

Comparison of cardiac biomarker fluctuation in runners of marathons, semi-marathons and untrained runners

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Objectives:
Regular exercise like running is one important part of the prevention program of cardiovascular disease. There are several studies on biomarker changes during marathons especially cardiac biomarkers have been studied and mild to moderate elevations have been described as a results of a running exercise. Exact underlying mechanism for these biomarker elevations reflecting physiological or even pathobiological changes is unknown and less trained athletes might exhibit a higher risk compared to well trained.

Aim of the study:
The aim of our study was to compare three cardiac biomarkers for ischemic condition (Troponin), cardiac stretch (natriuretic peptides) and fibrotic processes (Galectin-3) were tested in different type of runners, trained marathon and semi-marathon runners and untrained runners before, directly after and 3 hours after the running exercise.

Materials and Methods:
- 23 marathon runners (mean age: 41 ± 8.8 yo)
- 15 semi-marathon runners (mean age: 44.1 ± 8.4 yo)
- 17 healthy sedentary subjects (mean age: 37 ± 4.4 yo) (race of 10 km, <2h of sport/week)

Blood samples were taken just before (T0), just after (T1) and 3 hours (T3) after the race, centrifuged, aliquoted and stored frozen at -80°C before further analysis. The study was approved by the Ethical Committee of our University Hospital.

The analyses were performed on the Abbott ARCHITECT i2000sr (Abbott Laboratories, Germany) for the hs-cTnl, BNP and Gal-3 and on the C8000 (Roche Diagnostics, Switzerland) for hs-cTnT and NT-proBNP according to the manufacturer’s instructions for use.

Results:
In all 3 running groups there is an increase of cardiac biomarkers (Table 1) Troponin I (Fig 1) and T (Fig 2), BNP (Fig 3), NT-ProBNP (Fig 4) and Galectine-3 (Fig 5) after completion of the physical exercise. Biomarkers increase is depending on the intensity and duration of the exercise and is higher in long distance marathon and semi-marathon runners compared to the control group with a 1 hour run.

Cardiac biomarker levels between trained marathon and semi-marathon runners were not statistically different in the pre-exercise baseline samples for BNP, NT-ProBNP and Galectin-3. Compared to untrained runners only Troponin I levels were higher in baseline sample of marathon runners (hs-cTnl, p<0.03) when compared to controls, cardiac Troponin T (hs-cTnT, p<0.29) was less significant.

Conclusions: Our study demonstrates that exercises of different intensity can be associated with biochemical abnormalities that may reflect adverse consequences on the heart like possible micro necrosis, oxidative stress, fibrosis and myocardial stretch.