Biological impact of an endurance race of 64 km in comparison with semi-, marathon and a control group

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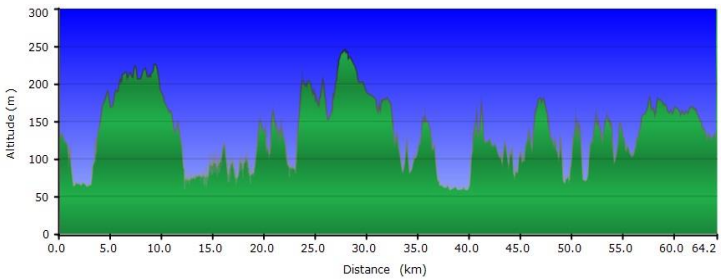
Objective

Ultra-marathons are defined as races covering a distance of more than 42.2 kilometers. During the last 10 years, participation in these type of challenge has become increasingly attractive to millions of non-professional endurance athletes worldwide. The aim of this study is to investigate the impact of intense exercise, represented by different endurance races, thank to oxidative stress and cardiac markers



Ultratour altimetric profile

Methods

Four populations were compared, a control group of 16 participants " sedentary" (SED)(37,0 ± 4,4years old), a group of 24 semi-marathon runners (SEMI) (41,0 years ± 8,76 years old), a group of 28 marathon runners (MARA) (44,1 ± 8,4 years old) and a group of 33 ultra-trail runners (UT) (45,8 ± 8,7 years old). Three blood tests were drawned, one just before, one just after, and the last three hours after the end of the race. Different oxidative stress and cardiac biomarkers were measured on different devices according to the manufacturer specifications.

Results

Myeloperoxydase increased significantly ($p<0.0001$) during exercise except for SED, but the release is significantly different according to the level of training of the runners (Fig.1). Glutathion oxidized/reduced ratio seems to remain stable during the race except for SED and UT. A significantly decrease in lipidic peroxidation was observed during exercice($p<0.01$). We noticed a significantly increase of creatine kinase, isoform MB, myoglobin and C-reactive protein during the race ($p<0.0001$) and was significantly different according to the race ($p<0.0001$). We observed a very significant increase of troponin T and natriuretic peptide ($p<0.0001$)(Fig.2 and 3) but with a different kinetic than the one obtained for a myocardial infarction.

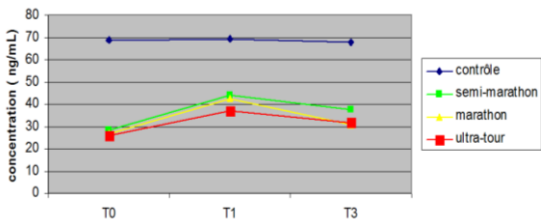


Figure 1: Myeloperoxydase kinetic

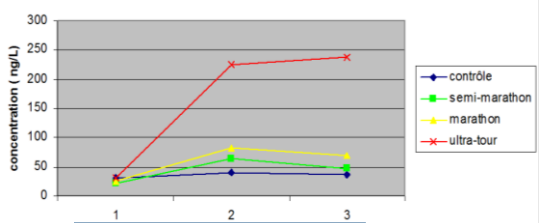


Figure 2: NT-proBNP kinetic

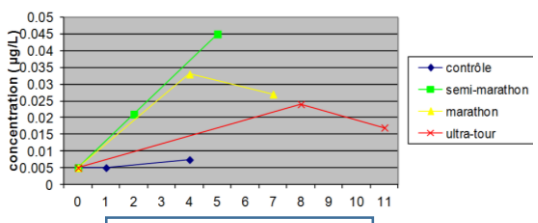


Figure 3: TnThs kinetic

Conclusion

Endurance races provocate the income of oxidative stress objectified by different biomarkers increase, but a cell necrosis is not specially observed. In fact, the increase of the cardiac markers during endurance races may be explained by a transient modification of myocyte permeability and by micro-muscle damages causing an inflammatory process explaining our observations of markers of inflammation.