Abstract

J Int Acad Prev Med 1984;8:81-97

Development of lymphocyte culture methods for assessment of the nutritional and metabolic status of individuals.

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BACKGROUND: The quantitative microbial assay techniques which Roger J. Williams developed and used in the discovery of pantothenic acid contributed not only to the isolation of many other growth factors but allowed the rapid subsequent development of biochemical genetics and intermediary metabolism. During this early period, nutritional factors were associated with diseases such as pellagra and pernicious anemia. The ease of clinical diagnosis, confirmed by laboratory tests, for many of these diseases resulted in rapid incorporation of nutritional treatment of these diseases into medical practice.

OBJECTIVE: More than 30 years ago, Professor Williams began accumulating data concerning biochemical individuality and offered evidence for a broader link between nutrition and disease, behavior, performance and well-being of humankind. Considerable evidence has since accumulated for this concept. However, the incorporation of a broad base of nutritional therapy into medical practice has not been accomplished largely because methods of assessment of individual nutritional status are lacking. A number of approaches such as determination of blood and urine levels of nutrients, determination of the degree of saturation of an enzyme with a coenzyme derived from a vitamin as a measure of the nutritional adequacy of the vitamin, and hair analyses for minerals have been used by comparing the individual analysis with a range of normal values. These methods do not actually determine the nutritional requirements of an individual, particularly the quantitative requirements, which are known to vary significantly from one individual to another.

FINDINGS: The lack of general clinical test suitable for assessing individual nutritional status has limited most medical practice to a “well-balanced” diet and occasional vitamin supplementation. The demonstration of abnormally high requirements for particular vitamins in diseases characterized as vitamin-dependent diseases, such as vitamin B6 responsive homocytinuria, has greatly increased the use of large amounts of nutrients in attempts to treat various disorders. This meganutrient approach has received considerable criticism because of limited experimental evidence concerning possible long term adverse effects and also the lack of convincing evidence for a beneficial effect upon disease states.

CONCLUSION: In the belief that optimization of nutrition for each individual would have a very significant impact on human health and productivity, we initiated a program to attempt to develop a method by which the limiting nutritional and biochemical factors of an individual could be identified.