

the linoleic and arachidonic acid contents of low-density lipoprotein (8). Only recently has long-term, oral β -carotene supplementation proved to be successful in these patients with extremely low plasma β -carotene concentrations being reversed to values of age-matched control subjects (9). Furthermore, there is preliminary evidence that improvement of antioxidant status might ameliorate pulmonary inflammation (10). We therefore fully agree with Portal et al (1) that efficient antioxidant supplementation benefits CF patients.

Brigitte M Winklhofer-Roob

Division of GI and Nutrition
Department of Pediatrics
University of Zurich
Steinwiesstrasse 75
CH-8032 Zurich, Switzerland

REFERENCES

1. Portal BC, Richard M-J, Faure HS, Hadjian AJ, Favier AE. Altered antioxidant status and increased lipid peroxidation in children with cystic fibrosis. *Am J Clin Nutr* 1995;61:843-7.
2. Winklhofer-Roob BM, Shmerling DH, Schimek MG, Tuchschnid PE. Short-term changes in erythrocyte α -tocopherol content of vitamin E-deficient patients with cystic fibrosis. *Am J Clin Nutr* 1992;55:100-3.
3. Winklhofer-Roob BM. Oxygen free radicals and antioxidants in cystic fibrosis: the concept of an oxidant-antioxidant imbalance. *Acta Paediatr* 1994;395(suppl):49-57.
4. Brown RK, Kelly FJ. Evidence for increased oxidative damage in patients with cystic fibrosis. *Pediatr Res* 1994;36:487-93.
5. Brown RK, McBurney A, Lunec J, Kelly FJ. Oxidative damage to DNA in patients with cystic fibrosis. *Free Radic Biol Med* 1995;18:801-6.
6. Lepage G, Ronco N, Champagne J, Lamarre A, Roy CC. Beta-carotene inhibits lipid peroxidation and improves peroxisomal function in cystic fibrosis (CF). *FASEB J* 1993;7:A39(abstr).
7. Winklhofer-Roob BM, Puhl H, Khoschsorur G, Van't Hof MA, Esterbauer H, Shmerling DH. Enhanced resistance to oxidation of low density lipoproteins and decreased lipid peroxide formation during β -carotene supplementation in cystic fibrosis. *Free Radic Biol Med* 1995;18:849-59.
8. Winklhofer-Roob BM, Ziouzenkova O, Puhl H, et al. Impaired resistance to oxidation of low density lipoprotein in cystic fibrosis: Improvement during vitamin E supplementation. *Free Radic Biol Med* 1995;19:725-33.
9. Winklhofer-Roob BM, Van't Hof MA, Shmerling DH. Response to oral β -carotene supplementation in patients with cystic fibrosis: a 16-month follow-up study. *Acta Paediatr* 1995;84:1132-6.
10. Winklhofer-Roob BM, Schlegel-Haueter SE, Khoschsorur G, Suter S, Shmerling DH. Serum neutrophil elastase/ α_1 -antitrypsin complexes and lipid peroxides decrease during improvement of vitamin E and β -carotene status in cystic fibrosis. *FASEB J* 1995;9:A854(abstr).

Standardization of nutritional-status terminology

Dear Sir:

The fact that Kretsch et al (1) had to explain their use of the term requirement exemplifies the need for the nutrition com-

munity to develop a standardized system for discussing nutritional status. Kretsch et al stated, "Normalization or restoration of biochemical markers to their original baseline values (MPI) was the approach used to determine the vitamin B-6 requirement for young women in this study." During the baseline period "A normal American-type menu was provided ad libitum for the first 4 d of this period followed by 3 d of a formula diet supplemented with 2.0 mg pyridoxine \cdot HCl." It is not clear whether the baseline values were based on samples collected at the beginning or end of this period. Samples collected at the end would obviously be biased toward a 2-mg intake. Regardless of when the baseline values were established, restoration of values to the baseline would indicate primarily the vitamin B-6 intake needed to equal the typical American intake. Although there is no doubt that this can be very useful information for determining whether the vitamin B-6 intake of a given individual is less than average, is the assumption that the average dietary intake equals the requirement warranted?

A second common approach to assessing nutrient status is cofactor saturation. In reviewing the problems of establishing nutrient requirements, Baker (2) stated, "With B-vitamins attempts to determine requirements using activity of a key enzyme of which the vitamin is a component or cofactor have generally met with failure." In discussing the recent interest in carnitine, Kelley (3) states, "Often, clinical benefits are inferred from biochemical data and plausible, but unproven, arguments that an observed biochemical effect of carnitine should be clinically beneficial." A similar situation exists with vitamin B-6. In the current example, there is no doubt that aminotransferase assays and tryptophan-load tests provide information about the degree of cofactor saturation of various enzymes. However, I am not aware of any data defining the saturation point that is associated with clinical problems. Electroencephalographic abnormalities are one of the first clinical signs of vitamin B-6 deficiency. These abnormalities were corrected with vitamin B-6 intakes of 0.5 mg/d (4), which is much less than the requirement suggested in the current report. Because the recent association between folate supplementation and neural tube defects (5) demonstrates that some systems are very sensitive to small changes in nutrient intake, it may be prudent to assume that any decrease in saturation is deleterious until more complete information is available. However, recommendations based on such reasoning should note that they are just initial estimates and that more complete studies are pending. Rush (5) notes that current folate studies do not define the minimum supplement needed to prevent neural tube defects because these studies used similar supplements.

None of these comments question the validity of the data or conclusions presented in the report by Kretsch et al (1). In fact, the authors are to be commended for recognizing the necessity of specifying their definition of requirement. However, it is a good example of the need to refine the terminology used in discussing nutrient requirements. Should "requirement" be defined as the average daily intake, the intake required to prevent significant clinical symptoms, or perhaps the amount required for optimum longterm health? The concept of minimal compared with optimal intake in livestock has been discussed (6). The recommended dietary allowances (RDAs) are confusing because most lay people are not aware of the distinction between RDAs and physiologic requirements. Because all of these approaches may be useful, it might be appropriate to

develop some terminology to distinguish between these approaches for assessing nutrient status. One possibility might be to define terms such as the following:

- 1) Minimal requirement—The intake needed to prevent development of overt clinical symptoms (eg, reduced growth, neurologic changes, impaired reproduction) within a few weeks. Biochemical changes alone without eventual development of clinical symptoms would not be used to define the minimal requirement.
- 2) Normal intake—The amount in the diet of the average healthy population.
- 3) Optimal intake—The amount needed for optimal long-term health and longevity, which for some nutrients, such as vitamins C and E, has been proposed to be greater than the normal intake.

In view of the increasing ability to monitor a wide variety of biochemical indexes, perhaps we need a term such as "biochemical requirement" for information such as enzyme saturation data which has not yet been clearly related to physiologic changes. Definitions for the RDA and other situations could be added. Even if such terms were adopted, there might have to be different values for different age groups and physiologic conditions such as pregnancy. However, standardizing the terminology would facilitate more accurate communication and comparisons between reports. Each manuscript should not have to define these basic terms. The increasing use of health claims in food advertising accentuates the need for precise communication in the scientific literature. I was recently contacted by two lay publications that are developing articles on recent developments in nutrition. A brochure advertising the Nutra-Con94 conference sponsored by Global Business Research (New York) stated, "Forget your Recommended Daily Allowance! Recent scientific breakthroughs have nearly conclusively linked the prevention of certain diseases with megadoses of a few ordinary vitamins, minerals and fibers!" Ambiguities in the terms used to assess nutritional status in the scientific literature foster such statements. Because work on the next revision of the RDAs is now starting, this would seem to be a particularly opportune time to consider improving our terminology.

Stephen P Coburn

Fort Wayne State Development Center
Division of Disability, Aging, and Rehabilitative Services
4900 St Joe Road
Fort Wayne, IN 46835-3299

REFERENCES

1. Kretsch MJ, Sauberlich HE, Skala JH, Johnson HL. Vitamin B-6 requirement and status assessment: young women fed a depletion diet followed by a plant- or animal-protein diet with graded amounts of vitamin B-6. *Am J Clin Nutr* 1995;61:1091-1101.
2. Baker DH. Problems and pitfalls in animal experiments designed to establish dietary requirements for essential nutrients. *J Nutr* 1986;116:2339-49.
3. Kelley RI. The role of carnitine supplementation in valproic acid therapy. *Pediatrics* 1994;93:891-2.
4. Kretsch MJ, Sauberlich HE, Newbrun E. Electroencephalographic

- changes and periodontal status during short-term vitamin-B-6 depletion of young, nonpregnant women. *Am J Clin Nutr* 1991;53:1266-74.
5. Rush D. Periconceptional folate and neural tube defect. *Am J Clin Nutr* 1994;59(suppl):511S-6S.
6. Roth-Maier DA, Kirchgessner M. Selected problems of B vitamins in animal nutrition. *Livestock Prod Sci* 1977;4:177-89.

Reply to SP Coburn

Dear Sir:

This letter is in response to the query raised by Coburn concerning the timing of the baseline urine and blood collections reported in our recent publication (1). Whereas blood was collected at the beginning and end of the baseline period, only data from the period's end were reported. Urine was collected only at the end of the baseline period. Thus, the women were provided with 2.0 mg pyridoxine · HCl/d for 2 d before collection of the 24-h urine samples and for 3 d before collection of the blood samples. It is unlikely that this short duration of supplementation would have substantially altered the subjects' vitamin B-6 biochemical status, thus biasing the results toward the 2.0-mg/d intake.

Although we certainly share Coburn's concern about the need for standardized nutritional status terminology, we also recognize the practical difficulty in defining terminology that could apply to all nutrients. Two recent publications have addressed these issues (2, 3). However, because revision of the recommended dietary allowances is now beginning, it is certainly fitting that scientists should convey their thoughts on this issue to the Food and Nutrition Board.

Mary J Kretsch

USDA, ARS, Western Human Nutrition Research Center
PO Box 29997
Presidio of San Francisco, CA 94129

Howerde E Sauberlich

Department of Nutrition Sciences
University of Alabama at Birmingham
Birmingham, AL 35294

REFERENCES

1. Kretsch MJ, Sauberlich HE, Skala JH, Johnson HL. Vitamin B-6 requirement and status assessment: young women fed a depletion diet followed by a plant- or animal-protein diet with graded amounts of vitamin B-6. *Am J Clin Nutr* 1995;61:1091-101.
2. Food and Nutrition Board, Institute of Medicine, National Academy of Sciences. How should the recommended dietary allowances be revised? Washington, DC: National Academy Press, 1994.
3. Cook College, Office of Continuing Professional Education. Proceedings of a workshop on future recommended dietary allowances. New Brunswick, NJ: Rutgers University, 1993.