

## Reviewer's report

**Title:** Relative Fat Oxidation is Higher in Children than Adults

**Version:** 1 **Date:** 27 February 2007

**Reviewer:** Leonard S. Piers

### Reviewer's report:

#### General

The purpose of this study was to quantify whole body fatty acid oxidation rates in children versus adults, and determine whether they differed, and if so, by how much. The study has been well described and meticulously executed. I, however, have some reservations with regard to the analysis and presentation of the data as outlined below.

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Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)

1. The relationship between resting energy expenditure (REE) and metabolically active fat-free mass (FFM) is critical in the study of physiological aspects of body weight regulation and human energy requirements. REE data have been normalized by dividing by body weight, fat-free mass (FFM) (i.e. ratio method) and also by using a regression-based approach. The ratio based approach leads to spurious conclusions as demonstrated by Poehlman & Toth (1995). The ratio-based approach implies that when REE is regressed against body weight or FFM the intercept term is (or not significantly different from) zero. Wang et al (2000) have observed that when REE in adult humans is plotted against FFM, a linear relationship with a non-zero intercept is observed within the FFM range of 40–80 kg. The non-zero positive intercept of this relation implies that subjects with low FFM have a relatively high resting metabolic rate compared with those with a high FFM. The likely explanation for this is that although skeletal muscle and adipose tissue are the largest components of FFM, their resting metabolic rates are low. In contrast, organs, including liver, kidneys, heart, and brain, which account for only 5–6% of body mass, have much higher resting metabolic rates and constitute a larger proportion of FFM at lower body weights (Wang et al. 2000). I suggest the data in relation to energy expenditure be reanalysed as recommended by Poehlman & Toth (1995).

2. The authors should outline the precautions taken and assumptions made with regard to the estimates of fat oxidation rates in the methods section of the manuscript and consider the use of the Elia & Livesey (1988) or Livesey & Elia (1988) equations to calculate fat oxidation rates. Livesey & Elia (1988) have indicated that substrate utilization can be assessed by indirect calorimetry with an accuracy, at the very best, to within 5% of the true value. They have shown that small errors in the non-protein respiratory quotient (RQ) and the error arising from incorrect selection of the RQs for fat and carbohydrate have large effects on the estimate of fat and carbohydrate oxidized.

3. The non-protein VO<sub>2</sub> and VCO<sub>2</sub> in figure 1 and non-protein RQ in figure 2 should be presented and all statistical analyses should be carried out on these (non-protein) values (page 9).

4. Figure 2 and results in the text on page 10 should also only include data on adults vs. children (not 4 subgroups).

5. Authors should provide a reference (or data) to support the observation that the subjects studied were 'representative of the region' (Results, page 9) or delete the sentence.

#### REFERENCES

Elia M & Livesey G. Theory and validity of indirect calorimetry during net lipid synthesis. *Am J Clin Nutr* 1988;47:591-607

Livesey G & Elia M. Estimation of energy expenditure, net carbohydrate utilization, and net fat oxidation and synthesis by indirect calorimetry: evaluation of errors with special reference to the detailed composition of fuels. *Am J Clin Nutr* 1988;47:608-628.

Poehlman ET & Toth MJ, 1995, 'Mathematical ratios lead to spurious conclusions regarding age- and sex-related differences in resting metabolic rate'. *Am J Clin Nutr* 1995; 61:482-485.

Wang Z, Heshka S, Gallagher D, Boozer CN, Kotler DP & Heymsfield SB. Resting energy expenditure-fat-free mass relationship: new insights provided by body composition modeling. Am J Physiol Endocrinol Metab 2000;279:E539-45.

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Discretionary Revisions (which the author can choose to ignore)

6. The authors should report fat oxidation rates over the duration of data collection, rather than extrapolating results to 24 hours (page 10).

**What next?:** Unable to decide on acceptance or rejection until the authors have responded to the major compulsory revisions

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

**Statistical review:** Yes, and I have assessed the statistics in my report.