Reviewer's report

Title: Comparison of air displacement plethysmography to hydrostatic weighing for estimating total body density in children

Version: 1 Date: 13 June 2005

Reviewer: Jonathan C Wells

Reviewer's report:

General

This study compares plethysmography (ADP) against hydrostatic weighing (HW) for assessment of body density. The study has been well carried out in practical terms but the manuscript requires extensive revision in relation to statistics and discussion. Major criticisms are that the authors have not distinguished between methodological and theoretical components of the techniques, and that they have not produced evidence that the Bodpod lung volume measurement is itself accurate.

The manuscript has no page or line numbers, I hope my comments can be identified.

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

Specific comments

Intro
1. HW is referred to by the authors as the gold standard, however this has been refuted due to inconsistency between individual children in the density of fat-free mass (FFM) (Wells et al., AJCN 1999; 69: 904-912). Cadaver dissection is the gold standard.
2. The subjects in the study of Dewit et al. failed to complete duplicate tests, not tests per se. This relates to refusing an invitation to be re-measured, rather than failing a test.
3. Not all reports validated ADP successfully in adults, as the authors suggest. See eg Collins et al, MSSE 1999; 31: 1350-60.
4. It is not clear what testing design refers to on page 5, line 9.
5. The four-component model is an inappropriate reference for assessment of ADP. ADP measures volume, and its validity for this task requires a reference method for volume. When ADP data are converted to body composition values, this transformation incorporates theoretical data on the density of FFM. Thus, this comparison no longer tests accuracy of ADP, but tests agreement of the combination of method and theory. The quoted study of Fields and Goran should be treated with greater caution.

Methods
1. Why not compare volume, rather than density? Equally, if agreement in %fat is different from agreement in density, this implicates the contribution of Lohman’s estimated values for FFM density.

2. The results discuss and plot Bland-Altman statistics, but no mention is made in the methods, nor is the approach referenced. The Bland-Altman method has accepted statistics for assessing bias and limits of agreement which should be quoted. The description in the last para of the methods, describing the plotting of difference against criterion values, is both incorrect and different to the actual plots where average of HV and ADP is correctly used on the x-axis.
3. There is no reference method for the ADP lung volume procedure. This procedure is difficult to
perform and may well give inaccurate values, either randomly, or systematically. Detecting a difference between predicted and measured lung volume does not allow identification of which one is better. This part of the study should ideally be repeated, or supporting material provided for the hypothesis that ADP lung volume measurement is accurate.

Results
1. Lung volume predictions and measurements should again be compared using the Bland-Altman method.

Discussion
1. Again, HW is not a gold standard
2. Again, distinguish between comparison of methods (for measurement of volume) versus comparison of final data (for comparison of combination of methods and theory).
3. It is incorrect that greater mineralization could increase body density measured by HW but not by ADP. Both methods measure weight and volume, which method could hide such an effect?
4. The study of Dewit et al. (ref 2) did measure lung volume simultaneously with underwater weight.
5. In general the discussion could be shortened and some of the unnecessary speculations removed.

Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

Discretionary Revisions (which the author can choose to ignore)

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: No

Declaration of competing interests:

I have received funding and equipment from Tanita UK, a manufacturer of bio-electrical impedance equipment. This has in no way affected my review of the above paper - I believe that the authors can address all my criticisms and that doing so will produce a good quality paper.