

Release of cardiac biomarkers after an intense physical exercise: preliminary results



Le Goff C.¹, Laurent T.¹, Chapelle J-P¹, Kaux J-F²

1. Department of Clinical Biology, University Hospital of Liege, Belgium

2. Physical Medicine Service, University Hospital of Liege, Belgium



Background:

Over the past 2 decades, there has been a large interest in cardiac markers elevations, which are often seen following endurance sport events. These elevations were transient, with levels decreasing to pre-event concentrations within 24-48 hours. This might be explained by the relatively short half-life of studied markers, or water imbalance during and after the event. Therefore, the present preliminary study aimed to examine the increase in N-terminal pro-brain natriuretic peptide (NT-proBNP), highly sensitivity cardiac troponin T (hsTnT) and I (TnI II), myoglobin, creatine kinase muscle – brain (CK-MB), myeloperoxidase (MPO) and Highly sensitive C-reactive protein (hs-CRP) elevations after prolonged strenuous exercise.

Materials and methods:

Blood samples (EDTA plasma and heparinised plasma) were drawn at baseline, after 45, 90, 105, 165, 225, 285, 345, 690 and 1440 minutes in two healthy persons (29 year, trained 6 hours per week; 23 year, untrained). Each subjects runs at the maximal possibility during 2 hours.

Results:

For the untrained person (Fig. 1), level of NT-proBNP exceeded the upper reference limits 12 hours after exercise but increased in all times. HsTnT and TnI II levels were upper the reference limit respectively 45 minutes and directly after exercise and increased up to 4 hours after exercise. We reported a decrease of these concentrations above the reference limits after 24 hours. Myoglobin increased after 45 minutes until 5 hours after exercises. It decreased after the 5th hour to be normalized 24 hours after exercise. CK-MB increased directly after the exercise and was upper the reference limits 165 minutes after the exercise. Level of MPO was very high just after exercise and decreased quickly in the following hours to be just upper the limit references 24 hours after exercise. HsCRP levels increased after 105 minutes and continued to increase after 24 hours. For the trained subject (Fig. 2), we noted the same profile of increase of cardiac markers levels stayed but in the range of reference.

Fig. 1

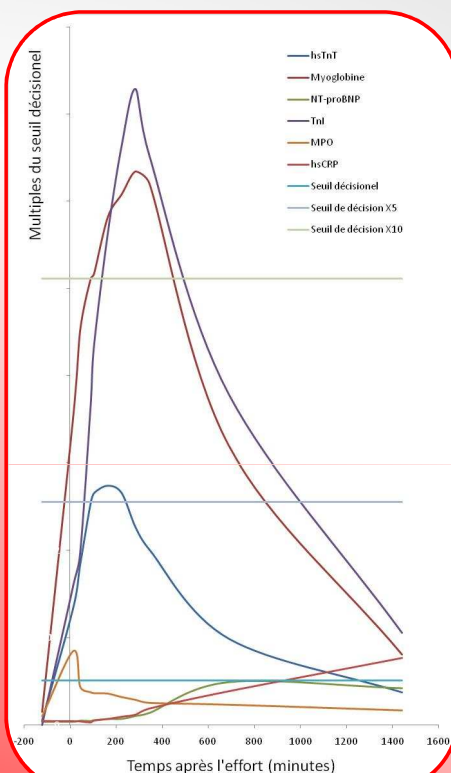
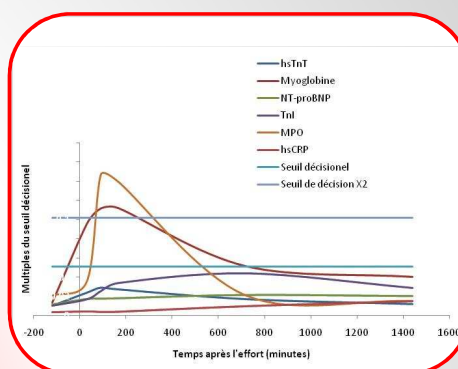


Fig. 2



Conclusion:

These cases are extremely interesting. Indeed, this observation suggested a physiological counter regulatory process rather a simple increase of myocardial damage related to the intensity of exercise. In fact, for this moment, we do not know if the release of cardiac markers is physiological or pathological thus it must be studied. This preliminary study on endurance training suggested that intensity is determinants of the rate and the magnitude of subsequent cardiac marker release. These results suggested that an adaptation mechanism could exist. Benefits and possible long-term negative aspects of prolonged exercise should be evaluated with a more important population of athletes.

This experimentation was partly financed by "Standard de Liège 2009" grants.