Abstract

Introduction

Human terrestrial locomotion is characterized by either walking or running. Several studies have shown that the preferred transition speed (PTS) typically occurs at approximately 2.0 $m \cdot sec^{-1}$ (7.2 $km \cdot hr^{-1}$) (Hreljac, 1993, 1995; Rotstein, Inbar, Berginsky, & Meckel, 2005).

In addition, it was postulated that humans (and animals) change their gate when it is most economical to do so (Hreljac, 1993). In other words, the PTS would occur at the energetically optimal transition speed (EOTS). However, several studies refuted this theory by showing that the PTS is significantly lower than the EOTS (Brisswalter & Mottet, 1996; Rotstein et al., 2005).Whether the PTS is altered due to specific walk training (such as the training done by racewalkers) is not readily apparent. The purpose of this study was to evaluate the PTS and EOTS in trained racewalkers compared to a control group.

Method

Eleven racewalkers and thirteen control subjects participated in this study. Subjects arrived at the lab on three separate occasions. Visit I: walk-run PTS determination: subjects were required to walk at a slow walking speed on a treadmill and the speed was increased by 0.2 $km \cdot hr^{-1}$ every 30 s until the subject felt it was easier to run. Run-walk PTS determination: Subjects were required to run on a treadmill at a speed which was above their ability to walk and the speed was reduced by 0.2 $km \cdot hr^{-1}$ every 30 s until the subject felt it was easier to walk. PTS was defined as the average of the walk-run PTS and the run-walk PTS. Plantar and dorsi flexion isokinetic strength were also measured. Visits II & III: subjects walked and ran on a treadmill at PTS – 1 $km \cdot hr^{-1}$, PTS – 0.5 $km \cdot hr^{-1}$, PTS, PTS + 0.5 $km \cdot hr^{-1}$, PTS + 1 $km \cdot hr^{-1}$. At each stage physiological measurements of VO_2, HR, V_E, and RER were collected. EOTS was determined by plotting individual curves of the energy cost of locomotion as a function of velocity.