We appreciate the letter from Dodd et al. (1) regarding our paper (2), and we thank them for their careful consideration of key methodological issues facing nutritional epidemiologists. In their letter, Dodd et al. have asserted that our paper (2) contains potentially misleading statements.

First, they question the use of 1 of the 2 models studied in our paper, in which a detailed dietary assessment method is considered an unbiased estimate of the underlying true intake, and a biomarker is taken as a possibly biased correlate of the underlying true intake (a “concentration” biomarker). (We also consider the reverse case in equal detail). Dodd et al. (1) wish to dismiss this first model. We note that, although there are important scientific and public health questions about hundreds of foods and nutrients in relation to human health, very few “recovery” biomarkers have been identified in nutritional epidemiology, primarily doubly labeled water for total energy intake and urinary nitrogen for protein intake. For the remaining foods and nutrients, concentration biomarkers are essential for validating standard dietary assessment methods and adjusting relative risks for measurement error using statistical methods, such as those arising from the first equation which Dodd et al. suggest we disregard.

We agree with Dodd et al. (1) that within-person variation in the measure assumed to be unbiased will not affect the deattenuation factor but will lead to the false appearance of correlated errors between methods and underestimation of the validity correlation coefficient (refer to Figure 1 in Preis et al. (2) for an exploration of the extent of this bias). As we reported and Dodd et al. point out, the results found were not materially different from those reported originally (3) when we assumed (2) that the random within-person variation in doubly labeled water and urinary nitrogen was that observed in a similarly designed study in which the time interval between repeated measures of doubly labeled water was 16 months, better representing the long-term variation of interest in chronic disease epidemiology than the 14 days as in the Observing Protein and Energy Nutrition (OPEN) Study (3). However, this was used only as a hypothetical example, and no one knows what would have been found if realistic data on within-person variation in the biomarkers had been obtained in the OPEN Study.

Apart from the methodological issues addressed in our paper, our findings for energy-adjusted protein from the Automated Multiple-Pass Method (AMPM) Study did not support the conclusions of the OPEN Study (based on 1 nutrient and 1 gender) that the correlation in errors between dietary assessment methods is high and that these findings therefore cast doubt on previous validation studies. We agree with Freedman et al. (4) regarding the desirability of large validation studies of dietary questionnaires, best imbedded in the primary study, which will enable precise adjustment of relative risks and confidence intervals for measurement error. In addition to a more detailed reference instrument such as a 24-hour diet recall or multiple-day food record, the use of biomarkers will be valuable when feasible, and replicate measures over a realistically long time interval will be critical to interpret the findings.

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REFERENCES


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