Thus, the Bland-Altman and regression analyses indicate that the authors’ conclusion about DLW+DXA not being suitable for estimating EI during short-term CR studies may have been premature. Their experiment appears to have generated 3 widely spaced data points precisely suggesting one relation between the 2 calculations of EI (a large difference proportional to EI) and 7 closely spaced data points precisely suggesting a completely different relation (a large constant difference).

This data set is too small and heterogeneous to warrant any further conclusion about how accurate and precise DLW+DXA may be, but accurate estimation of EI is of fundamental importance for everyone interested in CR. Therefore, investigators should be encouraged to collect and analyze more diverse data of this kind to search for potentially correctable sources of error in both calculations of EI and in the experimental methods that generate the data. If such sources are found and corrected, differences between the 2 calculations may be reduced to a random error of 8%.

One of the authors of the de Jonge et al article (LM Redman) was a postdoctoral scholar in the laboratory of ABL. LB and ABL have no financial or personal relationships with any research sponsor that would constitute a conflict of interest.

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REFERENCES

Reply to L Bowman and AB Loucks

Dear Sir:

We thank Bowman and Loucks for their interest in our study on the validation of energy intake during caloric restriction with the use of doubly labeled water (DLW) and changes in body composition (1), and we are glad to have the opportunity to address the issues raised. It is important to note that our study was designed to validate the methods for measuring both energy expenditure (EE) and energy intake (EI) during caloric restriction. More specifically, we tested whether DLW can be used in periods of caloric restriction to measure EE values for groups (average) and individuals and EI values when combined with dual-energy X-ray absorptiometry (DXA).

In regard to measures of EE under energy restriction, our findings clearly showed that the method can be used with good accuracy and reasonable precision. We found an average difference between DLW and respiratory chamber methods of 1.3 ± 8.9%. On the basis of the Bland-Altman plot provided, Bowman and Loucks state that the random variation seems to increase "with a CV of 30% of energy expenditure in excess of 1600 kcal/d." This conclusion is not warranted by the data, because the discrepancies between the 2 methods occurred in individuals with both low and high EE, and the maximum discrepancy was ≈13%.

In regard to the measurements of EI, our study examined the accuracy and precision of calculating EI in groups and individuals by using DLW and the changes in body energy stores measured by DXA over 7 d. Investigators knowledgeable in the field of energy balance rightfully do not expect that a combination of these 2 methodologies (DLW and DXA) over periods of 1–2 wk could provide reliable data to assess EI for a given individual because the changes in body energy stores (fat mass and fat-free mass) are too small to be detected precisely by DXA. The reason we undertook such a validation study was also to temper the common belief from many scientists that individual adherence to a caloric intake prescription can be derived by combining measures of DLW and body composition. In our study, this method yielded an estimate of average group EI that was reasonably consistent with actual EI, ie, 8.7% higher. However, for individuals with an overall precision of 36.7%, our data are consistent with the conclusion that the large differences between the DLW and DXA methods and actual EI reflect current technological limits of the DXA method, which is inadequate to detect small changes in body energy stores and therefore EI. As discussed in our article, limitations in the precision of the measures in the changes in body energy stores by DXA can produce intraindividual SDs of ≥400 kcal/d, which is a substantial proportion of daily EI for most individuals. Given these SDs, our observation that DLW- and DXA-based estimates of EI for some individuals had discrepancies from measured EI that substantially exceeded this magnitude is not surprising. Therefore, we do not feel that our conclusion that "the interindividual variability was too large to provide an assessment of CR adherence on an individual basis" was "premature." In view of the above argument and of the small sample size, we do not believe that there is much value in speculating about the precision or accuracy of the method, on the basis of a Bland-Altman plot that compares the provided and the calculated EI values, whether or not the most discrepant values are excluded from the analysis. In preparation for our article, we made such a plot, but we elected not to present it because the number of subjects was too small to establish a firm conclusion that the differences between the 2 methods were truly proportional to estimated EI, even though the 2 lowest and the highest data points were mostly responsible for the potential proportionality. Eliminating 30% of the data points, as Bowman and Loucks suggest, does not seem appropriate.

We, however, do agree with Bowman and Loucks that our data set is too small to establish a concrete value for the accuracy and precision of the method, but this was not the aim of our study. As discussed in our article, under different conditions (eg, large rates of weight change and longer measurement intervals), the accuracy and precision of DLW-based measures of individual EI during weight loss may differ from our observed values, especially with improved methods to determine body composition. This could be explored in future studies. In conclusion, our study documented that, until better methods to measure intraindividual changes in energy stores are available, individual EE but not EI can be measured in periods of caloric restriction.

LMR spent 1 y as a postdoctoral fellow with AB Loucks. None of the other authors had a financial conflict of interest.

Lilian de Jonge
Leanne M Redman
Tuong Nguyen
Eric Ravussin
The authors had no conflicts of interest to declare.

Alice H Lichtenstein
Nirupa R Matthan

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