Editorial

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Dietary Reference Intakes: resuscitate or let die?

Dennis M Bier[1]* *and Walter C Willett*[2]

[1]Children's Nutrition Research Center, Department of Pediatrics, Baylor College of Medicine, Houston, TX; and [2]Department of Nutrition, Harvard T.H. Chan School of Public Health, Boston, MA

The Dietary Reference Intakes (DRIs) are the most widely used values globally for recommended intakes of essential nutrients. Their US origins are the Recommended Dietary Allowances (RDAs) developed in 1941 by the newly established Food and Nutrition Board. The RDAs were revised 9 times until the final 10th edition was published in 1989. Corresponding Canadian nutrient reference intakes were first created in 1939 by the Canadian Council on Nutrition. They were revised multiple times, renamed Recommended Nutrient Intakes in 1983, and last revised by Health Canada in 1990. In the mid-1990s, the Food and Nutrition Board and Health Canada agreed to collaborate on the development of a more scientifically rigorous, comprehensive approach to recommendations for essential nutrient intakes, resulting in a new paradigm called the Dietary Reference Intakes.

The first DRIs were issued in 1997 for calcium, phosphorous, magnesium, vitamin D, and fluoride (1). During the following 8 y, the DRIs for the remaining essential nutrients were released in 5 additional reports. The last DRIs, for water, potassium, sodium, chloride, and sulfate, were issued in 2005 (2). Although additional companion reports have been issued since then for dealing with guiding principles, applications, risk assessment, and proposed additional definitions, the DRIs for essential nutrient intakes were not reassessed and revised until the 2011 release of updated DRIs for vitamin D and calcium (3). Thus, except for vitamin D and calcium, none of the remaining nutrient DRIs have been updated in more than a decade. Furthermore, only the recent revisions of the vitamin D and calcium DRIs were developed by using the tools of formal systematic evidence review and analysis. Earlier DRIs for the remaining nutrients were reached primarily by consensus evaluation of available data at the time by unpaid volunteer committees. Moreover, in the past decade, the nutrition community has voiced considerable interest in the potential development of DRIs for food constituents not traditionally classified as essential nutrients and in further assessing a more-formalized, systematic approach for including chronic disease endpoints in formulating DRIs for individual nutrients.

The Food and Nutrition Board has recognized the need for revision of the remaining DRIs and has struggled for some years to find a justifiable and practical approach to do so. A periodic update is essential to maintain the credibility of the DRIs. Notably, by an act of Congress, the Dietary Guidelines for Americans are updated every 5 y, but no regular update of the DRIs, which are meant to inform the guidelines, occurs. Furthermore, the knowledge that evidence will be reviewed regularly provides an incentive for investigators to conduct research that could contribute to improved DRIs. As former members of the Food and Nutrition Board, both of the authors participated in some of these discussions. In this issue of the Journal, Brannon et al. (4) propose a welcome framework based on "evidence scanning" to facilitate the identification of nutrients for which significant new data could justify reassessment of their DRIs. This would also identify nutrients for which little or no new data can be found that might inform a reassessment. The framework is constructed around a risk assessment approach described and tested in the epidemiologic literature (5, 6) to identify a "signal" for updating systematic reviews. This approach aims to balance the ideal goal of regularly conducting formal systematic reviews for each essential nutrient with the reality of limited funds and personnel available for conducting such reviews. Brannon et al. (4) tested their thesis with the use of literature published in the past decade on thiamin and phosphorus. In neither case was there sufficient new evidence to justify a formal systematic review to update the previously published DRIs for these nutrients.

The basic issues here are relatively straightforward, but surely not simple. Few would argue that the existing DRIs need either updating or confirmation that the published values remain appropriate. Few would disagree that the consensus approach taken to establish the existing DRIs no longer satisfies the highest standards for evidence-based decisions. Few would disagree that many of the tools for systematic reviews and formally grading evidence quality, risk of biases, study heterogeneity, and the like were not applied to earlier DRI recommendations. Consequently, few would likely object to formal systematic assessment of the evidence available to establish specific nutrient DRIs conducted with the input of those with deep knowledge of the topic. Nor should there be much disagreement with the position that evaluation of the evidence requires evaluation of all of the evidence, not just recent evidence. The proper way to formally and comprehensively review the evidence is to interrogate the entire literature, including the data used to establish the earlier DRIs. In other words, in the case of the DRIs for nearly all nutrients, one cannot update an earlier systematic review simply because there is no earlier systematic review to update.

* To whom correspondence should be addressed. E-mail: dbier@bcm.edu.
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Thus, although the approach for scanning new evidence proposed by Brannon et al. (4) is a practical method for prioritizing the order of updates to current DRIs, it does not satisfy the need for evidence-based DRIs for every essential nutrient. There are clearly limitations with the scanning approach outlined. First, reliance on a small group of individuals to identify key terms and outcomes and to review the evidence is potentially fraught with problems of subjectivity and limited areas of knowledge. Second, it is not clear whether generalizable rules can be written a priori for essential nutrients as a class. For some nutrients (most nutrients?) for which human dose-response data are sparse, a single well-conducted study may be sufficient to trigger reassessment of the nutrient's DRI. For other widely studied nutrients, re-evaluation of the present requirement might require several new, large, well-conducted studies. Furthermore, not finding new studies does not remove the desirability of doing a formal systematic review of the evidence in the first place and might mistakenly leave the impression that the DRI is well established. Unfortunately, faulty impressions of this sort tend to have very long lives in secondary citations. In short, there is a fundamental conceptual conundrum. The present DRIs were founded on a consensus approach that is now recognized to suffer from the lack of a formal, systematic evaluation of the evidence. Yet, Brannon et al. (4) propose a solution for updating DRIs that uses a consensus approach to determine whether a formal systematic analysis should be undertaken. That said, with the understanding that the DRIs for all nutrients should ultimately be reviewed in a systematic manner, the proposal of Brannon et al. (4) provides a way for setting priorities to move forward in this effort.

At present, the conduct of DRI reviews is dependent on the provision of funding by sources external to the Food and Nutrition Board and the National Academy of Medicine, typically US and Canadian government agencies. Thus, funding is sporadic and subject to vagaries of interest and competing priorities in these agencies. Accomplishing the task of rigorous and comprehensive updating of the DRIs would require both substantial time and a substantial input of human resources. To provide high-quality systematic reviews of today's expansive literature will require more than the voluntary spare time of already pressed scientists, although their input on the conduct and interpretation of the reviews will remain invaluable. An in-house research staff, or a contracted group, that is deeply knowledgeable in nutritional sciences as well as experienced in systematic reviews will be essential to gather and summarize evidence. Nonetheless, given the fundamental importance of establishing evidence-based DRI values for all essential nutrients and given their pervasive use as the foundation for nutrition recommendations globally, we find it disheartening that the resources necessary to undertake and complete the task properly are not available to the Food and Nutrition Board on a regular, ongoing basis. It is likely that the DRIs, née RDAs, have been the most widely recognized and globally used reference values issued by The National Academies over the past 75 y. Thus, it seems imperative that The National Academies find a means to permanently fund this effort, perhaps endowment-based, and ensure that this work will be done properly in the future. More realistically, because the DRIs are the foundation of essentially every nutritional recommendation for the US population and of defining nutrient adequacy in all national dietary guidelines, US Congress should accept as its obligation the need to appropriate the funds necessary for producing timely, high-quality, evidence-based DRIs.

DMB is a consultant to Ferrero SpA and recently served as a member of the ConAgra Foods Scientific Advisory Board. Within the past year, he received honoraria from Pfizer Inc. and from the Monsanto Company for participating in meetings sponsored by these corporations. In the past, he has served as a consultant to a wide variety of food companies, drug companies, and trade associations. He was formerly both a member and the chair of the Food and Nutrition Board responsible for setting the DRIs. WCW had no conflicts of interest to declare. He was formerly a member of the Food and Nutrition Board.

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