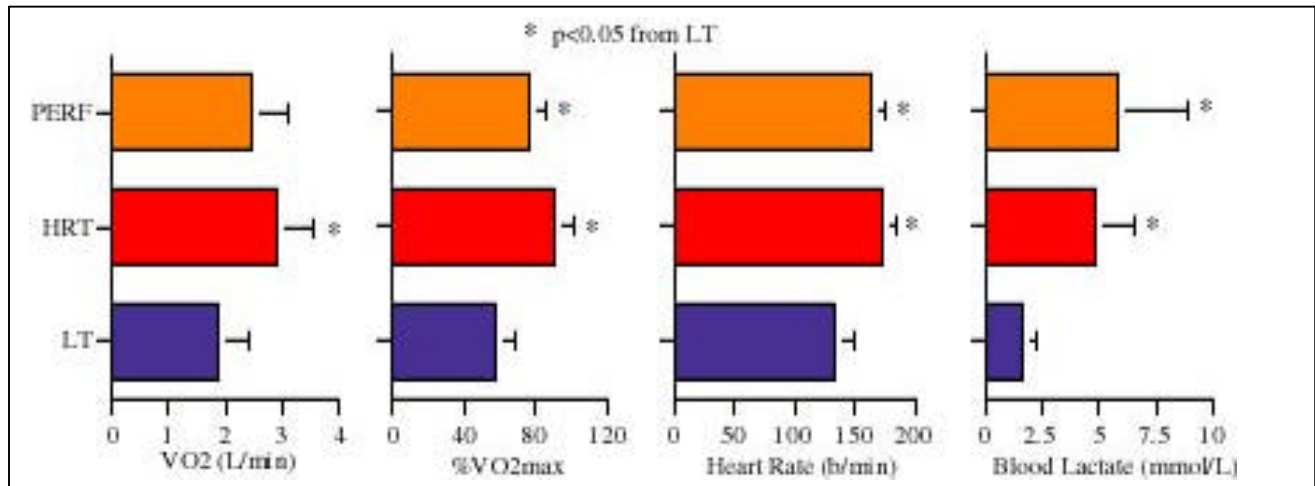


Magnitude of the Heart Rate Threshold Is Not Explained by VO₂max, the Lactate Threshold, Or Endurance Cycling Performance.

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Introduction: The HRT is purported to represent the lactate threshold and therefore be an indicator of exercise performance (1-4). The intent of this study was to statistically explain the occurrence of HRT in subjects using absolute and relative indices of cardiovascular fitness. **Methods:** Twenty two subjects (11 males) of varying fitness first completed an incremental exercise test to VO₂max on an electronically braked cycle ergometer. During the maximal exercise test blood lactate was measured each minute, and heart rate was measured every 15 s. Expired gas was collected continuously and analyzed every 30 seconds by an automated expired gas collection system. In another trial, subjects performed a 30 minute isokinetic cycling performance test (PERF). **Statistics:** Data for HRT, LT, and mean performance (PERF) were compared by separate one-way repeated measures ANOVA ($p=0.05/3=0.0166$). Stepwise multiple regression analyses were used to explain the between subjects variability in the HRT (%VO₂max, VO₂ (L/min)) and VO₂ (L/min) during PERF. Stepwise discriminant analysis was used to determine if any one factor or combination of factors could discern subjects with or without a HRT. The β error for detecting a difference of 5% VO₂max between the HRT and LT for the 22 subjects of this study was 0.3. **Results** The heart rate profiles exhibited were exponential (n=1), linear (n=8), and sigmoidal (n=13). Subsequent assessment of the heart rate response to exercise resulted in a HRT in 13 of 22 subjects (59%). The mean values for blood lactate, HR, VO₂, and %VO₂max at the HRT, LT and PERF are presented in Figure 1. The only predictor to enter in the discriminant function analysis was %VO₂max at the LT ($p<0.01$), accounting for 32.38% of the variance with HRT categories, and classified groups correctly by 76.2 %. None of the variables, VO₂max, %VO₂max at LT, and hours exercised per week had a sufficient F to be entered into a multiple regression equation.



Discussion: We hypothesized that the HRT would be related to, or be predicted by indices of cardiovascular endurance based upon previous findings (1-4). However, our results indicated that VO₂max, LT, or hours trained per week were not related to HRT, and that for individuals who have a HRT, it occurs at a significantly higher intensity than the LT. We conclude that cardiorespiratory fitness is not related to the exercise intensity at the HRT. Further studies are needed to identify the physiological variables that explain or cause the HRT phenomenon. **References:** 1. Gledhill N. et al. *Med Sci Sports Exerc.* 26: 1116-1121, 1994. 2. Hofmann P. et al. *Int J Sports Med.* 15:232-237, 1994. 3. Pokan R. et al. *Eur J Appl Physiol.* 67: 385-388, 1993. 4. Pokan R. et al. *Eur J Appl Physiol.* 70: 175-179, 1995.