

*Symposium on Recent Advances in the
Appraisal of the Nutrient Intake and
the Nutritional Status of Man*

Significance of the Appraisal of the Nutrient
Intake and the Nutritional Status of Man

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IT IS a privilege for the new Department of Nutrition, Food Science and Technology to join with The National Vitamin Foundation in sponsoring this Symposium on Recent Advances in the Appraisal of the Nutrient Intake and the Nutritional Status of Man. Because the people of the technically developed countries of the world are becoming increasingly aware of the magnitude of the nutrition problems of less fortunate peoples, the methods for evaluating nutritional status are receiving more attention than ever before. These methods are necessary in order to define human nutrition problems and to guide practical efforts toward

their solution. An increasing interest in these methods has also resulted from the growing recognition of a relationship between dietary intake and some types of degenerative disease. Therefore, this conference is being held at a time when the importance of being able to evaluate accurately the nutritional status of population groups is better appreciated than ever before.

There have, of course, been a number of conferences on this subject held in the United States in recent years. The meeting sponsored by the Quartermaster Corps in Chicago in 1954¹ was very helpful in defining the methods then in use, and particularly in summarizing the technics for the biochemical evaluation of nutritional status. At the 1959 Federation Meetings a half-day symposium placed primary emphasis on the experiences of the survey teams sent out to various countries by the Interdepartmental Committee on Nutrition for National Defense (ICNND). At the Fifth International Congress on Nutrition held in Washington the following year, nutri-

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tion surveys were again the subject of a symposium in which persons from seven countries participated.²

While these latter two conferences explored some of the controversial aspects of such surveys and suggested a number of useful procedures, not enough time was available for either a definitive review of the status of present methods or a detailed discussion of the significance of research developments. By planning a two-day conference with a half-day to consider each of the four main aspects of the problem and by emphasizing present status and future developments, we have tried to ensure that this conference will contribute to the improvement of evaluation procedures for dietary habits and nutritional status.

The World Health Organization (WHO) is convening an Expert Committee on this subject in August of this year; it is particularly hoped that the discussions of this conference will provide valuable background material which will help the members of the committee in the preparation of their subsequent report. It is expected that both the present report and that of the WHO Expert Committee will receive wide distribution.

Several factors have guided the organization of this conference and should receive due consideration in the discussions.

First, there is an obvious need for several different types of dietary data, depending upon the intended use. For some purposes an appraisal of the family will suffice; for others, individual family members such as preschool children or adolescents must be singled out for special attention. For still others, the individual alone may be studied without reference to a family unit. Therefore, the first session will deal with the problems of measuring food habits for a variety of different purposes.

Second, sufficient consideration is not always given to the fact that accurate calculation of nutrient intake from data on food intake involves more than the routine application of values from existing food composition tables. Present knowledge of the nutritive value of most foods is based on a relatively small number of analyses; and even when large numbers of samples have been analyzed, the variation in

results is such that it is difficult to determine which values apply in a given instance. Furthermore, studies of the effects of processing on nutritive value are even more limited in scope and number, and there is such a great variety in both home and commercial processing procedures that, here again, it is almost impossible to know which values apply in a given instance. We are also learning that there are many natural substances in foods which interfere with utilization of nutrients. Finally, the importance of nutrient imbalances, best exemplified by the loss of protein efficiency by amino acid imbalance, is just beginning to be recognized. In the second session the factors which affect the interpretation of stated nutrient content of foods will be considered and obviously the best available means of arriving at accurate nutrient intakes will emerge from the discussions.

Third, accurate knowledge of actual nutrient intakes is not synonymous with evaluation of the nutritional status of either the individuals or the population surveyed. All of us have been guilty at times of implying that an individual receiving a certain level of a nutrient was, as a consequence, in a physiologically deficient state or conversely, that the level assured that he was adequately supplied. Such a conclusion is justified only when intakes are extremely high or low. For intermediate ranges the so-called host factors determine whether or not a given nutrient intake will be adequate for an individual. These factors include genetic variability, age, sex and activity, as well as physiologic states such as growth, maturation, pregnancy and lactation, plus such pathologic states as infection, trauma and neoplastic disease. For example, an intake of protein which is adequate for a healthy individual may be completely inadequate for a person under the stress of a severe burn.

As balance experiments have occasionally revealed, even psychological stress may suddenly render inadequate what was previously an adequate intake of a nutrient. Ohlson³ described a woman in whom nitrogen equilibrium was maintained on 1 gm. of protein per kilo per day for many months. Upon being informed that her son had been wounded in Korea, her nitrogen balance suddenly became



strongly negative. This occurred even though there was no change in her protein intake and no outward indication of how seriously disturbed she was by the news. Once she received news that her son was safe, her nitrogen balance became strongly positive for a few days and gradually returned to equilibrium. Extraordinarily enough, the episode was repeated in almost identical form some months later.

Another example of psychological stress affecting nutrient balance has been reported from Norway.⁴ In a young man who had been in calcium balance for many weeks a progressively negative calcium balance began to develop a few weeks before the preliminary examination for his PH.D. degree. Once the examination was successfully passed, balance became strongly positive before returning essentially to zero.

Low intakes of a nutrient may produce no deficiency signs if other nutrients are limiting enough to inhibit growth. In vitamin B-complex deficiency states, the administration of a single one of the deficient vitamins may result in the appearance of clinical signs of deficiency of one of the others.^{5,6} The administration of skim milk as a source of protein to children who are severely deficient in both protein and vitamin A may precipitate ocular signs of acute vitamin A deficiency.

Fourth, many more examples could be cited to emphasize the fact that surveys of dietary habits and calculations of nutrient intake, although useful, are not a substitute for direct evaluation of nutritional status. The second day of our two-day symposium will be devoted entirely to the problem of how to evaluate nutritional status.

From a practical point of view, there are three principal approaches to this problem: clinical examinations, anthropometric measurements and biochemical studies. Each of these has its uses and its serious limitations, and no one should be employed to the exclusion of the others. Since rapid progress is now being made in the development and evaluation of biochemical procedures, a full half-day will be devoted to this topic which is one of the most interesting and important aspects of the conference.

Fifth, it should be repeatedly emphasized in the discussions that even the best methods can produce useless and even misleading results if the sample is not well chosen. For example, a dietary survey carried out on the basis of the family unit may be reasonably accurate for other members of the family, but fail to reveal a gross deficiency in the diet given to a preschool child. A nutrition survey carried out in a school or an army group is likely to miss the cases of malnutrition excluded by the nature of the study group. Even when large numbers of individuals are rounded up for examination, the seriously malnourished are likely to be left at home. For the determination of the prevalence of severe malnutrition in most areas, there is probably no substitute for a house-to-house canvass. Certainly studying the population of hospitals or outpatient clinics results in a grossly biased sample.

Sixth, another point should be emphasized throughout the conference—the danger of inaccurate or unjustified use of survey results. Even supposedly well informed and highly trained people frequently misuse survey results. Because an individual's intake does not match that of the recommended daily allowance, it is sometimes concluded that he is deficient in a given nutrient when the correct conclusion is only that a certain proportion of people would be found deficient. Repeatedly, it should be stressed that recommended daily allowances are intended to cover the needs of nearly all the population and are not a reliable indication of the requirements of a given individual. From both a physiologic and statistical point of view, if recommended dietary allowances are correctly determined, few individuals in the population need intakes as high as those specified. Thus, even population groups with average intakes well below the recommended allowances may contain few individuals who are actually deficient in a certain nutrient.

The misinterpretation of results applicable only to assessing the status of populations extends to those from all of the methods for the direct evaluation of nutritional status in man. Whether referring to clinical, anthropometric or biochemical procedures, such an error must be avoided in the discussions.



We must also beware of reasoning which assumes that because a given sign is *sometimes* due to a given cause, it must *always* be due to that same cause. It is absurd to attribute follicular hyperkeratosis in children to vitamin A deficiency in a population group in which it has already been demonstrated that prolonged administration of vitamin A with or without fat fails to alter the lesion. The lack of specificity and the multiple causation of most of the so-called clinical signs of nutritional deficiency is a major limitation to the usefulness of clinical examinations in the appraisal of nutritional status.

There are, of course, many additional pitfalls to the appraisal of nutrient intake and the evaluation of nutritional status of man. This conference will strive for an honest and realistic appraisal of the methods now available for the evaluation of dietary habits, nutrient intake and nutritional status of man. We are interested in the lessons to be learned from past experience, and not in annotated suggestions as to how to keep on making surveys in the same way. The discussions should indicate what is promising for the future, even if much testing is still required. We must not hesitate to discard those methods of the past which have proved faulty or of limited value. It is hoped

that this symposium will fully justify the widespread interest which it has aroused. Improved dietary and nutrition survey procedures should lead to a more efficient relief of the world's nutrition problem and to a better utilization of the world's food supply.

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