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Energy expenditure of walking and running: comparison with prediction equations.

Hall C, Figueroa A, Fernhall B, Kanaley JA.

Department of Exercise Science, Syracuse University, Syracuse, NY 13244, USA.

Abstract

PURPOSE: This study established the published prediction equations for the energy expenditure of walking and running compared with the measured values. To make this comparison we first determined whether differences exist in energy expenditure for 1600 m of walking versus running, and whether energy expenditure differences occur due to being on the track or treadmill.

METHODS: Energy was measured via indirect calorimetry in 24 subjects while walking (1.41 m.s(-1)) and running (2.82 m.s(-1)) 1600 m on the treadmill. A subgroup also performed the 1600-m run/walk on the track. The measured energy expenditures were compared with published prediction equations.

RESULTS: Running required more energy ($P < 0.01$) for 1600 m than walking (treadmill: running 481 +/- 20.0 kJ, walking 340 +/- 14 kJ; track: running 480 +/- 23 kJ, walking 334 +/- 14 kJ) on both the track and treadmill. Predictions using the ACSM or Leger equations for running, and the Pandolf equation for walking, were similar to the actual energy expenditures for running and walking (total error: ACSM: -20 and 14.4 kJ, respectively; Legers walking: -10.1 kJ; Pandolf walking: -10.0 kJ). An overestimation ($P < 0.01$) for 1600 m was found with the McArdle's table for walking and running energy expenditure and with van der Walt's prediction for walking energy expenditure, whereas the Epstein equation underestimated running energy expenditure ($P < 0.01$).

CONCLUSION: Running has a greater energy cost than walking on both the track and treadmill. For running, the Leger equation and ACSM prediction model appear to be the most suitable for the prediction of running energy expenditure. The ACSM and Pandolf prediction equation also closely predict walking energy expenditure, whereas the McArdle's table or the equations by Epstein and van der Walt were not as strong predictors of energy expenditure.

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