of university athletes' dietary intake. J. Am. Diet. Association. 82:632-645.

O'Hanlon, P., M.B. Kohrs, E. Hilderbrand, and J. Nordstrom, 1983. Socioeconomic factors and dietary intake of elderly Missourians. J. Am. Diet. Association. 82:646-653.

Khan, M.A., 1983. Sodium intake from meals and snacks consumed by college students. J. Am. Diet. Association. 82:664-666.

# REPORT OF AN INTERNATIONAL MEETING: INFOODS INTERNATIONAL NETWORK OF FOOD DATA SYSTEMS

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Five months ago, during January 30 to February 5, 1983, a significant international planning conference was conducted to discuss the need for and development of a world-wide food data networking organization, to be called INFOODS, for International Network of Food Data Systems. The conference, which was held at the Rockefeller Conference and Study Center in Bellagio, Italy included participants from government, industry, academia and nutrition, health and agricultural institutes in a number of countries in North and South America and western Europe. Co-chairmen of the meeting were R. Gaurth Hansen, Utah State University and Vernon R. Young, Massachusetts Institute of Technology.

The immediate objectives of the INFOODS planning conference were to explore and develop relevant topic areas and to define needs and strategies leading to the establishment of a standardized, high-quality, readily accessible food data bank systems network. In order to meet this challenge, a series of pre-determined, but not necessarily inclusive, issues were raised for consideration. Among the issues addressed was the need for world-wide information on the chemical composition of foods and the desirability and feasibility of meeting this need on an international level. Also discussed were the difficult problems that must be faced in generation of quality food composition information; the development of a structure for standardizing data entries, records and files; and a method of systemitizing them in a way which will facilitate the user without exceeding the limits of current technology.

## USER NEEDS

Food composition data are of value to many public and private agencies and individuals, including governments, food industries, research and educational institutions, physicians, dietitians, and increasingly, at least in the United States, the food-consuming public. The needs of these different users with respect to both data base content and form are necessarily varied.

A few of the uses identified by conference participants include:

- Performing nutritional assessments, diet evaluation and planning for normal populations and those with special needs
- Developing dietary standards of reasonable and adequate nutrient intake
- Identifying food and nutrient consumption patterns of population groups, evaluating the adequacy of consumption and trends over time
- Identifying relationships between food and nutrient consumption practices and the incidence of degenerative diseases such as heart disease and cancer