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## Does metabolic compensation explain the majority of less-than-expected weight loss in obese adults during a short-term severe diet and exercise intervention?

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### Abstract

**Objective:** We investigated to what extent changes in metabolic rate and composition of weight loss explained the less-than-expected weight loss in obese men and women during a diet-plus-exercise intervention.

**Design:** In all, 16 obese men and women (41 ± 9 years; body mass index (BMI) 39 ± 6 kg m<sup>-2</sup>) were investigated in energy balance before, after and twice during a 12-week very-low-energy diet (565–650 kcal per day) plus exercise (aerobic plus resistance training) intervention. The relative energy deficit (EDef) from baseline requirements was severe (74%–87%). Body composition was measured by deuterium dilution and dual energy X-ray absorptiometry, and resting metabolic rate (RMR) was measured by indirect calorimetry. Fat mass (FM) and fat-free mass (FFM) were converted into energy equivalents using constants 9.45 kcal per g FM and 1.13 kcal per g FFM. Predicted weight loss was calculated from the EDef using the '7700 kcal kg<sup>-1</sup> rule'.

**Results:** Changes in weight (-18.6 ± 5.0 kg), FM (-15.5 ± 4.3 kg) and FFM (-3.1 ± 1.9 kg) did not differ between genders. Measured weight loss was on average 67% of the predicted value, but ranged from 39% to 94%. Relative EDef was correlated with the decrease in RMR (R=0.70, P<0.01), and the decrease in RMR correlated with the difference between actual and expected weight loss (R=0.51, P<0.01). Changes in metabolic rate explained on average 67% of the less-than-expected weight loss, and variability in the proportion of weight lost as FM accounted for a further 5%. On average, after adjustment for changes in metabolic rate and body composition of weight lost, actual weight loss reached 90% of the predicted values.

**Conclusion:** Although weight loss was 33% lower than predicted at baseline from standard energy equivalents, the majority of this differential was explained by physiological variables. Although lower-than-expected weight loss is often attributed to incomplete adherence to prescribed interventions, the influence of baseline calculation errors and metabolic downregulation should not be discounted.

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Dulloo AG.

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