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SALIVA AS A TOOL FOR MONITORING OXIDATIVE STRESS IN SWIMMERS ATHLETES PERFORMING A VO₂ CYCLE ERGOMETER TEST

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Physical exercise is considered one of the most important beneficial factors of a healthy lifestyle, able to minimize the risk of several disorders, such as cardiovascular and endocrine. Increasing number of scientific evidence indicates that prolonged and strenuous physical exercise can cause muscle fatigue, inflammation and oxidative stress, limiting the physical performance. Furthermore, chronic exposure to high levels of reactive oxygen species (free radicals), due to the unbalance between the pro-oxidant factors and antioxidant defenses, can become toxic and cause cell and tissue damage. Carbonyls and isoprostanes are the main compounds produced during oxidative stress, whereas uric acid is one of the most powerful salivary antioxidant.

The use of saliva in the monitoring of physical exercise is an attractive approach because this technique is less invasive and safer. Saliva samples may be collected several times from one subject, allowing a sort of real-time monitoring during and after physical tests, training or competitions. Thanks to the rapid equilibrium between blood and saliva across salivary membranes, saliva analysis provide a comprehensive chemical characterization of exercise-related oxidative stress indicators and promises a new possible analytical approach to monitor physical exercise, in alternative to traditional blood and urine assays.

In this study we analyzed lactate, uric acid, carbonyls and isoprostanes in stimulated saliva samples in order to monitor oxidative stress in swimmers athletes performing a VO₂ cycle ergometer test. For this purpose, ten healthy volunteers underwent incremental exercise on a cycle ergometer, at constant 60 rpm, with increment of about 25 W every minute until voluntary exhaustion or impossibility to maintain current workload. Stimulated saliva samples were collected 5 minutes before the exercise (t_0), at the maximum intensity (t_{max}) and 2.5, 5 and 10 minutes after the end of the test. Peripheral capillary oxygen saturation, electrocardiogram, heart rate, blood pressure, ventilatory equivalent to oxygen and carbon dioxide values were continuously monitored during all the entire experiment.

The results showed a clear increase of salivary metabolites levels during the exercise because of the increase of work load, whereas a sharp decrease, approaching baseline values, of these compounds was observed in the recovery phase.