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Effect of weight loss on Resting Energy Expenditure in pre- and post-pubertal obese children

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Background: In obese adults, caloric restriction leads to a reduction in energy expenditure, and it is this compensatory adaptive down-regulation that is cited as one of the causes of weight regain in adults. There are currently insufficient data to establish if this phenomenon also occurs in obese children who lose weight and whether puberty affects this adaptive response.

Objective: We hypothesised that obese children who lose weight have less 'reflex' changes in Resting Energy Expenditure (REE) (that may drive weight regain), compared with obese adolescents with a similar degree of weight change.

Method: Prospective cohort study. 41 subjects; 21 obese pre-pubertal children (age 3–7 years; 11 male) and 20 obese adolescents (age 14–18 years; 10 male). Obesity defined as BMI >2.4 SDS. Subjects recruited as either 'reducers' (relative/absolute weight loss of ≥10% in preceding 9–15 months) or 'maintainers' (controls). REE measured using Medgem® indirect calorimetry in all 41 participants at baseline and REE measured at follow-up in 23 subjects, 6–21 months later (average 10.6 months); 13 obese pre-pubertal children (6 male) and 10 obese adolescents (5 male).

Results: At baseline, REE (Kcal/day) in pre-pubertal weight reducers and maintainers had similar mean values (SD) of 1197(274) and 1246(160), but post-pubertal reducers had 252 kcal lower REE compared to post-pubertal maintainers, 1852 (279) and 2104 (393) respectively. When REE was expressed as Kcal/Kg/day (division of mean REE by mean weight in each group), baseline values for the pre-pubertal reducer and maintainer group and the post-pubertal reducer and maintainer group were 25.4, 23.7, 18.9 and 17.8 Kcal/Kg/day respectively. At follow-up, values were 28, 25.5, 18.4 and 16.6 Kcal/Kg per day respectively. Therefore compared with baseline, changes in REE/Kg per day between baseline and follow-up measures

were +2.6 in pre-pubertal reducers, +1.8 in pre-pubertal maintainers, -0.5 in post-pubertal reducers and -1.2 in post-pubertal maintainers.

Conclusions: Pre-pubertal children have a greater REE compared to post-pubertal adolescents, which would help them to maintain weight loss. Larger studies are needed to explore the relationship between weight loss and REE in pre and post pubertal children.