PLASMA CATECHOLAMINES AND NITRIC OXIDE CONTENTS IN SPRI
ETERS AND LONG-DISTANCE RUNNERS

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The cardiovascular adaptations and risk with exercise are associated with changes of the autonomic nervous system and vascular substances like nitric oxide (NO). Thus, the aim of this work was to study catecholamine plasma levels and NO in trained (aerobic and anaerobic) and untrained subjects.

This study included male volunteers: sprint athletes (SA), endurance athletes (EA) and age and sex-matched sedentary controls (SC). All the subjects performed an aerobic maximal graded exercise test in cycle ergometer (Monark 824E), consisting in a constant pedal frequency (60 rpm) starting with 50 W workload and increasing 25 W every 2 minutes until fatigue. Before, during and after exercise (for 30 min) heart rate was continuously assessed by using a heart rate monitor (Polar®). Before the exercise test a blood sample was collected to analyse plasma nitrates/nitrites (NOx, as a measure of nitric oxide) and catecholamines. After exercise (5 and 30 minutes), blood was collected again and the referred measures repeated. A Wingate test was also performed with the additional procedures described above. The NOx was measured using a commercial kit (R&D Systems; DE1500). Plasma catecholamine levels were measured by HPLC-ECD.

As far as specific VO2max is concerned, there was an increase in both athlete groups but more significantly in EA than SA, as expected. Heart rate rest values were lower in EA. The maximal heart rate achieved was under the theoretical maximum. Thus, all subjects used more than 80% of the heart rate reserve, meaning a good chronotropic response and good sympathetic nervous system activation. Values under 80% may be a predictor of mortality. Nevertheless, the EA maintained a lower heart rate during the test when compared to SC (the highest ones). Heart rate recovery after one minute was above 12 bpm, which means a reduced cardiovascular risk (vagal activity increased properly). EA had the highest level recovery for first minute recovery and the lowest heart rate after 30 minutes. Catecholamine levels are in agreement with the degree of sympathetic activation and heart rate values for each group when a maximal aerobic test was performed. However, before and after the Wingate test no differences were observed in noradrenaline or adrenaline plasma levels. This may be due to a higher catecholamine turnover in anaerobic conditions. The EA group showed a higher basal level and a high NOx production after the exercise anaerobic test when compared to the control group; concerning the aerobic maximal test no differences were found with exercise. Thus, the catecholamine turnover and effects depend on the type of training and exercise performed. However, in terms of the sympathetic activation vs vasodilation promoted by NO the aerobic test in aerobic trained athletes is more effective. Thus, the EA group has more exercise benefits that the SA one.

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