

Veränderung von Geschwindigkeit und Laktatkonzentration bei einer 40minütigen Laufbandbelastung im steady-state der Herzfrequenz

Dynamics of running speed and lactate concentration during treadmill exercise about 40 min testing at steady state conditions assessed by heart rate

Summary

Background: *In endurance training control the assessment of the individual fitness state at the aerobic-anaerobic threshold and the determination of the maximal steady state of lactate metabolism are of paramount importance.*

Usually, the parameters used for training control are defined in terms of heart rate and do not take into account individual speed or performance characteristics.

So far, in endurance training, the correlation between steady state indicators based on physiologic requirements and physically defined performance parameters have not been systematically studied.

Objective: *We sought to determine the dynamics of both lactate concentration and physical performance in endurance training during steady state conditions defined in terms of heart rate. Therefore, in 22 male and 22 female sports students, physical exercise testing was performed at aerobic-anaerobic crossover for 40 minutes. We used a treadmill (h/p cosmos pulsar 3.0), whose speed automatically adjusted to the heart rate of the athlete under test. In each study participant, the following parameters were assessed: treadmill speed (as a measure of running speed) and lactate concentration. The latter was determined during the pre-exercise resting state and during the test at the 10th, 20th, 30th and 40th minute.*

Results: *During exercise testing, the female athletes exhibited a significant decrease in treadmill speed from 10.61 ± 1.66 km/h (10th min) vs. 9.29 ± 1.64 km/h (40th min). The male athletes showed a similar decrease in treadmill speed: 11.28 ± 1.64 km/h (10th min) vs. 10.02 ± 1.74 km/h (40th min), p < 0.01. Simultaneously, a significant (p < 0.01) decrease of the lactate concentration was observed in both the females: 3.76 ± 1.41 mmol/l (10th min) vs. 2.74 ± 0.93 mmol/l (40th min), and the males: 3.85 ± 1.32 mmol/l (10th min) vs. 2.66 ± 1.08 mmol/l (40th min). There were no sex-related differences among the parameters investigated.*

Conclusions: *While running speed remained constant at maximum steady state defined in terms of lactate concentration, a significant decrease was noted when steady state was defined in terms of heart rate. Overall, our results demonstrate that there are important differences between indicators of cardio-pulmonary performance and parameters of muscle metabolism. These differences have to be taken into account regarding work load control in endurance training.*