

The Effects Of Acute Resistance Exercise On Bioelectrical Impedance Analysis Measures Of Body Composition

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ABSTRACT

Bioelectrical Impedance Analysis (BIA) is a popular method of body composition assessment; however, validity of BIA is thought to be highly dependent on adhering to pre-test criteria, including the abstinence from exercise prior to testing. **PURPOSE:** The purpose of this study was to determine if acute, localized resistance exercise (RE) compromises the validity of BIA total body composition estimates. **METHODS:** In a crossover design, 16 healthy, resistance trained adults, including 7 females (age: 22.7 ± 1.9 y; height: 165.4 ± 8.4 cm; body mass: 62.1 ± 10.9 kg; body fat: $25.9 \pm 7.3\%$) and 9 males (age: 24.3 ± 3.6 y; height: 179.1 ± 5.1 cm; body mass: 88.0 ± 7.6 kg; body fat: $18.4 \pm 6.6\%$) completed three conditions in a randomized order: lower-body resistance exercise (RE_{LOWER}), upper-body resistance exercise (RE_{UPPER}), and rest (REST). The RE protocol consisted of a warm-up consisting of 2 sets of 12-15 repetitions of 3 upper-body exercises (upper) or 3 lower-body exercises (lower), followed by 5 sets of 10 repetitions per exercise, with 1-minute rest intervals. The REST condition involved no exercise. BIA (InBody 770) was completed immediately pre and post-exercise and at 15-, 30-, and 60-minutes post-exercise. BIA estimates of fat mass (FM) and fat-free mass (FFM) were analyzed using 3 x 5 (condition x time) analysis of variance with repeated measures, follow-up pairwise comparisons, and evaluation of the partial eta-squared (η_p^2) effect sizes. **RESULTS:** Pre-exercise FM and FFM did not differ between conditions (0.1 to 0.4 kg; $p > 0.4$ for all). Condition x time interactions were present for both FM ($p < 0.0001$, $\eta_p^2 = 0.48$) and FFM ($p < 0.0001$, $\eta_p^2 = 0.45$). Pairwise comparisons indicated that FM was lower in the RE_{UPPER} condition as compared to both REST (1.5 kg; $p < 0.001$) and RE_{LOWER} (1.3 kg; $p < 0.001$) conditions immediately post-exercise. These differences remained at 15-, 30-, and 60-minutes post-exercise (0.6 to 1.6 kg; $p \leq 0.01$ for all). Pairwise comparisons also indicated that FFM was higher in the RE_{UPPER} condition as compared to both REST (1.3 kg; $p < 0.001$) and RE_{LOWER} (0.9 kg; $p < 0.01$) conditions immediately post-exercise. These differences remained at 15- and 30-minutes post-exercise (0.8 to 1.3 kg; $p \leq 0.02$ for all). At 60-minutes post-exercise, FFM remained higher in RE_{UPPER} as compared to REST (1.0 kg; $p = 0.005$) but no longer differed between RE_{UPPER} and RE_{LOWER} (0.4 kg; $p = 0.44$). **CONCLUSION:** These data indicate that acute upper-body RE compromises the validity of BIA total body composition estimates compared to REST and lower-body RE and reinforces exercise abstinence as a pre-test consideration. Further exploration of the effects on segmental body composition data is warranted.