Exercise Biochemistry Review

Responses of Urine and Blood Biochemical Markers to Exercise-induced Body Fluid Losses in Elite Chinese Road Cyclists

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Objective To examine biochemistry parameters regarding exercise induced fatigue, e.g. Sweat Loss (SL), Creatine Kinase (CK), Lactate Dehydrogenase (LDH), Blood Urinary Nitrogen (BUN), etc.
Methods This study examined Sweat Loss and blood biochemistry biomarkers regarding fatigue and muscle injury among elite cyclists under a training mode of 120 min moderate workload at 50 - 70% VO2max, then, 10 min relaxation, and then, followed up with a 20 min of spinning session over 85% VO2max. 12 healthy elite Chinese male cyclists (22.6 ± 2.9 years old, 78.3 ± 5.7 kg in weight, 184.6 ± 4.3 cm in height) were recruited. They performed four exercise performance tests throughout this study with 15 days washout period in between. Blood serum tests and urine tests were taken both pre- and post-exercise tests, and dynamic cardio-respiratory hardware (MetaMax 3B, Cortex Biophysik, Germany) was applied during each of their test. There were 2 different sport beverages available. The fluid replacement plan was a double blind crossover design. The volume of fluid intake was in accordance with ACSM recommendation for fluid replacement. Those who were assigned with sport beverage A (6% carbohydrate with 1% peptide) for the first and second performance tests, will be re-assigned to sport beverage B (6% carbohydrate without peptide) for the third and fourth performance tests, vice versa. Notes were taken for the volume of fluid intake to calculate the estimated Sweat Loss.
Results We found 91.7% trials have increased LDH, 88.9% trials have increased CK, and 100% trials have been observed increased BUN right after exercise performance test. Even with sufficient water supply, athletes hydration status were getting worse after exercise performance test, their urine USG results were 1.024 ± 0.006 and 1.027 ± 0.006 for pre- and post-exercise performance test respectively. Their dehydration status quantified by the percentage change in body mass (%BM) was 1.86% ± 1.03% with a 95% confidence interval ranging from 1.57% to 2.15%.
Conclusions Though, with sufficient water supply, athletes hydration status were getting worse after exercise performance test considering Sweat Loss and blood biochemistry indicators regarding fatigue and muscle injury.