TACSM Abstract

Cross-validation of a Prediction Equation for Energy Expenditure of an Acute Resistance Exercise Bout.

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ABSTRACT

Previously, our laboratory introduced a regression equation for predicting net kcal consumption of a resistance exercise (RE) bout: Total net kcal = 0.874(height, cm) - 0.596(age, years) - 1.016(fat mass, kg) + 1.638(lean mass, kg) + 2.461(total volume x 10^{-3}) - 110.742 (R^2 = 0.773, SEE=28.5 kcal). **PURPOSE**: The purpose of this study was to validate this regression equation using the same variables as predictors. **METHODS**: Forty-seven healthy, active subjects (23 men, 24 women, 20-58 yrs, 173.5 ± 10.5 cm, 85.5 ± 19.0 kg, VO_{2max} 36.0 ± 8.4 ml/kg/min) were randomly divided into validation and cross-validation groups (n_v = 24, n_{cv} = 23). The validation group's data was used to develop an equation to predict net kcal consumption, which was applied to the cross-validation group's data to estimate net kcal consumption. Similarly, a prediction equation was derived from the cross-validation group's raw data and applied to that of the validation group. The strength of the relationship between each group's measured and estimated net kcal consumption was assessed via correlational analysis. **RESULTS**: Multiple linear regression yielded the following estimates of net kcal consumption: validation net kcal = 1.125(height, cm) – 0.662(age, years) – 0.800(fat mass, kg) + 1.344(lean mass, kg) + 2.278(total volume x 10^{-3}) – 144.846 (R^2 = 0.751, $p < 0.0001$, SEE=29.7 kcal); cross-validation net kcal = 0.515(height, cm) - 0.520(age, years) - 1.220(fat mass, kg) + 1.995(lean mass, kg) + 2.620(total volume x 10^{-3}) – 59.988 (R^2 = 0.823, $p < 0.0001$, SEE=29.2 kcal). These equations had a cross-validation coefficient of 0.902 and a double cross-validation coefficient of 0.863. **CONCLUSION**: The strong relationship between the measured and estimated net kcal consumption of both the cross-validation and validation group lead us to conclude that the regression equation derived by this laboratory is valid for estimating net energy expenditure for a total RE bout.