Race Cycling: biological evolution

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Background: The metabolic and cardiac impact of a cycling effort on blood biology is not very well described in the literature. We aimed to measure the concentration of different biomarkers (cardiac and metabolic) released during an international cycling race.

Materials and Methods: Venous blood samples of 15 young men (25.1 ± 6.4 y.o.) were collected just before (T1), just after (T2), 3 hours(T3) after an international cycling race of 176 kilometers in Belgium for the determination of cardiac and m etabolic biomarkers:

- red blood cells (RBC)
- haemoglobin (HgB)
- creatinin (Cr)
- highly sensitive troponin T (hsTnT)
- myoglobin (MYO)
- NT-proBNP

All automated assays were performed according to the manufacter's specifications.
For the statistical analysis, an Anova calculated with the Statistica Software version 9.1 was used.

Results:

- RBC and HgB levels varied significantly between T0 and T3 (respectively p=0.0026, and p=0.002) (Fig. 1 and 2).
- Cr concentration also varied significantly between all times (T0-T1:p<0.0001, T1-T3:p=0.0326 and T0-T3 p=0.0001)(Fig.3). These changes might be related to renal flow depletion during exercise.
- MYO increased significantly between T0 and T1 (p<0.0001), but quickly decreased between T1 and T3, however the T3 level stay higher than T0 (p=0.014) (Fig.4).
- The stress delivered from the physical activity performed during the race induced a significant variation of hsTnT which increased significantly between T0 and T1 (p<0.0001) and stayed higher 3 hours after the end of the exercise (T0-T3: p<0.0001) (Fig.5) .
- The intense exercise delivery by the race induced a significant variation of NT-proBNP, that followed the same kinetic of hsTnT but in smaller proportion. We noticed variations statistically significant between T0 and T1 and between T0 and T3 for NT-proBNP (Fig.6).
- These increases of cardiac biomarkers were significant but reasonable and could not allow us to talk about cellular necrosis or irreversible injury.

Fig. 1 Evolution of Red Blood Cells

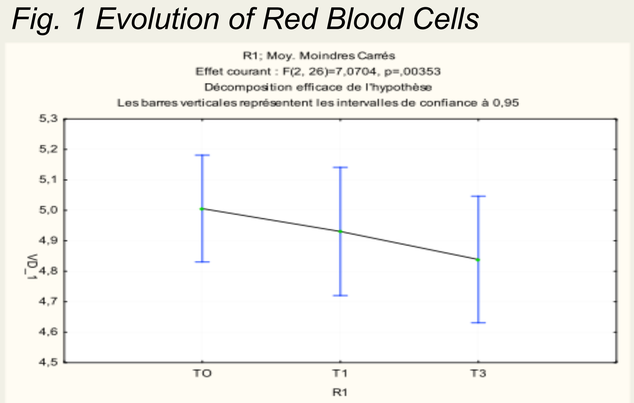


Fig. 2 Evolution of Haemoglobin

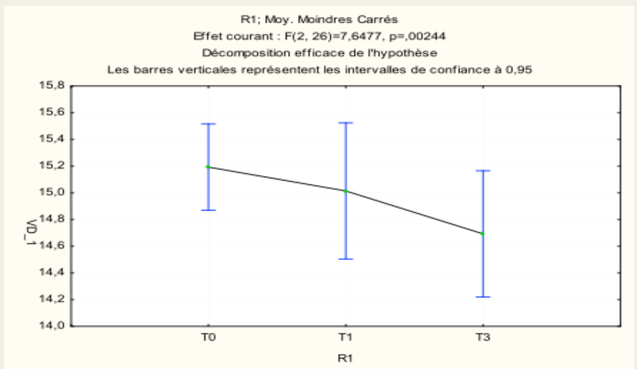


Fig. 3 Evolution of Creatinin

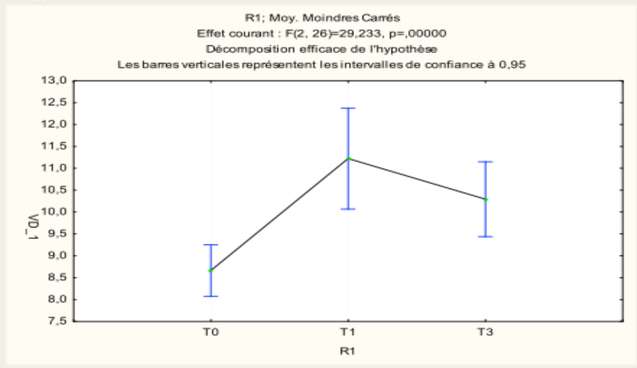


Fig.4 Evolution of Myoglobin

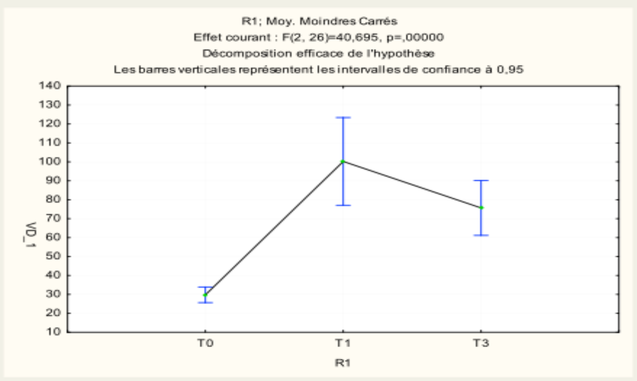


Fig. 5 Evolution of hsTnT

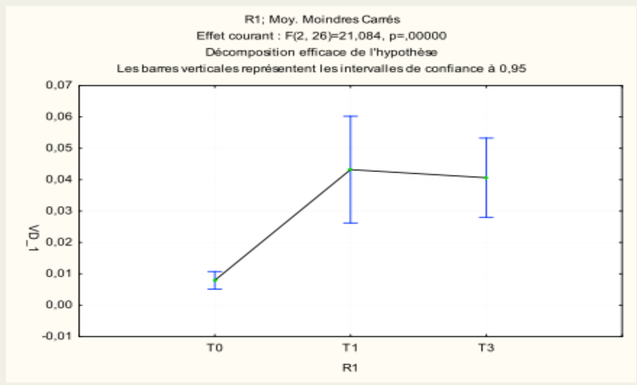
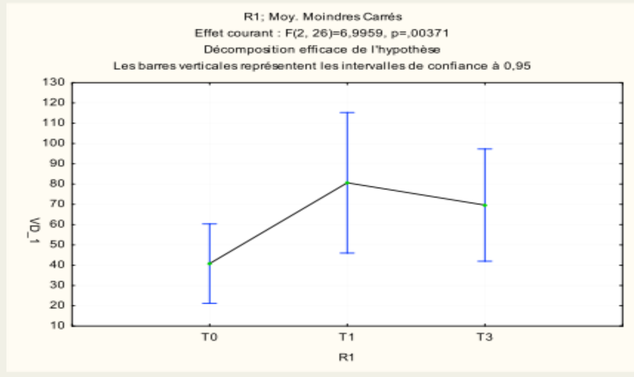


Fig.6 Evolution of NT-proBNP



Legend:
These figures represents the kintetic of the blood biomarkers (cardiac and metabolic) released during an international cycling race

Conclusions: Our results show that stress generated by a cycling race could be the cause for the different metabolic variations observed. Troponin T stays without a doubt the most specific marker for stress related to myocardial tissue. Its increase can then be considered as being of interest.

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