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Effect of calorie restriction on resting metabolic rate and spontaneous physical activity.

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Abstract

OBJECTIVE: It is unclear if resting metabolic rate (RMR) and spontaneous physical activity (SPA) decrease in weight-reduced non-obese participants. Additionally, it is unknown if changes in SPA, measured in a respiratory chamber, reflect changes in free-living physical activity level (PAL).

RESEARCH METHODS AND PROCEDURES: Participants (N = 48) were randomized into 4 groups for 6 months: calorie restriction (CR, 25% restriction), CR plus structured exercise (CR+EX, 12.5% restriction plus 12.5% increased energy expenditure via exercise), low-calorie diet (LCD, 890 kcal/d supplement diet until 15% weight loss, then weight maintenance), and control (weight maintenance). Measurements were collected at baseline, Month 3, and Month 6. Body composition and RMR were measured by DXA and indirect calorimetry, respectively. Two measures of SPA were collected in a respiratory chamber (percent of time active and kcal/d). Free-living PAL (PAL = total daily energy expenditure by doubly labeled water/RMR) was also measured. Regression equations at baseline were used to adjust RMR for fat-free mass and SPA (kcal/d) for body weight.

RESULTS: Adjusted RMR decreased at Month 3 in the CR group and at Month 6 in the CR+EX and LCD groups. Neither measure of SPA decreased significantly in any group. PAL decreased at Month 3 in the CR and LCD groups, but not in the CR+EX group, who engaged in structured exercise. Changes in SPA in the chamber and free-living PAL were not related.

DISCUSSION: Body weight is defended in non-obese participants during modest caloric restriction, evidenced by metabolic adaptation of RMR and reduced energy expenditure through physical activity.

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