

# Biomarkers of Dietary Intake May Help Clarify True Diet-Disease Associations

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Due to their relatively low cost and ease of use, self-report questionnaires are typically used to measure energy and nutrient intakes in large population studies of diet-disease associations. Yet, at best, these measures provide only crude estimates. Total energy and protein intakes are commonly underreported, and the degree of underreporting appears to vary according to overweight status and race/ethnicity.

The measurement error introduced by self-reported dietary intake is a major challenge to researchers interested in understanding how diet influences disease risk. In an effort to address this issue, Dr. Lesley Tinker and colleagues from the Public Health Sciences Division used data from the Women's Health Initiative (WHI) to compare the association of biomarker-calibrated versus self-reported energy and protein intake with diabetes risk in postmenopausal women.

Recovery biomarkers of total energy intake (doubly labeled water) and protein intake (24-hour urinary nitrogen excretion) were measured in a subsample of 544 WHI women. These data were used to derive calibrated estimates of energy and protein intakes from self-reported data and participant characteristics, which were then applied to a much larger sample of approximately 71,000 WHI women.

Compared with biomarker-calibrated measures, the self-reported measure of energy intake was 32% lower, and protein intake was 21% lower. Higher self-reported energy and protein intakes were modestly associated with diabetes risk, with or without an adjustment for body mass index. In contrast, biomarker-calibrated energy and protein intakes were much more strongly associated with diabetes risk. However, the strength of these associations were substantially reduced after adjusting for body mass index, suggesting that adiposity, as an indicator of energy balance, is a key risk factor mediating the associations.

The development and use of biomarker-calibrated dietary intake estimates remain in their infancy; however, efforts are currently underway to harmonize calibrated estimates across multiple cohorts with the ultimate goal of being able apply corrected estimates more broadly. Biomarker-calibrated

estimates of dietary intake could represent a significant methodological advance in elucidating the true contribution of nutrition-related risk to multiple disease endpoints.

This research is part of a suite of dietary biomarker studies initiated in the WHI in 2004 by Dr. Ross Prentice. A biomarker feeding study, led by Prentice and Dr. Johanna Lampe, is currently underway at Fred Hutchinson Cancer Research Center, with a range of nutrient biomarkers being investigated.

[Tinker LF, Sarto GE, Howard BV, Huang Y, Neuhaus ML, Mossavar-Rahmani Y, Beasley JM, Margolis KL, Eaton CB, Phillips LS, Prentice R.](#) 2011. Biomarker-calibrated dietary energy and protein intake associations with diabetes risk among postmenopausal women from the Women's Health Initiative. *American Journal of Clinical Nutrition* 94:1600-6.

