

Comparison of certain biochemical changes during exercise tests on treadmill and bicycle-ergometer with equal workload intensity

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KEY WORDS

Ergometry; exercise; lactate; pyruvate; lactate dehydrogenase (LDH); aldolase; 2,3-diphosphoglycerate (2,3-DPG)

SUMMARY

Ergometrics, using both treadmill (T) and bicycle-ergometer (B), plays an important role in assessing physical work capacity. In addition to the other important parameters (blood pressure, heart rate, oxygen consumption, oxygen and carbon dioxide-partial pressure in blood, etc.), it is of interest to follow, measure and compare values of certain metabolic products immediately after completion of exercise on T and B. The aim of this study was to define which test develops the most significant changes in metabolic parameters when the same workload intensity is maintained. The metabolic parameters measured were: lactate, pyruvate, 2,3-diphosphoglycerate (2,3-DPG), lactate dehydrogenase (LDH) and aldolase activity. The mean values obtained at the end of both tests were: lactate 3.17 mmol/l±1.017 mmol/l (T) and 4.28 mmol/l±1.2 mmol/l (B); pyruvate 78.17 µmol/l±30.32 µmol/l (T) and 92.16 µmol/l±32.73 µmol/l (B); 2,3-DPG 3.58 mmol/l±1.31 mmol/l (T) and 3.93 mmol/l±1.44 mmol/l (B); LDH activity 239.22 U/l±38.24 U/l (T) and 260.5 U/l±61.27 U/l (B); aldolase activity 4.93 U/l±1.45 U/l (T) and 5.88 U/l±2.31 U/l (B). The results obtained indicate that a much higher production and/or lower elimination of acid metabolic products occurs during the test on B. This is most likely due to increased muscle pressure in big muscle groups in the legs which, by compressing the local blood vessels, diminish oxygen supply and the elimination of acid metabolic products. According to the results of the study, the use of T can be recommended as a more appropriate method for physical work capacity assessment of untrained individuals in occupational medicine.

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