

Influence of physical exercise on ionized and total magnesium concentrations in athletes

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Introduction:

Magnesium (Mg) is an essential micronutrient for health and exercise. Exercise performance is highly dependent on the regulation of magnesium homeostasis. Monitoring magnesium status in athletes may therefore be important. Since ionized magnesium (iMg) is the active form involved in cellular processes, it may be hypothesized that iMg should be preferably measured for evaluation of the Mg status. Before routinely measuring iMg in athletes, it is important to know the intensity of training affect iMg values in athletes. Therefore, the influence of an acute bout of exercise on the iMg concentration in comparison to total magnesium in athletes is determined.

Methods:

18 healthy well-trained athletes were measured at rest day and exercise day. At rest and exercise day, a POMS (profile of mood states) questionnaire and 7 blood samples were taken at set time points (8:30 fasted, 11:00 fed, 12:30, 13:30, 15:00, 16:00 and 18:30). Results from rest day were used in the linear mixed model for the exercise day. At exercise day, between 11:00 and 12:30, athletes performed a bicycle ergometer test at 70% of their VO₂max. Blood samples were analysed directly on the Stat Profile[®] pHox[®] Plus M analyser (Nova Biomedical) for the ionized magnesium concentration and on the Dimension Vista 1500 (Siemens) for total magnesium concentration.

Results:

Ionized and total magnesium both decreased significantly (0.52 ± 0.04 to 0.45 ± 0.03 mmol/L and 0.81 ± 0.07 to 0.73 ± 0.06 mmol/L, respectively) after exercise in comparison to non-exercise day where no significant change was observed between these time points. Both, ionized and total magnesium concentrations, recovered to base-level within 2.5 hours after exercise. Recovery time of magnesium concentration to base-level was correlated with the 'fatigue-questions' in the POMS questionnaire.

Conclusion:

Both ionized and total magnesium concentration significantly decrease after exercise and recovery is observed within 2.5 hours after finishing exercise.

Notes: pHox[®] analyser was provided by Nova Biomedical, Waltham MA, USA.