Development and cross-validation of prediction equations for estimating resting energy expenditure in severely obese Caucasian children and adolescents

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The objectives of the present study were to develop and cross-validate new equations for predicting resting energy expenditure (REE) in severely obese children and adolescents, and to determine the accuracy of new equations using the Bland-Altman method. The subjects of the study were 574 obese Caucasian children and adolescents (mean BMI *z*-score 3·3). REE was determined by indirect calorimetry and body composition by bioelectrical impedance analysis. Equations were derived by stepwise multiple regression analysis using a calibration cohort of 287 subjects and the equations were cross-validated in the remaining 287 subjects. Two new specific equations based on anthropometric parameters were generated as follows: (1) REE = (Sex X 892·68) - (Age X 115·93) + (Weight X 54·96) + (Stature X 1816·23) + 1484·50 (R^2 0·66; SE 1028·97 kj); (2) REE = (Sex X 909·12) - (Age X 107·48) + (fat-free mass X 68·39) + (fat mass X 55·19) + 3631·23 (R^2 0·66; SE 1034·28 kj). In the cross-validation group, mean predicted REE values were not significantly different from the mean measured REE for all children and adolescents, as well as for boys and for girls (difference < 2%) and the limits of agreement (± 2 SD) were + 2·06 and - 1·77 MJ/d (NS): The new prediction equations allow an accurate estimation of REE in groups of severely obese children and adolescents. These equations might be useful for health care professionals and researchers when estimating REE in severely obese children and adolescents.