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Determining the Accuracy of Basal Metabolic Rate Prediction Equations for Athletes

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Resting metabolic rate (RMR) is the energy required to perform basic functions when at rest. Different types of basal metabolic rate (BMR) prediction equations also exist, but they vary in terms of accuracy and specific factors taken into account by the researchers who developed them (i.e., age, lean body mass, fat mass). It has been reported that these equations tend to overestimate RMR; but, the majority of sample sizes used for analyses were either small or favored specific populations. **PURPOSE:** To determine the accuracy of BMR prediction equations for athletes. **METHODS:** Two hundred and eighty-five athletes (157 women, 128 men), ≥ 26 years of age, who exercised at least twice a week and were non-smokers, participated in this study. RMR was measured using indirect calorimetry. Prior to RMR measurements, participants were required to fast and avoid caffeine for 12 hours, avoid alcohol and exercise for 24 hours, and rest in a recliner for 15 minutes before data collection. Lean body mass, fat-free mass, fat mass, and percent body fat were determined using dual-energy X-ray absorptiometry (DXA). The Mifflin-St. Jeor, Harris-Benedict, Cunningham, and Owen prediction equations were compared to indirect calorimetry using one-way analysis of variance (ANOVA) with repeated measures. **RESULTS:** Indirect calorimetry (1416±267 kilocalories [kcal]) was significantly lower than the Mifflin-St. Jeor (1531±258 kcal), Harris-Benedict (1599±266 kcal), Cunningham (1650±246 kcal), and Owen (1579±247 kcal) ($p < 0.001$) equations. The Mifflin-St. Jeor equation had the lowest mean difference and highest percent accuracy for all participants combined and women (115, 54.8%; 95, 57.2%, respectively). However, the Owen equation seemed to be more accurate for men (98, 61.3%). The Cunningham equation yielded the highest mean difference and lowest percent accuracy for all participants combined, women, and men (234, 29.1%; 221, 23.6%; 250, 35.9%, respectively). **CONCLUSION:** We found that the four BMR prediction equations analyzed all over-predicted support the need for a more suitable BMR prediction equation for athletes.