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# Strenuous exercise and action of antioxidant enzymes

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**KEY WORDS**

Strenuous exercise; ergometry; oxidative stress

**SUMMARY**

Background: *During the course of evolution, the antioxidant system has developed in order to prevent cell damage and to maintain equilibrium between production of free radicals and their neutralization. Because of increased oxygen consumption and energy utilization during physical work, oxidative stress may be expected. A review of current literature revealed no consistent data regarding activity of antioxidant enzymes during strenuous exercise.* Objectives: *The aim of this paper was to identify the activity of antioxidant enzymes in erythrocytes during strenuous short-term exercise.* Methods: *The activity of superoxide dismutase (SOD), glutathione peroxidase (GPX), and glutathione reductase (GR) were investigated. Also, glucose-6-phosphate dehydrogenase (G-6-PDH) activity was studied in order to assess the level of recovery of reduced glutathione (GSH) by maintaining NADPH. Peripheral blood was drawn before (1) and immediately after (2) the test completed. Modified Astrand's protocol on a bicycle ergometer was used to achieve strenuous exercise in volunteers.* Results: *The results obtained were: SOD1 - 897.95±99.85 U/g Hb and SOD2 - 828.38±75.12 U/g Hb; GPX1 - 30.19±4.03 U/g Hb and GPX2 - 26.00±4.85 U/g Hb; GR1 - 58.29±8.23 U/L and GR2 - 62.67±7.29 U/L; G-6-PDH1 - 14.97±3.79 IU/g Hb and G-6-PDH2 - 16.5±2.74 IU/g Hb. The difference was statistically highly significant: $p<0.001$ for SOD, GPX, and GR activities, and $p=0.018$ for G-6-PDH activity.* Conclusion: *The results reflect the presence of oxidative stress in erythrocytes after strenuous exercise. Further investigations should clarify the role of other antioxidant-relevant compounds during exercise such vitamins, trace elements, and metals and enable estimation of the level of damage caused by generation of free radicals (e.g., malonyl dialdehyde, 8-hydroxydeoxyguanosine etc.). All this information together will undoubtedly give us clear insight into free radical generation during strenuous workloads.*

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