Battling Quackery

Attitudes About Micronutrient Supplements in American Academic Medicine

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THROUGHOUT THE 20th century American academic medicine has resisted the concept that supplementation with micronutrients might have health benefits. This resistance is evident in several ways: (1) by the uncritical acceptance of news of toxicity, such as the belief that vitamin C supplements cause kidney stones; (2) by the angry, scornful tone used in discussions of micronutrient supplementation in the leading textbooks of medicine; and (3) by ignoring evidence for possible efficacy of a micronutrient supplement, such as the use of vitamin E for intermittent claudication.

Part of the resistance stems from the fact that the potential benefits of micronutrients were advanced by outsiders, who took their message directly to the public, and part from the fact that the concept of a deficiency disease did not fit in well with prevailing biomedical paradigms, particularly the germ theory. Similar factors might be expected to color the response of academic medicine to any alternative treatment.

In *The Crime of Galileo,* historian Giorgio de Santillana[1] presents a revisionist view of the great scientist's struggle with the Catholic church. According to de Santillana, Galileo's crime was not his propounding a heliocentric universe; it was that he wrote in Italian; he communicated his revolutionary ideas about astronomy directly to the public. Previous scientists wrote in Latin, limiting their audience to other scholars. Within this small community, controversial ideas could be entertained. Copernicus' proposal of a heliocentric universe 70 years before Galileo's treatises had elicited no attempts at suppression by the church. The 17th-century church represented the intellectual establishment, and Galileo's persecutors included some of the finest minds of his time. Galileo was punished not for writing heresy, not for threatening paradigms, but for bypassing the intellectual establishment and taking his exciting ideas directly to the people. The establishment, threatened not so much by his ideas as by his methods, did what it could to destroy his credibility.

In addition, Galileo did not respect professional boundaries. He was a mathematician, and yet his writings dealt with phenomena considered within the purview of philosophers, a profession of considerably higher status than mathematics.[2] Thus, he was considered a usurper as well as a popularizer. In what follows we argue that the reaction of academic medicine to the concept of micronutrient supplementation can best be understood in light of the foregoing description of Galileo. Our thesis is that throughout much of the 20th century, American academic medicine was resistant to the concept that micronutrient supplementation might prove beneficial, and that the cause of this resistance was similar to that which faced Galileo. This resistance is evident in several ways: (1) by uncritical acceptance of bad news about micronutrient supplements; reports of toxic effects were rarely questioned and widely quoted; (2) by the scornful, dismissive tone of the discussions about micronutrient supplementation in textbooks of medicine, a tone avoided in most medical controversies; and (3) by the skeptical reaction greeting any claim of efficacy of a micronutrient, relative to other therapies; indeed, most claims were simply ignored.

Note that in each of the areas mentioned above we examine the reaction to micronutrients relative to other therapies. It is not proof of bias to be concerned about toxicity or to be skeptical of claims of efficacy. Bias occurs when concern and skepticism are applied selectively. Also note that we are not proposing to prove that any particular micronutrient supplement is indeed efficacious. Some readers of earlier drafts of this article have concluded that we are apologists for megavitamins. We are not. Rather, the vitamin controversy is one of a series of examples we have used to discuss the forces that influence medical practice other than those stemming directly from scientific discovery.[3-7]

Herein we rely on the multiple editions of 2 major American medical textbooks: A *Textbook of Medicine*[8] and *Principles of Internal Medicine*.[9] Each has been published in 12 different editions between 1950 and 1992. They can be presumed to represent established opinions and can be used to sample how medical opinion changes over time.[3]

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UNCRITICAL ACCEPTANCE OF NEWS OE TOXICITY: THE EXAMPLE OF HIGH-DOSE VITAMIN C

To illustrate the uncritical acceptance of bad news, we focus on the discussion of one particular toxic effect—kidney stones resulting from megadose vitamin C.

It is well known that high-dose ascorbate ingestion can cause kidney stones.[10-13] In a casual survey of 20 of our physician colleagues, all were aware of the association. But where does this common knowledge come from? A search of the medical literature found no articles in refereed journals reporting instances of high-dose vitamin C causing kidney stones. Instead, review articles cite book chapters that in turn cite abstracts, letters, and other review articles. Take, for example, a 1984 article entitled "Toxic Effects of Water-Soluble Vitamins"[13] that noted that excessive intake of vitamin C may cause kidney stones and cited 7 references to buttress that statement.[14-20] Of these 7 citations, 5 were textbooks or monographs,[14,15,17-19] 1 was a letter to the *Lancet*,[20] and 1 was a case report not related to either ascorbate or kidney stones.[16] Of the 5 books, 2[15,18] cite a total of 2 additional references to substantiate the claim that high-dose vitamin C causes kidney stones; one was a letter[21] and another a chapter.[22] This chapter in turn cites the same *Lancet* letter[20] and an article in the *Medical Letter*,[23] which is without citations. Nowhere in the trail of citations is there related any fundamental information on whether or how frequently high-dose vitamin C leads to kidney stones. Instead, authors simply make the statement that vitamin C may cause kidney stones and as proof cite other authors who have said the same thing.

What is the actual evidence about vitamin C intake and kidney stones? In 3 case-control studies[24-26] there was no clear association between ascorbate intake or excretion and stone formation. In a prospective observational study[27] of 45 000 men with no history of kidney stones, those men consuming 1500 mg or more of ascorbate daily from diet and supplements had 78% the rate of kidney stone formation of those consuming less than 250 mg daily. This reduction was not statistically significant, but certainly does not support the idea that high-dose ascorbate increases the risk of kidney stones.

The story of vitamin C and kidney stones is not unique. A major component of medical writing on vitamin supplements focused on toxic effects,[10-13] under such titles as 'The Vitamin Craze"[10] and "Toxic Effects of Vitamin Overdosage."[11] The 1987 and 1991 editions of Harrison's[9] contain the statement that " . . . disorders of vitamin excess may now be more common than vitamin deficiency." Once again, no evidence is cited to support this statement.