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COMMENTARY

Metabolic adaptation: Confounding the critics

Jonathan Krakoff | Douglas C. Chang

Obesity and Diabetes Clinical Research Section, Phoenix Epidemiology and Clinical Research Branch, National Institute of Diabetes and Digestive and Kidney Diseases, Phoenix, Arizona, USA

Correspondence
Jonathan Krakoff, Obesity and Diabetes Clinical Research Section, Phoenix Epidemiology and Clinical Research Branch, National Institute of Diabetes and Digestive and Kidney Diseases, 4212 North 16th St., Phoenix, AZ 85016, USA.
Email: jkrakoff@mail.nih.gov

Metabolic adaptation (MA, also known as adaptive thermogenesis) defines the greater-than-expected decline in energy expenditure (EE) with weight loss and is generally accepted physiology (1). However, its role in weight loss and regain remains elusive. In this issue, Martins et al. (2) make a significant contribution to our understanding of MA's role in weight loss. MA is calculated as the measured EE—predicted EE after weight loss, with predicted EE based on regression equations at baseline. The degree of MA varies by method of measuring EE (resting metabolic rate [RMR] vs. respiratory chamber) and timing (during negative energy balance or weight stabilization). During weight stability following weight loss, MA ranges from ~38 to 54 kcal/d using RMR (3) to ~165 kcal/d when measured over 24 hours (4).

Previous work by Martins et al. has cast doubt on the long-term presence of MA and its role in weight regain (3,5). Here, they tackle the question of whether MA mediates active weight loss (2). In this careful analysis of premenopausal women with overweight prescribed an 800-kcal/d diet to achieve BMI < 25 kg/m^2, they investigated whether MA that was measured following a 4-week weight-stabilized period was associated with time to reach the weight loss goal. In univariate analysis, this association was weak, but in models accounting for adherence, energy deficit, and target weight loss, MA was associated with time to weight loss goal such that, for each 10-kcal/d decrease in measured RMR from predicted RMR, the time to weight loss goal increased by 1 day. An important aspect of their analysis was that the effect of MA was muted by a confounding effect of these other variables.

MA has substantial interindividual variation that is difficult to ignore. In the current paper, the difference between measured and predicted RMR ranged from approximately −300 to +300 kcal/d. When measured over 24 hours, the range is +50 to −450 kcal/d (4). Even accounting for organ size changes (6), wide interindividual variation remains. Such interindividual ranges and the evidence by Martins et al. that the effect of MA may be masked until other measures such as adherence are accounted for raise the following question: has the effect of MA been underestimated? The careful analysis by Martins et al. would appear to answer "yes" to this question (2). Therefore, the contribution of MA to weight loss and regain may be hampered by the imprecision of other important measures, particularly adherence. In the models presented by Martins et al., adherence accounted for the largest portion of the variance, and the relationship between MA and time to weight loss goal was underestimated if adherence was excluded. The results by Martins et al. indicate that underlying MA explains some of the individual difficulty at achieving weight loss goals. These results inform us that future studies need precise measures of adherence, intake, and EE at baseline, as well as during and following weight loss. This will require significant investments of resources to answer the important questions about the approach to weight loss. The current study is an important step in this direction.

CONFLICT OF INTEREST

The authors declared no conflict of interest.

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